STATE OF MICHIGAN

STATE OFFICE OF ADMINISTRATIVE HEARINGS AND RULES

In the matter of:	File Nos.:	GW1810162 and MP 01 2007
The Petitions of the Keweenaw Bay Indian Community, Huron Mountain Club, National Wildlife Federation, and Yellow Dog Watershed Environmental Preserve, Inc., on permits issued to Kennecott Eagle Minerals Company. /	Part:	31, Groundwater Discharge 632, Nonferrous Metallic Mineral Mining
	Agency:	Department of Environmental Quality
	Case Type:	Water Bureau and Office of Geological Survey

D R A F T T R A N S C R I P T

HEARING - VOLUME NO. II

BEFORE RICHARD A. PATTERSON, ADMINISTRATIVE LAW JUDGE

Constitution Hall, 525 West Allegan, Lansing, Michigan

Tuesday, April 29, 2008, 11:00 a.m.

APPEARANCES:

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Lansing, Michigan

Tuesday, April 29, 2008 - 11:05 a.m.

JUDGE PATTERSON: I believe this morning we were going to address the motions in limine; is that correct?

MR. LEWIS: Yes.

MR. HAYNES: Correct.

MR. EGGAN: Yes.

JUDGE PATTERSON: And then adjourn until 1:00 o'clock for the witnesses at --

MR. HAYNES: Correct.

MR. EGGAN: Right.

JUDGE PATTERSON: Okay. I've read all the motions. Does anybody want to argue beyond what's in the motions in support?

MR. LEWIS: I think, your Honor, we filed a short reply to the Petitioner's two motions in limine. I served them on counsel yesterday. If you've had a time to review those, unless other counsel wants to argue, I'm -- it's fine, if you're ready to rule.

MR. REICHEL: Object for the record. Respondent did not file a written response to the two motions in limine submitted by the Petitioners. What we would concur in the response -- made by Kennecott. Excuse me. I just wanted to note for the record, if you're having difficulty understanding me, I had some dental work done this morning.

I apologize.

MR. EGGAN: Your dentures look real nice,

MR. REICHEL: Thank you. I just need some more Polygrip or something.

MR. EGGAN: Let me see.

MR. HAYNES: If you're ready to rule, I don't see the need for supplemental argument.

JUDGE PATTERSON: Okay. Mr. Eggan?

MR. EGGAN: Agreed; agree, your Honor.

JUDGE PATTERSON: All right. I'll start with the Petitioner's motion to exclude -- I've got these in the wrong order. Stick with me for a minute. Again, I'll start with Petitioner's motion in limine to exclude witnesses based on the fact that the, quote, unquote, "recitation" in the filed witness list is insufficient to apprise them of the substance in sufficient detail of the proffered experts' testimony.

It would appear on the face of the motion that Petitioner's recitations were more thorough, possibly more explanatory, at least those excerpts from Kennecott's witness list; however, in response to the motion, Kennecott has assured this Tribunal that it has already provided expert reports and that information accessary for the preparation as provided otherwise and did not do so in the witness list just in an effort not to be duplicative.

Based on those facts and that assurance, it would appear there has been sufficient -- there's been, as I've repeatedly said in a number of orders, to put it in lack of a better term, a lot of water over the dam. I think at this point there's sufficient evidence and background of the experts to provide proper preparation, so I will deny that motion.

Secondly, as to the motion in limine to prohibit evidence post-application, I have reviewed some of the cases, and those appear to be cases on appeal based on a record generated at the Administrative Tribunal or a Circuit Court below. As this Tribunal has repeatedly stated, what we engage in here is de novo review, and the issue is whether or not in this case KEMC or Kennecott is entitled to the permits and the mission being to develop a record towards a final Agency decision. To adopt the position that any post-application evidence would be prohibited would confer at this contested case hearing into an appeal, which it is not. It is a hearing to develop a record towards a final Agency decision and, therefore, that motion too will be denied.

Third, KEMC has moved to prohibit introduction of reports of the experts of Petitioners based on two assertions: one, that they are hearsay and, second, that they are irrelevant and immaterial. At this point I don't

think it's possible to determine relevance or materiality without knowing what the specific issues and the parameters of the evidence are at the point of their being proffered. So far as hearsay, I did note that I think it's -- Dr. Maest is going to testify, which would alleviate and I think render moot whether or not her report is hearsay if she's going to be here to testify live.

MR. EGGAN: She will be, your Honor.

JUDGE PATTERSON: All right. Secondly, as to a blanket ruling on whether or not they're hearsay, I don't think I can make at this point. Obviously, these types of reports are governed by Section -- I believe it's 75 of the Administrative Procedures Act, which loosens the hearsay exception in some respects if these reports were relied upon or utilized and -- by somebody in the application review period. So I will -- in respect of hearsay and relevancy and materiality, I just don't think I can make a blanket pronouncement on that. That's something that's going to have to be addressed as those certain reports, if they come in on that form, are proffered to this Tribunal. So we'll just do that on a piecemeal basis. Does that cover everything? I think --

MR. LEWIS: Yes, your Honor, I believe it does.

MR. EGGAN: I believe it does.

MR. HAYNES: Yes.

JUDGE PATTERSON: Any questions or --

MR. LEWIS: Not on that point, your Honor. We did have a couple other issues to take up.

JUDGE PATTERSON: Okay.

MR. HAYNES: We have some housekeeping matters.

JUDGE PATTERSON: All right.

MR. HAYNES: First, counsel have agreed that the resumes of the experts can be admitted without having to show the expert the resume, have the expert verify that the resume is the resume of the expert and then move the admission. So the resumes of all of the experts that have been exchanged will be admitted without prejudice obviously to any party being able to qualify the expert and cross-examine the expert.

JUDGE PATTERSON: Okay.

MR. HAYNES: I think we've got agreement from all counsel on that?

MR. LEWIS: That's correct.

MR. REICHEL: That's correct.

MR. EGGAN: Yes.

MR. HAYNES: Second, the mining permit application has been listed by all parties in various forms in various exhibits, and that's the application and its appendices and the environmental impact assessment and its appendices. And we've agreed and we'll stipulate that those documents are

admitted, and the exhibit numbers are scattered, but we'll sort that out at some point.

JUDGE PATTERSON: Okay.

MR. EGGAN: May I add that I believe all stipulation was the mining permit application under Part 632 as well as the groundwater discharge permit application under Part 31 to round that out. I assume that that was the stipulation?

MR. HAYNES: Yes.

MR. LEWIS: That's right. I agree, and including the EIA documents that Mr. Haynes referred to. I think, with both the resumes and the mine permit application and groundwater discharge permit application materials, your Honor, what we may be able to do is, at some point before long, perhaps our assistants can put those lists together -- the respective lists, and we can give those numbers of exhibits to the Court, and that'll be the list of stipulated admitted exhibits.

MR. HAYNES: Or frankly, we can just make them joint exhibits.

MR. LEWIS: I see some difficulty in that. They're kind of scattered all around the place, and we're going to be referring to our own respective exhibits, I suspect, so --

MR. HAYNES: That's fine.

JUDGE PATTERSON: However you can work that out, I --

MR. LEWIS: All right.

MR. REICHEL: For the record, your Honor, the Respondent concurs in those stipulations.

JUDGE PATTERSON: Okay. Thank you, Mr. Reichel.

MR. EGGAN: One thing that we did not discuss this morning, Mr. Lewis and Mr. Reichel, is a discussion that we had on a continuing basis over the last week or so with respect to us providing the order of the witnesses; in other words, Petitioners providing an order of witnesses to both of -- to both Respondents and Intervener. We have provided that, and it's my understanding that three days prior to Kennecott's presentation of its proofs, it will provide a list of the witnesses and order that it intends to call, and then Mr. Reichel has indicated he will be providing a similar list to us. Mr. Reichel, maybe you can speak to that as to when it will be -- you'll be able to do that.

MR. REICHEL: Yes. I can confirm that discussion. We have agreed to that. With respect to the Respondent's witnesses, as the Court -- as your Honor may already be aware, we may need to take some of our witnesses out of sequence with respect to our case in chief, if you will. Certainly, we anticipate at least a week before the presentation of our case, we will share with counsel the

anticipated sequence of our witnesses.

MR. EGGAN: Okay.

MR. LEWIS: And just one minor point. I believe we put the stipulation as to Kennecott on the witness order on the record yesterday, if I'm not getting things wrong, through Mr. Eggan, and it was then -- three or four days I think is what the stipulation was yesterday, but we will endeavor to do three if we can --

MR. EGGAN: That's fine.

MR. LEWIS: -- or four, I mean, if we can.

MR. EGGAN: Okay. That would be great.

JUDGE PATTERSON: Do the best you can.

MR. EGGAN: You agreed to three.

JUDGE PATTERSON: Obviously, there's dynamics that may change that.

MR. LEWIS: Yes; that's correct.

JUDGE PATTERSON: As much information as you can disseminate as quickly as possible would be helpful.

MR. LEWIS: That's fine with me.

MR. EGGAN: Very good.

JUDGE PATTERSON: Okay. Anything else?

MR. LEWIS: I don't believe so.

MR. DYKEMA: Your Honor, before we adjourn, can you give counsel a moment to confer?

JUDGE PATTERSON: Yeah; sure.

(Off the record)

MR. DYKEMA: Your Honor, this is Peter Dykema, Huron Mountain Club. I have one clarifying question on one of your Honor's rulings this morning --

JUDGE PATTERSON: Okay.

MR. DYKEMA: -- with respect to the Petitioner's motion regarding witnesses whose recitations were brief. Am I correct, your Honor, that your ruling does not extend to experts who have not been -- with respect to whom we have not been given any kind of expert report? As I understand your Honor's ruling, the brevity of the recitation is, in effect, moot if we've already been given an expert report, and I understand that.

JUDGE PATTERSON: Right.

MR. DYKEMA: But in the case of an expert with respect to whom we have not gotten any kind of expert report, are we to assume that your ruling does not extend to that person?

MR. LEWIS: Could I speak to that, your Honor?

JUDGE PATTERSON: Yeah; sure.

