ORIGINAL

IN THE MATTER OF:)
)
WATER QUALITY STANDARDS AND)
EFFLUENT LIMITATIONS FOR THE)
CHICAGO AREA WATERWAY SYSTEM)
AND THE LOWER DES PLAINES RIVER;) No. 08-9
PROPOSED AMENDMENTS TO 35 ILL.)
ADM. CODE PARTS 301, 302, 303)
AND 304.)

TRANSCRIPT OF PROCEEDINGS held in the above-entitled cause before Hearing Officer Marie Tipsord, taken before Sharon L. Berkery, CSR, at 160 North LaSalle Street, Room 9-031, Chicago, Illinois, on the 14th day of August, A.D., 2009 commencing at 1:40 p.m.

APPEARANCES:

ILLINOIS POLLUTION CONTROL BOARD
Ms. Marie Tipsord, Hearing Officer
Mr. G. Tanner Girard, Acting Chairman
Mr. Shundar Lin, Board Member
Ms. Alisa Liu, Environmental Scientist

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

ENVIRONMENTAL LAW AND POLICY CENTER,
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MR. ALBERT F. ETTINGER,
MS. JESSICA A. DEXTER,
appeared on behalf of ELPC, Prairie Rivers Network, and Sierra Club;

APPEARANCES (cont'd.):

BARNES & THORNBERG, LLP,
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312-357-1313
MR. FREDRIC ANDES,
appeared on behalf of the Metropolitan Water Reclamation District of Greater Chicago.

REPORTED BY: SHARON BERKERY, C.S.R.
CERTIFICATE NO. 84-4327.

MR. ETTINGER: For those of us who want to try and set a new record for number of exhibits, you'll be thrilled to hear that I have here a compilation of what I think is the natural history data that Dr. Thomas referred to earlier.

MS. TIPSORD: Okay.

MR. ETTINGER: And I just want to show you that and ask you what this is.

DR. THOMAS: Yeah, this is -- I think I mentioned in my testimony this morning, the Natural History Survey has been doing long-term monitoring of the Illinois waterway using electrofishing gear since 1957. And these -- they have a couple stations in the Starved Rock Pool the Marseilles Pool and Dresden Island Pool.

And this is a compilation of the species and some of the numbers that they've collected over these years from the three pools. So, because I referenced this in terms of the data on the Dresden Pool versus a couple of these others, I thought it might be good to enter this into the record.

So this is from the Illinois Natural History Survey Long-Term Electrofishing Monitoring Program. It's gone from 1957 to 2007.

MR. ETTINGER: And this mixes all of the numbers together for all of those years?

DR. THOMAS: It's sort of a sum total, so...

(WHEREUPON, the document was tendered.)

MS. TIPSORD: If there's no objection, I will enter this chart, that has across the top Starved Rock Marseilles and Dresden and then species name, as Exhibit 329.

Seeing no objection, It's Exhibit No. 329.

(WHEREUPON, a certain document was marked Exhibit No. 329 for identification, as of 8/14/09.)

MS. TIPSORD: And with that, then, I think we're ready to start with Mr. Andes.

DR. DAVID L. THOMAS,

called as a witness herein, having been previously duly sworn and having testified,

was examined and testified further as follows:

EXAMINATION (Resumed)

BY MR. ANDES:

Q. Good afternoon, Dr. Thomas.

A. Good afternoon.

Q. Let's start with the first question. Have you conducted any habitat studies in the CAWS?

A. Other than -- none, other than what I explained this morning, in terms of a boat trip that I had taken in the early 1990s, looking at the potential for improving habitat in a portion of the CAWS.

Q. And to clarify, in terms of that particular event, as I understand it, it simply constituted one boat trip up a segment of the CAWS, from Stickney North, you said --

A. Correct.

Q. -- in which you pointed out some habitat improvement options?

A. Correct.

Q. And there wasn't any report generated as a result of that trip?

A. That's correct.

Q. Okay.

Question No. 2.

MR. ETTINGER: I'm sorry. If that's his study, maybe the trip -- the more recent trip is also a study. Do you want to...

THE WITNESS: Yeah, I mean, I --

BY MR. ANDES:

Q. You didn't study, but --

MR. ETTINGER: I don't either. That's why I was just saying, if you're looking for formal studies, I think you've got your answer.

MR. ANDES: Okay. I just wanted to clarify --

THE COURT REPORTER: Please don't talk on top of each other.

MR. ANDES: We've been doing that for 15 years.

Okay. I think we understand this trip, we understand that there have not been any studies.

MR. ETTINGER: Fine.

MR. ANDES: Thank you.

BY MR. ANDES:

Q. Can you explain the similarities for common features for the large rivers in which you've worked, including the Kaskaskia and the Lower Delaware, have with the CAWS?

A. Yes, there are large stretches of the Kaskaskia River, particularly from the middle stretches on down, and also on the Lower Delaware River that are deep water. The Lower Delaware River is for major navigation, so there are huge ships that utilize that area.

The bottom is a silt and clay bottom, very low, and macroinvertebrates number in density. The Chesapeake and Delaware Canal that I worked in was an artificial waterway designed for barge and boat traffic between Upper Delaware Bay and the Delaware River Upper Delaware Bay. So those are some of the similarities probably.

Q. Number 3. In Section 2 of the testimony, you state that "I've evaluated fish habitat using many of the parameters of the QHEI and have reviewed how QHEI has been used in Ohio. I believe it is a sound methodology for assessing physical habitat."

First question, where have you evaluated fish habitat?

A. As I mentioned, the Kaskaskia River, the Lower Delaware River and its tributaries, the Maluka River in Great Bay in New Jersey. I mentioned the Chesapeake and Delaware Canal, the Lower Susquehanna River, Hudson River, Raritan River and Bay, Schoharie Creek in New York State and an associated pump storage reservoir. And some smaller streams in New England for a small hydro project. So those are some varieties.

Q. Now, in which -- and in those fish habitat evaluation projects, on which ones did you use the QHEI as a tool?

A. We did not use QHEI in any of those. We were looking at the fish species that were utilizing those areas, and what -- and how their habitat requirements were being met. But we did not use this methodology for assessing habitat.

Q. Any particular reason why not?

A. Well, the QHEI is really sort of a -- it's sort of a rapid assessment tool, and it's really not needed if you're doing more detailed studies of a waterway. But it gives you a good

overview, and it's a nice way to compare between stations, because you have at least a number you can use.

Q. So it's more of a rapid assessment tool?

A. Correct.

Q. So when you say it's a sound methodology for assessing physical habitat, do you mean in the sense of being a rapid assessment tool?

A. Yeah, and also it gives you a number. At least you can relate to something and you can compare sites, you know. If I did it as a verbal description, it would be hard to compare two different sites or two different rivers.

So this gives you some index to make those kinds of comparison. It would be hard without coming up with a numerical index.

But the studies I did were never designed to sort of see how they might compare between two systems or...

Q. Would you use a QHEI as the basis for establishing designated use categories?

A. My impression was it was used more for that, which I was never involved in doing, like a

regulatory study, where you're trying to assign water quality. I mean, I was more interested from the fish perspective and what habitats they're using and from their life history requirement, so -- which would have been one of the reasons I wouldn't have been involved in using this methodology.

Q. So you're saying that -- correct me if I'm wrong -- that it's a rapid assessment tool, and yet, what we're discussing here is using it to establish use categories which will ultimately be used to establish water quality stands and enforceable requirements.

Is it appropriate to use a rapid assessment tool to establish enforceable requirements?

A. Well, there's other data being used in conjunction with a QHEI. But in terms of characterizing the area, I think it is a good tool to use as a way to do that.

As a verbal description, it would be much more -- much longer and much more complex. But to be used strictly alone, I would say, you know, you'd want to have these other kinds of data.

And the other data that really

goes with it is actually assessment of the macroinvertebrate and the fish populations that are using these systems. So you're using those two in conjunction with each other, as well as water quality data that you have.

