ORIGINAL

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:

WATER QUALITY STANDARDS AND	)	
EFFLUENT LIMITATIONS FOR	)	
THE CHICAGO AREA WATERWAY	)	
SYSTEM AND THE LOWER	)	
DES PLAINES RIVER:	)	No. R08-9
PROPOSED AMENDMENTS TO	)	
35 Ill. Adm. Code Parts	)	
301, 302, 303 and 304	)	

REPORT OF PROCEEDINGS had before the ILLINOIS POLLUTION CONTROL BOARD held on August 14, 2009, at 9:00 o'clock a.m. at the Thompson Center, Room-9-40, Chicago, Illinois.

A P P E A R A N C E S:

ILLINOIS POLLUTION CONTROL BOARD:
MS. MARIE TIPSORD, Hearing Officer
MR. THOMAS E. JOHNSON, Member
MS. ALISA LIU, Environmental Scientist
MR. LIN SHUNDAR, Member
MS. ANDREA MOORE, Member

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY:
Ms. Stefanie Diers
Ms. Deborah Williams

ENVIRONMENTAL LAW AND POLICY CENTER
33 East Wacker Drive, Suite 1300
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(312) 795-3707
BY: MR. ALBERT ETTINGER and JESSICA DEXTER
Appeared on behalf of ELPC, Prairie Rivers Network and Sierra Club;

APPEARANCE CONTINUED:

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BY: MS. FRANZETTI

Appeared on behalf of the MWRDGC.

CHAIRMAN TIPSORD: Good morning, everyone. My name is Marie Tipsord, and I've been appointed by the Board to serve as hearing officer in this proceeding entitled "Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and Lower Des Plaines River, Proposed amendments 35 IL Adm Code 301, 302, 303 and 304. This is docket number RO8-9.

With me today to my immediate left is acting chairman G. Tanner Girard, the presiding board member. To his immediate left is board member Shundar Lin and to my far right board member Andrea Moore will be joining us. To my immediate right is Alisa Liu from out technical unit. Nicole Meyer will be joining us. She is our extern this semester. She should be down in a little bit as well.

This is our 32nd day of hearings. We are continuing to hear testimony from members of the public today, and today the focus of the hearing is to hear testimony from Dr. David Thomas. The

testimony will marked as an exhibit and entered as if read. After marking the pre-filed testimony as an exhibit, we will then proceed to questions for the testifier beginning with Midwest Generation, and then I have the District followed by the IEPA, again, based on the sheer number of questions. Anyone may ask a follow-up question and you need not wait until your turn to ask questions. I do ask that you raise your hand and wait for me to acknowledge you. After I have acknowledged you, please state your name and whom you represent before you begin your questions. Please speak one at a time. If you are speaking over each other, the court reporter will not be able to get your questions on the record. Please note that any questions asked by a Board member or staff are just to help build a complete record of the Board's decision, and not to express any preconceived notions that arise. And I probably should have said this before we went on the record, if anybody else comes in

and we need more chairs, there are plenty of chairs over here. We can set them up back there or over here on the side. And they will have to sit in the front row.

Dr. Girard, do you have anything at this point?

MEMBER GIRARD: Good morning, and welcome to day No. 32. I see these are the hard core participants on Friday morning. We have a little smaller audience and it's kind of like church, nobody wants to sit in the front row. We look forward to your testimony and questions today.

CHAIRMAN TIPSORD: With that, Albert?

MR. ETTINGER: Did you swear in the witness yet?

CHAIRMAN TIPSORD: Do you want to introduce him before we swear him in?

MR. ETTINGER: This is Dr. David Thomas.

CHAIRMAN TIPSORD: Thank you. Can we have the witness sworn.

(Witness sworn.)

DAVID L. THOMAS, PH.D.,
having been first duly sworn, was examined and testified as follows:

MR. ETTINGER: I guess we will offer into evidence Dr. Thomas' pre-filed testimony.

THE COURT: If there's no objection we will mark the pre-filed testimony of Dr. David Thomas as Exhibit No. 327. Seeing none, it's Exhibit No. 327.

(Document marked as Exhibit No. 327 for identification.)

AUDIENCE MEMBER: Ten exhibits per hearing day it looks like.

CHAIRMAN TIPSORD: Pretty close. And then did you want to go straight to questions?

MR. ETTINGER: Yes.

EXAMINATION

BY MS. FRANZETTI:

Q. With that, good morning, Dr. Thomas. My name is Suzanne Franzetti. I represent Midwest Generation. To my right is Greg Seibert, and I will be asking you the questions today, and they

are basically the pre-filed questions by Midwest Gen. Am I correct in assuming that you have a copy of those questions in front of you?

A. Yes, I do.

Q. With respect to my questions, when I'm referring to your pre-filed testimony, I am referring to what has now been marked as Exhibit 327.

With that, I'm going to begin with question No. 1: "Have you conducted any QHEI surveys in the upper Dresden Pool and/or in the Chicago Sanitary & Ship Canal?

A. No.

Q. So we can skip the follow-up question. Let's move to question 2.

Have you conducted QHEI surveys anywhere else?

A. Not formally QHEI. I have done habitat studies, but not a formal QHEI survey.

Q. And I will get to those habitat studies in the very next question. So let's go to that.

Question 3, "Have you ever conducted any type of aquatic life or habitat

survey in the upper Dresden Pool or in the Chicago Sanitary & Ship Canal?"

A. Yes. I think it was 1991 I was invited up to Chicago by Dick Lanyon (phonetic) of the District to do a survey of some of the Chicago waterways, specifically to look at whether there might be some opportunities for habitat improvement. So we started at the Stickney plant and went upstream from there. We did get up into the north channel of the Chicago River. I don't believe we got to the Cal Sag. So we did a portion of the Chicago waterways, but not all of them. So that was probably the first time that I had been on the waterways themselves to actually look specifically at habitat. And, of course when you are looking at it visually, you are looking at shore line habitat, those things that are visible obviously from the surface.

I have also been involved in studies since 1985 in the Calumet system. So at least in that part of the system I've been very involved in, not what you might specifically call habitat studies for fish, but looking at contaminant levels and sediments, and the impacts

on aquatic wild. Then more recently I have been on the waterway system again for looking at habitats which was a more recent trip before this hearing.

Q. Was this most recent trip in preparation for this hearing?

A. That's correct.

Q. Okay. Let me just go back and ask you some follow-up questions regarding that answer.

So in 1991 you conducted a survey that started at the Stickney plant?

A. Correct.

Q. And went north of there, correct?

A. Correct.

Q. So you have not conducted any habitat survey for that portion of the waterways included in this rulemaking that is located downstream of the Stickney plant, correct?

A. I have not done any habitat surveys per se. I've been, a number of times, to the electric barrier. I actually helped collect some round gobies with one of our grad students that was doing some work on the round gobies in the

area of the electric barrier. I have -- last year I did spend a little time looking at some of the areas on the upper Dresden Island pool that I could get access to from roads, and so I was able to look at a few areas along that stretch of the river.

Q. With respect to your visit to the electric barrier that you just mentioned, would that constitute a habitat survey?

A. No.

Q. With respect to your visit last year, looking at some of the areas in the upper Dresden Pool, would that constitute a habitat survey?

A. Not formally a survey, but I was able to observe a number of the emergent weed beds, which I was surprised actually how extensive some of them are. I could see egrets out there and Great Blue Herons feeding on those, so you could get an idea how shallow some of them are. I also saw areas where there were logs or other structures in the area that would be providing habitat for fish and aquatic invertebrates. So, no, not a formal study, but at least being

able to evaluate some of the habitat in that pool.

Q. Can we get a little more specific. Approximately how many areas of the upper Dresden Pool did you visit?

A. I might have been able to get to like four -- four or five.

Q. Can you give me a description of where those areas were within the upper Dresden Pool?

A. Well, I was very interested in looking at the spillway area below the Brandon lochs and dam, and I was actually quite impressed by the amount of habitat that is available there. Lots of cormorants and egrets and herons feeding on fish. I was able to get in by --

Q. I'm going stop you just for a moment there. So you saw cormorants and egrets eating fish there?

A. That's mostly what they feed on.

Q. What did you see in terms of habitat?

A. There was a fair amount of emergent vegetation in places, in some of the ripple areas. Obviously, a lot of shallow habitat. But a pretty

major ripple area that's available to the pool downstream.

Q. And this pretty major ripple area, as you describe it, is in the spillway area just below the Brandon loch and the dam?

A. That's correct.

Q. Okay. That was one of the areas, and that's the habitat you observed. Can you move to one of the other areas that you went to concerning a habitat that you observed?

A. I'm not sure I have my notes.

Q. I'm sorry, Dr. Thomas, before you do, can you give us some aerial estimate -- strike that.

About what size area are you talking about as having this emergent vegetation, major ripple area?

A. Well, I think there's actual data in the record. EA has done a lot work there obviously. I think if -- someone correct me -- but I think I remember there's like seven percent of the total pool area is considered part of that ripple habitat. If I remember the figure right out of the EA report --

MR. ETTINGER: Well, she asked a question. It doesn't help her to tell her what's in the EA report. I think her question is directed to what you would have estimated having seen yourself.

BY THE WITNESS:

A. I don't know how to put how many acres it was. I suppose it looked like an acre.

BY MS. FRANZETTI:

Q. All right. Let's move on to one of the other four or five areas that you visited. Can you tell me where that was?

A. One was at the casino.

Q. Joliet Casino? I'm sorry, I don't go to the casinos. Is it the Empress -- is it the Empress that's down there?

A. Yes. And there was an extensive weed bed in that area that I was able to observe, as well some of the shore line.

Q. Do you recall what one of the other areas was that you visited last year?

A. I was able to observe some of the area over the I-55 bridge north of that, and I think there was a fourth area, but I can't

remember where that was now. It was farther downstream. I was working my way down from upstream to downstream.

Q. Was the other area below the I-55 bridge?

A. No, I think it was above, but I'm not sure.

Q. In the area that you said was just north of the I-55 bridge, what habitat did you observe?

A. There was a fairly extensive weed bed there also.

Q. Would it be accurate for me, in terms of trying to summarize the habitat that you did see, to say that outside of the spillway area, just outside of the Brandon loch and dam, the habitat that you saw in these other areas was this weed bed habitat?

A. Well, I would say -- fairly extensive weed beds in places. Also logs and brush overhanging and some of them into the water. All of those are going to be habitat for fish and invertebrates.

Q. Now, I know you were saying it's a

little difficult for you to estimate the aerial extent of the habitat you are describing, but can you, as best you can, in the Empress casino area, estimate, was that about an acre or less than -- a smaller area than the spillway area? However you can --

A. I mean, you can see about a half mile up and downstream. Obviously a more restricted area in front of you, but you are actually going to be able to observe vegetation, but I could get a good overview. Plus one of the EA reports had lots of photographs up and down the pool, so I had some context to put what I was seeing with other areas that I couldn't get to without a boat.

Q. Okay. As you say, so you had referred to an EA report?

A. Absolutely.

Q. As part of your preparation for and during these observations you made?

A. That's correct.

Q. Which EA report?

A. It might have been an attachment to the testimony. There's a lot of colored

photographs.

Q. It might have been attached to Mr. Seibert's testimony that's been filed in this proceeding?

A. I think so, yes.

Q. Did you basically find that your observations in the areas you went to were consistent with what had been reported in the EA report you were referring to?

A. Yeah, I would say pretty much. I don't remember my overview description in those reports of the aquatic weed beds, but it may have been in there.

Q. Did you get into the waters in the Brandon tail water area?

MR. ETTINGER: What do you mean by get into the water?

MS. FRANZETTI: I'm sorry. That was bad language. I wasn't asking if you went swimming.

THE WITNESS: I did not.

MS. FRANZETTI: Let me revise that.

BY MS. FRANZETTI:

Q. Did you go into the area known as

the Brandon tail waters?

A. No, I did not physically. I would have loved to have gone down there with a seine and collect the fish, but I did not get into the water at all.

Q. Did you get into the area at all? Did you walk along --

A. I was by the bridge there. There is a bridge going right down below. I was on the bridge looking upstream and downstream.

Q. From the bridge?

A. Right.

Q. So you did not wade along the shoreline looking at habitat?

A. No.

Q. Did you in these other areas that you went to?

A. No.

Q. So you did not wade along the shoreline?

A. No. Although as I said, by seeing herons and egrets out in the water, it gave me a very good idea of what the water depth was what where I saw them.

Q. Did you see the herons and egrets at all of the locations that you visited?

A. I don't know if I noticed any at the I-55 bridge, but I did at the casino. Of course there were lots of them in the tail water area.

Q. I'd like to go back to -- you made mention about being involved in some studies since 1985 in the Calumet system. You did note those were not habitat studies.

Could you describe a little more fully what type of studies you were referring to in your answer?

A. Yeah. Well, probably from '85 to almost '95 I was at the Hazardous Waste Research And Information Center -- at least that's what it was called at that time -- and we sponsored research projects in the Calumet area almost continuously during that period of time. Some of those studies were done by natural history survey staff looking at sediments in the Calumet system and the toxicity of those sediments.

I've subsequently been involved with the City of Chicago and their efforts for habitat restoration in the Calumet area. So I

have been down there a number of times. I've been on some of the pools there. We've had studies of birds. We've had studies of contaminants and Black Crown Night herons and also tree swallows. We've done insect studies there. We've done studies on Purple Wood Stripe control. So I would say pretty continuously since '85. When I say involved times, it was in the supervisory or review fashion.

Q. Right, you weren't out there actually collecting the samples?

A. I was occasionally with staff that were doing collections, but that wasn't my primary job.

Q. With respect to those sediment studies that you referenced being conducted during the 1985 to 95 period for the Hazardous Waste Research and Information Center, do you recall generally whether there were any conclusions regarding the toxicity of the sediment?

A. Yes, there were a lot of contaminants in the Calumet. And the interesting thing that I found, which I'm not sure how relevant it is here, but sometimes the sediments

that appeared to be the most toxic to -- and these are small organisms, test organisms -- were sometimes the elements that didn't have the whole suite of chemicals we were looking at. So this is one of the difficult things in any of these type of studies in nature is that sometimes what you are measuring doesn't necessarily show up into the toxicity of the organisms you are looking at.

MS. WILLIAMS: Can you explain that a little more in detail, Dr. Thomas, about why we find sometimes the most toxic sediments aren't always the ones with the highest levels? What factors go into that?