MR. LEWIS: First of all, this very issue was discussed, I believe, in the context of the Petitioner's earlier motion for discovery, and we did point out a number of things in there. Number one, the primary difference between the disclosures by the Petitioners and the

disclosures by Kennecott was the election of how much information to restate in the witness list from prior reports. Now, we elected, rather than to restate a few pages of information from prior reports, to reference the reports that were already in the public record, which the Petitioners have available to them. Secondly, there was no obligation on the part of either the Petitioners, Interveners or Respondents to prepare new reports for any witnesses who had not already prepared and provided reports. The Petitioners, as with us, have some experts in that category who had not previously provided reports.

JUDGE PATTERSON: Yeah, I noticed that.

MR. LEWIS: Now, to get to Mr. Dykema's point, I think we would have to go through the process of finding those witnesses in our respective witness lists and comparing the amount of information that we both provided to one another. And on those witnesses I think you will find that we were equally as informative, as were the Petitioners. So I think this is a moot point, and I think your prior ruling, you know, covers the ground well enough.

MR. REICHEL: Judge, may I address that as well?

JUDGE PATTERSON: Sure.

MR. REICHEL: With respect to the Department of Environmental Quality witnesses, I would note first that the -- although the recitation of testimony in our witness

list was summary in nature focusing on the subject matter, we did, with respect to our experts, identify in the witness list reports -- either formal reports or documents contained in the DEQ files either offered by or relied upon by these witnesses, which have been disclosed to the Petitioners in advance of this hearing. So it's our contention that the availability of documents offered by the DEQ witnesses or contractors in the DEQ files has been sufficient to apprise -- reasonably apprise the Petitioners the anticipated substance of their testimony.

JUDGE PATTERSON: Mr. Dykema, any response?

MR. DYKEMA: In those cases where an expert that Kennecott or the DEQ intend to call has put a report of some kind in the record that apprises us of what they're likely to say, I understand the Court's -- your Honor's ruling, and that makes perfectly good sense. With respect to Mr. Reichel's argument that those experts who have not made any kind of expert disclosure or report, that we have to go through those one at a time, I'm comfortable with that. I just want to let the Court know that there are witnesses for whom we have neither an adequate disclosure nor an expert report, and so we're flying dark. But if the Court prefers that we take those up one at a time when a witness is proffered, that's fine with us.

JUDGE PATTERSON: I think that's the only way we

can do it. We're at this point essentially operating in a vacuum. And in the event that anyone feels prejudiced or disadvantaged by that, we can accommodate that and give you time to further prepare or whatever. All right?

MR. DYKEMA: Thank you, your Honor.

JUDGE PATTERSON: Anything further?

MR. HAYNES: No, your Honor.

MR. REICHEL: No.

JUDGE PATTERSON: Okay. 1:00 o'clock -- who's going to testify at 1:00 o'clock?

MR. DYKEMA: The Petitioners will call Dr. Kerry Woods of the Huron Mountain Wildlife Foundation.

JUDGE PATTERSON: Okay. And that's the only witness for this afternoon?

MR. DYKEMA: Yes, your Honor.

(Off the record)

MR. DYKEMA: Petitioner calls Dr. Kerry Woods.

REPORTER: Would you raise your right hand? Do you solemnly swear or affirm the testimony you're about to give will be the whole truth?

DR. WOODS: I do.

KERRY D. WOODS, PH.D.

having been called by the Petitioners and sworn:

DIRECT EXAMINATION

BY MR. DYKEMA:

Q Dr. Woods, would you please state your full name for the record?
A Kerry David Woods.
Q And where do you live?
A I live in Cambridge, New York.
Q Are you presently employed?
A At Bennington College in Bennington, Vermont.
Q And what is your position at Bennington College?
A I'm a professor of natural sciences.
Q And when did you become a professor there?
A 1986.
Q Can you please review for the Court your formal education?
A I did my undergraduate work at Illinois College, where I was a physics and biology double major. I took my Ph.D. at Cornell University in Ithaca, New York, in ecology and evolutionary biology and held post- --
Q And did you do any -- excuse me.
A -- and held postdoctoral appointments -- research and postdoctoral fellowship appointments at the University of Minnesota at Minneapolis and at the University of California at Santa Barbara.
Q And when did you first start teaching in biological sciences?
A Well, I started, I suppose, as a graduate student, so in the late 70's and full time in the early 80's at St. Olaf

College and --

Q And did you teach at University of California?

A Yes. I had -- my appointment there was part-time research, part-time teaching, so I taught there and at the University of Minnesota as well.

Q Other than those institutions and at Bennington, have you been a teacher in the biological sciences elsewhere?

A I've had visiting appointments elsewhere. I taught for one summer at the University of -- Central European University in -- based in Budapest, Hungary, and I've had visiting lectureships at other places; in New Zealand and at Harvard Forest in Massachusetts.

Q And in what subjects have you had visiting teaching positions?

A On, environmental science generally at the Central European University and forest ecology at the others.

Q And how long have you been at Bennington?

A 22 years this fall.

Q And apart from being a professor and instruct at Bennington, have you held other positions at the college?

A I've had several elected positions in faculty governance committees; the personnel review committee and the academic policies committee, as well as a number of other appointed committee services, but those are the primary ones.

Q What is the charge of the academic policies committee at

Bennington?

A Basically it oversees the full -- all of the aspects of the academic function of the college. We oversee curriculum development, allocation of faculty positions.

MR. DYKEMA: Can we have slide number 5, please? Your Honor, I've prepared binders with the exhibits and the copy of the demonstratives that Dr. Woods will testify to, if I may approach?

JUDGE PATTERSON: Is this part of what I already have?

MR. DYKEMA: It is not.

JUDGE PATTERSON: Okay.

MR. DYKEMA: This was prepared just for today's testimony.

JUDGE PATTERSON: Yeah, come on up.

MR. PREDKO: Your Honor, I guess we would object to the extent that the exhibits were due quite a long time ago, and we were never provided these up until right just now.

MR. DYKEMA: Your Honor, it might be best to take this one at a time, but I can assure the Court that the materials that will be presented both on the screen and in the binder have been in the Respondents possession for a long time. Some are comments that were submitted by the Huron Mountain Club to the DEQ two years. Some are exhibits

that are in our exhibit list or that have already been entered.

JUDGE PATTERSON: Okay.

MR. DYKEMA: So there is nothing new here. The material, such as we're looking at on the screen, are just materials that have been taken out of Dr. Woods' CV, which was included in our witness list that was served many, many weeks ago.

JUDGE PATTERSON: They just weren't provided this specific form here?

MR. DYKEMA: That's right, your Honor. We've just pulled out some material to highlight it and to help Dr. Woods testify to it.

JUDGE PATTERSON: Okay. Go ahead.

Q Dr. Woods, I'd like you to summarize for the Court the professional activities that you have engaged in over the years in addition to the formal teaching positions and administrative positions that you have held and -- or if it is of help --

A I've been involved for many years in the Primary Professional Society of Free College Ecological Science in North America, and that's the Ecological Society of America. And I've served on several of their governance committees, including the professional ethics committee, which I chaired for several years; the governing council two years ago -- or

last year. I was the chair of the national meetings of the ecological society, which was held in San Jose, and those are the largest professional meetings in ecological science globally.

I'm the -- also currently the chair of the North American Section of the International Association for Vegetation Science, and I've for the last seven or eight years served as an editor for the journal of both of those societies, for the Ecological Society of America and for the International Association for Vegetation Science. I've been on advisory committees for various other organizations and field stations and for the last several years have been the director of research for the Huron Mountain Wildlife Federation.

Q Dr. Woods, can you turn with me, please, to the first tabbed item in the binder that I've handed you?

A Uh-huh (affirmative).

Q Is this your CV?

A Yes.

Q The material in slide 5 which is on the screen now, is that taken out of your CV?

A Yes.

MR. DYKEMA: Your Honor, in the binders that I've handed around, slide number 5 has been identified as Exhibit Part -- Exhibit 138 in the Part 632 appeal -- contested case

proceeding. I ask that it be admitted.

JUDGE PATTERSON: Is it 138? Mine's 133.

MR. DYKEMA: I'm sorry, your Honor. I'm referring to the demonstrative that's up on the screen.

JUDGE PATTERSON: Oh; oh, I'm sorry. All right. Any objection?

MR. PREDKO: Yes, your Honor. Your Honor, the exhibits that we were provided pursuant to this Court's rule only went up to Exhibit 117, and so I'm not sure where this exhibit is coming from. I've never seen this. I've reviewed all the exhibits that Petitioners have provided.

MR. DYKEMA: Your Honor, Dr. Woods has just testified that this information comes directly out of his CV, and I believe the parties have a stipulation that the CV is admissible.

MR. PREDKO: The CV itself, your Honor, is fine. I've taken a look quickly through this book, and there are numerous reports in here that we were not provided; numerous exhibits that we were not provided. Pursuant this Court's ruling, exhibits were to be provided over a month ago.

JUDGE PATTERSON: Well, I think we'll have to take those one at a time.

MR. PREDKO: Okay.

JUDGE PATTERSON: Obviously the CV itself is subject to the stipulation, I assume. Is that what you're

offering or that --

MR. DYKEMA: I thought, your Honor, for the Court's convenience, it might be helpful to have in evidence some material that highlights entries in the CV such as our Exhibit 138, which is on the screen now, which is taken from the CV.

JUDGE PATTERSON: So it's just an excerpt from the CV?

MR. DYKEMA: That's right.

JUDGE PATTERSON: All right. I'll admit that.

(Petitioner's Exhibit 632-138 received)

Q Dr. Woods, in your positions as an editor of the ecology publications that are identified in Exhibit 138 and in your CV, what is the range of scientific research that you are called upon to review, analyze and assess?

A For the editorships that are mentioned there, the manuscripts that come to me for judgment and for allocation to peer reviewers cover a ride range of terrestrial ecology. The program chairmanship for the ESA covered the full range of ecological science. I was responsible for assessing, accepting or rejecting and then arranging into a program about 5,000 submissions from everywhere from marine biology to forest ecology, you own specialty.

Q I'd like now to discuss with you your -- the publications that you, yourself have authored in the area of ecology.

Approximately how many peer-reviewed publications have you authored?

A On the order of 20.

Q And approximately how many of those are in the field of forest ecology?

A Essentially all of them, although some are remote sensing and paleoecological studies so not looking at current on-the-ground forest ecology but all addressing forest ecology in one way or another.