Q. And then you had wanted to define pretty carefully, am I right, the nature of those communities and how they would be improved by changes that are required? When you talk about information on fish and macroinvertebrate communities, you're talking about defining the community and how it would change if certain things were done; am I right?

A. Well, I'm not sure. Most studies are designed to look at the response that might be done to the changes. I think, when you get involved in habitat restoration projects or mitigation projects, you are specific -- excuse me -- specifically looking, in those cases, at improving the habitat for certain species. So I am involved in some projects along the Illinois River and improving floodplain pool habitat. And those are designed to improve the habitat for certain species.

Q. But if we're talking in this

rulemaking about improving the fish community -- and I think I've heard you say, and certainly, this is in the Illinois EPA documents -- the supposition that improving water quality here will lead to an improvement in the fish community. Am I right?

A. Uh-huh.

Q. So let's put aside the habitat agent for a minute. Don't you need to define that community in order to then define what improvement will occur if you change water quality?

A. Well, I think we have defined the community. I mean, I think it's the result of all the studies that have been done there, the fish populations that are there.

Q. So can you tell me from the record in this case -- and I assume you've read all the testimony?

A. All of it.

Q. Can you define for me what the fish communities are or look like in Use A and Use B Waters and how they will change if these water quality standards go into effect?

A. I'm trying to make sure I -- I'm not positive I understand your question.

Q. Isn't that the purpose of changing the water quality standards that changes in the standards will lead to an improvement in the fish community and the macroinvertebrate community?

A. That's correct.

MR. ETTINGER: I object, insofar as you're asking a scientist the purpose of a legal proceeding. So if that's what you're doing, I have problems.

MS. TIPSORD: He's actually already answered the question.

MR. ETTINGER: I understand. I just don't want to go too far down that road.

MS. TIPSORD: I understand.

MR. ETTINGER: Because he's not an expert on weighing relevance or what is proper testimony in a UAA proceeding.

BY THE WITNESS:

A. But I can say that -- and one of the things I relied on for the Chicago area waterway was the -- I think it's Attachment M3, the study of fisheries, resources, and water quality in the Chicago Waterway System 1974 through 1996. So that covers a pretty broad stretch of time.

And one of their conclusions in that report was that, as water quality is improved, they have seen an improvement in the fish population. So I think the answer to your question is, yes, there is an expectation that, in these systems, as water quality has improved, that we are seeing a response by the aquatic community to those improvements.

BY MR. ANDES:

Q. Let me ask you then, if water quality has improved, based on changes, such as the District's implementation of TARP, would you suspect -- put aside this rulemaking for a minute -- wouldn't you expect water quality to continue to improve due to those actions, including further actions that are going to take place in TARP, such as --

A. I would think -- yeah, to the degree that storm water runoff is further reduced. And the record does document that some of the negative effects from large runoff events, that, to the degree that they're reduced, I would expect that that would help the aquatic community.

Q. So the aquatic community would be

improving anyway, even if this rulemaking doesn't go forward?

A. I can't draw that conclusion.

Q. I know that, but -- let's move on.

Going back to the QHEI for a minute. Are you aware of to what extent it can or it should be applied to low gradient artificial channels?

A. Well, it has been applied in large rivers, and Ohio moved to adopt it to large river systems that are lower gradient. As I thought about this, though, and how it's used, I -- my feeling is -- and what I testified this morning was that I think it may underestimate the available habitat, particularly for fish as you go to a larger river system.

Q. I didn't ask about large river systems, I asked about whether it's appropriate to apply to low gradient artificial channels. Not size of the system.

I'm talking about low gradient artificial channels. Are you aware of any information showing that it's appropriate to apply QHEI to that kind of water body?

A. I think you can and it has been. I'm not sure I can say much more than that, so...

Q. Let me skip down a little farther in Question 3, to 3M. And we'll go back to this issue in a number of ways.

Can you explain to me what the similarities and differences are in physical characteristics between the upper Dresden Island Pool and the CAWS in waterways north of Romeoville?

A. Well, the Upper Dresden Island Pool is a wider system, and it has a little bit more natural shoreline.

Q. A little bit more?

A. Well, it has more -- I shouldn't say little bit. It probably has more natural habitat for fish.

I think a lot of this has been described in the record, and I would agree with that. You know, it's a different system, it's bigger, it has more water, it has probably greater diversity of habitats, so in a certain area that we find in much of the CAWS.

Q. Okay. Let's move on to No. 4.

In Paragraph -- Section 2

Paragraph 2 of your testimony it states, "Fish do not need a continuous stretch of good habitat to restore life functions" -- go on from there. This portion of your testimony concerns the Upper Dresden Island Pool, however, you later assert you'd be surprised if spawning were not also occurring in the CAWS.

Have you performed any bottom surveys of the CAWS?

A. I haven't personally performed any bottom surveys, other than what's visible from boat trips on the CAWS, that you can see in the shallow areas.

Q. Are you aware of which portions of the CAWS have adequate firm bottoms for spawning, if any?

A. I've seen some areas that would be adequate for spawning.

Q. Where?

A. Shoreline habitat, Cal-Sag in a number of areas, even in Chicago's --

Q. So through a --

A. Sorry. Well, at Lockport Pool.

I mean, we have -- which is

probably the poorer -- some of the poorer habitat quality, but the ecological analyst data still finds some spawning in that pool. And it has a few species that have been captured there.

So even there, in the Brandon Pool, there is some spawning going on, although it's much more limited than --

Q. I'm sorry, in the Cal-Sag, have you seen any evidence in this record indicating spawning?

A. Well, look at it this way, there's --

Q. Well, answer the question.

I mean, where is there any data of spawning?

A. Well, I'm not aware of anybody trying to find -- doing it -- you know, ichthyoplankton sampling. I'd be surprised if someone hasn't, I just haven't seen it in the records.

But every one of those fish that are in there, where there's a population in there, when breeding season comes, they're going to spawn. Now, whether they're successful or how successful they are, that's another matter.

But to say that they're not going

to spawn at all when the spawning season comes, is just not right. They are going to spawn.

Q. The question is where they spawn.

Is this spawning habitat, here in the CAWS then, and it sounds like you're saying you're not aware of any evidence -- physical evidence of spawning habitat in the CAWS.

A. All I'm saying is I have not seen anybody present ichthyoplankton data -- well, other than in Lockport Pool and Brandon Pool, EA collected data there, and they found larvae. I haven't seen the same data for the Cal-Sag or the Sanitary and Ship Canal, or...

Q. And your only observations of bottom have been from a boat; am I right?

A. That's correct.

Q. Let's move on to No. 5.

On Page 2 you state that the habitat in the Upper Dresden Island Pool is sufficient to minimally obtain the Clean Water Act. You describe your review of fish habitat information to the Pool and conclude that the Pool can support a more balanced and diverse fish population.

Based on your later testimony, you

also draw some conclusions about the CAWS. Can you first describe what you mean by sufficient to minimally attain the Clean Water Act?

A. Well, there's already a fairly diverse fish population in that pool, and the latest exhibit we put in, 329, shows that there's a lot of the same species that you find in general use waters, downstream in Marseilles or Starved Rock Pool. I think there's room for improvement in both water quality and possibly in habitat in the pool, but I think that's a system, based on all the data I have seen. That should qualify it to have this productive habitat as other impounded river water bodies in the state, so...

Q. And so, that's your definition of attaining the Clean Water Act, is similar status to other impounded water bodies in the state?

A. Yeah. I mean, I think I referred to the UAA and felt their description of minimally attained, or however they exactly worded that, I tended to agree with them. I thought it could be.

Q. Now, did you do a similar evaluation for the CAWS as you did for the Pool?

A. Well, I mean, I evaluated the data

that's been collected for the CAWS, and I agreed with the basic strategy of, you know, designating segments of a water body.

Q. Do you think that the CAWS habitat is also sufficient to minimally attain the Clean Water Act?

A. I don't think I said that.

Q. No, I'm just wanted to get a sense of whether you think it is or not.

A. Well, as I testified this morning, I'm not always clear that -- what is meant by a balanced indigenous population in a lot of these systems. So I'm -- it would be interesting to hear someone explain to me what they thought a balanced indigenous population would be in these systems.