THE WITNESS: Yeah, I'll give you my little bit of speculation. There are synergistic effects between variety of chemicals. The other thing is even when you measure a suite of 40 or 50 potential contaminants, you may be missing something in there. We found the same thing at Vandalia, the old Joliet Arsenal. They were looking at explosives, and there were a few other contaminants identified there. But in some of their studies they had the same

thing, that some of the lower levels of contaminants they were looking at, some of those sediments tend to be more toxic than other sediment samples that had higher levels than the chemicals they were focused on. So it's hard to tell what's happening, whether it's -- you haven't measured a particular chemical that's there that may be causing the problem or whether there's a synergism between some of the chemicals there that have made it more toxic. This is why you end up going to laboratory studies, just because you need to control the variables. It's very hard in nature to measure certainly all the chemicals and all the variables that may be impacting an organism.

BY MS. FRANZETTI:

Q. Dr. Thomas, with respect to your visit last year to the upper Dresden Pool, prior to then, when was the last time you had paid a similar visit to the upper Dresden Pool?

A. Well, other than going by it a few times when I was at the electric barrier in some

previous years, I made no other specific visit to go to that pool.

Q. And while you were there going to the four or five areas, did you examine the substrates that existed in those areas?

A. No, I did not, other than what could be observed --

Q. Well, when you say other than what could be observed, what did you observe about the substrate in any of those areas?

A. Well, maybe I should say inferred rather than observed because I'm assuming there is aquatic vegetation because they have a silt bottom that those weeds were growing in there.

Q. But you made no observations yourself of the substrate?

A. That's correct.

MS. DEXTER: Can I ask a follow-up. How these emergent aquatic beds that you have discussed, how do those beds compare to what you know about the rest of the Illinois Water Reclamation District of Illinois?

THE WITNESS: Well, there is other information that I've relied on. One is the

Natural History Survey did a study of the aquatic vegetation in the Dresden Pool back in the later 1980's, and they actually documented the size of the beds then over a three or four-year period. There was actually a big decrease in the size of beds through the late 1980's partially due to a drought here, I think, in 1988, and they were also doing chemical analysis of the sediments and some chemical analysis in the aquatic vegetation.

The other thing that I have relied on in thinking about the aquatic vegetation in this pool was the work by the Natural Historical Survey, which has been doing long-term electro-fishing studies in the upper Illinois -- actually starting from farther south, maybe near Havana maybe up into the upper Illinois since the late 1950's, so this electro-fishing survey has gone on for the state for over 50 years. And the biologists there tell me that the most aquatic vegetation for the whole Illinois system is in the Dresden pool area.

So they have the data from the other pools, Marseilles and Starved Rock and some of the others downstream, but the biggest aquatic vegetation beds are in the Dresden Pool.

MR. ETTINGER: I haven't had you read your testimony and background, but it might be useful for you just to explain what your role was in the Natural History Survey since we are talking so much about it.

THE WITNESS: Well, I had two roles actually. I started my career in the Natural History Survey in the 1960's as a field biologist working on the Kaskaskia River, so a lot of my large river experience occurred on the Kaskaskia, and then in -- I'm bad on my dates -- but for the last ten years or so I was chief of the Illinois Natural History Survey. So I review a lot of the reports. I actually was out on the Illinois River electro-fishing and sampling with some of our crews at our Havana station and out of our four biological stations and also our station down in Dolton in the lower Illinois River and Missouri River in Pool

26. Because I was particularly interested in innovative species, I was out with some of our crews at times looking at the invasive species issues in the Illinois River. So that was an area of particular interest where I got more involved in actually some of the data collection than in some of the other areas where I was more of an oversight rule.

MR. ETTINGER: And you ceased to be chief of the Natural History Survey when?

THE WITNESS: The end of February of last year.

MR. ETTINGER: Thank you. We're talking so much about the Natural History Survey, I thought I ought to explain where that came from.

BY MS. FRANZETTI:

Q. Dr. Thomas, you mentioned the study of aquatic vegetation in the late 1980's. Is that study cited in your testimony?

A. No, it is not.

Q. Is a written report of that study available; do you know?

A. Yes, it is. I think actually it was done -- well, I'm trying to think -- I think it was done for Com Ed actually, but I could pull out a reference.

Q. That's okay. If you have one handy, that would be great. Just to try and give a little more clarity to the record in terms of what study this is.

A. Yes. It was the final report went to Commonwealth Edison Company of Chicago at that time. It was dated July of 1992. The title of it was, "Des Plaines River Long-Term Monitoring Program, Vegetation Analysis and Habitat Characterization." And the authors were Pamela Tazik, T-A-Z-I-K and Steven Sobaski.

Q. For the court reporter's benefit, would you please spell the last name?

A. Sobaski is S-O-B-A-S-K-I.

Q. Now, you also mentioned --

HEARING OFFICER TIPSORD: Excuse me, Ms. Franzetti. Is it possible for us to get a copy of that report for the record?

THE WITNESS: I don't have the whole report with me. This is just a cover page,

and I think maybe the executive summary. Is that what it is?

MS. DEXTER: We could get copies of it.

HEARING OFFICER TIPSORD: If we could get a full copy of it.

MR. ETTINGER: I think it's about yeah big (indicating).

HEARING OFFICER TIPSORD: We can reserve a Hearing Exhibit now if you'd like, and you can give us the one copy as an exhibit.

MR. ETTINGER: We'll get you a copy. I don't know that we want to supply a copy, too many copies, so we'll see how it is.

HEARING OFFICER TIPSORD: Well, if you can get us a copy, we can always scan it.

MR. ETTINGER: We will get you a copy.

HEARING OFFICER TIPSORD: And then people can get it from the website.

BY MS. FRANZETTI:

Q. Dr. Thomas, you mentioned there was

also some chemical analysis that was there as a part of that study of aquatic vegetation?

A. That's right.

Q. Would you please elaborate what was the nature of the chemical analysis that was done as part of the study?

A. They looked at metals, PCB's.

Q. I'm sorry to interrupt, is that the water column?

A. No, they were looking at those in the sediment. I think also in the plant tissue itself.

Q. Do you recall what they found in terms of the results of the chemical analysis of the sediments and plant tissue?

A. I don't think I could accurately summarize.

Q. Now, you also made mention of -- excuse me, I'm sorry my notes couldn't keep up. You made mention of there being areas of the most developed aquatic vegetation in the UVP. I'm not sure is that based on the studies in the late 1980's that we were just talking about for ComEd?

A. Would you -- I'm sorry would you

repeat your question.

Q. Let me ask it this way. You testified that some of the most developed aquatic vegetation is in the Upper Dresden Pool?

A. Right.

Q. What is that based on?

A. That's based on these long-term electro fishing surveys done by the Natural History Survey staff, which are yearly surveys, and that's based on recent observations over the last few years for instance.

Q. Are those quantitative observations? Do they contain a quantification of the size of the areas they believe have this most developed aquatic vegetation?

A. No, I think these are general statements. Within that pool, within the Upper Dresden or Upper Dresden Island pool, those are the most extensive weed beds they see anywhere in the Illinois River.

Q. Now, we've been talking a lot about these extensive weed beds. What type of fish like extensive weed beds?

A. Good question.

Q. We're trying to figure out what kind of fish can live here. So I guess we better get to it.

A. Aquatic weed beds are great for young of the year fish. If you are a small fish worried about being eaten by other predators, finding shelter is really important so aquatic weed beds become a really important nursery area for young fish. You are going to find sun fish. Some of the basses in aquatic weed beds. You are going to find a number of your minnows within these weed beds.

Q. I'm sorry, is that minnows?

A. Yes.

Q. So sun fish, some basses, some minnows?

A. Your crappie. There's really quite a variety of fish that will make use of the weed beds. Some on a more permanent basis. Some may be just moving into them for feeding and then moving back out.

Q. Any other classes of fish besides these four that you've identified?

A. Well, some of the suckers like

buffalo, I think, you would find, but again, they may be in there occasionally for feeding or shelter or some other aspect of their life history, not necessarily spending most of their time there.

Q. And why not?

A. Well, fish prefer different habitat types and different stages. So some of them may be in deeper water at times. Some of them are going to be in shallow water. It depends on what they are feeding on.

Q. So generally do suckers and buffalos prefer habitat that is not this weed bed habitat?

A. The reason I'm hesitating some is because a lot of the areas in the large rivers where reflective buffalos and red horns and that, there hasn't been really aquatic weed beds for them to go to. So to say that I know how they would use it, I'm not sure that I could fully answer that.

Q. Okay, that's fine.

A. I do know that for the large mouth buffalo, that in the lower parts of some of our rivers it tends to use flood plane pools, and

those pools often have more aquatic vegetation. Now, whether that's important to them in their lifecycle or not, I'm not totally sure.

Q. So you don't know what the preferred habitat is of suckers and buffalos, is that what you are trying to tell me?

A. Yes, well, I have a general idea. But what I'm having trouble answering is what they would use aquatic weed beds if they are available to them.

Q. Okay. That's what you don't know?

A. That's how much I'm not sure.

Q. Okay. I'm going to move on to question 4: "For the habitat studies and life history studies referenced at the bottom of the first page of your testimony" -- and I'm referring to the first sentence of the third paragraph -- "'I have experience conducting habitat studies and life history studies of various species of fish on large rivers,'" and it goes on from there --

A. Right.

Q. But with respect to the studies you are referring to there, can you delineate which were habitat studies and which were life history

studies? If anyone was both, point that out to me too. But I'm trying to get an understanding of how many habitat studies versus life history studies you've done.

A. Well, you know, I'm not sure. I mean, any time you are studying fish in the system, you are obviously studying the habitats that they exist in. I go back to looking at the definition for QHEI, which is really, I think, Rankin described it this way, as a rapid assessment tool used in lieu of large scale monitoring programs. I would say I've been involved in a large scale monitoring programs. In most cases what I was interested in are the habitats used by specific species of fish that we were collecting at the time. Now, when I worked on the Kaskaskia River in the 60's, I was focused on some of the darters, the small, very small fish, because I was doing life history studies on those, but we were also doing habitat studies on all of the fish that we were collecting there. And in fact we were relating the distribution of some of our fish and the food habits of some of those fish to the populations of aquatic

invertebrates in the system because we were doing a lot of drift sampling. Drift sampling is you put fine mesh nets in the water, and you look at the invertebrates that are up in the water column drifting, and lot of those are available to fish for fish food. So I'm not sure I could ever separate it out. I never tried to do a characterization of habitat without it being associated with, tying it to the fish that were there. So I've tended to today look more from the fish end and then look at the habitat and why were they distributed as they were across the range of habitats that were available through there.

Q. So can you tell me what fish have been the subject of these studies you are referencing in your testimony?

A. Well, the Kaskaskia, there were up to a hundred species. I wasn't doing detailed studies of all of those, but actually I did food habits on following 40 or 50 species from that river. Again, my focus there was on darters. When I moved on to Cornell, worked on my Ph.D. in the lower Delaware River and upper Delaware Bay, I was focused on drums, cyanid drums -- just say

drums. Some of those got up into fresh water and I was looking at their habitats and the food habits and how the habitats changed as the fish grew larger. They changed their habitats. So the habitat needed by the small young is different from larger young and different from the adult, and those were the types of things I was trying to delineate.

Q. So was your study on the Kaskaskia River primarily focused on darters?

A. Well, that's what my master's thesis was on. It was one group of darters. But as I said, it's part of my work on the river, for the survey we were looking at all the fish that were there. I also spent a lot of time looking at flood plane pools and the river fish that utilize those. And in fact I have continued with my interest in those. We've had studies in the survey of the last five, six years looking at some of the same pools that I was involved in studying back in the 1960's. So we've looked at how those pools have changed and how they've functioned to assist the life history of a number of fish.

A number of fish come out of the

river during spring floods. They moved into these flood plane pools. A lot of them spawn there. They are nursery areas for the young. Some of them move back. Some of them get stranded there. But those pools are part of the life history and part of the habitat for many of our large river fish.

Q. You've used this term flood plane pools.

A. Right.

Q. Can you give us a definition of what you mean by a flood plane pool?

A. Yes. Many of them are formed as oxbows on the river. If you remember, rivers get very sinuous and windy and the river will cut through and it cuts off, sort of a moon-shaped piece of river and that gets sometimes isolated from the river and sometimes it's connected. Those pools may get flooded every year or every few years during floods of the river. At those times of flooding, there's a whole variety of large river fish that move into them, and they use that for spawning and nursery habitat for the young fish.

Q. Are there flood plane pools as you've just defined them in the Upper Dresden Island pool from I-55 up to the north end of the pool?

A. No, I think what you have in that pool, which you also find in much of our rivers --

Q. I'm sorry to interrupt you. "No, there are no flood plane pools in the Upper Dresden Island Area"?

A. I don't believe I would -- I'd have to check into that. I don't believe there is. A the typical flood plane pools, you have these back channels and other habitat that's somewhat similar. When I say flood plane pools, you have the whole variety of the connected back water area that's always connected to the river. Something far up into the flood plane -- and that may be only flooded every four or five years. We don't have that range of habitat out at the Dresden Island pool. But we do have some of the back water areas that I would assume, many of them, serve some function as at least a back water type of pool.

Q. But you have not studied that?

A. That's correct.

Q. Moving on to question 5. During the 12-year period from May 1985 through November 1997 when you were director of the Illinois Waste Management and Research Center, did your job responsibilities involve projects that focused on aquatic habitat quality and/or aquatic biology and? If you feel you've already referred to any studies in that time period that qualify as having focused on aquatic habitat quality or biology, please just point those out to me. You don't need to repeat what those studies were.

A. Yeah, I did mention the Calumet studies. We also had studies on Waukegan Harbor. On Crab Orchard, and again, a lot of those studies -- there were also studies up in Rock River. Most of those studies were focused on the effects and the role of contaminants on those systems on aquatic organisms.

HEARING OFFICER TIPSORD: Mr. Lin?

MEMBER LIN: Most of those you contracted out the whole summer?

THE WITNESS: That's correct.

MEMBER LIN: So you are not involved

in that research?

THE WITNESS: Right. We contracted out various studies. Although, I have to say, we did work with a number of the researchers to sort of focus sometimes their studies. They had planned to address what we thought were some of the more pressing issues.

BY MS. FRANZETTI:

Q. Moving on to Question 6, Dr. Thomas. During the subsequent 11-year period from December 1997 through February 2008, when you were the chief of the Illinois Natural History Survey, did you perform any field surveys of aquatic habitat or conduct any QHEI surveys of the river?

A. Well, I certainly didn't do any QHEI surveys because our staff are really involved with the long-term monitoring. Let me give you a couple things. I stayed involved in --

Q. Actually, before you do. So I understand, no, you didn't do any QHEI surveys of the river. Did you perform any field surveys of the aquatic habitat?