Q And how many of those papers, Dr. Woods, have dealt with the forest ecology of old growth forests in the upper Great Lakes region?

A All but two or three.

Q And have you authored papers specifically studying the old growth forests of Huron Mountain Club?

A Yes; about five or six -- five at this point, I believe.

MR. DYKEMA: Can we have slide number 1?

Q Dr. Woods, we're looking at the slide that we have marked in the binders as Exhibit 134. Are the papers listed here taken out of your CV?

A Yes.

Q And can you summarize for the Court the subject matter and nature of the studies that have been identified here?

A These are all concerned with the dynamics over time of old growth forests and particularly looking at the dynamics and

properties of the tree populations and the canopy dynamics, including responses to natural disturbances and regeneration processes.

Q The title of this slide refers to hemlock hardwood forests. What are the significance of hemlock hardwood forests in the Huron Mountains?

A Well, that's a fairly large category of forest types that would -- within which most of the old growth forests of the northeastern U.S. from the Great Lakes to New England would be included. And so the majority of the old growth forests of the Huron Mountains would fall into this type.

MR. DYKEMA: You Honor, I move the admission of Exhibit 134.

MR. PREDKO: And again, what is Exhibit 134? Are you just talking about the excerpts that are up on the screen?

MR. DYKEMA: That's right; that's right.

MR. PREDKO: No objection, other than, again, your Honor, that the exhibits that were provided to us only go through 117, and so I'm not sure where these additional exhibits are coming from. This one's certainly brand new. I don't have an objection to this one but --

MR. REICHEL: No objection, your Honor.

JUDGE PATTERSON: Again, it's just an excerpt of the CV; correct?

MR. DYKEMA: That's correct.

JUDGE PATTERSON: It'll be admitted.

(Petitioner's Exhibit 632-134 received)

Q Dr. Woods, have you authored papers other than what we're seeing in Exhibit 134 that have a direct bearing on the scientific value of the Huron Mountain Club property?

A Actually, a couple of things; one more recent paper that's just in print as of a couple of months ago that is looking at further parts of the aspects of forest dynamics, looking at tree seedling dynamics, only recently published, so it wasn't in the CV I submitted to you. Also, there's the -- as of 2007, we have complied what we call an All Taxa on biological -- biodiversity inventory for the Huron Mountain Club and that's published under my authorship as a compiler. It is a summary -- a digest, a summary of All Taxa of all groups, ranging from microorganisms to wolves that have been documents at the Huron Mountain -- within the boundaries of the Huron Mountain Club.

Q Can you turn with me, please, Doctor, to the second-to-last tab in the binder that I've distributed, which is Exhibit 24 on the Part 632 case?

A Yeah.

Q Is this the All Taxa Biodiversity Inventory that you just referred to?

A Yes.

Q Can you explain to the Court how you went about compiling this inventory of the organisms on the Huron Mountain Club property?

A The work that has been done by researchers on the lands of the Huron Mountain Club consist of some, oh, roughly 200 published papers, unpublished reports to the Huron Mountain Wildlife Foundation, and I read all of them and simply compiled all of the records that were in them. Some of them are focused surveys of particular groups. Others are more diffuse studies but where some species were documented uniquely, and all of those went into the compilation, and they're all referenced within in.

Q How far back do the papers reporting scientific studies on the Huron Mountain Club property go?

A The earliest ones go back as far as the 20's and 30's, but those are quite sporadic. The main body of work goes back to the late 40's and 1950's.

Q Returning -- continuing with an account of your publications, have you also published abstracts summarizing speeches and addresses that you've made?

A Sure. The published abstracts are associated with official professional meetings, and those are. in fact, published in the public arena. Speeches that have been made at invitation to other institutions don't have published abstracts, but there's a list of examples of tide holes and

institutions that have been where I've offered reports on this research. In my CV there's something over 50 at this point.

Q And have you received grants to fund your researches in ecological science?

A Yes. Those that have supported the research in northern Michigan and at the Huron Mountains have included grants from -- major grants from the National Science Foundation and the U.S. Forest Service and most recently the Andrew Mellon Foundation. I've also received some support from the Huron Mountain Wildlife Foundation but not in the last decade.

Q And on approximately how many occasions have you been invited to speak on subjects related to forest ecology?

A Somewhere between, I would -- somewhere between 50 and 100; say 75.

Q In how many countries?

A Let's see. 5 or 6.

Q And in how many states in the United States?

A Last time I counted, I think it was 15.

Q Doctor, have you received honors in recognition of the scientific contribution you have made to the field of forest ecology?

A The -- on my resume is -- I've listed a fellowship that I held about ten years ago at Harvard University Harvard

Forest. It's called a Bullard Fellowship. That's a -- that's given in recognition of ongoing research in plant science. As of this fall, I will be a fellow of the National Center for Ecological Analysis and Synthesis in Santa Barbara, which is a similar -- the awarded fellowship.

Q Doctor, how much of your scientific research has been focused on issues relating to the forests of the northern Great Lakes region?

A The large majority of it. Some of my research has addressed vegetation of the northeast as well, but the large bulk of my work has been focused in the upper Great Lakes.

MR. DYKEMA: Your Honor, I ask that the Tribunal accept Dr. Woods as an expert and allow him to offer opinions in the fields of forest ecology, community ecology and in particular the forests of the northern Great Lakes region.

MR. REICHEL: Excuse me, your Honor. May I ask counsel to repeat the second category?

JUDGE PATTERSON: I was just going to ask that.

MR. DYKEMA: The community ecology.

MR. REICHEL: Community ecology.

JUDGE PATTERSON: That's what I have. Any voir dire on anybody's part?

MR. REICHEL: Just briefly.

VOIR DIRE EXAMINATION

BY MR.REICHEL:

Q Dr. Woods, what is community ecology?

A It's the midrange of ecological systems that we study. There are population ecologists who look at particular species and their -- the dynamics of their populations. There are ecosystem ecologists who look at the geochemistry of nutrient cycling. Community ecologists look at the interactions among populations and the -- so forest is a community, and community ecologists look at those systems as integrated entities. And that's, in fact, what my degree is in.

MR. REICHEL: I have nothing further. I have no objection to the witness' qualification in those fields.

MR. PREDKO: No objection, your Honor.

JUDGE PATTERSON: Okay.

DIRECT EXAMINATION

BY MR. DYKEMA: (continued)

Q Dr. Woods, do you hold a position with the Huron Mountain Wildlife Foundation?

A I was appointed to be the director of research at the Huron Mountain Wildlife Foundation as of three and a half years ago.

Q And have you been affiliated in any way with the foundation prior to your appointment as the director?

A The foundation had approved and in the past supported some of my research. I don't think of that as an affiliation with the organization itself, but that was --

Q What is the foundation?

A -- the previous involvement.

Q Excuse me.

A The foundation is a not-for-profit organization whose mission is stated simply to support research into the natural sciences of the upper Great Lakes Region, and the foundation maintains a field station on Ives Lake, which is the sort of low-ground lake in the upper part of that map there. And upon a certain amount of research directly each year but also overseas research projects, other than the ones the foundation funds directly that are taking place in this region, and the lands of the Huron Mountain Club itself are the primary research locus but not exclusive.

Q Where does the foundation get most of its money?

A To date nearly all of it, if not all of it, has been through direct contribution of foundation members. We are at the moment, I think, nearly 100 percent of the way to getting some funding from the National Science Foundation to expand facilities not -- it won't go directly to research support. It will allow us to expand our field station facilities. But to date -- and especially the funds that go to support the researchers themselves -- has all been contributions.

Q You've mentioned contributions by members of the foundation. I think you may have mis-spoke. Did you mean to say "contributions by members of the Huron Mountain Club"?
A I -- yes, because not all of them are members of the foundation. You're right.
Q And the Huron Mountain Club and the Wildlife Foundation are distinctly co-entities?
A They are.
Q When for the foundation created?
A 50th anniversary was in 2005, I believe, so 1955.
Q And since then approximately how many peer-reviewed scientific papers have resulted from research sponsored in hole or in part by the foundation?
A I believe the total of peer-reviewed papers -- oh, I'm losing the number from my head. It's several dozen, but I'm --
Q Please turn with me to tab C in the binder that's in front of you.
A Yes.
MR. DYKEMA: And your Honor, for the --
A Yes.
MR. DYKEMA: Let me ask you to --
A I believe -- it's 70 something, I believe, at last count.
Q Thank you. If I can ask you to pause for a moment, Dr. Woods --

A Uh-huh (affirmative).

MR. DYKEMA: Your Honor, the exhibit that has been marked as Exhibit 6-d -- small d -- which has all the lettered tabs behind it, through letter tabs A through N, this was comments submitted by the Huron Mountain Club to the Department of Environmental Quality in May of 2006, so almost exactly two years ago. It is my understanding, your Honor, that the comments and materials submitted to the Department of Environmental Quality during the mine application review process are all a part of the record before this Tribunal all right. But I would ask the Court's guidance on that so, if I need to introduce this material, I'll do so. My understanding is it's already in the record.

MR. PREDKO: Counsel, which exhibit were you referring to of your --

MR. DYKEMA: It is -- the second tab is -- you'll see it's got 6d handwritten, and that 6d -- what we've identified as 6d are the comments that the Huron Mountain Club submitted to the DEQ in May of 2006 and all of the attachments to those comments that were submitted to the DEQ in May of 2006.

MR. PREDKO: Your Honor, we do object to the admission of these comments. And in fact, I thought that this was a subject of a motion in limine. The comments, a lot of them written by lawyers are hearsay and should not be

admitted as substantive evidence in this proceeding. They can have experts come in and testify as to why the application was incomplete. But comments written by lawyers and other folks during the process are hearsay and should not be admitted.

JUDGE PATTERSON: Well, first of all, Counsel, to address your inquiry, I -- these, at least to my knowledge, are not part of the record in this proceeding. They may have been furnished to DEQ in the application review process, but I don't think they've been offered or certainly admitted in this particular proceeding that I'm aware of unless there's a --

MR. DYKEMA: Well, we have identified as Exhibit 6 in our list of exhibits the materials that were submitted to the DEQ during the permit review process. Now, that's a blanket identification.

JUDGE PATTERSON: Right.