I think the populations have been improving and can continue to improve. Whether -- how close that they get them to Clean Water Act standards, I'm not prepared to say.

Q. So you were prepared to say that as to the Pool, but you're not prepared to say that as to the rest of the CAWS; am I right?

A. I think there's more opportunities in the Upper Dresden Pool to get closer to -- once

condition have been met by the balanced indigenous population and the Clean Water Act -- for the reasons we talked about, in terms of its size, greater diversity of habitat.

Q. I'll move to Question No. 7.

You state that, "One must consider the range of scores shown for an area, the predominant habitat characteristics, as well as the presence of various microhabitats. The fact is it might be influencing QHEI scores and one's knowledge of the species in the system."

Are you aware of any studies that have been done to identify the predominant habitat characteristics for various microhabitats in the CAWS?

A. Mackey actually presents some data on that.

Q. Okay.

And, are you -- you don't have any reason to question the assessment that he's done to date as presented in testimony?

A. Well, I -- I think I had issue with some of his conclusions. But -- I mean, he has correct me -- was his data showing some of the sonar

data for underwater structures and that? Because I get mixed up on who presented what.

Q. I believe so.

A. Yeah. I mean, like he'd show -- I think one of his show the Sunken Barge, and -- well, that could serve as fish habitat.

He showed, you know, blocks of rock and stuff that were in the canal. And all of those could, and would, serve as habitat for micro-organisms and macro-organisms and fish, so...

Q. Does the QHEI process adequately look at microhabitats?

A. As I testified this morning, I think, actually, in some of these systems, it underestimates the available habitat for fish in these larger systems.

Q. How would you -- and the concept of microhabitat is one that you're talking about here, but it's sort of your concept; am I correct?

A. Well, I think others use that concept, but maybe use a different terminology. But it's --

Q. I'm wondering who else uses it, and can we get a citation to the references?

A. I don't -- I'm not sure.

Q. How would you assess, given the limitations of the CAWS, confined channels, managed flows, uniformly-shaped channels, how do those factor into your assessment of microhabitats?

A. Well, I don't think it's as uniform as people made it out to be. I was actually -- because I was just on a recent boat trip up the Cal-Sag, which I didn't get to -- when I had done my earlier boat tour in the early '90s -- but I was amazed by the variety of habitat that is there.

And there's some emergent vegetation coming in now in the area. I might call that a microhabitat.

In other words, a small area with maybe gravel and sand that has some emergent vegetation. That provides some very specific habitat that some fish might use -- fish would use for feeding, some might use for spawning.

It's not in that macro, or larger scale habitat. But it's small, and it still may be used by some species of the habitat.

Q. These are isolated areas you observed from the boat on the Cal-Sag?

A. Yes. Well, actually, there was more

vegetation than I had expected to see. A lot of it was broken off and floating in the water.

But I haven't seen that really described in the things I read. So I was actually surprised it was as much as it was.

Q. Broken off and floating pieces from trees?

A. No, this is aquatic plants.

Q. Okay.

A. A filamentous plant. Which I probably should know the name of, but I don't know.

And then, we saw other plants that were emergents, growing on the bottom of the water and emerging from the surface.

Q. Along the shoreline areas?

A. Near the shoreline areas, yeah.

Q. In Question No. 8, in Section 2, Paragraph 3 of the testimony states, "That temperatures present in the Upper Dresden Island Pool, times during the summer, are sufficient to cause avoidance and limit the carrying capacity of the system."

Can you cite references for that statement?

A. Well, as I think I've mentioned this morning, I think it's the EA 2003 report, Appropriate Thermal Water Quality -- I can't read my own writing. Is it standards or something.

Anyway, I think it was -- I don't know what the number is of that report, but I think they talked about there was avoidance of areas at times during the summer by some of the fish, so...

Q. So that particular EA report is your reference?

A. Well, that and temperature data. I mean, if you see temperature data that exceeds the avoidance temperature that has been reported for fish, you can assume that those species that are in -- if those species are there, they probably do avoid those areas during that time.

Q. So you're basing that, then, on reviewing temperature data and avoidance temperatures in the literature?

A. Yeah.

Q. Do we know if the highest number temp -- if the highest number temperatures in the Pool are due to thermal loading, such as power production or exposure to the Pool to direct solar

radiation?

A. Well, both work in combination. I mean, you have a Delta T above ambient, so that the ambient goes up, the thermal discharge is going to go up, unless you begin adding on cooling units and so forth.

Q. Do temperatures in other pools and lakes also increase in the summer? And if so, are the temperature increases in the pool significantly different than the temperature increases in other pools and lakes?

A. Well, all water bodies will warm during the summer, usually. The incident of radiation and...

Q. You mention avoidance in your testimony. Don't fish avoid unfavorable conditions in natural systems?

A. There are times when they are presented with a gradient that they will avoid in natural systems.

Q. And if those conditions are unfavorable, don't fish return when the conditions are more favorable?

A. Yes, they should. Assuming it's not

in the whole lake.

We have had -- which I didn't think of this morning in sort of response to that question -- but there have been some thermal fish kills, high temperature fish kills in Illinois. But those have been some of the cooling ponds or lakes where there's been some higher temperatures and lower DO.

They're usually at high ambient temperatures that they have occurred. And so there have been fish kills associated with that in Illinois.

But it's usually where the fish don't have an escape to avoid those thermal plumes.

Q. When do the fish generally spawn and when are the larvae young of the year present?

A. Well, I mean, very generally, it depends on the species. Of course, some species will spawn all summer and early fall, like the dessert shad.

But, probably, May through end of August is the primary spawning season for most of our fish. Some are a little bit earlier and some may go a little bit later.

Q. So how does that timing compare to when summer thermal and DO events occur?

A. Well, there's spawning during the -- most of them are spawning during the warmer time of the year. It's interesting when you look at the data for preferred temperature in upper avoidance and lethal, you find that a lot of fish carry out a lot of their life history not that far -- at temperatures not that far below lethal temperatures.

So usually it's three or four degrees, between the avoidance temperature or a preferred temperature and a lethal temperature. But it's not as much as one might expect.

They carry out a lot of their life history duties at fairly high temperatures, so...

Q. In natural systems, does the fish community structure remain constant for the entire year, or are there seasonal changes in the fish community structure?

A. Well, in these systems, I mean, you basically have the same assemblage of fish throughout the year. You get bigger numbers in late summer and fall.

Because, at that time, a lot of

the larval fish are entering the catch, if you will, if you're out there shocking or collecting in some way. So you tend to get higher numbers in the fall, probably lower numbers in the spring, because you have some natural mortality in that first six months of life.

So you don't get as big of numbers there. But the mix of species is still about the same.

Although, in your catch data -- if you're doing electrofishing, for example, you -- if fish move to deeper water, you're going to get fewer of those fish. Because electrofishing gear is not that efficient once you get below about four feet of depth.

So if fish in the wintertime, for instance, and they've moved to deep pools, you're probably not going to get many of them sampling with electrofishing gear.

Q. Those seasonal changes in a community structure, how do those compare between the Pool and other pools and lakes? Is that similar concept?

A. Yeah, it's a similar concept. Fish tend to move -- or many fish, anyway, move to deeper

water during the wintertime.

And, actually, that's because the bottom water in the winter is actually warmer than the surface water, because your heaviest water is at 4 degrees centigrade or 39 Farenheit. So they tend to move down to that deeper water.

Q. Let's move on to the next question, No. 9. In your testimony you state, "I have not seen data that demonstrates the sediment toxicity is a major factor limiting the aquatic life potential of this system."

What sediment toxicity or sediment chemistry data have you reviewed from the system?

A. Well, I -- Burton provided a lot of the sediment data and some of the toxicity data. So a lot of the reports I looked at were from him.

Whereas, looking at the CAWS, I've been involved with the Calumet area since '85, so I've been very involved with the sediment and toxicity data from that part, that small part of the system.