A. I was involved with survey staff and

also with the Department of Natural Resources on their basin surveys of the Kaskaskia River. I've maintained an interest in what's happened to the fish populations in the Kaskaskia Rivers, and I still hope to put out bulletin from the survey on a hundred years of changes of fish population in the Kaskaskia. So when E&R and the Illinois EPA did their basin surveys of the Kaskaskia River, I went with them while they did their electro fishing and surveys there. I also participated in electro fishing surveys on Prairie Creek that goes through the old Joliet Army arsenal. Lust Creek in Southern Illinois, did collections there. The Illinois River, Lake Michigan, I've been involved with some of our staff in collections made there.

Q. Now, when you say you are involved, are you observing?

A. I'm observing -- when I'm in the field I'm helping net fish or whatever needs to be done. I've also stayed involved by being on a couple of advisory committees. I was on the Nature Conservancy's Emiquon Science Advisory Committee looking at the restoration efforts they are trying to do there at Emiquon, which is in the

Havana area of the Illinois River, and I've been on the Illinois River Science Advisory Committee, which is an advisory committee to the lieutenant governor's advisory council on the Illinois River. So I've stayed involved in sort of river issues through those.

Q. Question 7: "Please describe your experience in handling projects that involve constructing improvements to the physical habitat in a river and the resulting effects on the aquatic fishing community?"

A. Well, I'm not sure I can give you the resulting effects but from --

Q. Let's start with -- tell me about projects that you handled that involved constructing improvements to physical habitats in a river?

A. I'm just trying to think of the dates. I worked for five and a half years for an engineering firm in Boston, Massachusetts, and they did a lot of work on hydro facilities, small head hydros in New England, large hydro facilities, pump storage projects, and some of the work through them was looking at mitigation

projects, particularly for plum storage where you have a lot of drawdown during the week of water. And so we were looking at creating artificial pools that would maintain water so when the water was drawn down, you could maintain shallower water habitat for some fish, like sun fish and that, they could use them for spawning. So I have been involved in some mitigation projects with large engineering projects.

For your information on pump storage, I think most of you are probably familiar, but the concept is you pump water up the top of a hill when electricity is cheap, either on a weekend or at night, and then during the day when you have to meet peak power, you let the water come down through a turbine and generate electricity to make up for when peak power is needed. These have been particularly used in conjunction with nuclear plants that have to have more steady output of power. By doing that, the water levels are constantly fluctuating in there, so one of the issues was how do you -- is there a way to maintain some habitat so some fish can spawn or turtles could use the habitat for

spawning. So we've looked at some of these pools as a way of mitigating drawn down, weekly drawn down in these pools.

Q. All right. Can you give me approximately when that five-and-a-half year position with the engineering firm in Boston occurred?

A. Yes, I think it's in my -- I have to look at my resume. It was in the late 80's.

Q. Is that '79 to '85?

A. '79 to '85.

Q. That's your position with the Charles -- is it Chaz or Charles?

A. It was Charles T. Mae, actually bought out by Parson's Corporation now.

Q. Now, did you get involved in creating, actually creating any of these pools?

A. I didn't myself. We helped design, because I'm with an engineering firm. We told the engineers what we'd like to see, and then they worked on the design and then someone else did the actual construction of the pools.

One other project out in the pump storage --

Q. Can we stay on this project. I'll let you get to any others in the minute, but let's finish this one up.

So you were involved in designing them. Did they get built?

A. Yes.

Q. All right. Were you still there after they were built?

A. No.

Q. All right. So you do not know what the effects of those pools were?

A. Right, and that's why I said I couldn't answer that part of your question.

Q. That's what I was trying to understand the basis for your answers.

All right. Any other projects that you were involved in?

A. The only other one I was going to mention is there was a water storage project on the Delaware River that, I don't know, some of you may have remembered, there was going to be a tox island built, dam built on the Delaware River. It was hugely controversial back in the 70's, I believe. That was defeated, but downstream water

needed extra water during low water flows in the summer. So what ended up happening is they flooded a small valley along New Jersey along the Delaware River. They pumped, during the wintertime and during the spring high flows, filled this reservoir, and then during the summer when they needed water downstream, they would release water from this reservoir. There was an issue with a Bog turtle -- that's B-O-G -- that was a threatened and endangered species. So we designed some mitigation pools on that habitat. Again, to provide habitat for these turtles for breeding. To the best of my knowledge -- I know that project has been built, and to the best of my knowledge they did incorporate some of those pools in the design.

Q. And do you know what the effects were in creating any of those pools?

A. I have not heard whether they were successful or not.

Q. Would you advocate -- are you advocating here -- strike that.

Do you believe here that creating these pools is something that could be

done in the upper Dresden Island pool to improve habitats?

A. I'm not sure. Something similar to that necessarily would be helpful. One of the things that I have thought of though on the waterways is that I think, and this is something that Dick Lanyon and I talked about way back in the early 90's when I took the trip, I think the areas where there is a lot of riffraff and at least there used to be on the shore a lot of cinder block and cement and that, I think if some of those were put just off shore you could probably protect some of the areas behind those a little bit away from barge traffic and potentially create some, a little bit more stable habitat for fish breeding or nursery areas for young fish. So I think --

Q. How would you do that, Dr. Thomas?

A. I think you would need to create sort of a long thin dike or small island or whatever. You get almost some of that habitat under the bridges where you have pilings there and you have water on the shore with a side of those pilings. So you have a little bit more protected

habitat because those pilings attenuate the waves that are coming in from barges.

Q. And have you seen similar projects done and what their effect was?

A. I have seen -- I was just trying to think what -- I have seen some from the Army Corps of Engineers, dredging projects where they've made islands or which is created habitat for birds, but also behind some of those they've created some shallow habitats that may be less effected by waves. Sometimes they will allow aquatic vegetation to grow or it will provide some different kind of protected habitat for fish so -- that wasn't the original intent of the project, but that was the end result of some of those projects.

Q. So are you inferring from Corps projects where they created an island that helped as a buffer to wave action that maybe the same thing could be accomplished if you built your thin dike?

A. Yes, but there's a lot of other simple things you can do. I mean, there may be areas that are less depositional areas. In other

words, areas where you don't have a lot of deposition of sediment where you could add just sand, for instance, or sand and gravel and create a little bit of a shoreline habitat.

Q. Can I stop you there and ask a question. What areas in the upper Dresden Pool don't have the sediments that you are talking about that might be appropriate for adding sand to?

A. Well, I think the reports say that there are a fair number of those areas. So you may not need to do that in those areas. Again, that would take an evaluation of the various habitats that are available and what might be limiting to some species of fish. But you asked what could be done, and those are all things that can be done. Whether they need or not to be done --

Q. I'm sorry. I don't really mean to be talking in terms of just hypotheticals because what we're concerned about here is what can be done.

MR. ETTINGER: I think part of our problem is we're again talking about the

whole system, and you've been focusing your questions on the upper Dresden Pool. And some of your questions were directed to the area from Stickney up. So there may be some ambiguity there.

BY MS. FRANZETTI:

Q. I was trying to use upper Dresden Island pool. So in the upper Dresden Island pool, would you advocate the use of a long dikes?

A. I can't answer that it's needed.

Q. Okay.

A. All I'm saying is if there were areas where someone did a study of that, deemed it to be an improvement or improved fish habitat, some of these can probably be done at not unreasonable costs. That's all I'm saying.

Q. And what you are trying to tell me is first there needs to be a study done of the upper Dresden Island pool to determine whether there are areas that would benefit from mitigation projects and to try and determine to what extent, correct?

A. I'm sure probably EA has that kind of data because they've been out on the pool.

Q. Well, don't speculate as to what EA has.

A. But I don't have it.

Q. I understand. You don't have the data --

A. Right.

Q. -- on which to determine whether there are areas in the upper Dresden Island pool that would benefit from mitigation projects and to what extent, correct?

A. That's correct.

Q. Okay. Moving on to question 8. Have you conducted any field work that studied the effects of ambient water temperatures on aquatic species?

A. I find that sort of a strange question.

Q. Oh, yes. Why?

A. Well, ambient water temperatures, the effect -- I mean, what you see in most aquatic systems is, I guess, where you have a gradient in the natural environment, you may see fish respond to that gradient, but --

Q. How are you using the term gradient?

A. Excuse me?

Q. What's the meaning of the term gradient that you are using?

A. It's when you have a range of temperatures available to a fish. We tend to do those more in the laboratory where you have a thermal preference study, and you have an actual, what's called a gradient tank, so you might have 20 to 30 degrees centigrade available to a fish. You acclimate a fish to a temperature, and they will swim around and pick out an area that usually is close to its preferred temperature.

In the natural environment it's much more complicated than that because they are probably not responding just to temperature. They may be in an area because of the food or they are getting away from predators for a variety of other reasons. That's why I'm saying I didn't quite understand the effects of ambient temperature. I've seen fish kills in nature due to extremes in temperature, but --

Q. Okay. Let me just --

MR. ETTINGER: I guess you are saying field work, and I'm not sure we know

exactly what you mean by field work. Is that something formal or just his experience?

MS. FRANZETTI: No, I'm looking for a more formal study first.

BY MS. FRANZETTI:

Q. Have you conducted or participated in any studies of the effect of temperatures, water temperatures on aquatic species?

A. Yes.

Q. Tell me what those studies were.

A. Well, I worked for probably seven years at the Oyster Creek Nuclear Station in New Jersey, and we did all kinds of studies related to their intake system, to their discharge system, to the movement of fish and their discharge canal, to the effects of heated water on local movements of fish, as well as fish populations in the Oyster Creek system itself and in Barnegat Bay, and actually have some publications related to that. So that was probably the most extensive work I did was at that plant. And we had -- we were not only measuring what was happening in the discharge canal, but we

had an experimental trailer set up there where we would could run both ambient water and discharge water through tanks and look at behavior and see what was happening to fish in a more controlled environment in the laboratory so --

Q. Now, what did you learn from the Oyster Creek studies that is relevant here to the question of the thermal regime of the upper Dresden Island pool? How are those studies relevant to the issues we're dealing with, the thermal issues we are dealing with in the upper Dresden Island pool?

A. I think the issues of fish attraction, fish avoidance, potential lethality due to entrainment through the power plant, I think all of those are pertinent topics to any heated discharge, and they would apply to the Lockport plants, as well as any other.

Q. Okay. Then take each one of those. Take the topic of avoidance. What did you learn from your Oyster Creek studies that you think is relevant for the board here in looking at the thermal regime of the upper Dresden Island pool?

A. There were times of the year when

the fish avoided a good part of the thermal plume, and then there were times when they were attracted to the thermal plume.

THE COURT REPORTER: I need one second, please.

HEARING OFFICER TIPSORD: Why don't we take our first break. Ten minutes, please.

(Whereupon a break was taken, after which the following proceedings were had:)

HEARING OFFICER TIPSORD: Do we remember where we were or do we need the court reporter to refresh us?

MS. FRANZETTI: I'm there, as always.

BY MS. FRANZETTI:

Q. Dr. Thomas, before we broke part of what we were talking about was your work with the Oyster Creek nuclear station out in New Jersey. And again can you approximate what year that occurred? For example, was that for the time you were working for the Charles Main?

A. No, that was before then. It would

have been in the 70's.

Q. And who were you doing that study for? Was it for the utility that owned the Oyster Creek station?

A. Yes, it was for Jersey Power And Light, I believe.

Q. And did that study make any findings with respect to the impact of the nuclear station on the aquatic community?

A. Well, there were lots of reports that were either submitted to the Nuclear Regulatory Commission or some papers that came out of it. So there's a lot of different aspects. I'm not sure I can summarize in a few words what the impacts were.

Q. Do you recall whether any of the studies concluded that the thermal discharge from the Oyster Creek station was having any significant adverse effect on the aquatic community?

A. Well, one of them I remember that was -- let me backtrack.

Probably the most visible impact was actually from cold shock, and a few times in

the colder months of the year they had to shut down the power plant. Usually some unexpected thing happened in the plant, and there were some pretty significant fish kills. It seemed like two Thanksgivings in a row I ended up having to leave dinner and drive up to the Oyster Creek plant and count the fish that had been killed when the plant shut down. And that's a case where the fish are adapted to warm water. The plant turns off. All of a sudden the water is very cold. They have no place to escape to in terms of finding other warm water, and you get what's called cold shock of the fish. So did that have an effect on the overall population of those species? I don't think anybody was able to measure that. But you could measure the number of fish that were outright killed. We also had estimates of the number of fish killed on intake screens and going through the plant in trying to --

Q. My question was on the thermal effect in the river to the aquatic community. So I don't think entrainment is part of my question.

A. Well part of mortality in entrainment is thermal, part of it is potentially

chemical and part of it may be mechanical going through the plant for entrained organisms.

Q. Okay, Dr. Thomas. That's fine, if you think so. But with respect to the cold shock, so that happened a few times to that plant in that period?

A. Well, two or three times over seven years say.

Q. And you were saying that you could quantify the number of fish that were killed by cold shock, but not what the lasting effect was, if any?

A. That's correct, or population. It becomes a different issue to then look at, did it have a negative impact on the population, which I think may be your underlying question, and we were not able to demonstrate that there was any population effect. There was an effect on the fish that were residing there, but on the overall population, most of these were coastal populations so we were not able to determine the negative impact on the population itself.

Q. When you say you were not able to determine, did you make some attempt to determine

it?

A. We looked at the population levels of some of the fish around the plant, and in Barnegat Bay versus other populations up and down the coast, because we had other studies going. So, for instance, we had --

Q. Dr. Thomas, can I stop you there because that's enough for me?

A. Sure.

Q. So you were trying to do a comparison after the cold shock occurred with the fish populations of the fish in area of the nuclear station's discharge and fish populations outside of the area of that discharge, correct? And from that comparison did you find a negative effect?

A. Well, none that we could document statistically. The problem is in natural environments, the fluctuation of populations is great enough that you really need a very large impact to actually be able to measure it statistically. I think we found an entrainment effects, and this is the only figure I remember, that we need almost an 80 percent change in

population of a plankton organism for it to actually show up as a statistically significant negative impact. So this is one of the problems with some of these studies, it's difficult to quantify because of the large natural variation that you are dealing with.

Q. So there was not enough of an impact from the cold shock event to measure any statistically significant difference?

A. Population, right. There was definite impact on the population -- you have to define the population. If you looked at the population within the discharge canal, yes, that was significant because it was a large percentage of any particular species in the discharge canal at that time. If you are looking at the broader population like stripped bass along the Atlantic coast, no, there was no detectable impact from that, no.