MR. DYKEMA: And we identified that on the understanding that the materials on the basis of which the DEQ reached its initial permitting decision would be a part of the record here. But, your Honor, if we need introduce everything again in order to make it a part of the record before this Tribunal, I -- we need that guidance.

JUDGE PATTERSON: I think you have to do that. The fact it was furnished to the DEQ in the application

review process doesn't make it part of this record, but it's specifically being offered and admitted.

Q Please turn with me, Dr. Woods, to tab capital letter C. Do you have that in front of you?

A Yes.

Q What is it?

A It's a list of scientific papers that have been published and -- either in peer-reviewed literature or in -- I believe some of them are internal reports to the foundation. Some of them are thesis -- theses for master's and Ph.D. degrees out of various institutions. But it's a full listing as of a year or two ago, I think, of the reports published from research conducted under the Huron Mountain Wildlife Foundation's oversight.

Q Is there a way for you to characterize for the Court the range scope of the research reflected in what we are calling Exhibit 6dC?

A Yes. It's categorized here, but it ranges from geological research through aquatic biology and ecology to surveys of terrestrial animal and plant populations to ecosystem dynamics, including hydrological or -- in other words, it's a very wide-ranging body of work.

Q And can you turn with me, please, to the next tab, tab D, --

A Yes.

Q -- which I will identify as the Part 632 Petitioner's

Exhibit 6dD? What is this?

A This is a listing of current or ongoing scientific studies at the Huron Mountains under the oversight of the Huron Mountain Wildlife Foundation. It's, I believe, one or two years old. The -- so -- but much of this -- much of -- many of these projects are still ongoing, and there are some others that have been established since it was

Q I can represent to you, Doctor, that this was prepared in connection with our comments to the DEQ almost exactly two years ago.

A Okay.

Q Can you give the Court a sense of the new work that has been undertaken under the auspices of the foundation in the last two years or at least some examples?

A Yes. We have -- I'll try to sort of cover the -- cover it topically and with some examples. We continue, as always, to have a variety of studies of forest ecology. We have a new study beginning this year that's focused on the ecology of white pine and its establishment in old growth forests, which is happening at the Hurons because it's one of three places where there are old-growth white pine forests. We have several new studies of aquatic ecosystems, including -- I don't believe it's in here yet -- including a study of an unusual population of lake trout as to its genetic and evolutionary relationship to lake trout -- other lake trout.

We have several studies -- linked studies of the hydrology and ecosystem function of some of the streams at the Hurons as they are connected to behavior and population dynamics of the -- of fish populations and invertebrate populations that have been ongoing over the last two or three years and continuing. We have a study of the small mammal populations, which is a follow-up on a study that was done about 50 years ago -- 45 years ago, using that as a baseline for comparison to the present. Those researchers are basically replicating the sampling that was done in the 50's and using those data to try to assess stability and change in the kinds of small mammal communities in an old-growth ecosystem. So we have about 23, I believe, projects approved for 2008. We had about the same number last year. So that's just some examples of the range of things that are ongoing.

Q Thank you.

MR. DYKEMA: Your Honor, I'd move the admission of Petitioner's Part 632 Exhibits 6dC and 6dD.

MR. PREDKO: Your Honor, we have no objection to the extent that these are being admitted for the limited purpose of showing the kinds of scientific studies that go on at the Huron Mountain Club. The objection we would have is that the substance of these studies clearly is not going to be in any way admitted into evidence by way of admitting

these documents.

MR. DYKEMA: I'm only offering the lists, your Honor.

JUDGE PATTERSON: I assumed that.

MR. DYKEMA: I'm not trying to slip in the papers but --

JUDGE PATTERSON: Mr. Reichel?

MR. REICHEL: No objection to the admission of the list of papers.

JUDGE PATTERSON: And that's all it is, is just a list of --

MR. DYKEMA: That's right.

JUDGE PATTERSON: -- what's been performed? You're not vouching for their substance or veracity at this point?

MR. DYKEMA: Well, the title would give some idea of the subject matter.

JUDGE PATTERSON: Right.

MR. DYKEMA: And Dr. Woods has indicated the subject matter. But, no, I am not -- I'm not suggesting that, by getting in these lists, we have admitted the conclusions that each of these researchers found -- came to.

JUDGE PATTERSON: All right. They will be admitted with that limitation.

(Petitioner's Exhibits 632-6dC - 632-6dD received)

MR. REICHEL: Excuse me. This is not by way of objection but just clarification, Counsel.

MR. DYKEMA: Of course.

MR. REICHEL: Just to avoid any confusion of the record, how are these going to be identified? As you know, the Respondents, at least so far as we understand, have offered us a list of exhibits -- sequentially numbered exhibits in 632 issues.

MR. DYKEMA: Correct.

MR. REICHEL: And some of the ones you've proffered here today continue that series, and I was just inquiring as to whether you intended these documents -- how you intended to denominate these documents.

MR. DYKEMA: Well, I think I have that in record, but I appreciate the chance to clarify that. Our exhibit list included in Exhibit 6, which was broadly identified as everything that had been submitted during the permitting process. Now, we have a ruling on that, but we have identified the comments and attachments here as Exhibit 6d.

MR. REICHEL: Okay.

MR. DYKEMA: So I'm continuing to use that nomenclature to identify these attachments so that your binder -- the numbers in your binder will correspond to what's in the transcript.

MR. REICHEL: Thank you for that clarification.

MR. PREDKO: Your Honor, and I would just note that, when they submitted their exhibit list, they did submit this broad category for Exhibit 6, and I think the Court made a ruling that you had to specify what you were talking about, and they did that in a supplemental exhibit list, which I have, which I didn't have a second ago. And this list lists 6a, 6b and 6c, no 6d. And so I want to make it clear again, you know, while Mr. Dykema is referencing a few materials which have been provided, this entire exhibit is brand new today, never disclosed even pursuant to this Court's order.

MR. DYKEMA: May I have just a moment, your Honor?

JUDGE PATTERSON: Sure.

(Off the record)

MR. DYKEMA: Your Honor, I would just note again that until today there has been no ruling as to whether the designation of our Exhibit 6 was adequate. We were proceeding on the assumption that the materials below on which the DEQ necessarily based its decision would be a part of this record. But the adequacy of the designation that counsel refers to has not been ruled upon. And again, these materials are not new. These materials were provided to the DEQ two years ago. Now, we've -- we described them generically on the assumption that they all would be in the record since they've been in the DEQ's files for two years

and presumably they would view them when they issued their decision on the permits. But this is not new material.

MR. PREDKO: I think, your Honor, if we just continue to approach it exhibit by exhibit, we'll -- that's the way --

JUDGE PATTERSON: I think that's the only thing we can do.

Q Dr. Woods, will you turn with me, please, to the final tab in your binder, which is Petitioner's Part 632 Exhibit Number 31?

MR. DYKEMA: And I apologize to the parties and to the Court. I realized while walking into court this afternoon that a two-sided document was copied one-sided. I will supply everybody with a full copy of the document properly photocopied promptly after we adjourn today.

Q But, Dr. Woods, can you explain to the Court what Exhibit 31 is?

A This is a report that was written and submitted by Aldo Leopold in 1938 to the Huron Mountain Club upon their, as I understand it, invitation request to him to come to the Huron Mountains and develop for them recommendations and plans for conservation-appropriate land-use management of their lands subsequently. Aldo Leopold was the founder of the field of wildlife management at that time. He was a professor at the University of Wisconsin.

Q Will you look with me, please, at the fourth full paragraph on page 1 of Exhibit 31, the paragraph beginning, "The scientific values"?

A Yes.

Q Do you see in the * ?? sentence there 1:44:38 where Dr. -- Professor Leopold wrote, "All earth sciences must in the long run learn how to use land by referring to unused land as a base datum or starting point"? Do you see that?

A Yes.

Q Can you explain to the Court the people to which Aldo Leopold is referring there?

A This is an anticipation of what we would now refer to as the reference ecosystem concept. More generally, science moves by critical comparison. If you're doing a lab experimental study, you do an experimental treatment. In order to assess the effects of your experimental treatment, you run a parallel control with field sciences and other sciences like astronomy. Where experimentation is not active -- you know, managed controlled experimentation is not possible because of either the, you know, size and complexity of the system or the time frames involved, the kinds of critical comparisons that have to be made to understand the consequences and effects of particular factors have to be comparisons among existing systems. So he says, "All earth sciences must learn how to use land" by referring to unused

land as a base datum or a starting point. I read that as essentially asserting the same thing, and he would have been one of the first people to do so, I think; that, in order to really understand the effects of land management or any other process or effect on the landscape, you've got to use -- you've got to assess it comparatively by carefully chosen -- by comparing it to carefully chosen systems and his base datum or starting point, our modern reference ecosystem.

Q Is the property of the Huron Mountain Club of value to science as a reference ecosystem?

A Yes. He was recognizing that in the remainder of this report quite -- made that as -- made a strong claim in his report, and I think that stands today, if anything, more powerfully as other potential reference ecosystems in the region have been lost to other kinds of management.

Q For what reasons is the property of the Huron Mountain Club of value today and in the future -- of value to science as a reference ecosystem?

A There are three or four properties that make for a good reference ecosystem. One is simply size. A lot of the processes and properties we're interested in can only be effectively looked at if there's a sufficient area for them to play out the way -- as a full system. And the Huron Mountain Club reserved areas, which amount to about 10,000

acres, which are buffered by another similar amount of very likely -- historically likely managed areas, probably one of the three or four largest pieces of pristine landscape in the upper Great Lakes region, and that would be one of the second criteria that makes for a very valuable reference ecosystem.

There are lots of things you might want to use a reference ecosystem as a control for, but the most general kind of control we can look for is an ecosystem that -- landscape that has had minimal active management. And people talk about old growth or pristine or virgin landscapes. We think of it basically as a landscape that has had -- which has been subjected to few of the kinds of influences whose effect we would like to assess. So that's a second factor.

One that's kind of distinctive to the Hurons is the security. As a researcher you want to choose a reference ecosystem that's secure in two respects. One is that the management -- you can count on the management continuing to maintain its reference atlas. But there's a more straightforward sense of security, which is, when you set your equipment up -- your sensors and your monitoring equipment up in the field, you don't want it vandalized, and a lot of the other kinds of -- other locations that have the biological properties that make a good reference ecosystem

don't have that kind of security.