Q. The Burton data was just as to Upper Dresden Island Pool; am I correct?

A. Excuse me?

Q. This statement -- was this statement, particularly as to the Upper Dresden Island Pool? I think you mentioned the Burton data, which would have been for the Pool; am I right?

A. Well, I thought he'd had some data up in Lockport -- at least the Lockport Pool and Brandon.

Q. I'm just trying to figure out the scope of this statement.

Are you saying this is the -- this statement is applicable to the entire CAWS, the entire system, or are you saying it particularly as to the Pool?

A. Well, I think it would be true to say that I haven't seen direct data on some of the sediment contaminants in the CAWS actually limiting the productivity there. Although, it may very well be true in some places.

Q. I'm trying to get a sense -- have you looked at sediment data, for example, for the Cal-Sag?

A. I don't believe so.

Q. For the Sanitary and Ship Canal?

A. I may have -- do we know if that was

in the -- was that in the Wasnik testimony that she presented, some sediment data?

Q. There was data with the Wasnik testimony for -- throughout the system.

A. I think I did look at some of her data.

Q. But that wasn't reviewed before you prepared this testimony; am I right?

A. That's correct.

Q. I'm trying to get a sense of what data you reviewed to make this --

A. It was probably the Burton data, which was primarily the data that I relied on in terms of data that I've seen.

Q. So if there were areas that weren't covered by the Burton data, your statement wouldn't apply to those?

A. Well --

MR. ETTINGER: He had not seen statements. It would apply, but...

MR. ANDES: He hasn't seen any data?

MR. ETTINGER: Right.

BY MR. ANDES:

Q. I can skip a couple of my questions.

Well, let me ask, as to the data you have seen, do you believe that the metals concentrations are below the threshold where direct toxicity is a problem?

A. Well, let me put it this way, I've seen a lot of contaminated systems with metals, including probably the closest to this area, Lake Calumet and Waukegan Harbor. And Waukegan Harbor actually doesn't have that much in terms of metals.

But most metals seemed to get bound up in the sediment, and so, even areas where there's fairly high levels in the sediment, they don't seem to prevent a toxicity problem, at least to fish and probably to most macroinvertebrates.

The PAHs, and some of the others, seem to get implicated more in terms of toxicity effects when people do laboratory studies to try to tease out what chemicals are having toxic effects on some animals, so...

Q. We need you to talk to the people of the Superfund Program.

So you don't think metal issues in the sediment generally are a problem in terms of aquatic toxicity? Even if they're above the Ingersoll and McDonald's levels or other indicia?

A. I'm not sure about that. Copper in the water can be quite toxic to plants, so that's why you use copper sulfate if you want to treat your farm pond for aquatic weeds.

And sulphur from some discharges when it's in the water can have an effect. Mercury in its more soluble form has been sometimes associated with aquatic problems.

But I'm just saying, at least for the lot of the systems that I've looked at where you have metal contaminants in the bottom sediments, we often have not found them in like fish samples or found them accumulating. So they do tend to get bound up.

That's not saying there aren't cases where they become problematic, but...

Q. I'm aware that metal toxicity to aquatic life -- correct me if I'm wrong -- is a separate issue than bioaccumulation. I'm not asking whether they get bioaccumulating the fish. Because that's something we would deal with more for mercury, PCBs, dioxin.

I'm asking in terms of direct aquatic toxicity to the fish, would certainly be

more of an issue for metals than for the PCBs.

A. Well, the report I referenced this morning by the researchers from Southern Illinois University did not -- they specifically looked at whether -- and this was for the Dresden Pool -- they got up as far as to the Stickney plant. So it does include some of the CAWS.

They did not find metals to be contributing to the toxicity in the studies -- in their studies, which is similar to a lot of other studies that I've seen. They have higher metal levels, but they were not contributing to the toxicity.

And the nice thing about this TIE studies that do is that you can separate out -- so are metals are having an effect, you can bind up the metals and see if that changes the toxicity. If not, then you can look at PAHs or some other factors.

So, anyway, from the part of the system they looked at -- and I think their results were somewhat similar to Burton's also, if I remember.

Q. Well, I'll --

MR. ANDES: For the record, I'll reserve the same right Ms. Franzetti did, since we haven't reviewed that study yet. Actually, it's on initial information I'm receiving, I have a lot of questions about those conclusions.

So we'll reserve the right to call Dr. Thomas back and talk about that further?

MR. ETTINGER: I'll note, as I should have noted with Susan, you could reserve the right, but I don't know whether your reservation will be respected, and, ultimately, the hearing examiner would have to decide that.

MR. ANDES: I thought I -- understood.

MR. ETTINGER: Okay.

BY MR. ANDES:

Q. Going on to Question No. 10.

You state, "That the white sucker, which is a temperature species, was collected in the Dresden Pool every year since 1994. The logperch, also a temperature species, was collected fairly regularly in the Pool."

If these temperature-sensitive

species are already present in the Pool, can you explain to me why additional thermal limitations are needed?

A. Well, there's a big difference between presence and the species thriving.

Q. Can you define that for me?

A. Yeah, you can have a species present, but it may be present in lower numbers than should be in the system, if that particular stress was removed, so...

Q. Do you have a bases for concluding, say, as to the logperch, which were collected fairly regularly, to what extent there would be many more of them if the temperature were --

A. No, I'm just saying there's a big difference between presence and the species thriving. The question seemed to imply that they are present. So, obviously, thermal regulations aren't needed, or something to that effect.

And I'm just saying there's a big difference between something being present and something actually doing well and thriving. And the species is present, but may not be necessarily thriving in the system.

Q. Do you have any information to conclude that the logperch is not thriving? It's collected fairly regularly to clearly not avoid any area, they are present, they are alive.

What information do you have indicating that they are a sickly community?

A. Well, I didn't use that term, but...

Q. I know.

A. They were sickly. But I don't have data to the contrary that they couldn't have a bigger population.

The other thing, as I said this morning, what's missing, for me anyway, is I haven't seen the detailed thermal data for the Upper Dresden Pool. And so, because this -- the logperch and the white sucker, both bottom species, we have temperature data on the plume coming out of the plant, and we know from the record anyway, there's cooler water underneath.

But I don't know what that looks like. I haven't seen the detailed profile data to say, yeah, there's cool pockets here and it's hotter here, and this is where it's all mixed to the bottom, and -- and so, I would need -- if I was

asked to really elaborate more on this, I need to see some of those detailed plume data to get a better feeling for what's going on.

Q. So to really make definite conclusions, you would need that data?

A. Well, that would be one piece of the data, yes. And then I probably have to sit down and analyze the collection data. Where were they collected, where weren't they collected, how does that much up with the plume. That's a level of analysis that I didn't have the time to do, and I didn't have all the data that would have been necessary to do that.

But, you know, if you really wanted to get into that kind of issue, that's the kind of analysis you really need to do.

Q. Okay.

No. 11. The testimony states, "I believe these waterways can support tolerant or intermediately tolerant species, including early life stages of the species, based on my review of the habitat data and the use of the IEPA and my personal knowledge of the CAWS."

I think you've described what your

personal knowledge is. So we'll skip that one.

Have you reviewed water quality data for the CAWS and considered it in formulating this statement?

A. Yes.

Q. What data did you look at?

A. Well, one of the things that I probably should have added right back in my testimony was I relied a lot on the fisheries data collected by the District over that long period of time. And they also had some water quality data they reported on, so...

Q. So how did you use water quality data in coming to that conclusion?

A. Well, I was relying -- it wasn't so much me using it as me interpreting, and sometimes I think they actually made the statement that water quality is improving and fish populations have improved. So I was using the results of their studies, including some of the direct statements about water quality improvements and the positive effects on the fish population to come up with that statement.

Q. So you based it on the statement by

the District that water quality has been improving. Is that what you're saying?

A. Well, that, plus the fisheries data that shows the improvement over time.

Q. But --

A. And also -- I mean, we keep talking about the CAWS, but, you know, we have to keep -- and I'm reminded of this sometimes myself. I mean, there's a huge diversity of habitats within the CAWS, and there's a wide range of water quality also.