Q. Do I understand correctly then the bulk of the fish that were killed because the plant shut down causing a cold shock were in the discharge canal area?

A. That is correct.

Now, just to finish answering your question about thermal, probably the biggest thermal impact that utility ended up having to readily pay out was because a tropical marine bore, a wood bore -- there's some boring. They are called wood bores -- the invertebrate that bore into wood. It must have gotten in with some ships coming in from farther south, and it got established in the heat of a discharge canal, and actually some of it started destroying some of the docks and parts of Barnegat Bay, and that was an effect, not the kind of effect that you normally think of, but that was an effect of the heated water and that was something that could be measured in terms of the amount of destruction of docks, due to this more tropical wood bore that was able to survive in the discharge canal.

Q. Dr. Thomas, are you aware of any cold shock events occurring with respect to the Midwest Generation stations either along the CAWS or the upper Dresden Island pool?

A. No, I have not heard or read about any.

Q. Given your work for nuclear plants,

although I'm not sure how much you are aware about coal fire generating stations, but if you can't answer this question because you don't know, that's fine, just tell me, isn't it true that cold shock occurs primarily at nuclear plants because of their tendency to trip?

A. Well, I actually have worked at a number of coal fire plants, but I don't know that that's true. I couldn't say.

Q. Just a moment. Moving on to question 9. What do you mean by the statement in your testimony, Section 2, second page, first paragraph, that, "I also understand the argument that a QHEI score of 35 to 60 is a range in which waterways may be able to meet the Clean Water Act goal, depending upon particular characteristics of the area"? Does that statement in your testimony mean that you agree with that argument?

A. Yes, I agree with their basic argument that it was a reasonable expectation for that system.

Q. And what is the basis for your agreement?

A. Well, Yoder testified that these

values need to be used in conjunction with the fish data, which I agree with, and I think the assemblage of fish species there indicates that the potential is there to basically meet the requirements of the Clean Water Act goal.

Q. Let me move on to the next question. Regarding your testimony at Section 2, third page, first paragraph, the QHEI scores above 45, "Seem to be predominant," in the UDP. Did you review the "particular characteristics of the area" of these scores, and if so, what did you conclude as to which ones may be able to meet the Clean Water Act goal?

A. Well, I have to admit I had some difficulty understanding the question.

Q. Let me give you a little more clarification because I do want you to understand it and answer the question as it's intended.

With respect to question 9, where you answered that you do agree that a QHEI score of 45 to 60 is in a range in which waterways may be able to meet the Clean Water Act goal but it depends on the particular characteristics of the area. So my next question, the one we're on,

is for the scores above 45, that you say seem to be predominant, and for those scores that were between 45 -- above 45 but up to 60, not over 60, did you look at the particular characteristics of those areas to determine whether or not they could meet the Clean Water Act goals?

A. Well, first, I mean, I don't think these scores are an indication. They are an index. I don't think there's anything magic necessarily about 45 or 43 or -- so that's one point.

The second is, I really think that the QHEI scores for this system, and particularly probably for large rivers in general, probably underestimate the available habitat that's available to fish in these systems. In other words, I think these scores might be lower than -- would not represent the variety of habitats that might be available to species in the system. They underestimate the value of those. So I think it's a good index to give us an overview of the area. It gives us some numbers to compare between areas, but, you know, I --

Q. I think you told me earlier that you

have not conducted QHEI surveys?

A. Yes.

Q. So what's your basis for this opinion that you believe these scores underestimate the available habitat?

A. If one of the areas that they are measuring is riffle areas, one of the habitat things that's measured -- if you think about it this way, in a small stream you might have six or seven riffles per mile, let's say, in a stream. As a river gets larger, you might be down to two riffles per mile. When you get to really large rivers, you might be lucky to have one every 10, 15 miles. Does that mean that that riffle is only available to fish within 500 meters of that 500-meter section or 10,000-meter section? Most large river fish are able to move, if they need riffle habitat, and they do move fairly large distances, maybe up a tributary stream and maybe up a main river to get to a riffle habitat. I was just talking to -- I was at a large river meeting this week, and I was talking to a large river ecologist from Missouri, and he was saying they use the outside bends of the Missouri River,

consider that sort of as a riffle habitat because you have more riffle there, but he said it's about two miles or two-and-a-half miles between those types of habitats.

So all I'm saying is, the fish on large rivers are really adapted to moving over a wider range, and I think using a set length, which is my understanding, and someone can correct me if I misunderstood how the QHEI is calculated, but I thought it was calculated over a 500-meter stretch, which corresponded to the stretch that they were actually collecting the fish from, but as you move to large systems, those fish tend to move over longer distances to find a preferred habitat. We talked earlier about many larger fish will move out of the river itself or into flood plane pools or mouths of tributaries or back water areas to carry out parts of their life cycle, and unless you include all of those habitats in your index, you are really undervaluing the habitat available to them.

So I'm not sure like in the lower Kaskaskia, if you did the QHEI, I'm not sure whether you would include the habitat available up

in the flood plane. My understanding of it was, you would just include the habitat within the river, and yet you would be excluding habitat that's very important to many of those species to carry out their life cycle. So all I'm saying is, if anything, I think these numbers may be low in the kinds of habitats that are available in the systems that we're studying.

Q. I'm not sure I fully understand. So let me ask you a few questions.

Are you saying that because large fish are able to move large distances, that -- are you referring to fish living outside, for example, the upper Dresden Island pool and saying that sometimes they will come in for a visit, and you know, then move on? I am not understanding the significance of your point that they --

A. Let me give you just an example. Say we have a collection -- habitat evaluations done a mile down the stream of the tail waters of the Brandon, the riffle habitat. When we do the QHEI, that's going to get a zero for riffle. Yet what I'm saying is, for many of the fish that need

a riffle habitat for some part of their life history, that that riffle is still available to them. Even small fish like the Black Sided Garter, which is one of them I studied in the Kaskaskia --

Q. Where is the riffle available to them?

A. Below them in the tail water area.

Q. So you are saying they go up to the tail water area to enjoy the riffle?

A. Well, they may breed there.

Q. Fine.

A. And then they move back down to the pool afterwards. You collect them in the pool, you do your habitat evaluation in that pool, which doesn't include any -- you have zero for riffle habitat, and yet what I'm saying from the fish's point of view, that riffle habitat is still available, even though it's still a mile away.

Q. But if you are doing, not just QHEI, but you are also doing fish surveys in the pool --

A. Right.

Q. -- then don't you have the two pieces that you are talking about?

A. You do. But that's why I'm saying if you just -- and that's why they say, the QHEI is often used in lieu of the monitoring. If you have all the monitoring data, you are documenting what the habitat is. You really don't need a QHEI. But it becomes important in this case. All I'm saying is, yes, we are talking about 45 to 60 -- I'm just testifying that this is a range from what I know of the system in which you have good potential of meeting the goals of the Clean Water Act. I mean, in terms of habitat.

Q. Did you study here the fish survey data that's available on the upper Dresden Island pool in connection with the QHEI scores to draw any opinion as to potential to attain the Clean Water Act goals?

A. I think I have gone through all of the fish data reports that have been made available as part of this record. I've also relied somewhat on some other data that the Natural History Survey has collected regarding fish and the upper Illinois River basin. In terms of looking at the QHEI for a station versus the fish collected there, and do I think -- I did not

do -- try to do that kind of analysis. I think it would be hard to take an index and the fish that are dead and totally match them up.

Q. Let's go back to my original question here because I don't think that you've answered it. With respect to the location that's had QHEI scores in that 45 to 60 range, did you do any review of what the particular characteristics were in those areas in order to draw a conclusion as to whether or not they would support attaining the Clean Water Act aquatic life use goals?

A. Looked at the fish, looked at the scores, I looked at what's been documented about the habitat. So evaluating all of those things, I would say, yes. I mean --

Q. What were the particular characteristics of the areas that scored between 45 and 60 that you felt enabled them to meet the Clean Water Act goals?

A. Well, I'm not sure I wrote down each score to that degree to say these are the aspects, and in fact it was a little bothersome -- Rankin's, when he did his work, it was in March or April, I'm sure he didn't detect any emergent

aquatic weed beds during that time of the year, so that wouldn't have been part of his score, yet they are there, and I think they provide a significant habitat for a lot of fish species. So I don't feel I've been justified to rely just on that habitat. And I think it was one --

Q. I'm not -- Dr. Thomas, I'm not trying to force you to. You made the statement that you agree with the argument that QHEI scores between 45 and 60 may be able to meet the Clean Water Act goal depending on the particular characteristics of the area. You agreed with that argument. So my question was, all right, so if you do, did you look at the scores here between 45 and 60 and do some analysis of the particular circumstances to try and conclude whether or not they in fact can meet the Clean Water Act goals? That's all I'm asking. And if you didn't do it, that's fine.

MR. ETTINGER: I think there's some ambiguity here in terms of the term the area, did he look at a specific area where there's a score and measure that against the fish. But I believe Dr. Thomas has

testified in a big river system the area might be bigger. The relevant area in terms of their life cycle might be different. So I think there's a little ambiguity in your question and that may be confusing.

BY MS. FRANZETTI:

Q. Maybe I should ask this --

A. I did not rely totally on the QHEI scores. I relied on the fisheries data as they reflect their ability to live and grow in that section of the river.

Q. Okay. Maybe I should have asked you, what do you mean by "depending on the particular characteristics of the area," what do you mean that's an argument that you agree with?

A. All the areas, all the habitats that might be available, logs in the water, sand, gravel, shore line, some current, aquatic vegetation.

Q. So did you go back to the QHEI reports here and look at the locations that scored in 45 to 60 to try and evaluate those particular circumstances?

A. Well, I didn't look at all of them,

I can tell you that. I looked at the sheets that gave all the scores, but I did look at some of them, and that's why I gave the example, there's one station downstream from the tail water area, and that has zero for riffle, riffle habitat, and yet my argument is those fish had that riffle available to them and would have used it and probably do use it if that's needed for carrying out a portion of their life cycle. So that's what I meant by some of these scores I think underestimate the total habitat that's available to some of these fish.

Q. And the scores you were referring to those, those included the QHEI scores that were produced by Mr. Yoder's company?

A. Well, I looked at all the ones that were available I think.

Q. Do you know whether or not that work was included in what you reviewed? You mentioned Rankin?

A. Right.

Q. That's different from --

A. And I saw the Yoder ones.

Q. Okay, you did. That's what I'm

talking about.

A. Okay. But I saw also -- didn't EA do a separate analysis themselves? And I looked at those also.

Q. With respect to Mr. Yoder's firm's QHEI work, did you look at the corrected QHEI scores?

A. I saw that there were corrections made, but I wasn't trying to analyze -- I mean, when you have all this detailed information --

Q. Dr. Thomas, did you look at the corrected QHEI scores?

A. I saw the corrected -- did it mean anything to me, no. But I saw the corrected scores. I think is does make a difference though that I wasn't relying on those to tell me what's happening to the fish populations.

HEARING OFFICER TIPSORD: Excuse me, Ms. Franzetti. Just for clarification of the record, we keep talking about the EA report, and I have assumed and we should probably put it on the record, when you talk about the EA report that are a part of this record, you are talking about materials that

are already in the record or were a part of the pre-filed testimony for Midwest Generation; is that correct?

THE WITNESS: I believe so. I'll tell you, I've reviewed so many things.

HEARING OFFICER TIPSORD: But they are items that are already in the record or will be?

THE WITNESS: I hope so.

HEARING OFFICER TIPSORD: That was your understanding?

THE WITNESS: That's my understanding. I think everything you sent me, the Plankton reports, the various Fisheries reports.

MS. DEXTER: In terms of QHEI is everything that he's reviewed.

HEARING OFFICER TIPSORD: I was asking about the EA reports. We keep talking about the EA reports. I just assumed when he reviewed the record, that he was talking about the reports that are part of the pre-filed testimony or maybe placed in. If that's not the case, then we need

him to provide us those that are not or won't be introduced.

MR. ETTINGER: May I suggest that the three of us should talk. EA has actually been doing studies of these systems since the '80s and I want to make sure we didn't send him one of those earlier studies. I don't think we did, but I'd like to talk to Ms. Dexter and Dr. Thomas and make sure that we didn't give him an earlier EA report that wasn't in the record, and we will get back to you on that.

HEARING OFFICER TIPSORD: And that's fine. My only request is, if he did look at something that is not part of the record, that we make it part of the record.

MR. ETTINGER: We'll get back to you with an answer on that.

HEARING OFFICER TIPSORD: Okay, thank you. Sorry, Ms. Franzetti.

BY MS. FRANZETTI:

Q. Dr. Thomas, you've mentioned the Brandon tail water area and -- are you aware that the median QHEI score in the Brandon tail water

area is about 46?

A. I thought that was somewhat below the actual -- does that include the whole tail water?

Q. Yes.

A. That seems awfully low to me.

Q. I'm sorry, I think I just misstated that. Except for the Brandon tail water area, except for the Brandon tail water. I left out a key word in formulating that question. Do you agree from what the QHEI scores you reviewed that the median is about 46?

MR. ETTINGER: I'm sorry, I'm still unclear what we are talking about. The upper Dresden Pool, the median score is 46, outside of the Brandon tail water?

MS. FRANZETTI: Correct.

BY THE WITNESS:

A. I'm not positive. If I remember, that sounds like it may be in the ballpark of what someone has reported.

BY MS. FRANZETTI:

Q. That's fine. I'll ask you to assume it. The record will bear out whether or not

that's an accurate median value. And do I understand your testimony correctly that even though that median value is at that very low end of the 45 to 60 range, that you still believe it's reasonable to conclude that the upper Dresden Island pool can attain the Clean Water Act aquatic life goals?

A. I wasn't sure when I was going to get into this, but I guess I might as well jump in now.

It's interesting when you look -- and this is -- if you'll excuse me a minute. I'm going to jump off to something else. But I'm going to get back to your question -- if you look at IBI scores and you look at the Fox River, and that's been in the record. The IBI scores for the flowing part of the Fox River, and the IBI scores for the impounded parts, you see that the IBI score for the impounded parts on the Fox River is about the same as the Dresden Pool. Maybe even a little bit lower. I think the values have been reported. The problem here is -- and there's no doubt, and there's been testimony, the effects of impoundment of the effects of diversity

in the system. And that's true. I'm not going to try to argue against that. The issue is, almost every one of our large rivers are impounded to some degree over some portion of their length. I don't think as a nation we are going to start going back and say, well, because they don't have the same mix of species, the same, what we call, balance indigenous population of a flowing river, that we are going to downgrade the water quality criteria for all of our reservoir areas and impounded areas and all our large rivers. It's just not going to happen. So, yes, it is a little bit lower than you would find in a free-flowing river, but it isn't that far out from many other impounded areas of river. Almost all of which that I'm thinking of are general use waters. And so how the Board is going to treat that, I have no idea because it's a broader issue than just this system, but I find the populations and the mix of species in this system, what one might expect, it's probably even better than some other impounded areas in other general use waters.