Another factor is simply the diversity of the landscape there. The two other tracts in the Upper Peninsula that are larger in extent -- that would be the Sylvania Tract on the Wisconsin border and the Porcupine Mountain State Park over on the western end of the Upper Peninsula -- both -- are both subject to a great deal more human traffic -- unregulated human traffic. And the Sylvania tract is considerably less ecologically diverse. It's a much more uniform piece of landscape. So those are some of the primary attributes that make the Huron Mountains a particularly attractive reference ecosystem in the sense that Aldo Leopold's talking about.

Q Does the presence of over a half century of scientific research on the property contribute to its value as a reference ecosystem?

A Oh, hugely. One of the challenges that we have in assessing ecosystem dynamics in the face of, say, large-scale environmental change is having a baseline against which to compare what you're observing. Or in assessing the effect of the history of land management is what's happening now, a consequence of that history of land management or simply a consequence of some kind of environmental change. Without having a Dataset that extends over time, it's very, very hard to get a handle on those things.

It's challenging to start a long-term study now, and so if there's an existing Dataset that is years or decades deep, it gives you a huge head start and a deeper baseline than you could otherwise have. My own research at the Hurons depends completely on the fact that some researchers from the Forestry School at Michigan Tech established some permanent study plots there in the early 60's that I've been able to adopt.

Q I'd like to -- each of these factors that you've identified as contributing to the scientific value of the HMC property as a reference ecosystem, I'd like to drill down on that a little bit.

A Okay.

Q One factor you identified was the relative absence of human disturbance, which I'll refer to as pristineness.

A Okay.

Q Are you familiar with the Huron Mountain Club preserved area?

A Yes.

Q How big is it?

A It's roughly 10,000 acres. I can't give you more precisely than that.

Q And what is its biological condition?

A That's an area that has never been subject to any commercial logging or exploitation of that kind. It has a sparse

network of trails and sort of two-track roads and some boats that are kept on some of the lakes within it. But the bylaws of the club stipulate that no further development and maintenance of those paths and tracks will happen on that preserved -- on those preserved land. And that includes a number of lakes and streams as well as the terrestrial ecosystems, and many of those have been less affected by stocking and live-bait use and so forth than waters outside of it. So in terms of what you're calling pristineness, it would rank very, very high.

Q What's the quality of the water?

A The quality of the water chemically is -- well, the levels of many metals and pesticides and other things that people monitor for water quality purposes are actually in many cases below the levels of detection for the standard equipment.

Q Is that common in Michigan?

A No. It's not common anywhere.

Q I'd like to look at one little piece of the preserved area. Would you turn with me, please, to the document that resides behind tab M as in "Mary"?

A Got it.

Q Do you recognize what I will identify as Exhibit 6dM?

A Uh-huh; yes.

Q What is it?

A This is a survey that was done in the early 90's by the Michigan Natural Features Inventory, part of the Natural Heritage Program of a particular kind of ecosystem type that's pretty distinctive to the -- pretty unique to the upper Great Lakes Region. It's called a dune -- they're called dune-and-swale complexes, and they're lakeshore features that are composed of partially flooded series of sand dunes that have developed over the long history of the Great Lakes of changing water levels and development of sand dunes. And so they are a series of dunes with intervening wetlands, the swales. And they're considered to have very high conservation priority by a lot of conservation organizations, including the state agencies involved in the Nature Conservancy and so forth.

Q Who is the Michigan Natural Features Inventory -- who or what?

A The Natural Feature Inventories -- there are Natural Feature Inventories in -- programs in most states. They originate from actually the work of the Nature Conservancy some years ago trying to establish a systematic inventory of natural features, which includes everything from rare species to ecosystems and habitats to, in fact, geological features as well. And over the years those have been folded into state environmental management agencies in the different states, so every state has its own slightly different name for them.

But that's the Natural Features Inventory here that's under tab, "The State Natural Heritage Program."

Q What was the purpose of the survey that's reflected in Exhibit 6dM?

A Simply to document where such -- where this particular type of habitat can still be found and to assess the quality, the pristineness, if you will, and conservation value of particular instances of its occurrence.

Q Can you turn with me, please, to page 38 of Exhibit 6dM?

A Yes.

MR. DYKEMA: And can we have on the screen, please, slide number 6? Can we make it full screen?

Q We're now looking on the screen, Dr. Woods, to an exhibit that was introduced yesterday. It's an aerial photograph of the Salmon Trout mouth area. And we're referring again to page 38 of the dune-swale survey. How did the authors of this report rank the Salmon Trout Bay area?

A Well, they have a table on that page which ranks -- well, there's several tables that rank listings by different areas, but the table 3-Can tanks listings of Michigan wooded, dune-and-swale complexes on Lake Superior in the category of low dunes, and there are seven listings there. This one is the one -- this one is ranked first in terms of the quality and preservation of the -- and conservation value to habitat.

Q So in those categories, they -- these authors gave it an A?
A Yes; out of -- they have A's and B's and C's and AB's and BC's, and it's the only one that has a straight-out A.
Q Is there any other dune-and-swale complex on the Lake Superior shoreline that they gave a straight A to?
A In the previous table, the -- there's a listing of one, a high dune swale complex for the Iron River in Marquette County, which received an A as well, and that's just down the shore at the outlet of Lake Independence.
Q Is the Iron River the outflow of the Yellow Dog River Watershed?
A Yes.
Q Do you happen to know whether that -- the land there is owned by the Yellow Dog Watershed Preserve?
A I don't.
Q How many plant species did the authors of the dune-and-swale complex study identify in the mouth area of the Salmon Trout?
A They list 157, which is half again as many as any of the other complexes that were surveyed in this study.
Q Does that surprise you, the number?
A No, not particularly, because it's pretty typical of what happens of what we see. And most of the habitats of this area, which are largely due to their lack of history of significant disturbance in management, have unusually high

diversity. The flora of the Huron Mountain Club as a whole is about 800 plant species, but I could list other Taxa, but that's just one that's well-documented. And that's by a recent estimate done by Professor Mike Palmer at the University of Oklahoma, who's collected floras for areas of different size and shape, as it were, over the entire North American Continent and has developed mathematical models to predict diversity. That's about half as -- half again as many species as we -- as his model predicts should be in an area of this extent and this location, so it's fairly typical of the region to be unusually diverse.

Q And to what do you attribute the enhanced biodiversity of this land?

A Well, one factor is simply the diversity of habitat. There's a lot of -- within an area of a couple of tens of thousands acres here, there is a greater diversity of -- simply a greater diversity of habitat that you can find in very many places in the Midwest in areas of that size. But it also almost certainly is related to the historical lack of events that would cause loss of species; in particular, the lack of extensive land management clearance, conversion and re-establishment of forests and so forth. All of those basically allow populations that are sparse or of low density to maintain themselves when they can be easily lost otherwise. The size of the area probably helps, too.

Because then if there is a local loss of species, there's a potential for re-colonization from other local populations.

Q Will you turn with me, please, Dr. Woods, to page 75 of the dune and swale survey?

A Uh-huh (affirmative).

Q In the first full paragraph on page 75, the authors wrote -- and reading only a part of the sentence. "The vegetation of this complex reflects what was encountered by the land surveyors in the 1850's." What do you take that to mean?

A The -- like all of the Midwest, this area was the first documentation of the vegetation and habitats of the landscape that was systematically done was by the original surveyors of the Government Land Office who lotted out the sections and townships. And part of their protocols were to record habitats and record particular trees and so forth that they encountered. So it's our earliest record of what's on the landscape. If you visit most landscapes and compare what you see on them to what the land surveyors of the General Land Office surveys noted, it will be a very different picture for fairly obvious reasons. So they're making the observation upon that, that it's unusual to find this kind of persistence of a composition and appearance of a -- species composition of a landscape that has been more or less sustained through that 150 years since the surveys.

Q Almost at the bottom of the page, the authors wrote on page

75, "Current management of this complex appears to ensure its long-term viability as a natural area." What do you take that to mean?

A I think it probably refers to the commitments and the bylaws of the Huron Mountain Club to maintain the conservation values and integrity of the land that they're managing under their own objective.

Q Doctor, we've looked at this Exhibit 6-d-M as a snapshot of -- well, first let me stop myself.

MR. DYKEMA: Your Honor, I offer Exhibit 6-d-M.

MR. PREDKO: Your Honor, we would have the same objection to this exhibit. This exhibit was not provided in advance. The first time I've seen this exhibit is today. It's 150 pages long. And I've not had time to review it. And we object because we're prejudiced by the late provision of the document.

MR. DYKEMA: Well, again, your Honor, we're a little surprised and taken aback that everything that happened before the Department of Environmental Quality during the permitting process has been relegated to oblivion. This isn't new. This was submitted to the department. It was shared with Kennecott through the department two years ago. If counsel wants some time to review before deciding whether to make an objection, that's fine. This is certainly the kind of material in which the

scientists like Dr. Woods routinely rely.

JUDGE PATTERSON: Do you want some time to review it?

MR. PREDKO: If I could, your Honor, and then come back tomorrow possibly with a specific objection. I mean, the witness has already testified about things in it.

JUDGE PATTERSON: Right.

MR. PREDKO: But it's the other stuff that's in this document that I guess I have questions on.

JUDGE PATTERSON: Okay. All right.

Q Dr. Woods, we've looked at the wooded, dune and swale survey as providing a lens on one piece of the Huron Mountain Club preserved area and as shedding some light on the value of that piece of the area as a reference ecosystem. Can you describe for the Court any other papers that you think are of particular significance in highlighting in a similar way the value of the property as a reference ecosystem?

A Sure. Amongst the published works, the peer-reviewed papers, certainly my own work with the forest community dynamics would fall into that category. We actually understand very little the properties and behavior of old growth forest. We have a lot of lore about them, but we really don't know that much about them. And that's largely because of lack of good baseline data from reference ecosystems. So this kind of opportunity and the papers that

come out of it would be another example.

Some of the aquatic -- papers on aquatic systems have -- would fall in the same category, the work that Professor Huckins from Michigan Tech has been doing in the Salmon Trout River looking at the fish communities there has both baseline value in its own right but it's also comparable to studies that have been done on the Salmon Trout River in the past. The study of small mammals that I mentioned earlier has not yet been published in peer review literature, but it will be, and it certainly falls into the same category.