So we have to realize when we're talking about this that we're talking within this range of habitats and water quality.

Q. But if your general statement as to the CAWS is support for tolerance or an intermediately tolerant species, including the early life stages, are you saying, well, maybe it could in some segments and not other segments?

A. Yes, I would say that would be true. There's some segments that -- and I think those have already been identified.

I mean, those segments as B Waters, I think there's a recognition there's only

going to be so much improvement in those because of their present usage in the habitat, so...

Q. So you're not saying all the waterways could support these species. Basically, what you're saying -- what you meant was what the IEPA said?

A. Yeah, pretty much.

Q. And can you -- well, again, I'm trying to understand. If you've looked at water quality data, and you've looked at fisheries data, how -- looking at the data, including improvements that have happened over time, how does that lead you to conclude that these water bodies, or some of these water bodies, it sounds like, would support early life stages?

A. I think they already are supporting early life stages. And I think they could support even more under further improvements in the water quality.

Q. And what's your basis for that statement? What's your biological basis for those statement?

A. Because these species in there are going to spawn. And from what I saw, like in the Cal-Sag, I was actually surprised how relatively

good the water quality looked. And I think there's successful spawning in it.

Q. So if that's happening, let me go back to my earlier point.

A. Uh-huh.

Q. If that's happened in the current conditions, what's to say that's not going to keep improving? Why is it necessary, then, to tighten down all the water quality standards?

A. Well, this has been sort of a long process from the late '60s and early '70s to -- there's been sort of an incremental improvement in water quality with some of the regs and some of the -- like in the CAWS, many of the things that the city has done has been successful. I mean, you know, when you stop chlorination, the early use of the TARP, these have shown up as positive results in the system.

So things being done are working. We're not there yet, and, you know, people will argue about how far can you really go. But I think that there is still room for some improvement and --

Q. What I'm asking you --

A. -- we need to work towards that point.

Q. -- how are you -- if you're saying that yes, it's improving --

A. Uh-huh.

Q. -- but we can make it improve even more, what's your basis for that statement that changing these parameters is going to lead to more of an improvement than would happen otherwise?

A. Well, I look at the fisheries data for the CEPA stations. I mean, they're -- basically, they add some flow, just by their nature. But they're improving oxygen in the local areas and there has been a response by the fish population.

There are small mouth bass and channel catfish that are showing up in those. So, I mean, that's partly what they were designed for, to help improve dissolved oxygen, and there seems to be a positive response by the biotic community to that, so...

Q. So you don't believe there's any limit to that in terms of --

A. Well, I'm sure there's a limit financially for how many CEPA stations you're going to build, and I certainly understand that. But -- no, I'm just saying that I think you were asking the

basis, and I think that we've done things to help improve the water quality, we have seen a positive response to it.

Q. You're saying that because they find a lot of fish gravitating toward the aeration stations?

A. Well, I'd have to go back and look at the fisheries data, but I think they're finding species that were maybe uncommon in a relatively low abundance in the Cal-Sag that were showing up at these CEPA stations in greater abundance.

Q. Can you show me one?

A. I think Page 18 in here.

MS. TIPSORD: You know, could we have exactly what you're looking at again?

THE WITNESS: Okay. I'm sorry.

MS. TIPSORD: Including, if you can, give it to me by exhibit number.

BY THE WITNESS:

A. This is Attachment M3. That's all I have on it. It's a study of the fisheries resources of water quality in the Chicago Waterway System, 1974 through 1996. I'm not sure whether it was Attachment 2, but I guess --

MS. TIPSORD: We really need to know that. Because I thought at first it was an exhibit, it's obviously not. It was attached to the testimony --

MS. DEXTER: It's from the record.

MS. TIPSORD: Right. But, I mean it was attached to the testimony of one of the distant witnesses.

MR. ANDES: I think so.

MS. TIPSORD: And I looked back through the Agency's stuff and I'm not seeing it there either.

MR. ETTINGER: You can always mark it again.

MS. TIPSORD: Can you give me the title again?

THE WITNESS: It's called the Study of the Fisheries Resource and Water Quality in the Chicago Waterway System 1974 through 1996.

MS. WILLIAMS: Does it have an MWRD number?

THE WITNESS: It's Report No. 98-10.

MS. DEXTER: It's either Melching or

Mackey.

MS. TIPSORD: All right. Melching's testimony was admitted as Exhibit 169 and Mackey's was entered as Exhibit 179. And I will check when the transcript comes in and make sure that that is in the record.

MS. DEXTER: I can look it up when we go back to the office.

THE WITNESS: But in answer to your question, may I read just a portion from this?

MS. TIPSORD: Yes.

THE WITNESS: Page 18, the second paragraph.

It says, "The CEPA stations have also shown an immediate benefit for the quality of the fish populations in the Calumet River system. Twenty-five fish species have been collected from the waterways of the five CEPA stations -- station locations during 1995 and 1996. Small mouth bass and channel catfish were collected at the CEPA stations on the Cal-Sag Channel.

"This was the first occurrence of these desirable game fish species in the Cal-Sag Channel collections."

MS. TIPSORD: And Ms. Williams has found it.

MS. WILLIAMS: I just want to point out for the record that MWRD 98-10 was attached to Mr. Mackey's testimony.

THE WITNESS: Okay.

MS. TIPSORD: That was Exhibit 179. So it is attachment M3 to Exhibit 179.

MR. ETTINGER: Do we have another question on the floor or...

MS. TIPSORD: No, we were taking care of housekeeping. I just nodded to Mr. Andes.

BY MR. ANDES:

Q. Now, have you looked at, in making this conclusion -- well, let's go back to the conclusion.

You were saying that certain segments of the CAWS could support tolerant or intermediate species. And, as to sediment character and contamination, did you look at that data and factor it into that analysis?

A. I'm sorry.

Q. You looked at sediment information, both character of the sediment -- composition of the sediment, as well as contamination, and factored that into your analysis?

A. Not really for the CAWS. I was really more focused on just some of the general water quality and the fish populations and macroinvertebrates.

Q. Wouldn't the sediment composition -- as Dr. Mackey says in his testimony, wouldn't the sediment composition be relevant in terms of the substrates?

A. Well, this is an interesting point. And I thought maybe we were going to get to it later on macroinvertebrates, but I could bring that up here.

The production of macroinvertebrates in large river systems, and this includes these waterways, is not in the bottom sediments of the main part of the channel and that. It tends to be on hard substrates.

And these hard substrates tend to be along the surface -- or along the shoreline.

Some of them, though, could be a sunken ship or some of them could be, you know, even pilings or whatever that were in the water. And that's where a lot of production is.

I -- over the summer, I went back -- because I worked with a grad student at the University of Illinois that was doing a study of logs in the Kaskaskia River. And one of the reasons was, when we did all those Ponar samples in the Kaskaskia River, we were finding a very low abundance of macroinvertebrates.

And yet, when we take a drift sample, and these are nets that are put in the water to get drifting invertebrates, we find pretty good numbers of drifting invertebrates. So the question was where do they come from?

And what we were finding was they were coming from hard substrates, Kaskaskia primary logs, which there are a lot of in the water. And he did a study of putting in a whole array of artificial logs, where he could, every week, scrape off the logs and see what had settled on them and what the populations were. And he documented the increase in populations on those logs.

What we have in the record here that's similar to that is the hestrodendes (phonetic) samples. They're an artificial substrate that is put in the water and we can measure what settles on those.

So I think -- I don't expect when someone shows Ponar samples from these systems that you are going to find much in the bottom sediments. But there are a lot of hard substrates in this system in the water, and that's where I would expect a lot of the production of macroinvertebrates to be. And that's going to serve as a food source for a lot of the fish that are using the system.

Q. So you think in the Cal-Sag Channel there's habitat?

A. Absolutely.

Q. On the side walls?

A. In fact, we were going through the O'Brien Lock and Damn on our boat trip just a few weeks ago, and I was pointing out to Jessica that if you looked on the side of the pilings there, and this is just sheet metal, but you could see all the algae growing off of the pilings and you could see some zebra muscles on there, and there's going to be

aquatic inverts crawling about in that. So even on just a sheet of -- a plain sheet of sheet piling, there are a number of plants and algae and that that are going to grow and micro-organisms and also macro-organisms that are going to use that substrate.