Q. Have you done any sort of comparative analysis to support that statement?

A. I have collection data from -- electro fishing data from the Illinois Natural History Survey for both Starved Rock, Marseilles pool, downstream and general use water, and this Dresden Island pool. You can see some difference in species, but if you look at those lists, you are going to see it's pretty well the mix of species that you have there. Some species are higher in the Dresden Island pool because, I think, of the weed beds and other features of the pool. Some species like the Red Horses might be lower.

Q. And, Dr. Thomas, none of that have been included in your pre-filed testimony, correct?

A. That's correct.

Q. Do you agree that, except for the Brandon tail waters, fast water is absent in the upper Dresden Pool?

A. What do you mean by fast water?

Q. Well, you want me to give -- do I have to give you a velocity range? I'm talking about current.

A. Right, I understand that.

MR. ETTINGER: Are you including treatment areas?

MS. FRANZETTI: To the extent they are a part of what this proceeding has defined as the upper Dresden Island pool, yes.

BY THE WITNESS:

A. I would say that it would be characterized as slower moving water for most of the rest of the pool. I think there's somewhere in the record what sort of an average velocity is through the pool, but I'm not positive I remember that.

BY MS. FRANZETTI:

Q. You do agree that, except for the tail waters, riffles are absent from the upper Dresden Island pool?

A. I'm not positive that other riffles aren't available in some of the tributaries, but yes, for the pool itself, I would agree.

Q. What tributaries to the upper Dresden Pool are you talking about?

A. Let me see. Jackson Creek actually comes in the downstream of I-55, correct?

Q. Yes.

A. So I am not sure.

Q. You are not sure if there are any tributaries you are talking about?

A. Yes, I am not sure if there's any of that kind of habitat available.

Q. Do you agree that hard substrates, and in particular I mean gravel and cobble -- that let me restate that.

Do you agree that hard substrates, and in particular gravel and cobble, hard substrates, in fast water, are lacking in the upper Dresden Island pool, except in the Brandon tail waters?

A. I wouldn't agree totally with that. I think from the descriptions I read there are sand bottom areas that were formed that's considered a harder substrate. It depends on how they are washed and that. There are also logs and debris at times that will form a harder substrate that could be used by some fish. But in general, I would agree with that description with those exceptions.

Q. Is it true that certain species or

groups of fish species such as most darters and Red Horse, as well as some minnows, require the habitats that we have just been discussing to reproduce and feed successfully?

A. Not all of them, but most of them do need that. The logperch, no. It does have populations in lakes and will use a sandy shoreline or sandy gravel, but, yes, in general they need some flow over usually a harder substrate. There are some other exceptions. The mud garter and some others that will actually spawn in back water pools for this vegetation. So just for the record I should state that there are some species that are adapted to sluggish water, of those groups, but in general I would say the large majority of them do need a habitat as you've described.

Q. You mentioned earlier, and now I'm going to refer to question 11, where it specifically addresses these micro habitats. What are micro habitats as you've used that term in your testimony?

A. I use it -- and I'm not sure it's necessarily in the literature. I use it as just a

very small portion of habitat. When we talk about riffle areas, we talk about the whole riffle. But within that riffle, there are a whole series of micro habitats. There might be an area of real, shallow, fine gravel, and there might be another area of larger rocks and cobble. And one example might be a log. A hollow log might be used by a flat head cat fish for spawning. That would be a micro habitat that it's using. It's just a very small portion of all the habitat available there.

The QHEI as an index wouldn't pick up necessarily these micro habitats that might be available. It's giving you a general snapshot of the whole area, but when you are looking at it by a species by species basis and what each of their requirements might be, then you might be more concerned about some of these what I'm calling micro habitats, small areas of habitat that might be more suitable for them for spawning or some other aspect of their life history.

Q. Dr. Thomas, the next part of the question is, would you describe the location and extent of the micro habitats that exist in the -- and let's take it one area at a time first --

describe the location and the extent of the micro habitats that exist in the upper Dresden Pool.

A. Well, I think I referenced, we just talked about the tail water, for instance, that even casual observation from the bridge reveals the variety of smaller habitats that are available. Some faster moving water. Some slower pools. Some emergent vegetation. So if you get downstream, the micro habitats are probably provided by the aquatic vegetation, by logs in the water, by overhanging branches. There's areas along the shore where there might be riffraff or gravel. So all of those things could provide habitat for some species of fish.

Q. Okay. Am I correct that your knowledge of the location and extent of micro habitats in the upper Dresden Island pool is based on your trip out there last year?

A. Well, not totally. I have descriptions in some of the reports and that I've read. There's photographs that the EA provided of lots of the area throughout that pool.

Q. So some of these areas are described

in the QHEI survey reports?

A. Well, there, or the fisheries' reports or photographs that show logs and overhanging branches. So anyway, there's a variety of places where someone has described or pictured habitats.

Q. Is it your opinion that these micro habitats are what enable the upper Dresden Island pool to attain the Clean Water Act aquatic life use goals?

A. I'm not sure it attained, as it was capable of attaining. I think that's an important aspect of it all. It's an important habitat. But it, in and of itself, is not the only habitat available.

Q. I understand that. I'm trying to understand how you're using the existence of these micro habitats, what their significance is. And so are you saying that their presence makes the upper Dresden Island pool capable of attaining the Clean Water Act aquatic life use goals?

A. Yeah, I think there's enough variety of habitat in that pool compared to other pool areas of other river systems that it should be

capable of maintaining something close to the Clean Water Act goal of a balanced indigenous population.

Q. I haven't asked you, have you made these determinations before as to whether or not a particular body of water can attain the Clean Water Act aquatic life use goals or is this the first time you are opining on that topic?

A. Well, I find the whole concept of -- I tend to approach it from a species point of view.

Q. Dr. Thomas, the question is whether or not --

A. I'm getting there. I tend to approach it from the species point of view. So a broad, general term like that used in our legal system doesn't have huge overriding meaning to me. I mean, I'm not sure anybody could totally tell me in any of these water bodies what the balanced indigenous population should look like, for one thing. And I have seen the historical data so I could probably tell you better than most what it was, but it's never going to be what it is now and what it's going to be. What's the imbalance

indigenous population for Lake Michigan? We get a new invasive species that takes off every year. So populations are changing there every year, the mix, the balance of them. So I'm not sure anybody really could tell you very actively what a balanced indigenous population should look like there. What I'm saying is, for this system I think we have a basic assemblage of species that in my view would be close to probably what we could expect in that system.

Q. Moving on to the Chicago Sanitary & Ship Canal. Can you describe for me the location and extent of the micro habitats that exist in this Sanitary and Ship canal?

A. Well, of course, it's a very diverse system with, you know, lots of difference between the north channel --

Q. No, no, no, the Chicago Sanitary & Ship Canal only.

A. Sorry, okay. Habitats in general are more limited there, but on the other hand there is --

Q. No, Dr. Thomas, where are the micro habitats in the Chicago Sanitary & Ship Canal?

A. The broken riffraff.

Q. And where is it?

A. Along the shore.

Q. Of the --

MR. ETTINGER: Do you want a meets and bounds description? Should we get a map out? I'm not sure what your question is.

MS. FRANZETTI: Well, Albert, I'm asking what is the basis for his statement that there are micro habitats in the Chicago Sanitary & Ship Canal?

MR. ETTINGER: Why don't you ask that question, and he can answer that.

BY MS. FRANZETTI:

Q. I would like to know the extent of them and their location in the ship canal, otherwise these are just generalized statements that really can't be evaluated. Number one, we are using a term that he's admitted isn't even used in the literature. It's his own term. So I think I'm entitled to know what you are saying is the extent of their location in the Chicago Sanitary & Ship Canal and where are they located. So I don't need meets and bounds, but I need a

little more specifics than there's micro habitats out there.

A. Emergent vegetation. There's areas of gravel and rock along portions of the shoreline. There's some logs. There's other debris in the water. There's sunken barges. Any structure like that in the water is going to serve as a micro habitat. This is why people sink ships in lakes or the ocean or sink Christmas trees in our lakes because they provide a habitat from macro invertebrates to grow on and for fish to use as a habitat. So that's what I mean by that. Could be overhanging branches. Large rubble, rocks in the water.

Q. What's the extent of the Chicago Ship Canal? Do you think they are prevalent throughout the length of the ship canal? Do you think there are certain parts of it? Can you be any more specific?

MR. ETTINGER: We were in the ship canal last month. What did you see there in terms of habitats that you know of?

BY THE WITNESS:

A. I mean, you go through areas that

have relatively limited habitat. There's straight walls and probably somewhat uniform bottom, although I didn't measure it. You have other areas in which there appears to be a more developed shore line and it provides more habitat. I haven't gone through and analyzed that there's five percent gravel shoreline, and one percent emergent vegetation, but there are all those micro habitats or small areas of habitat available to a variety of fish that live in those areas. That's all I'm saying.

Q. Moving on to question 12. Give me just a moment to read it to myself. It may be that we've covered parts of this. Question 12, "Your pre-filed testimony refers to 'habitat improvement' in the upper and lower Dresden pool that could result in improvement of fish communities, and also that physical habitat can be improved 'by providing physical structures for the growth of microbial organisms and macro invertebrates that can provide food to fish.' Please explain in greater detail the nature and extent of improvements to habitat and their location in the upper Dresden pool that you were

referring to in this testimony." And I will just add, I know you talked about the potential construction of a dike. We already have that. But I don't know that you have identified any other improvements you think, habitat improvements, that could be made in the upper Dresden pool that we haven't already discussed. So I'm not asking you to repeat your testimony, but to make sure I know all of what you are referring to.

MR. ETTINGER: I'm sorry, you just shifted back to the upper Dresden Pool. You want to answer this for the upper Dresden Pool or are we at the Sanitary Ship Canal?

MS. FRANZETTI: The question is the Dresden Pool, and I believe his prior testimony regarding construction of the dike was also the Dresden Pool.

MR. ETTINGER: I was confused.

MS. FRANZETTI: So, yes, we are staying in the Dresden Pool.

MR. ETTINGER: I was confused because your last set of questions was about the Chicago Sanitary & Ship Canal.

BY THE WITNESS:

A. Well, there's always lots of things you can do to improve fish habitat. Again, I think it takes an analysis of those habitat types that might be limited for species of interest. One of the things we recommend, like in Lake Peoria, where the Corps is dredging, is the creation of some islands with some deeper water around them for over-wintering habitat. Because deeper over-wintering habitat is an issue in that part of the Illinois River. It may or may not be an issue for the Dresden Pool. So depending upon some of the species you were interested in and what you were interested in enhancing, might effect the types of things that you might want to do in that pool. All I'm saying is there's a number of possibilities of things to do to improve fish habitat. But, again, it's got to be targeted at what species you are interested in and what you would like to see improved.

Q. And you have not done the analysis you are talking about, the species type you want to improve and what they would need and whether you could do that in the upper Dresden Pool? You

haven't done that type of analysis?

A. That's correct.

Q. Moving on to Question 13, do you believe the absence of sufficient food for fish is currently a limiting factor to species abundance and diversity in the upper Dresden Pool?

A. Well, I have not seen any data that would indicate that food is a limiting factor, with a possible exception of small mouth bass. The EA study showed plankton in the upper Dresden Pool to be similar to other large water bodies. I think Burton and Siegert testified the condition of fish in the upper Dresden Pool is similar to other water bodies. But their reports did say that small mouth bass had lower condition. Whether that's temperature effect or a food effect or some other thing, I don't really know. But the data I've seen does not seem to indicate that food is limiting for most of the fish in the system.

MS. FRANZETTI: And, again, the data that you are referring to, is that something, Counsel, that maybe we can get some clarification on after you've had a chance to talk to him?

MS. DEXTER: I think we need to go back and look through the reports and identify which ones he's talking about.

BY THE WITNESS:

A. I apologize if some of them weren't in the records. My understanding was it was part of the record.

BY MS. FRANZETTI:

Q. It may well be, Dr. Thomas. You don't have to apologize for anything at this point. We just need to get a little clarity when you say the data you've seen. You can appreciate that.

A. I'm sorry that I didn't get more specific.

Q. Right, and it makes it difficult, if not impossible, for me to ask follow-up questions about that data.

MS. FRANZETTI: And on that note, Madam Hearing Officer, I'm just going to reserve the right to ask further questions of Dr. Thomas when we do have a little more clarity and certainty to the data that he's referring to for some of these statements.

BY MS. FRANZETTI:

Q. Question 14. "Your pre-filed testimony states that many structures will also provide shelter and potential breeding habitat for fish. What fish species are you referring to, and of those species, will the suitability of the habitat still be effected at all by the presence of sediments"?

A. Well, in those areas of heavy sedimentation, I mean, that's a problem for almost all Illinois waterways. So that would be a problem, if you put a structure in an area where you have heavy deposition. So if you were going to put sand and gravel in, for instance, or if you are going to put in riffraff or something in, you would put it in areas that tend not to be depositional areas. In other words, areas where you have a significant build-up of sediment, and those are usually very quiet areas, back water areas where the sediment can drop out and accumulate.

Q. What fish were you referring to?

A. I think if, you know, if it was determined that someone wanted to create more

habitat for small mouth bass, for instance, you might look and see if there were areas where there was some current. You haven't had enough depth and you thought adding gravel or sand and gravel mix or something might provide some habitat for them to build a nest in. That could be just one example.

Q. So with respect to upper Dresden Island pool, you have not done an evaluation as to what additional shelter and/or breeding habitat for whatever species of fish you think are or should be there, you have not done that type of evaluation?

A. No. Other than saying that there's pretty good sun fish population, pretty good large mouth bass, I have to presume that there's habitat for nest builders to successfully build nests and have young and reproduce in the system already.

Q. Moving on to question 15. "Would you please identify the facts that support your belief that the upper Dresden Pool can 'support a more balanced and diverse fish population'"?

A. Yes. And probably by that I meant a greater number -- greater numbers, and

particularly some of the more sensitive species. I mean, we already have a pretty large mix of species, but we could see potential improvements in this habitat for Walleye and small mouth bass and channel cat fish, potentially some of the red horses. So those would be species that we might see greater numbers of with potentially improved water quality in that pool.