There's a study that recently reached publication in two papers that is looking at the soil chemistry of old growth forests as related to canopy gaps and species of trees in the canopy. And that, too, is a study that could only be done in this kind of context, because it's trying to assess whether the old growth forest -- whether the chemical and hydrological properties of the soils of old growth forests are, in fact, distinct from those of managed -- a forest with management history. There are probably other examples, but those are the ones that come to mine.

Q You mentioned a paper prepared by, among others, Professor Huckins. Can you turn with me, please, in your binder to the document behind tabs J, K and L? And my first question to you, Dr. Woods, is whether these are reports on research

that has been conducted under the auspices of the foundation?

A Yes.

Q And can you summarize for the Court the research reflected in these reports?

A Yes. This is a project that's been ongoing now for -- it's in its seventh or eighth year and has been specifically addressing the general ecological relationships of a unique population of brook trout that live in the Salmon Trout River. They're called Coasters. And they behave like a freshwater salmon. They're unusual in that they swim out into Lake Superior as adults and spend their adult life there except coming back into the stream to breed. And so this is a general study of the fish communities, the population dynamics of the Coaster trout, their relationships to other species in the stream, the one specific focus being on their relationship with some of the introduced salmons. But it's specifically taking place here simply because this is a very rare organism that used to be considerably more widely distributed. Coaster populations occupied dozens of streams on the south shore of Lake Superior, and this is the only one where they have persisted again in large part presumably because of the -- because the landscape through which the stream is running has remained relatively pristine.

Q You mentioned that Professor Huckins' research also concerns the fish community in the Salmon Trout?
A Yes.
Q Did Professor Huckins have earlier reference points with which to compare the current fish community in the river?
A There have been several previous fairly thorough studies of fish communities in a number of the bodies of water on the Huron Mountain Club including the Salmon Trout River. And I believe the earliest ones go back as early as the 30's, I think. But there are certainly more recent ones, too. So, yes, there are several stages along the way to which he can compare his findings.
Q How did Professor Huckins conclude the current fish community in the Salmon Trout compares with the community found generations ago?
A It's little changed. He has -- as one would expect in a diverse ecosystem like this, there are some species populations come and go. So there are a couple species that he's found that haven't been previously documented and one or two that had been previously documented that haven't turned up in his samples. But on the whole, there are -- he's documented 30-odd species. I can't remember exactly. And most of those have been continuously present through those surveys.
Q You mentioned the Coaster brook trout used to spawn in

dozens of Michigan rivers but is now only found to breed in the Salmon Trout River at least on the streams of the south shore. Did I understand you correctly?

A Yes. There's a population on ??2:1044 as well.

Q What's the size of the breeding population on the Salmon Trout as found by Professor Huckins in his multi-year study?

A In the years he's been monitoring the population, he's documented -- he's been trying to document the number of mature fish that have been coming upstream to breed. That's the primary metric we're looking at. And he's seen numbers that range typically from between 1- and 200. One or two years that were actually lower than that were probably anomalously low because his monitoring systems were vulnerable to floods and otters and things. So --

Q Is this the only example you know of of a plant or an animal that used to be found more widespreadly but is now only found at the Huron Mountain Club?

A No. In fact, of the groups that are well studied, the mammals and birds and fish, there are quite a few species that -- in fact, well, I guess I'll put it the other way around. The species that are known to have been native to the region -- of the species that are known to have been native to the region, they're essentially all still there with one or two exceptions. We don't have mountain lions or caribou. But that's -- you can't say that of very many

areas. So that, in itself, says that. Every time that somebody looks closely at one of the more obscure groups, we find documented species that are either species that are not known from the area at all or are only known from scattered areas or have not been documented in some time. So there's several categories of rarity there. There's things that used to be more widespread and aren't. They're things that are just rare generally and things that have unique occurrences. There are several species of -- or I'll say that a little more carefully. Several genetically distinct populations of fish, for instance, that live in bodies of water on the club lands. There's a species of Cisco that live in Ives Lake and so -- and a couple of the other lakes which are distinct to those lakes. It's quite likely that many other lakes of the region would have had -- inland lakes would have had such genetically distinct populations that have -- but they're been lost. It's a little different than the salmon -- than the Coasters but it's a similar sort of story.

Q You discussed at some length the value of the Huron Mountain Club property as a reference ecosystem given its pristineness and other qualities. Do the size and the pristineness of the property also make it valuable as a refuge for rare and unusual animals rarely found elsewhere?

A Certainly. Size is probably the most generally recognize

single factor in terms of a habitat's capacity to sustain populations of anything simply because numbers, size of a population. A population's persistence is directly related to its size. So the larger the area in which the population has a viable habitat, the better chance it has of surviving indefinitely. And many of the species that are now rare in the eastern U.S. are rarely simple because the particular kinds of habitats that they depend on have been radically reduced in extent. And that applied particularly to what we're talking about as pristine ecosystems of these particular habitat plants.

Q You talked about the Coasters. You also mentioned Cisco. What is a Cisco?

A It's a small fish that's related to a wide -- a large group of -- a large family of fishes that are found throughout the Great Lakes area, the whitefishes and their relatives.

Q And are there genetically unique Cisco populations in the Lake Superior (sic) Mountain Club?

A Yes. There's at least two that I'm aware of that have been documented. They're sometimes referred -- they're sometimes classified as distinct species. And taxonomy gets very sticky at this level. And it's sort of a matter of philosophy whether you call them distinct species or a subspecies. But they are clearly genetically distinct, and there's good published data to that effect, yeah. They're

listed, in fact, in the -- in the Michigan's list of rare and unusual and endangered species and so forth.

Q Are you familiar with a scientist named Dana Richter?

A Yes.

Q What has he studied on the property?

A He's a mycologist. He studies fungi and that's -- and over the last decade he's been maintaining a long-term monitoring of population -- communities of mycorrhizal fungi in red pine forests. Mycorrhizal fungi are the fungi that are symbiotically associated with the roots of plants. In fact, most plans including the red pines he's looking at are completely dependent on those fungi -- association with those fungi. And most of the mushrooms that you see in the woods are fruiting bodies of the mycorrhizal fungi. So he's been documenting the species of mycorrhizal fungi in red pine stands for, I believe, 12 years this year.

Q Has he found any rare or unusual species?

A Yes, he has. He's found several that are rare or unique in the region, yes.

Q How about mollusks? Have scientists found any rare or unusual mollusks?

A Yes. In fact, in almost any group we've looked at closely there are species that are rare or are unique occurrences in the sense of only -- this being the only Michigan occurrence or the only Midwestern occurrence. And that's true in the

mollusks. That's been documented by several researchers. That's another group that we have multiple records -- or multiple studies of over the years so a long-term baseline.

Q How about birds? What's the bird diversity like in the Huron Mountains?

A It's -- I can tell you exactly on page 5 of the taxa biodiversity inventory. There's a breakout by -- well, no, it doesn't break it out birds. It says 372 vertebrates. There are 100-and-some bird species that have been recorded on the club. I thought it would be on page 112 but -- 234 species. Excuse me. I was underestimating.

Q Can you offer Judge Patterson a qualitative judgment as to just how rich an avian sampling that is for an area this size?

A Yeah. This is -- and this is a more subjective judgment than I was able to offer on the plants, because we have this extensive compilation of comparable records for plants. But I think it's pretty safely -- and I think I would get agreement from pretty much anybody looking at it that this is an unusually high diversity for a tract of this extent.

Q And is the Huron Mountain Club property a good place to look for Michigan birds that you don't often see elsewhere?

A Oh, yes.

Q And I notice, Dr. Woods, looking at the list of publications a number of papers offered by a Dr. William Manierre. Are

you familiar with his papers?

A Yes. He's done a lot of natural history work at the club lands. But he's -- probably the most impressive piece of work is probably the single-most thorough inventory of bryophytes, which are mosses and liver warts and lichens, which are another group, for an area of this size of anybody I know of -- anyplace I know of and has found quite a number of species that are either new records for Michigan or in some cases the U.S. and, in at least one instance, it's the first record of a species in North America.

Q Dr. Woods, how common or uncommon is it when a scientist comes on the Huron Mountain Club property to study or inventory a class of organisms that he or she finds species that are rarely, if ever, seen anywhere else?

A It's common and it actually is -- the less well studied group is the more common it is. But it's true even in some of the well studied groups like the plants and the mosses. There's species of cactus that occurs nowhere else in Michigan and only one other site in the upper Great Lakes in Wisconsin that it occurs on the Huron Mountain Club lands. And there have been a number of groups of insects that have been rather thoroughly inventoried like the mayflies and a family of wood-boring beetles that -- where the same kinds of things have occurred and recurred species documented here for the first time in Michigan, for the first time in the

Midwest. There are actually a couple of species of mites that have been described from their first and only described -- only ever recorded from the Huron Mountain Club and actually they're named after the Huron Mountains.

Q Dr. Woods, is there any piece of property elsewhere in the northern Great Lakes region quite like this in terms of its value as a reference ecosystem and as a refuge for rare and threatened species?

A Well, I've mentioned the two properties that would be most frequently probably compared or listed with it, and that would be the Sylvania tract in the Porcupine Mountains State Park in terms of reference ecosystems or large tracts of pristine landscape. They're different so one doesn't substitute for the other. In terms of the level of diversity and security, certainly the Huron Mountains would rank above the Sylvania tract even though it's somewhat larger in area. The Huron Mountains are more comparable, but the Huron -- I mean -- excuse me. The Porcupine Mountains are more comparable, also larger in area. But they're also a lot more subject to intense human presence. And that has certainly an effect on some aspects of the reference ecosystem properties. But that would be about it.

Q How about the McCormick tract which is just south of the mine site? How would you compare it with the Huron Mountain Club Preserve?

A It's a very different kind of place. It's smaller. It's a different kind of ecosystem. It certainly has value in the same ways along with two or three other somewhat smaller tracts in the region. On its own it would not, I think, rank anywhere near the same value as the Huron Mountain Club lands. But the fact is that it's actually part of a larger landscape that is, although there's managed lands in between them, still consists of pretty intact -- maintains pretty intact habitat corridors. So in a way, it supplements the -- and increases the reference ecosystem value of the larger -- the presence of both of them increases the value of the larger reference ecosystem landscape.