Q. How about for the fish?

A. Well, the fish -- obviously, you're going to have to be a little more -- if you're going to use that. But they'll feed off of invertebrates on those structures, so...

Q. But that doesn't provide habitat for them?

A. It provides areas that they can feed in, so, in that sense, it's some habitat that they can use. In terms of spawning, most of the fish that we're talking about would not be able to use that to spawn, they'd need other kinds of habitat.

Q. Intermediately tolerant species, can you tell me what those are intended to cover?

A. I would say white sucker and channel catfish, small mouth bass, probably fresh water prawn -- yellow bass, those might all be considered -- they wouldn't be considered fully

tolerant, they would be considered more immediate, whatever term we want to use for that.

Q. And when you talk about supporting tolerant or intermediately tolerant species, do you have a sense of what proportions of those species you would envision in the community?

A. I assume you ought to have -- you'd still have in these systems a higher percentage of tolerant species, which is also true of a lot of our other large river systems in the state. The real intolerant species in some of these river systems were lost by the middle of the last century.

In the Kaskaskia, by the 1930s, the real sense of the species were already gone. So we have already eliminated the most sensitive species in a good part of our state.

Q. And those aren't coming back?

A. In a lot of these systems, no, unless somebody reintroduces them. Which we're actually doing on the Illinois, by the way, in some of the backwater areas. We are reintroducing some species that have been lost over time.

Q. Of course in this system, in the CAWS, in the artificial system --

A. Right.

Q. -- those would never get --

A. That's correct.

The only reason I stopped you is we did have some waterways going into the rivers, I had to think way, way, way back.

Q. Over a hundred years ago?

A. Yeah.

MR. ETTINGER: Never is a long time.

BY MR. ANDES:

Q. Let's skip down to Question N -- Subquestion N.

Have you reviewed the continuous DO data from the District to determine whether current conditions are suitable for the early life stages of fish that you expect could thrive in the CAWS?

A. Well, I never said early life stages were going to thrive in the CAWS. But I said I would be very surprised if there weren't early life stages in the CAWS.

Q. I think we just talked about the difference between present and thriving, and you said they could thrive. The stage you thought they

could get to was thriving; remember?

I said, "Well, aren't they present?" And you said, "There's a difference between present and thriving."

A. I thought we were talking about Dresden Pool then. Were we talking about the CAWS?

Q. You said that they probably won't thrive in the CAWS. They may thrive in the Pool but not the CAWS?

A. I think some species would probably. I don't know what -- thrive is sort of a little bit of a nebulas word. But I think there are some species that would do fairly well there.

Remember, in some sections of the CAWS there was reasonable populations of, like white sucker. And so -- like the north channel. I assume the north shore channel, there's probably some spawning that's occurring there.

So there are sections of the waterway now in which some of these species are maintaining populations.

Q. So to go back to the question. If you looked to the DO data, looked at the current conditions and determine if those conditions are

suitable for the early life stages.

A. Well, the reason I have to hesitate on that is, again, it's one thing to have these monitoring stations where you look at DO, you know, once a week or whenever, but that still doesn't tell you the range of DO that might be available to species. It doesn't tell me necessarily along the shoreline where there is some vegetation that DO in those areas might stay a little bit higher.

So it's a little hard to answer that as a very general question. I know there's DO problems in the system, but how extensive, does it affect all the habitats that these fish might use, how much might the improvement be, I -- those are questions I can't really answer.

Q. So you haven't reviewed the DO data; am I right?

A. I've seen some of the DO data, but I haven't reviewed it in detail.

Q. And so, what you said just now is you cannot determine the relationship between DO levels and fish thriving or fish survival? Have you looked at the impact of the DO conditions, including -- particularly during wet weather, and how that

affects the fish population?

A. Well, I know there's a depression of DO, and if it lasts long enough and there are no refugia, it's going to have an adverse effect on the fish population. The fact that with DO improvement from the CEPA stations, the fish population has apparently improved based on the District report that indicates there has been a problem of DO holding down some of these populations.

And that if we can improve the DO, we can potentially see a positive response of the fish population to that, so...

Q. So what leads you to say -- so if they have a certain number of -- and I will specify they have nine aeration stations right now. And if they see improvement, you would expect that improvement to continue?

A. You mean if they did nothing else?

Q. Right.

A. Just left those in there?

Q. Right.

A. I don't know at what point the system is going to continue to improve on its own and whether we've seen that improvement already or

whether there could be continuing improvement. What that question sort of asks under line is, what is the -- sort of the curve, if you will, of improvement and at what point are you going to reach -- where it levels off and you're not going to get any further improvement? I don't know the answer to that question.

But it's been relatively recent for a number of these stations, so I would assume there's still some lag. You might expect that there might be some continued improvement for a few years.

Q. Okay.

A. But I'm speculating.

Q. So you really need more information to be able to determine what change is going to result and how much more is possible; am I right?

MR. ETTINGER: Possible from what?

BY MR. ANDES:

Q. From continued changes in the system.

A. Well, part of that may relate to -- again, this would go back to something that I haven't analyzed and what are all the causal factors causing the DO problems. Well, one of them is in the record that I have seen that the flood events

and storm water flow in the river does depress DO levels.

So once the TARP system is fully operational, I assume some of those events will go down. What impact that has on water quality over the year, I don't know.

I mean, that's another analysis that I'm not prepared to do. But it's a reasonable question for someone to ask.

But as we improve these -- as we identify what is the source of the DO problems, and as we can improve each of those, and as the system responds to that by a little bit higher DO levels, then yes, I would expect that we're going to see continued improvements by the aquatic organisms.

Q. So you would expect significant -- so if I can state, and correct me if I am wrong, you would expect a completion of TARP, which -- would it mean completion of the three reservoirs, which will happen in about 15 to 20 years? You would expect that could lead to improvement with DO and from your analysis, therefore, in the fish population?

A. It should help.

Q. You don't have a sense of how much

that would help?

A. I couldn't really answer that.

Q. You don't have a sense of how much, in the interim, putting in more aeration stations would help?

A. No, because I haven't -- I know there's higher oxygen around the stations, but I haven't seen the data. They may be in the record, I have not gone into the -- you know, every piece of thing in the record, but -- in detail.

But I don't know what the system-wide impact has been of those stations, whether average DO has gone up a half a part per million or a part per million. So if we're seeing -- or if there's some point in which you're seeing a rise in the general DO levels in the whole system, then yeah, you're going to see a more system-wide response to that.

Q. Now, let me shift to another aspect. One of our areas that you've discussed before has been habitat improvement.

A. Uh-huh.

Q. Is that something else that should be considered, I assume long-term, is identifying where

there are areas where habitat could be improved and that that could also be something that could improve the situation? Am I right?

A. Uh-huh.

Q. So do you have a sense --

MR. ANDES: I don't know what the hand gestures are.

MR. ETTINGER: I'm just telling him "uh-huh" isn't very good for the court reporter, and he should say yes.

BY THE WITNESS:

A. Yes.

BY MR. ANDES:

Q. Do you have any sense of the relative roles of habitat improvements, which could be conducted sequentially over a period of time versus changes in dissolved oxygen, for example, or temperature?

A. No. That's a very complex issue. And how you would tease out the contribution from each of those to the overall system? It's just -- I mean, it's been raised and it's -- you know, there's a barge effect right now, especially in some of the system where you have the

wave action.

And so, there are habitat things you could do to attenuate that some degree, provide a little more sheltered habitat, and that's going to, you know, show some habitat improvements again in those areas.

Q. So that was something you'd recommend assessing --

A. Yes.

Q. -- as part of this whole --

A. Right.

Q. So the habitat improvements could familiarize the situation?

A. Correct.

Q. You're probably aware that Dr. Mackey and other folks are conducting a further habitat study for the District?

A. Yes, I've seen that mentioned in the record.

Q. Okay.

A. It was supposed to be done this summer, if I remember rightly, so...

Q. I believe that was what was stated. It's pretty close. All right.

So that would be something you'd believe would be relevant to look at, to assess role habitat versus some of these other factors; am I right?