Q. What facts are you relying on for those opinions?

A. What's supported in other areas.

Q. Of the state? You mean other rivers?

A. Yes, even in, say, the lower Des Plaines River, for instance, or downstream pools.

Q. Downstream of the I-55?

A. In the Illinois River, for instance.

Q. Any other facts that you are relying on to support that opinion we haven't covered?

A. Well, I think the other is just the history of the area. If you look, I mean, the late 1960's, early 70's, we had basically carp and goldfish with cancers on them, and today we have a

much more diverse population. As water quality has improved over the last 20 or more years, we've seen sort of steady improvements in the fish community. Now, I realize that the data shown over the last 15 years, you have some years that are better than others in terms of the fish population that's in the system, but the evidence seems to indicate that as we've done things to improve the water quality that the fish populations have responded in a positive way to that. So I don't have any reason to believe that we couldn't continue to see some improvements beyond where we are now in that system.

Q. And that's based on the fact because there were improvements from the 60's and 70's to today?

A. Well, and even more recently, and I know I'm not testifying right now on the CAWS, the Chicago area waterways, but I think even with the TARP system, that portion that's gone into effect, there was some fisheries that indicated some improvement even after that. So I think we've been doing things that have resulted in a positive response from the fish community in the system.

Q. And what more are you saying can be done in the upper Dresden Pool that you believe will result in a more balanced and diverse fish population?

A. Well, there's been a number of potential stresses on the system that have been identified, and I think as we continue to move to reduce some of those, and I think temperature is one of those, I think dissolved oxygen at times may be a problem, contaminated sediments may be a problem for some species in some places. Barge traffic may be a problem. We're not going to correct that. Or at least it's unlikely. So I think we have a number of stresses, but I think as some of those can be reduced, I think we can expect that we'll see response from the aquatic community.

Q. Now, is that based on any studies, any analysis, any evaluations that you've done?

A. As I said, you can base it just on what's happened in this whole upper Illinois River system as water quality has improved since the early 1970's or other systems. We ran into -- one of the other areas that I worked on in New Jersey

was the lower Raritan River and Raritan Bay area, and that actually was a coal fire plant we were working on, and they never had any problem with impingement there or entrainment until somewhere in the mid-'70's as water quality started cleaning up, all of a sudden fish populations moved in and they started having plants grow and all of a sudden they were having entrainment impacts on things that weren't in that system before. So I think there's a lot of data out there on how fast the aquatic community can respond if you have improvements in water quality.

Q. Speaking of temperature, question 16, what are the temperatures in the upper Dresden Pool you are referring to as necessary to improve species abundance and diversity?

A. Well, I was referring to probably the IEPA recommended thermal maximum. Probably very generally temperatures above 90 degrees Farenheit in the system. I think as some of those temperatures were reduced, we might expect less avoidance and possibly better fish growth. I think that's -- and possibly the better habitat for fish like red horses and maybe white sucker

who might be a little more sensitive to warmer temperatures.

Q. And those are the improvements that you believe would occur if the IEPA proposed thermal standards were adopted?

A. I think they would move us farther in that direction of raising those periods, even though they may be brief, of higher water temperatures.

Q. All right. So they might move us in the direction of better fish growth, less avoidance; is that what you mean?

A. Yes.

Q. But you are not sure how far they might move us?

A. Give you a quantitative -- no.

Q. Moving to 17, and you mentioned at least one of these fish in that answer, you testified that white sucker and logperch are temperature sensitive species. "See Section 2, fourth page, last paragraph, and the fifth page, first paragraph of your testimony." What information did you rely upon to determine that these species are temperature sensitive?

A. Well, I -- for the white sucker, I relied on -- Yoder had an upper avoidance temperature of about 84 degrees Farenheit and an upper incipient lethal temperature of about -- rounding it off to about 89 degrees Farenheit. There was -- I had some data from Fish and Wild Life Service that had a little bit higher upper incipient lethal temperature for white sucker up at 91.4 degrees Farenheit. So those are two sources. They are off by a few degrees, but you get that kind of variation in the literature.

The logperch, I had an upper incipient temperature of 26 degrees centigrade. I'm not sure the table I got is in the record or not.

Q. Do you remember what table you got it from?

A. Well, I have the table.

Q. That's a good start. Pull that baby out.

A. You'll have to give me a minute here. I am not sure if it's in the folder or not.

Q. You know what, what we can do is, I think at a certain point here that I won't be done

that we're going to take a lunch break, do you want to look for that over the lunch breach?

A. Yes, let me try to dig that out, because -- actually, it's interesting, it's a species that I worked on for my master's, and I know where it's found, but I only had that one reference that gave upper incipient lethal temperature.

Q. Now, let me go back to the white sucker, just to be clear on the record what you did rely on. I appreciate you giving me the temperatures for the white sucker that is your basis for saying they are a temperature sensitive species. But let's be clear about where you got the data. You were relying on Mr. Yoder's data that he presented in this proceeding with respect to white sucker?

A. Yes, that was one of them.

Q. One of them, right. And then you mentioned some fish and wild life temperature data, correct?

A. Let me check something because it may have been out of the "Temperature Criteria for Fresh Water Fish" by Brungs and Jones. I'd have

to look through there to see if -- because they have a number of species listed.

Q. Dr. Thomas, you want to just maybe include that in the homework I'm giving you for the lunch hour?

MR. ETTINGER: Is Brungs and Jones in the record?

MS. FRANZETTI: It's been mentioned. I'm not positive if it is or not. It's definitely been mentioned. I'm not sure --

BY THE WITNESS:

A. I don't think that's where I -- I don't think that's where I got it. I think it was more recent data. I was just looking quickly. I know there's a table.

HEARING OFFICER TIPSORD: Jess indicates that's she's checked and it's not in the record.

MS. DEXTER: If it becomes time, we can put it in the record.

MS. FRANZETTI: Well, he just said, at least on this one -- it may change on logperch -- he didn't rely on that.

A. Yes, I was supposed to look at white

perch. I was looking at logperch. Yes, white sucker is in there -- no, well --

Q. What's the temperature in there?

A. Well, they just list here the maximum weekly average temperature for growth, and they listed that at 82 degrees in Farenheit.

HEARING OFFICER TIPSORD: At this point we need to put that in the record. We're reading from it, we need to put it in the record.

MR. ETTINGER: You can put it in the record, but I need it back.

MS. FRANZETTI: At least Jessica comes prepared unlike some other people we won't name.

MR. ETTINGER: She's eager to get rid of these.

HEARING OFFICER TIPSORD: I've been handed Temperature Criteria for Fresh Water Fish Protocol & Procedures, U.S. EPA, Environmental Research Laboratory Office of Research & Development. And it's got a May 1977 date on it. If there's no objection, we will enter that as Exhibit 328. Seeing

none, it's Exhibit 328.

(Whereupon Exhibit No. 328 was entered into the record.)

MS. WILLIAMS: I'd like to clarify for the record. I don't want to object. I believe Jessica is correct, that this is not an exhibit, but I believe the Agency submitted it.

MS. DEXTER: I believe I checked through.

MS. DIERS: Mr. Yoder did follow up, and it was attached.

MS. DEXTER: In the big one, yes.

MS. WILLIAMS: Well, when we had to do supplemental to what people requested, I'm pretty sure it was in there.

HEARING OFFICER TIPSORD: That's fine, but since we are dealing with it at the hearing, we'll go ahead and mark it again.

THE WITNESS: I should just add on to that, on page 51, Appendix B, they actually have it listed by its scientific name, which is Catostomidae, and they do

list some various lethal thresholds. That's probably somewhat different than upper incipient lethal temperature. Anyway, they have some different values in there. They are all in centigrade. So there is some additional data in there, but I didn't see any for the logperch.

BY MS. FRANZETTI:

Q. Dr. Thomas, recognizing you don't have specifically what the thermal data was you were relying on, let me ask you more generally, with respect to demoting white sucker and logperch as temperature sensitive species, were you primarily focusing on upper incident lethal temperatures, UILT?

A. No, where available I'd look at avoidance temperature. I mean, if you have temperature for growth, that's very important too. A lot of the literature doesn't have that for a lot of those species so --

Q. Okay. So you looked at, I guess, then any thermal data for these two fish species that you had in coming to the conclusion that they are temperature sensitive species, correct?

A. Well, I looked at the RIS list, the representative important species list that's been present, and then as I looked at the temperatures for those, I looked at what are the species on the lower end of that range. We're saying temperature sensitive. Maybe that's not the best term. They are the most sensitive or they have the lowest lethal temperatures or maybe on the lower end of the avoidance temperatures of the RIS group. I think that's a more accurate or better way of characterizing it.

Q. Thank you. We'll leave it at that, and when you can more specifically identify the data --

A. I got it off a table, and I'll try to identify what the source of that was.

Q. Great. Moving on to question 18, will a reduction of temperatures in the upper Dresden Pool without improvements in dissolved oxygen levels achieve a diverse fish population?

A. That's sort of a funny question in a way. I mean, I guess achieve a diverse fish population indicates there is a not diverse fish population there now. A better question might be,

would it improve to some degree the fish population or some aspects of the fish population. I think the two have to go together, the temperature and the dissolved oxygen, which in some ways they often do. I think from my reading of some of the Midwest Generation reports, DO has not been reported as a widespread problem, but there has been indication that it may be a problem at some times or some places within the pool.

Q. Do you have any -- do you have any opinion as to whether you think temperature is a more significant stressor in the upper Dresden Pool as compared to dissolved oxygen?

A. From the data I've seen, I would say that temperature is probably more significant than dissolved oxygen.

Q. Why is that? What's the basis of that?

A. Well, the basis of that, I guess, is that temperatures at time go above the avoidance temperature or approach lethal temperatures for some species at times where I haven't seen data on the dissolved oxygen in that pool that would indicate that it's reaching a lethal level for

some fish. Now, I'll be the first to admit that I haven't reviewed probably every DO record that's been collected out there. So I'm just saying from what I've seen in the record, that would be my opinion at this point. I do -- I can say in answer to that question that I did look at the upper avoidance temperature for like red horse and white sucker, and that seems to be in the 28 to 29 degrees centigrade range, and I'm sorry, I don't have the quick Farenheit translation of that, but it's in the 80's somewhere.

Q. Let's move on to question 19. What are the temperatures that you are referring to in your statement that the temperatures in the upper Dresden Pool at times in the summer months are sufficient for causing avoidance and limit the carrying capacity of the system? So first start with the temperatures that you are referring to.

A. Again, temperatures higher than the avoidance temperatures of some of these fish would indicate that the fish are going to move out of those systems.

Q. And can you generally reference what you are using as the avoidance temperature?

A. As I said for red horse and white suckers it's in the 28 to 29 degree centigrade. That's what's in the record. But I also based it the UAA report that temperatures at times were near or above the upper avoidance temperature of some species and also the ecological analysts -- this time I did write it down, the 2003 report regarding thermal standards on page 35 said that resident fish can and do move temporarily out of thermally enhanced areas and into portions of the river that are more suited to their preferred temperature range. So, again, I was using some of the EA reports, as well as the UAA, as well as some of the data that I saw on avoidance temperatures.

Now, I'll tell you the one thing that I found totally missing in terms of doing a good analysis, if you will, or just overview of the effects of temperature, I have not seen thermal plumb data from the discharge down to the I-55 bridge that shows the extent of the plumb, the top to the bottom temperatures. I did see one place, I can't remember where it was now, that said thermal mixing of the plumb with the river

probably occurred somewhere between two and four miles downstream. But I don't know -- I mean, if I was one that was going to do a real evaluation of that, I would -- and I think that thermal plumb data was referenced somewhere in someone's testimony that the plumb study was done -- I just had not seen the results of that plumb data. That would sort of be helpful, I think.

Q. How would you use that data? Why would it be helpful?

A. I mean, there's statements in here, like there's room for fish to move under the plumb or away from it, which I assume is correct, but I haven't seen the data that really shows me. For instance, suckers are going to be near the bottom and the red horses. So what is the temperature along the bottom, and when it fully mixes what are the temperatures really there. I don't really know. And without seeing that -- I mean, I think I have seen some things from the I-55 bridge that seems like it can be like up to 70 degrees Farenheit, above ambient temperature, but, again, without seeing good plumb data and how that plumb

operates and what the top to bottom and what the one side to the other are, it's a little hard to evaluate, what's available for fish for avoidance or attraction or whatever so.

Q. What do you mean by the carrying capacity of the system? I'm still on question 19.

A. Carrying capacity is just a term, fisheries' term used to indicate, if you will, the poundage of different fish that a system might support. It's based on habitat and competition and food availability and a variety of other things. You might hear the term, you know, this area will support, I don't know, X-number of large mouth bass or so many pounds of fish or whatever, so --

Q. So in that part of your statement, are you basically saying that it's your opinion that there would be more fish there?

A. I think certain species, we might expect an increase of if temperatures were lower.

Q. Which ones?

A. The red horses, the white sucker might be one. Walleye could be one. Small mouth bass could be included in that. Those would be a

few of the species right offhand that I can think of.

Q. Moving on to question 20. In your testimony you note that you, "Have not seen data that demonstrates that sediment toxicity is a major factor limiting the aquatic life potential of this system." Did you consider in your review of QHEI scores to what extent sediments were present in those areas that scored greater than 45 and to what extent the presence of those sediments, separate and apart from the issue of their toxicity, would impair the quality of that location for aquatic habitat?

A. Well, sedimentation is a problem throughout our state, actually throughout the Midwest, and there's no doubt that just heavy sedimentation in and of itself has been for a long time and continues to be a problem. I think actually from my view of, like the pool and the data I've seen, probably the turbidity, the amount of sediment in the water is probably a little bit lower in the upper Des Plaines pool and probably lower than it is lower down in the river or in some other rivers like the Kaskaskia or some of

others now. So, yes, sedimentation is a problem. It does preclude some habitats for fish that might otherwise be used if we didn't have as heavy of a sedimentation problem, but I'm not sure the upper Dresden Pool in some ways probably has lower just silt problem or sedimentation problems than some of our other rivers in the state.

Q. You don't know whether or not it's any worse or any better than any other rivers in the state; is that what you are telling me?

A. I think it's better.

Q. What's that based on? Have you done some comparison?

A. Well, one is aquatic vegetation beds. Most aquatic vegetation in the Illinois has been eliminating, other than, if we get a few years of lower water, some of those vegetation beds will start coming in in some of the back waters in the lower Illinois River. But generally that vegetation has been pretty well limiting. A lot of that is heavy turbidity. If the water stays turbid because of fine sediment in the water and you can't get enough light in, vegetation doesn't take hold.