Q Are you aware of any peer review literature that specifically documents the use by any kind of animal of the Huron Mountains and the McCormick as an integrated whole?

A No, I'm not aware of any published studies that have looked at that.

Q In your professional opinion and in your expert opinion, do you have any doubt that there are species of megafauna or birds or other animals that use the Huron Mountain Preserve and the McCormick tract and the land between them as an integrated corridor?

A No. I don't think anyone would doubt that large predators and birds of prey and so forth would see that all as a single range, in fact.

Q And if there were a large industrial facility built smack dab in the middle of this, would you expect that to disturb animal behavior?

A It would certainly be an interruption of the continuity of occupiable have habitat.

Q Dr. Woods, you've shared with us a very impressive knowledge of the research that has been conducted in this area in a wide variety of biological fields. I'd like you go give Judge Patterson a sense of to whom this work is of value. And let me put it to you this way. Is the scientific interest and value of the Huron Mountain Preserve -- is that something of concern only to northern Michigan biologists?

A Well, no. And, in fact, in the last couple of years we've had researchers bringing us proposals from institutions ranging from University of Wyoming to the University of Missouri to the University of Delaware. And so just in that respect we've had perhaps 50 researches on the club lands in the last two or three years, and probably a good third of them have been from further afield than just the upper Great Lakes or Michigan. And certainly the papers that have been published by our researchers have been very widely cited by other researchers in a much wider arena, if that's addressing your question.

MR. DYKEMA: Your Honor, before I pass the witness, I'd like to attend to a little bit of unfinished

homework. First I'd like to offer into evidence Exhibit 24, which is the all taxa biodiversity inventory that Dr. Woods has prepared over the years. That's in second to the last item in the binder. You'll recall, your Honor, that Mr. Townsend testified about that. And in response to an objection, we promised that we'd produce the ??flogger 2:2740??* materials.

JUDGE PATTERSON: I do recall that.

MR. PREDKO: May I voir dire the witness, your Honor?

JUDGE PATTERSON: Pardon?

MR. PREDKO: May I voir dire the witness?

JUDGE PATTERSON: Sure.

VOIR DIRE EXAMINATION

BY MR. PREDKO:

Q Dr. Woods, you testified that you prepared this document entirely based upon the historical articles of the Huron Mountain Club; correct?

A Yeah, the corpus of research publications from work there. Yes.

Q Okay. And so this all taxa biodiversity inventory is a history inventory. It does represent and you're not representing in here that all of these species currently exist at the Huron Mountain Club today; correct?

A That is correct. In fact, where we know there's a chance or

a likelihood of their having been extirpated, we note that.

Q But in going through this exercise, I mean -- and you note in the introduction that it's a -- it was a tremendous deal of work to go through and compile all of the information from all of the historical papers. And you note that -- in here that it would have been cumbersome or impossible to go back to all of the authors and talk to them about their papers to confirm what was in there. You relied on history information from as far back as 1920; correct?

A Yes. But a very small fraction of the listings are based on anything older than 10 or 20 years, yeah.

Q Okay. But again you didn't go back and confirm when you wrote this in August of 2007 that each and every one of the 4,321 species still exist at that time; correct?

A No, I did not. That's correct.

MR. PREDKO: Your Honor, we would not object to the extent that it's admitted for the purposes that -- that Dr. Woods has just testified about, that it's a history inventory.

JUDGE PATTERSON: Mr. Reichel?

MR. REICHEL: I would take the same position. The witness has testified he's compiled this from review of some existing data. Within that context, we have no objection.

MR. DYKEMA: Your Honor, I also would like to offer the three papers on the Coastal brook trout, which we

have identified as Exhibit 6-d-J, 6-d-K and 6-d-L. And I will volunteer that, if counsel would like some time to look at those before responding to our offer, we're certainly amenable to that.

MR. PREDKO: Well, your Honor, I do object to these because these are brand new exhibits today. This is the first time that they've produced or identified these exhibits. However, there's a more important reason why they cannot be admitted substantively for their results by this witness. This witness has testified that he is an expert in forestry ecology, community ecology. He is not an expert in aquatic ecology. He is not an aquatic biologist. That's who conducted these studies. And if they want to bring in an expert on aquatic species to come in and talk about aquatic species, that's fine. But this -- these exhibits should not be admitted through this witness -- the substance of them. We don't have any objection to Dr. Woods testifying that these are studies that were performed on Huron Mountain Club property. But the results of the studies, I do believe this witness is qualified to testify to.

MR. DYKEMA: Your Honor, the witness has testified that, in his capacity as on the editorial boards of some of the major ecological publications in the world, he is routinely called upon to analyze, assess and evaluate

proposed scientific papers in all fields of ecology, aquatic as well as terrestrial. So I think he's -- he's certainly in a position to validate these studies as having been performed for the foundation. He is in a position as director of the foundation to assess whether this is worthy of the foundation. And I think his general background and expertise qualify him to vouch for the quality of the work.

JUDGE PATTERSON: Are either of the authors going to be presented as witnesses?

MR. DYKEMA: We had not anticipated calling them, your Honor.

JUDGE PATTERSON: Is your purpose merely to have Dr. Woods as in previous -- these were gotten under the auspices of the Huron Mountain Foundation? Or are you entering them for the substance of the --

MR. DYKEMA: Well, I'm entering them for the substance insofar as Dr. Woods has already touched upon it. And we've elicited from Dr. Woods two specific points. One is that the fish community in the river is highly comparable to what it was generations ago. That's touched on in these reports, and Dr. Woods has testified to that effect. I think it would be useful to have these exhibits in the record to validate what he has said.

Secondly the historic population and the current population of the Coastal brook trout. Again Dr. Woods'

testimony came in on that subject without objection. These papers simply back that up.

MR. PREDKO: The testify -- Dr. Woods' testimony summarizing the kinds of research like the fish research that was done on the property is fine. He can testify to that as the director of the Huron Mountain Club. But the substance and the results of these studies, he's not a qualified expert to testify to that. Once again, if they want to bring in an aquatic expert to testify to the results of these studies and talk about exactly what was done to the Coastal brook trout, that's fine. But this witness is not an appropriate witness for that, with all due respect to Dr. Woods.

MR. DYKEMA: Your Honor, I'd submit these are materials upon which an expert of Dr. Woods' credential routinely relies.

JUDGE PATTERSON: Well, I'm going to leave the testimony as it stands on Dr. Woods' testimony and not admit the underlining exhibits. I think other than what he's testified to, in some way they go beyond the scope of his expertise and they're clearly hearsay. So I will exclude those three documents.

MR. DYKEMA: If I may have one moment, your Honor, to collect my thoughts?

JUDGE PATTERSON: Sure.

(Off the record)

DIRECT EXAMINATION

BY MR. DYKEMA: (continued)

Q Dr. Woods, are you a toxicologist?

A I'm sorry?

Q Are you a toxicologist?

A No, I'm not.

Q If the Kennecott Mine were to result in the deposition of toxic metals such as copper and nickel into the lands and waters of the Huron Mountain Club, would that, in your mind, raise a serious concern about potential damage to the land as a reference ecosystem and as a refuge of plants, animals and fungi?

MR. REICHEL: Objection. Lack of foundation.

MR. PREDKO: I have the same objection, your Honor. Again counsel for the Huron Mountain Club has established that Dr. Woods is not a toxicologist.

JUDGE PATTERSON: It was a leading question. I'll sustain it on that basis. You can rephrase.

Q Dr. Woods, did you submit a letter to the Department of Environmental Quality raising concerns that you had about the proposed Eagle Mine?

A Yes, I did.

Q What's the basis for your concerns?

A It's well established within ecosystem ecology and forest

ecology that inputs to an ecosystem of either nutrient materials or potentially toxic materials can have large effects on the functions of those systems. And that includes acid deposition. That's a fundamental and well understood part of forest ecology now. It also includes heavy metals in aerial deposition. So in terms of forest dynamics and function, I had and have concerns about whether, if such input should come about -- I have concerns that they would damage the reference ecosystem values for researchers of the landscape because we would now have a force or a factor influencing dynamics that would no longer allow the powerful comparisons we have now to be able -- that we can now make between the dynamics of this landscape and others.

Q Do you believe -- do you have an opinion as to whether there's a significant likelihood that such a result would occur if heavy metal bearing particulates were deposited in the lands and forests of the Huron Mountain Club?

A If such deposits were to come about, I do have a concern that that's -- I do think that's a realistic concern that there would be effects on patterns of growth, population dynamics of -- probably the most vulnerable aspects of an ecosystem in the -- of a terrestrial ecosystem begin in the soil functions, but they propagate from there throughout.

MR. DYKEMA: Thank you, Dr. Woods. Your Honor, I

pass the witness.

JUDGE PATTERSON: We can take about a 15-minute break.

(Off the record)

JUDGE PATTERSON: This one first.

MR. PREDKO: I will, your Honor.

JUDGE PATTERSON: Okay.

MR. PREDKO: Afternoon, Dr. Woods, I'm Chris Predko and I'm an attorney on behalf of Kennecott. I have a few questions for you this afternoon.

CROSS-EXAMINATION

BY MR. PREDKO:

Q For these first couple I'm going to refer to what's already been admitted is Petitioner's 32 which is this plat map.

A Okay.

Q I saw you looking at that during the break. Are you generally familiar with the area of the Huron Mountain Club?

A Yes.

Q And its boundaries?

A Generally, yeah.

Q And other witnesses testified for the Huron Mountain Club yesterday about the boundaries that -- you probably can't see it from there but it's outlined in yellow on this map?

A Yes.

Q Now, all of the scientific studies that you testified about

today and all of the rare and unusual species that you talked about, those are all within the confines of the boundaries of the Huron Mountain Club; correct?

A No, that's actually not strictly true. The all taxa by diversity inventory is limited to accomplish new species that have been documented out in the club lands but studies supported by the foundation are more wide range. The foundation's mission only specifies the upper Great Lakes region and in fact a number of the particular papers and studies that have come out of foundations work include work in habitats outside of the club boundaries.

Q Okay. Well, tell me this. How many studies has the club done about the Yellow Dog Plains?

A Well, the foundation -- there are two or three that have worked on the Yellow Dog Plains, including the ones I'm remembering were in fact insect focus studies. But both of the -- the bulk of the foundation's supported work has not addressed the Yellow Dog Plains.