A. Well, I'm not sure I would phrase is as versus, but I think it would be an important component, yes.

Q. Various factors, including habitat and improving the fish population?

A. Yes.

Q. Okay. Thank you.

Let's move to Subquestion R.

Do you know what effect the electric field barrier north of the confluence of the Des Plaines and the Illinois Waterway has on fish migration?

A. Yeah. Hopefully on this answer I can correct something that's wrong in the record. But it should keep adult fish from moving either upstream or downstream through that barrier.

Downstream, still could happen, you could still shock a fish, it could float through and recover potentially. There was some statement, I can't remember whether it was Mackey's testimony

or Melching.

THE WITNESS: Oh, in Huff's testimony? I think it was.

BY THE WITNESS:

A. Anyway, something about with electro -- this was related to electrofishing, saying that it should be -- yeah, I think it was in Mackey's -- saying that electrofishing should be more effective on small fish than large. It's actually just the opposite of that.

Electroshock is -- and there's a ton of papers on that, which I now have, if anyone is interested. But electric fields from electroshocking, for instance, are more effective on larger bodies, the bulkier fish rather than very small fish.

And so, real small fish may be able to pass through this field and move on upstream. They'll pass through with the current.

But, basically, in terms of adult fish, it should keep adult fish from either moving downstream or moving upstream. It should form a barrier to adult fish.

Q. Now, that fact assumes then, to some

extent -- I mean, after all, we're talking about improving the fish population. Part of that would be fish coming from other places, who then would like this community, this area; right?

Would the barrier serve some sense of limit to migration of those fish, such that they wouldn't be able to pass easily back and forth?

A. Well, there's not a large fish population in the Brandon Pool anyway, and so -- and I don't think there's any species in that pool that aren't already in the -- at least some portion of the Chicago area waterway. So I don't see any particular species being prevented, and, of course, that connection is an artificial one. I mean, it used to be.

So it's not like we have a migratory salmon or shad or something population that's being cut off. The negative effect from getting invasive silver and big head carp is much greater than any impact that might be from causing some of these adult fish not to be able to move from, say, Brandon Pool or Lower Lockport Pool up to other areas of the CAWS.

Q. So you're not looking for major new

populations of other fish becoming anyway?

A. In terms of the CAWS?

Q. Right.

A. No, I think most of the fish we've expected there -- are probably there to some degree. In some portion of the CAWS anyway. So I'm sure there's some exceptions to that, but generally.

Q. Are you aware that the Corp of Engineers is doubling the voltage of the electric barrier?

A. I've sort of kept up with it, but I don't know that I've heard that particular announcement. So -- yeah, if they have high enough voltage, they may take care of small fish going through, too.

Q. Let's move on.

Let's move to Subquestion W. And, actually, X. They are sort of the same question.

We're talking in the studies to form the basis for the UAA of 23 sampling points over the 78 miles of the system in terms of habitat. How many would you recommend?

Do you think 23 sampling points was enough to form conclusions about the habitat

here? Do you think something else would be required?

A. Well, I guess I have a couple of answers to that. Obviously, if that was all the data being relied on, I'd have to say no.

However, there are -- is a lot of other information that has been relied on. My feelings, especially after traveling on the Cal-Sag -- I think there were only two stations, if I remember correctly, in the Cal-Sag. And I don't think two stations were adequate to describe the available habitat.

My view, we -- they underestimated the available habitat that was there. So I would say they served maybe as a base, but I would say it's on the low end, not on the high end. But they underestimate the available habitat.

Q. And you're saying because you -- that's your concern with QHEI?

A. Well, it's my concern, but two stations trying to characterize the whole Cal-Sag.

Q. What if those two are really good, then they wouldn't be over -- they wouldn't be underestimating the quality, you would be over

estimating the quality; right?

A. Well, we discussed this some this morning, and I said one of the issues I had with QHEI and the large body of water is these fish tend to move over much wider areas. And if you're doing your measurement of the QHEI in a 500 meter stretch and that really isn't picking up, necessarily, all the habitat, any fish in -- even collected in that area, may be using -- to carry out their life history.

So again, I think, if anything, it may underestimate the available habitat of the fish because of their ability to move longer distances.

Q. If the points you happen to sample have good habitat but they move around a lot and most of the area they're going in doesn't have good habitat, then you've overestimated the quality; right?

A. You could do that. I mean, to try to characterize Dresden Pool by, obviously, the tail water areas of Brandon Lock and Damn, you would mischaracterize the whole pool.

Q. Have you looked, for example, at the points that were used on the Cal-Sag, and do you

have any reason to believe that those were particularly good or bad relative to the rest of the channel?

A. No. I didn't go back and actually try to pinpoint where those were when we were doing the trip.

But I think a lot of the habitats that we saw that I thought were -- would be reasonably good for fish populations we saw reoccurring a number of times as we went down that canal. And what I mean by that is emergent vegetation or logs in the water or overhanging vegetation or maybe shallower shoreline with gravel or -- so...

Q. Let's move down to Question 12.

MR. TIPSORD: You know what, let's take a ten-minute break.

(WHEREUPON, a recess was had.)

MS. TIPSORD: All right. I think we're ready doing to go back on the record.

Mr. Andes, your Question No. 12.

MR. ANDES: Yes.

BY MR. ANDES:

Q. We covered some of these issues

already. Let's move to Subquestion E.

The UAA states that good quality aquatic habitat in the CAWS is limited and the waterways would need to undergo major habitat creation and/or restoration to improve the fish macroinvertebrate assemblages.

Do you agree with that statement?

A. Partially. I agree there is a limitation of good quality habitat, but I'm not sure that the creation or restoration would have to be major to improve the fish population.

Q. So it could be minor?

A. Well, I'm not sure what was meant by -- major to me implies that it is going to have to be these massively overly expensive endeavors. And I think there's a lot of things that could be done to improve the fish habitat in the system that won't have to be that major.

I realize these are very qualitative terms we are talking about, but...

Q. Let's move on.

And also in the UAA document it says, "Improvements to water quality through various technologies, like re-aeration, may not improve the

fish communities due to lack of suitable habitat to support the fish populations. Unless habitat improvements are made in areas, like the Chicago Sanitary and Ship Canal, additional aeration may not result in the attainment of higher aquatic life use."

Do you agree with that statement?

A. Well, I agree it may not. I guess I would say, pretty much, I do agree with it.

Q. Let's move on to -- in our Question 13 you talk about the representative aquatic species secondary contact lists used by IEPA to represent the CAWS-A Waterways.

I guess the first question is to clarify secondary contact as that to a recreational standards term. So I wasn't clear on its use in that context.

A. I think that was used in Table 1 of the CABB/MDI Lower Des Plaines temperature criteria options, maybe used in the Yoda report.

Q. Okay.

A. So I think I just referenced it.

Q. So that was their confusion?

MS. DEXTER: Which is Exhibit 15.

MS. TIPSORD: Thank you.

BY MR. ANDES:

Q. Were those representative aquatic species -- that list, was that used to develop the dissolved oxygen criteria?

MS. WILLIAMS: Which question?

MS. TIPSORD: C.

MS. WILLIAMS: Because that question says were these RAS 8 species. Is that the question you're asking about the specific...

MR. ANDES: Yeah, I just played with the wording a little. But I'm talking about that list.

BY MR. ANDES:

Q. The question really, Dr. Thomas, was you're talking here about the representative aquatic species. And what I'm trying to clarify is, correct me if I'm wrong, that species list was used to develop temperature standards that -- those were not used to develop the DO criteria.

A. I can't address that for the Agency. I found the representative species they used. I thought it was a good list of species. I mean, I thought it was...

Q. Are you aware of how the DO criteria was developed?

A. No.

Q. I'm just checking the rest of the questions to determine what else we would need to discuss. I think we're done.

MS. TIPSORD: Thank you very much. I believe IEPA has a few questions.