Q. And that's based on last year's trip to those four or five locations?

A. No, that's based on just long-term data collection on the Illinois River.

Q. No, no, I'm asking you about the upper Dresden Pool.

A. Well, I know from the reports that we referenced earlier from the 80's and early '90's that there were pretty good aquatic vegetation beds then, and from my observations last year, I know they are still there, and some of the other reports I've seen, there's also been reference to the aquatic vegetation beds.

Q. Did you take any time to study the sediment report that was filed in this action prepared by EA? It was an attachment to Dr. Burton's pre-filed testimony.

A. Yes, I did look at that.

Q. And did you in that regard study what the sediment sampling that was done last year showed with respect to the presence and extent of sediments in the upper Dresden Island pool?

A. It was done last year?

Q. Was that a particular exhibit?

A. It was part of that sediment report by EA that was attached to Dr. Burton's testimony. Yes, I think I did see that. That was part of --

Q. You may have seen it. I'm trying to understand whether you considered the data that was collected by EA last year from the upper Dresden Pool in making these statements that you think there is less degree of sediments in the upper Dresden Island Pool than in other waters of the state?

A. In some other waters. I'm not going to say that it's -- I said in some other waters. But some of it is by observation. You can tell highly turbid waters when you see them, and most of them don't have aquatic weed beds in them. Or they have at times when water has been clearer, but most of the time they are gone, and that's true for most of the Illinois River.

Kaskaskia was all always sort of -- it never did have a really well established submersed aquatic leaves. They did have emergent ones -- so, yes, I know that sedimentation is an issue, and I'm not saying it's not an issue. I'm just saying --

Q. It's not significant?

A. It's not of a magnitude that's greater than, say, most other impounded large rivers in Illinois or the Midwest.

MR. ETTINGER: Are we ready for a lunch break yet?

HEARING OFFICER TIPSORD: We need to try to get done with Ms. Franzetti.

BY MS. FRANZETTI:

Q. Dr. Thomas, the turbidity levels that you are referring to, again, what is the extent of your observations regarding turbidity levels in the upper Dresden Island Pool?

A. My own personal observation would be very limited.

Q. Let's move to question 21. Do you have an opinion as to whether sediment toxicity is a factor limiting the aquatic life potential of this system? And I'm going to amend that question to first just refer to the upper Dresden Island pool.

A. There's no doubt that in laboratory studies of some organisms, some of those sediments are toxic. Having said that, it's sort of like

the same issue as the cold shock kill that we were talking about earlier in terms of the Oyster Creek plant. There could be some mortality potentially to some organisms or some sediments that are toxic but is having a population effect. I have not seen any data that would indicate that it's having an adverse effect on a population. With this caveat, it may be creating some longer-term chronic stress to some species. I don't know that as a fact, but it could well be a stressor. Particularly for some of the invertebrate species that may be living near the sediments or in and on the sediments.

Q. And included within your comment, you've seen no data indicating sediment toxicity as a factor in limiting the aquatic life potential, you told me you reviewed the EA report with sediment sampling, and you do not believe that the data reported in that report in any way indicates that sediment toxicity would be a limiting factor in the upper Dresden Island pool; is that correct?

A. Well, the same report that talked about the toxic sediments, and I am not

disagreeing -- in fact, I heard a recent study done by some researchers from Southern Illinois University, they gave a presentation on their report, and it basically supported the burden that found that ammonia, more than ammonia, PAH's, polychlorinated aromatic hydrocarbons, were probably the principal source of toxicity to some micro organisms that they were dealing with in the sediment. They ran a slightly different test than Burton ran. I don't want to get into detail. He ran pour water. They did detail the sediment itself. It was a similar kinds of test. That being said, it was a jump to go from there to say it's having a population effect. And in Burton's report, while he talks about the toxicity, there are other places where he takes about thriving fish population. So I haven't -- that's what I mean by haven't seen -- while I agree that there are some toxic sediments, I haven't seen the data that said, and this is having this adverse effect on populations.

Q. You read Dr. Burton's pre-filed testimony as well as his report, correct?

A. Yes.

Q. And you do not believe that he took the position that sediment toxicity is a factor limiting the aquatic life potential of this system?

A. Well, I can't speak for him. He may well have taken that opinion but --

Q. I'm not asking you to speak for him. I'm asking you when you read his report, his testimony with the attached report, with regard to the sediment sampling and his findings, am I correct that you did not believe he was saying that sediment toxicity is a limiting constraint on the system?

A. He may have said that, but he also said there's a thriving fish population. He also said that the population of plankton is similar there to other large reservoirs. So I mean, I don't know. There's two things. What he said and my interpretation of what he said a couple different places was what is in the record in terms of the populations that are there.

Q. So you disagree with his interpretation of the sediment data that was presented in his report?

A. I don't disagree that some of the sediments are toxic. If he said that it's having an adverse effect on some of the populations, I have not seen the population data that shows that these populations are reduced and they are reduced because of toxicity of the sediment. That's the part I haven't seen. If it's in there, I'll be more than happy to have someone point it out to me because I'm -- you know, it's a big record, and I read through a lot of things fairly quickly so --

Q. Now, do you have any basis for stating that there's no effect on the aquatic life from the presence of that contaminated sediment?

A. I didn't say no effect. In fact, I said, there may be some chronic effect on some populations. You know, the lower growth or the slower growth apparently of small mouth bass or the lower condition factor, I should say, does that have anything to do with effects on their food organisms? I don't know. It may not have anything to do with the toxicity of the sediment.

Q. You mentioned I think you said a recent study by some Southern Illinois researchers regarding sediment toxicity. Would you describe

that more fully for me, please, what you are referring to.

A. Yes, I could -- this is a paper that's going to be published. It's not published yet. So what I heard was a progress report. Actually, it's a manuscript in preparation for publication, but it hasn't been accepted yet or published in the peer reviewed literature.

Q. Who did the study that they are preparing to publish?

A. Michael Litti was the primary -- oh, wait. There is a group of authors, and it's a 2009 study. The name of it was "Identifying The Causes of Sediment Associated Contamination in the Illinois River Using A Whole Sediment Toxicity Evaluation, TIA.

Q. Why is that relevant here?

A. It's relevant because some of their stations were in the Dresden Pool.

Q. Oh, okay.

A. Or in the Chicago waterways under consideration. They did other parts of the Illinois River, but really they found the toxic effect only in the waterways we are talking about.

So a lot of their data supports Burton's findings. That's all I was saying. But they use a slightly different methodology. They use the effect of TIA on sediment. My understanding is Dr. Burton used it on the pour water. In other words, the water between the sediment. We get somewhat different results doing those two. I think he found pneumonia as having a higher toxicity effect. They found polychlorinated aromatic hydrocarbons, especially in combination with possibly some of the oils and greases as having the more toxic effect. But, again, you are exposing organisms into that mixture and then looking at the toxic effects. That's quite different -- so as I said, I don't disagree that these, some of these sediments are toxic to some organisms, but to take that to a population level on organisms that aren't living right necessary in contact but maybe in the water column but may be moving to different areas, exposure becomes a lot different.

So whether it's having a population effect is a whole another area, and I have not -- and that's what my testimony was. I have not seen the data showing it's been a

population effect or an effect on any particular population due to contamination of the sediment.

Q. Now, can you tell us who these researchers are associated with?

A. Southern Illinois University.

Q. I think all we had was Southern Illinois, which could be a geographic location and not the university.

A. Yes.

Q. And, again, their findings for stations that were within the -- is it --

A. I think their upper station might have been the Stickney plant or somewhere near there, and then they had a few stations --

Q. Down stream?

A. -- including, I think, some in the Dresden Island Pool.

Q. And with respect to their findings, they found the sediments were toxic?

A. Some of them.

Q. Okay.

A. Like all studies, there's a lot of variations between stations. So you may have a toxic area in one area and the next area may not

be or may be much lower.

Q. So some of the stations within the waterway system we're looking at in this proceeding did show that the sediments would be toxic to aquatic life, correct?

A. No, were toxic to the two test organisms that they utilized.

Q. And those test organisms were not aquatic life?

A. No, they are aquatic lives, but you can't make the generalization to all aquatic life. Fish might not have -- if you put fish in there, these are planktonic organisms basically. So if you put fish in there, they may have had very different results or quite different results.

HEARING OFFICER TIPSORD: Dr. Thomas, did I understand you that this is not yet published? There's no written material on this? This is based on you seeing a presentation at a conference?

THE WITNESS: Well, and I also got a draft of their paper that is going for publication.

MS. FRANZETTI: Can you supply us

with a copy of the draft?

THE WITNESS: I would have to get the author's permission I think. I'm sorry for that.

HEARING OFFICER TIPSORD: That's quite all right. I thought I might be able to short circuit some questions if we could have a copy of it.

THE WITNESS: I would be glad to check to see when it would be able. I'm sure it's going to be out and published and read by a wide audience before this hearing is over.

HEARING OFFICER TIPSORD: After. But you under estimate me.

MS. DEXTER: Can I ask one follow-up before you move on to the next topic. Have you studied other rivers for toxic sediments in them and observed what the fish populations are like in those rivers? Do you have any examples of that?

THE WITNESS: Yes, I'd say Raritan Bay, there were highly toxic sediments there. I'm trying to think of some other

ones that I was involved in. Of course the Calumet we've already talked about with its toxic sediments. Crab Orchard studies were looking at the effects of both metals and PCP's on their fish populations. And that's a case where there didn't seem to be impact on the fish themselves, but there was an issue of bioaccumulation and impact on potentially human health if fish were consumed. So I think those are the some of the major ones.

Well, I was just reminded of some of the stripe bass data we were involved in accumulation of PCB's. There was a while where the best breeding population of striped bass along the Atlantic coast was a Hudson River striped bass that had the highest levels of PCB's. So sometimes you can't always associate a contaminate with it's potential effect on the population. It was not having an effect on the bass, but there were concerns about human consumptions of PCB's.

BY MS. FRANZETTI:

Q. Moving on to 22. What type of habitat does the white sucker need in order to spawn successfully in the waterway?

A. Usually gravely areas at the lower end of pools are sort of a traditional place that they spawn.

Q. To what extent is that habitat present in the upper Dresden Island pool as defined in this proceeding obviously from the I-55 bridge up to the northern boundary of the pool?

A. Again, I would assume there's habitat on the --

Q. No, Dr. Thomas, I don't want you to assume. I'm asking you, do you know what type of habitat, whether and to what extent there is that type of habitat in the upper Dresden Island pool? If you don't know, that's fine.

A. Yes, it is there, that kind of habitat.

Q. Where in the upper Dresden?

A. In the tail water area.

Q. Any other place other than the tail water?

A. I wouldn't know for sure.

Q. What type of habitat does the logperch need in order to spawn successfully in the waterway?

A. Let me go back to one other point in the white sucker, if I may. I believe in some of the EA collections that was in the top -- young of the year were in the top ten species that they collected in the pool, at least in one year of data. So that would sort of indicate that there's probably spawning other places in the pool besides just the tail water area.

Q. That's sufficient data for you on which to make that conclusion?

A. Well, my conclusion was that -- my judgment was that if it's that common in their collection, that there were probably other areas, but it could have been all the spawning coming from the tail water area. I don't know for sure.

Q. I'm just trying to -- with all due respect, Dr. Thomas, I'm trying to understand when it is you need data in order to draw a conclusion and when it is you don't?

A. You always could use some kind of data.

Q. What type of habitat does the logperch need in order to spawn successfully in a waterway?

A. Usually clear, weedy, sandy areas. It will spawn in riffles, but it will also spawn along shore lines and lakes. Could be actually more habitat for them to spawn in, in the Dresden Island pool, than possibly even the white sucker.

Q. And, again, do you know to what extent that type of habitat is present in the upper Dresden Island pool?

A. I just know from some of the things I've read that there are sandy bottom areas in places. I don't know -- I couldn't tell you how many acres or foot of shore line or whatever.

Q. Do you know whether there's a sufficient amount to support a logperch population in the upper Dresden Island pool?

A. The data seemed to indicate that there's not much of a logperch population in the pool right now. In other words, there's not -- whereas I mentioned white sucker being in the top ten list, I actually have the data to go back to and look. But just off the top of my head, I

don't think there were that many logperch captured.

MR. ETTINGER: Her question was not what's there now but what would their habitat support.

BY MS. FRANZETTI:

Q. Do you think -- in other words, looking at the logperch numbers you've looked at, do you think based on your knowledge of this type of habitat being present, there should be more of them? And, again, if you haven't made that analysis, it's fine, tell me you don't know. But if you do, I would like to know.

A. Well, there's a number of factors that go into that. I'm trying to think of the best way to answer that. I would think there should be -- they should be able to do reasonably well in that pool.

Q. Why is that?

A. Because I think there is, from what I've read, it does seem to be the habitats available that they could spawn in and carry out their life history.

Q. And when you say they should be able

to do reasonably well, that means better than what you are seeing in the fish studies that you've seen?

A. Yes, probably higher numbers than what I've seen.

Q. Can you quantify it at all? Do you think another ten percent, another 50 percent?

A. One of the reasons I hesitated is a lot of electro fishing has been done. It's not -- for some of darters like that, that don't have an air bladder, it's not a -- it's not a very efficient gear to collect them, especially if they are in a little bit deeper water. So you tend to get small numbers, which may or may not be very reflective of the population. Seining, sometimes if you catch them in shore, you could get bigger numbers, and I do know that seining was done there so.

Q. So there may be more of them right now -- what you are saying is because electro fishing, for example, does not do a great job of collecting logperch, there could be more of them there than the numbers bear out?

A. That's correct.

Q. Okay, so I understand you correctly. So if that's the case, you are not sure how many more could really be there?

A. That's correct.

Q. Moving on to question 24, do you agree with the EA fish studies' conclusions that the fish community in the upper Illinois waterway is highly stressed and habitat limiting?

A. I actually could not find in their report the use of the term highly stressed system. I did see in Mr. Siegert's testimony a discussion of habitat, what he considered habitat limitations, but maybe somebody could point that out to me. I just didn't see. I looked through the report actually looking for that term "highly stressed" and I did not see that.

Q. Okay, let's take it apart and then state it. Why don't we just narrow it to, do you agree with the EA fish studies conclusions that the fish community in the upper Illinois waterway is habitat limited?

A. Well, I mean, there are a lot of other stresses that were talked about in addition to habitat.

Q. Just asking if you agree with their conclusion that the UIW is habitat limited?

A. To the degree that the most impounded bodies of water are habitat limited, I would agree with it.

Q. Moving on to 25, do you agree with EA fish studies' conclusion, that diversity in this system was dependent on species adapted to contaminated conditions and that because of these inherent limitations in the ichthyoplankton community was not likely to change in the UIW for the foreseeable future?

A. One, I did not find that conclusion in the EA ichthyoplankton report.

Q. Okay.

A. And I don't think species can adapt to contaminated conditions. So I don't agree with that phrase.

Q. You don't agree that species can adapt to contaminated conditions?

A. That's correct.

Q. What's that based on?

A. Based on a lot of years of studying contaminant effects, on the literature, on

contamination. You can measure the mortality of species to levels of contaminants, but I don't think it's a matter of species adapting to contaminants. Even when we did, years ago when we did avoidance studies, you could get fish to be attracted to or avoid high temperatures and they may or may not move in and out of low DO or low dissolved oxygen values, but if you put copper in the water or some other contaminant, they do not seem to respond. They either get killed, but they are not adapting to it. They are not responding to it. If you have a gradient of chemicals, for instance. So maybe with further thought I would think of something that's been an adaptation to a contaminant, but generally I would say organisms are not adapting to a chemical contaminant in the water.

Q. All right. With respect to -- strike that.

I know you said you didn't find this conclusion in the EA fish studies that you reviewed. Let me ask you to assume that it was their conclusion that because of contaminated conditions in the UIW, that the ichthyoplankton

community was not likely to change in the foreseeable future. Would you agree with that conclusion?

MS. WILLIAMS: At this point I want a clarification for the record of the use of the term UIW, the definition of the term UIW.

MS. FRANZETTI: I'll narrow it. I think the way it was used in the reports was a little broader than this, but for purposes of this question, we'll go from the Chicago Sanitary & Ship Canal down to the I-55 bridge?

THE WITNESS: I'm sorry, can you repeat the question?

MS. FRANZETTI: Let me try and rephrase it.

BY MS. FRANZETTI:

Q. I'm going to ask you to assume, because you said you didn't find this conclusion in the report --

A. Yes, that's correct.

Q. All right. So I want to just lay out --

A. Assume that they did.

Q. -- lay out the question for you and ask you if you agree with it. So with respect to the conclusion that because of contaminated conditions in the UIW as I've just defined it creating inherent limitations in the ichthyoplankton community, do you agree that it is not likely to change in the foreseeable future?

A. Well --

Q. And you may not have an opinion on this?

A. I do have an opinion. I don't really think the chemicals in the bottom are limiting the ichthyoplankton.

Q. Why is that?

A. Well, you've got a number of nest builders out there, various sun fish species, large mouth bass, their population. They are doing as well in that pool as we find down river. So they are at least finding areas of carrying out their lifecycles and producing young that are equivalent to other impounded parts of the Illinois River, for example. On the other hand there may be -- I mean, it wouldn't surprise me if

chemical contamination is a stressor on some fish along with other stressors that have been identified on the system. So it could well be, especially if there were hot spots of contamination that were identified, that removing some of those or burying them or whatever, making them less available to fish population could lead to a reduction in that stressor, and whatever response might come from that by the aquatic community.

Q. Moving on to 26, in your testimony you indicate that, "These waterways could support tolerant or intermediately tolerant species." That's Section 3, fifth page, second paragraph. And indicate further that this conclusion is based on your personal knowledge of the CAWS. Please explain what personal knowledge you are referring to?

MR. ETTINGER: Did your question say CAWS?

MS. FRANZETTI: Yes, because that's what I believe he referenced in this part of testimony.

MR. ETTINGER: Okay, now we are

talking about the whole water body, not just the upper Dresden Pool.

THE WITNESS: That I believe pretty well came from the fisheries report, the data in the fisheries' report that was collected by the district, and that is in the record. And I think that may have been one of their -- I mean, their data really showed that over the years there has been a positive response from the fish population in many parts of the Chicago area waterway.

BY MS. FRANZETTI:

Q. And what about -- can you just elaborate in terms of your personal knowledge is, having gone through the district's fish data, correct?

A. Yeah. I mean -- right.

Q. Okay. And based on that data, you have drawn the conclusion that these waterways can support tolerant or intermediately tolerant species, correct?

A. Some portions of the waterways, yes.

Q. Which portions?

A. Particularly those portions

designated as waterway A, the A category. There's A and B waters. Those designated A, I think have some that might be. Immediately tolerant is not the term that's being used here. There's tolerant and -- I get sort of mixed up in the different terminology.

Q. Were you trying to mirror the terminology that's being used in the proposed resolution?

A. At that point I wasn't familiar with the terms that were being used.

Q. I don't know I want to take the time, but it might have been moderately tolerant.

MS. FRANZETTI: Off the record.

(Discussion off the record.)

BY MS. FRANZETTI:

Q. Dr. Thomas, maybe let me just ask you directly, what did you mean by intermediately tolerant, and can you explain that a little more?

A. I think that was like small mouth bass or white sucker, possibly yellow perch.

Q. Moving on to 27. You used the phrase in your testimony, lower Dresden Pool. So please identify the boundaries of the area that

you are referring to at the bottom of page 4 of your testimony where you reference "lower Dresden Pool, and particularly is that -- does that include any portion of the pool that is below south of the I-55 bridge?

A. Yes, that needs to -- I probably meant either the lower Des Plaines River, but more specifically the upper Dresden. It should be the upper Dresden Pool, rather than the lower. That's a correction that should be made as a correction in my testimony. It should be the upper Dresden Pool.

Q. I'm trying not to talk over you, but I'm never sure when you are done. For the court reporter's sake, I apologize.

So there you are intending to refer to the upper Dresden Island pool as the Agency has defined its boundaries in this rulemaking, correct?

A. Yes, that's correct.

Q. Dr. Thomas, I did have one more follow-up question on this issue of tolerant, intermediately tolerant species. My question is, is that the fish community that -- strike that.

Is that how you would describe the fish community that is already present in the upper Dresden island pool as consisting of tolerant and intermediately tolerant species?

A. You are asking me a slightly different question than 28, I take it.

Q. Yes, yes. I'm asking you whether if you were to describe the fish community that's currently present in the upper Dresden Island pool, would you describe it as consisting of tolerant and intermediately tolerant species?

A. Yes, I think that would be reasonable.

Q. I'm just trying to give more description to what you meant by those terms.

Moving on to question 28. What criteria do you believe should be used to identify a species as a representative aquatic species for purposes of aquatic life use designation?

MS. DIERS: I want to object to this question. The wording "representative aquatic species" has not been used in this proceeding or Mr. Thomas' testimony for purposes of aquatic life use designation.

It's only been used in the context of establishing thermal criteria to support those. If you are willing to rephrase, I'll withdraw my objection, but I object.

MS. FRANZETTI: Well, let's do it this way.

BY MS. FRANZETTI:

Q. Dr. Thomas, are you familiar with the phrase representative aquatic species?

A. Are you using that as the same as the RIS list?

Q. That's really my question. Separate from the RIS list, do you have any familiarity with the term representative aquatic species? First let's start there.

A. Okay, I guess in my mind I was looking at those as about the same. You are taking a subsection of the total fish that are there and using that, whether it's temperature criteria or some other, you are using a smaller group of organisms to represent a larger body of organisms.

Q. Right. So you are equating RIS and RAS as essentially having the same meaning?

A. Yes.

Q. So use RIS, given that that will get us past the objection, what criteria do you believe should be used to identify a species as a resident -- what does the I stand for in RIS?

A. Important.

Q. So what criteria do you believe should be used to identify a species as a resident important species for purposes of aquatic life use designations?

A. Well, I realize the RIS has been used a lot in reference to temperature particularly, but I think Yoder put it pretty well, having an adequate representation of the spectrum of thermal tolerances, that spectrum I think hits other aspects of a life history too, and one of the problems, I think Yoder actually pointed this out is, we have -- whether the data is on temperature or oxygen or a contaminant, we tend to have much less information available on some of the more sensitive species. One of the reasons is they are not that easy to raise in the laboratory or to work with. So the fathead minnow that's used all the time. It's a fairly easy

species to raise. It's fairly hearty. But protecting it isn't going to necessarily protect a variety of other species in the system that are a little more sensitive. So I think trying to pick a range of species that sort of have a spectrum of tolerances, if you will, temperature has been the primary way of looking at that, but as I said, it could relate to other things, is a way of trying to assure whatever standard you are setting can be protective of that community. And if you want to be conservative about it, then you try to pick things on the more sensitive end to make sure you are protecting all of the system, not just the more tolerant points.

Q. Okay. Moving on to question 29. On page 5 of your testimony in the last paragraph of Section 2, you reference that in the EA 1994 ichthyoplankton investigation, which is attachment LL in this proceeding, that roughly 22,000 larval, young of year fish were collected. Do you agree that the EA 1994 investigation also stated that only six species or taxa accounted for 86 percent of those individuals collected?

A. Yes. And I think that's a number I

couldn't verify off the top of my head, that it was actually 86 percent, but something in that order I would certainly agree to, and I don't find that unusual for a lot of water bodies. Relatively few species may make a large portion of ichthyoplankton.

Q. Moving on to the next question. Did you review the EA findings that these six species share early life history characteristics that allow them to be successful in the system. Namely certain adaptations that allowed their eggs or larva to tolerate low dissolved oxygen levels and to have minimal contact with bottom sediments?

A. Well, I'm not sure about the tolerant low dissolved oxygen levels.

Q. Why are you not sure about that?

A. Because if you look at sun fish or bass, they fan their eggs for the very purpose of keeping oxygenated water flowing over the eggs. So unless someone actually measured DO in the nest and showed that those eggs are viable and hatching out at one or two parts per million dissolved oxygen, their very behavior is set up to keep oxygen on the eggs or not whether, it's successful

or not, is another matter. Also, the blunt nose minnows, which is another common fish in the system, lays eggs under rocks or hard substrate. It also will fan the eggs with its tail in moving water past the eggs to provide more oxygen, and obviously sun fish eggs which now --

Q. Dr. Thomas, can I just interrupt you there and say, and you don't consider their fanning of the eggs an adaptation as referenced in this question?

A. Well, it is an adaptation. They've been doing it for -- I don't know how far back you have to go. That's part of their life history strategy.

Q. My point being, if there's low DO levels in the water, those two fishes, unlike others, ability to fan their eggs is an adaptation to deal with in part -- in part it helps them deal with the low dissolved oxygen levels in the water, correct?

A. Well, adaptation probably goes way back to their history to the fact that sometimes organics and bottom sediments can lower the dissolved oxygen in those sediments, and fanning

insures that there's going to be more oxygen over the eggs and insures a higher part of survival. It's not an adaptation in the sense we're using earlier in terms of contaminants, but it is a strategy that insures that they are more successful under a variety of conditions, including a condition of low DO.

Q. Now, I'm sorry, I interrupted you. Was there anything else about that EA finding that the six species taxa shared early life history characteristics that allowed them to be successful in the system that you don't agree with or you would like to distinguish?

A. Well, you say have minimal contact with bottom sediments. Something like the blunt nose minnow or fat head minnow, which will lay eggs under a hard substrate, they are probably under a rock or log or whatever, they are probably not in -- generally, not in contact with bottom sediments, but the sun fish and bass are making their nests on the bottom. So they are going to have some contact with the bottom materials. Now, obviously when you fan a nest, one of the objects, besides the DO, is to keep sediment off the eggs

too. So in that sense, they are not as exposed to the fine sediments that may be settling out. That was part of the statement. They are in contact with the bottom gravel, sand or whatever they have laid their eggs on.

Q. Any other distinctions you want to draw with regard to those EA findings?

A. No, I don't think so.

Q. Moving on to question 30. Have you evaluated the effect of the impounded nature of the upper Dresden Island pool on the quality of the aquatic life community that it can take?

A. Yes, and I'd like to take a little time to answer this question because this is actually both a past and present research interest of mine. I mentioned the Kaskaskia River where I had some earlier training. When I first started studying on the Kaskaskia, there were no impoundments on that river, although the Carlvle dam was pretty well constructed, but one of my interests has been the effects of impoundments on fish populations. And I don't disagree with the data that's been in this record that impoundments do change the nature of the fish community. Taken

from a flowing river to a more impounded still water, you help some species of fish, but often you may even eliminate other species of fish that need flowing waters.

Fish populations, as I think I've testified before, in the Dresden Island pool are similar to pools further downstream in the Illinois River, with some exceptions. I think because of the stresses that go with impoundments, it makes it even more important that you have a good water quality because you've already generated some other stresses on some of the fish populations that they might not have in a free-flowing system.

Q. So in your opinion because of the account impounded nature of the upper Dresden Pool, in fact the water quality standards should be stricter than they are in an unimpounded pool?

A. I didn't mean to comment on the standards, but I think that when you have a variety of stressors on a system to a degree that you can reduce any of or all of those or at least some of them, that's bound to be able to help those fish populations that are there.

Q. Will it help if someone of the other stressors is having a bigger, more significant effect that will basically prevent your changing one of them from having any significant impact?

A. I know that's an issue in this hearing, and despite all the evidence seen, I haven't really seen a quantification necessarily of the impact of each of the stressors or the stressors in combination. It just appears from the record that when you can remove some of those stressors, that you do see a positive response. If we look in the Cal Sag, for instance, when they put in the sequel stations in the area they seem to get more small mouth bass and channel catfish, and there seems to be some positive response from the fish populations there. The TARP system, removing some of the storm water overflow into the system, seems to have shown a -- the aquatic community has seemed to respond to that. So there is evidence that as we've improved to what level to what is the most significant, those are difficult issues that scientists can and will argue about.

MS. FRANZETTI: I think we have

covered many of those issues already today.

Thank you, Dr. Thomas, I'm done with my questions.

HEARING OFFICER TIPSORD: Okay, let's go ahead and break for lunch. We'll come back in about an hour. It's twenty to 1:00.

(Whereupon a lunch recess was taken.)

STATE OF ILLINOIS)
) SS.
COUNTY OF C O O K)

I, DENISE ANDRAS, being a Certified Shorthand Reporter doing business in the City of Des Plaines, Illinois, County of Cook, certify that I reported in shorthand the proceedings had at the foregoing hearing of the above-entitled cause. And I certify that the foregoing is a true and correct transcript of all my shorthand notes so taken as aforesaid and contains all the proceedings had at the said meeting of the above-entitled cause.

Denise Andras

DENISE ANDRAS, CSR
CSR NO. 084-0003437