MR. ETTINGER: I just want to clarify one thing. He said --

MS. TIPSORD: I can't hear you, Albert.

MR. ETTINGER: We did not make a connection here. Dr. Thomas, did actually testify, I believe, in the dissolved oxygen proceeding. There was a separate proceeding from that, and that did relate to the dissolved oxygen criteria here.

MR. ANDES: The question really was in his testimony here, he -- in discussing the CAWS waters, he focuses on that list of the representative aquatic species. My point was simply the issue the District has been focusing on, the DO, that species list was

not used.

MR. ETTINGER: All I was trying to say was your question was did he have anything to do with developing the dissolved oxygen standard, and I didn't want it --

MR. ANDES: Oh, that wasn't it. The question was did he know how these DO standards were developed.

MR. ETTINGER: For the CAWS?

MR. ANDES: Yes, for the CAWS.

MR. ETTINGER: That's all we were clarifying. Because he did testify in the statewide dissolved oxygen.

MR. ANDES: We know the CAWS is utterly unique and different from the --

MR. ETTINGER: Yeah. I just wanted the record to be clear on that.

MR. ANDES: Let the record be clear.

MR. ETTINGER: Let the record be clear.

THE WITNESS: And that's the way I was answering it, for the CAWS.

MR. ANDES: Right. Thank you.

MS. TIPSORD: Let's go to the IEPA.

EXAMINATION

BY MS. DIERS:

Q. I'm Stefanie Diers for Illinois EPA. I have a few questions to ask.

I want to ask Prefiled Question No. 1. In your opinion --

A. Can you hold on just a second?

Okay. I'm sorry. Go ahead.

Q. In you opinion, why do you believe it is sensible to determine the highest attainable aquatic use of a waterway by studying the physical characteristics?

A. Well, I feel the physical and chemical environment of aquatic systems do basically provide the basic support system for the biota -- for the biological community.

Q. I just have a couple follow-ups because all our other prefiled questions have been asked.

Dr. Thomas, what weight would you put on aquatic life data versus habitat data if the aquatic life data came from collections taken in the waterway that is subject to chemical or thermal stressors?

A. Are you referring to a specific question here?

MS. TIPSORD: No, it's a follow-up.

THE WITNESS: Oh.

BY MS. DIERS:

Q. This is just a follow-up based on some of the things we talked about.

A. Okay. I'm sorry. Could you repeat it?

Q. What weight would you put on aquatic life data versus habitat data if the aquatic life data came from collections taken in the waterway that is subject to chemical or thermal stressors?

A. Well, I have to think about that a second. I mean, I think the two go together, obviously, and maybe a broader answer for your first question is the habitat analysis starts to give you -- and along with chemistry -- starts to give you a view of what the potential for the system is to carry aquatic biota.

So I think you'd have to consider the two together. If you have a system that has really good habitat and yet has a low population, you know something is not right, and probably it's

water quality.

I think from sampling I've done in acid mine drainage streams that had beautiful habitat and nothing -- no fish at all in them. So -- I mean that's an extreme example, to say, "Wow, there's pretty good habitat here, but this has some real problems."

So that would be an extreme case. But the habitat tells you at least what the potential is if that had good water quality.

Q. Are you aware of an -- I know we talked by the RIS and the RA lists recently and this morning. Are you aware of the RIS or an RA list being used to determine attainability of biological condition?

A. Attainability of biological -- of any biological -- of clean water? I'm not exactly sure.

Q. I think the RIS and RA has been used to look at water quality. We were wondering could you use that to determine attainability?

MS. DEXTER: Stefanie, do you mean defining attainable use without the RAS? Is that the question, whether or not he knows of other situations where -- or, I'm sorry, not

other situations, but any situations where the attainable use is defined using the RAS?

MS. DIERS: Yes.

MS. DEXTER: Is that your question?

MS. DIERS: Yes.

BY THE WITNESS:

A. I'm not sure if I know another case, because I haven't been so involved on the regulatory end of looking at that. I know -- I have been involved in doing some environmental impact statements for power plants.

And if you're going to present data, you do try to include a range of species, such as was done here with the RIS, that have a range of sensitivity. Obviously, if you can prove the most sensitive of your species are not going to be affected, the assumption usually goes that you're not going to affect the more tolerant ones.

So I think, when you're trying to do a demonstration, you do tend to find more sensitive species in which you have data. As I mentioned earlier, the hard part is there hasn't been a lot of work done on sensitive species in many cases, because they're hard to work on.

So I think the concept is a good one, though. And you can't look at everything, there's just too much information.

So you try to pick on a suite of species that represent the range of conditions that the community of organisms might respond to. And, hopefully, you've included some of the more sensitive ones so you don't lose those out of the system.

MS. DIERS: No further questions. Thank you.

MS. DEXTER: Can I ask one follow-up question?

MS. TIPSORD: Absolutely.

BY MS. DEXTER:

Q. We've talked a lot today about fish data and a little bit about electrofishing sampling. Is there anything we should take into consideration when we look at electrofishing samples that would, sort of, include how we interpret the data?

A. Yeah. And I think I discussed this a little bit in my testimony, but not directly. The -- and this relates to the IBI.

We've had in the record -- and we

didn't really talk about it, I don't think, in the cross-examination questions today -- but how the index of biotic integrity, how those scores compare, like in Dresden Pool or elsewhere in the CAWS with other water bodies. Both the electrofishing data for the CAWS, as well as for Dresden Pool, were using alternating current called AC electrofishing.

And there is a study that's just coming out from some of the natural history survey staff that shows a comparison of what you might catch with alternating current data versus direct current, which tends to be used more often. And it is interesting in some of the buffalo, like small mouth buffalo, large mouth buffalo, that are in this system, possibly some of the red horses are causing much greater abundance with direct current, DC electrofishing than with AC.

If that's the case, our index of biotic integrity might be much higher, or at least significantly higher, than the values that we have for this case. And I just had sent to me this last week probably six or seven publications that talk about the difference between AC and DC, and there's a lot of variations.

But I think it is important when considering these data. I'm not sure, but it seems like Ohio criteria may have used the DC electrofishing as part of how they sampled over the 500 meters or whatever they're sampling. So that's one thing to consider.

The other, which we talked about today, is that electrofishing is somewhat limited. In turbid waters you miss a lot of fish. You tend not to get fish in the deeper waters, particularly with the AC electrofishing.

The DC is a little more effective, in fact, and may be the reason you get more buffalo fish and some of these other near bottom fish. So it's another one of those confounding variables, but it's one I think that has to be considered for the record.

BY MR. ANDES:

Q. And then I have a couple of follow-up questions to that. I guess one would be if there are references indicating that difference, we'd certainly like to see those for the record.

I guess the other question is, so are you saying that if they used a different kind of

electrofishing, it could turn out that these waters are far healthier than we thought?

A. It might have a higher index of biotic integrity.

Q. Which means they are healthier? Fish communities are really healthier than we thought?

A. That's a possibility.

MR. ANDES: Thank you.

MS. TIPSORD: Anything else for Dr. Thomas?

Thank you so much for joining us.

Everyone have a great weekend.

I'll see you October 5th for Laura Barghusen, Cheryl Adelmann, and Victor Crivello.

Thank you, all. We are adjourned.

(WHICH WERE ALL THE MATTERS HEARD IN THE ABOVE-ENTITLED CAUSE THIS DATE.)

STATE OF ILLINOIS)
) SS:
COUNTY OF COOK)

I, SHARON BERKERY, a Certified Shorthand Reporter of the State of Illinois, do hereby certify that I reported in shorthand the proceedings had at the hearing aforesaid, and that the foregoing is a true, complete and correct transcript of the proceedings of said hearing as appears from my stenographic notes so taken and transcribed under my personal direction.

IN WITNESS WHEREOF, I do hereunto set my hand at Chicago, Illinois, this 25th day of August, 2009.

Certified Shorthand Reporter

C.S.R. Certificate No. 84-4327.