Q Now, you talked about an early ecologist Aldo Leopold.

A Uh-huh (affirmative).

Q And you talked about that, his report, and he was hired as a consultant for Huron Mountain Club; correct?

A That's correct.

Q And the report that you talked about is Petitioner's Exhibit 31 and I think you have a copy in that book in front of you?

A I do.
Q And one of the things that Aldo Leopold recommended was that the club adopt a land plan; correct?
A Uh-huh (affirmative).
JUDGE PATTERSON: You have to say "yes' or "no."
THE WITNESS: I'm sorry.
A Yes.
Q And part of that land plan was for the club to adopt this reserve area; correct?
A Yes.
Q And then outside of the reserve area there would be what's called a buffer area; right?
A Yes.
Q And his recommendations about that buffer was that it was going to be selectively logged and that there could be human presence on that buffer zone keeping the inside reserved area natural; right?
A Yes.
Q Now, one of the other things that Leopold recommended was that the club extend the buffer zone if it could. Are you familiar with that?
A I do recall his making that suggestion.
Q And one of the areas that he thought it would be useful for the club to extend to is the entire watershed of the Cedar Creek. Okay?

A Yes.
Q Are you familiar with that?
A Yes.
Q Did the club do that?
A I don't believe so. I am -- the foundation and the club are separate entities, so what the club does and doesn't do in terms of their plans for acquisition is really outside of any knowledge I have. But the current club boundaries don't, I don't believe, include the entire Cedar Creek watershed.
Q Now, the other thing he talked about when he was talking about additions -- and we put the report up on the screen also and I will identify the page for you. On page ten of his report when he was talking about making additions --
A Page ten is one of the pages not in my copy.
Q Oh, well, it's up on the screen for you and we'll highlight the portion that I want you to see. And Leopold says, "The addition of the entire watershed of the Salmon Trout River is out, for its headwaters have already been slashed to such an extent as to destroy its value as a natural area for scientific study"; right?
A That's what it says.
Q Okay. Now, are you familiar with the Salmon Trout watershed?
A Yes, generally.

Q Okay. And that's -- actually we put -- this is an exhibit that was entered yesterday through Ms. Pryor, Petitioner's Exhibit 11, sub 26. And is this what you know as the Salmon Trout watershed?
A It is the system.
Q Okay. And when Leopold is talking about the headwaters he's talking about this area down here (indicating), the seat; correct?
A That would be consistent with his calling it "headwaters." He wrote this 20 years before I was born, so it's hard to say for sure.
Q Your understanding of the term "headwaters" though --
A Yeah.
Q -- would be that he's referring --
A Well, those are headwaters.
Q Those are headwaters?
A Yeah.
Q Okay. Now, you know where the site -- the proposed site is going to be, don't you?
A It's as mapped there, yes.
Q Yes. And that is actually part of those headwaters, it's in that area right there that I'm pointing to at the southern tip of the watershed?
A Yes.
Q That Leopold referred to as slashed and destroyed; correct?

A He said destroyed as a natural area.
Q That's right. He said slashed -- well, when he said they were slashed he was talking about logging; right?
A He was talking about logging.
Q Okay. And you know that the logging that took place that he was talking about at that time, the logging -- the slashing logging as opposed to selected logging continued to occur on the Yellow Dog Plains up until very recently and probably still continues today; right?
A There's some logging that continues, yes.
Q Okay. Have you been down to the area where the mine is to be located?
A No, I didn't -- the last several years I have been through the area but it's not recently.
Q Okay. I'm going to show you a couple of photos and these have been admitted this morning. This is part of the mining application. This is Intervener 12, Bates stamp KEMC 109102, and I'll represent to you, Dr. Woods, that these are photos of the mine site. And would you classify that area as heavily logged?
A It's certainly been cleared in some areas.
Q Okay. Not the pristine type of environment that exists at the Huron Mountain Club?
A The kind of environment that exists at the Huron Mountain Club never existed on the Yellow Dog Plains; it's a fire

ecosystem and always has been.
Q Okay. But you don't see this up at the Huron Mountain Club; correct?
A No; that's correct.
Q Okay. And again, this is another picture of where the site will be located, again not the type of pristine natural environment that you find at the Huron Mountain Club; correct?
A Yes.
Q Yesterday Mr. Townsend testified for the Huron Mountain Club; are you familiar with Mr. Townsend?
A Only by vague acquaintance. I mean, I'm not an acquaintance.
Q Okay. And you know that he's a member of the Huron Mountain Club?
A Yes.
Q Okay. And he testified a little bit about the Salmon Trout River and the falls that exist on the Salmon Trout River. I'm going to -- this is a map and it's the same type of plot map, and you've identified there along the Salmon Trout River some falls and I want to ask you whether this is consistent with your knowledge about the location of water falls and dams along the Salmon Trout. And if you need to get up to see it, you're welcome to do so, Dr. Woods.
A No, if you're just asking whether those are actual --

Q Now, that one right -- too much caffeine this morning, but that one right there; that's the lower falls; correct?
A Yes.
Q Okay. And the next red dot right there (indicating) there's a lower dam?
A Yes.
Q Okay. And that one right there is the middle falls?
A Yes.
Q Okay. And then there's the Burnt Dam; correct?
A Yes.
Q And the upper falls; right?
A Yes.
Q Okay. Now, on this map where is the habitat of this Coaster Brook trout?
A The nest, the breeding habitat is primarily -- is downstream from those.
Q Downstream, so it is on this map north of the lower falls; correct?
A That's correct.
Q Okay. And Mr. Townsend testified yesterday that those lower falls prevent fish from going further upstream and southern on this map; correct?
A I don't know what Mr. Townsend testified to.
Q Well, I'm telling you that's what he testified to; would you agree to that?

A It seems reasonable to me. I'm not a -- as you said, I'm not a fish biologist.
Q Fair enough. Do you have -- well, you do have knowledge about the species that are on the club lands; correct?
A I'm familiar with the documents that have been produced about them.
Q Okay. You specifically testified about the coaster?
A Yeah.
Q All right. And you told me that its breeding grounds are above the lower falls; right?
A Yes.
Q Okay. Do you have knowledge of any coasters ever being found -- let me get my terms right here -- downstream from the falls -- upstream from the falls? Let me get it right before you answer it. All right.
A Upstream? I don't have knowledge of the coasters upstream.
Q Okay. And you're aware that in general falls and dams would be barriers for those fish?
A To migratory fish, yes.
Q Now, we covered the area about your expertise and you said in response to Huron Mountain's own questions that you're not a toxicologist; correct?
A That's correct.
Q Okay. But you do you have concerns about any metals deposited on Huron Mountain?

A Yeah, that's not a toxicological issue; that's an ecosystem function issue.
Q And I understand and my question to you is you haven't made any analysis as to the types and percentages and concentrations of chemicals that are going to exist as a result of this mine, have you?
A No, I'm not.
Q And you have no opinion on that, do you?
A No, I do not.
Q The all taxa inventory that you drafted, we --
MR. PREDKO: And this is a little bit discouraging because of the presentation of this exhibit, your Honor. The all taxa inventory was presented as an exhibit.
MR. REICHEL: Counsel, I believe that was -- Petitioner's Exhibit 24 was actually introduced yesterday.
JUDGE PATTERSON: That's correct.
MR. PREDKO: Okay. And it's marked 24 in this trial. Okay. You're right. Thank you.
Q Okay. Exhibit 24; do you have that in front of you, Doctor?
A It's in here somewhere.
A Yes, I have it.
Q And we already talked about how this is a -- it's a historical inventory of the species and subspecies at the Huron Mountain Club; correct?
A Yes.

Q And this document was compiled by you, prepared by you in August of 2007?
A This version of it, yes; it's updated.
Q And in putting this together you throughly reviewed all of the papers of the Huron Mountain Club; correct?
A All that I had and all that were present in the archives and familiar to me, yes.
MR. DYKEMA: Chris, I don't want to interrupt but I assume you meant to say "foundation."
MR. PREDKO: Yeah, I guess I am getting those terms mixed up. Thank you, Peter.
Q And so that's what your counsel has just corrected me on is that so all of the studies that have been done have been funded by the group called the foundation; correct?
A Actually just in essence, but they weren't all funded by -- many of the studies are done on other funding sources. We just -- the foundation is the door to use of this landscape. We have approve many studies that don't request funding from us. They're all studies under our auspices, yes.
Q And after conducting this thorough review -- and if you'll look with me at page five, by my count, Dr. Woods. I mean, it's very thorough on a lot of species and subspecies and that the Kingdom of Fungi, for example, you've got over 800 species listed it looks to me?
A Yes.

Q If my math is correct, you've got 1255 insects listed; correct?
A That's correct.
Q You know, you've even got -- in the Kingdom Animalia you've got in the text here the feral house cat listed; correct?
A Yes.
Q And you also list -- the humans are listed; correct?
A Yes.
Q Okay. So extremely thorough historical inventory. I do note though however, Dr. Woods, that nowhere in here do you note the existence of the Kirtland's Warbler; correct?
A That's correct; it has not been documented on the club.
Q And nowhere in here do you document the species called the Coaster Brook trout, do you?
A It's not designated taxonomically as a separate species, even though it's a genetically distinct group within the brook trout; that its status -- taxonomic status is still under review.
Q Now, Dr. Woods, you didn't answer my question. Nowhere in this inventory did you list or mention this Coaster Brook trout, did you?
A That's correct. That's correct, because it is not identified as a distinct species in the taxonomic literature yet.
Q Okay. Well, fair enough, Dr. Woods. Now, if you'll flip

with me to page 109. Now, you do talk about a distinctive form of lake trout called the Rush Lake trout; correct?

A It's not a -- it's not -- yes, because it has been published as a distinct genetic entity.

Q Well, you didn't identify it further in the inventory, did you?

A Yes. But you'll notice that it's listed as Salvelinus Namaycush Erinaceus, which is a varietal designation, not a distinct species.

Q I see that, but you didn't include it any of the listings; correct?

A That's correct, because restricted this to distinct published taxa.

Q Right. And so while you list this Rush Trout whose taxonomic status has not been formerly studied, you don't list the Coaster -- correct? -- nor do you refer to it in the introduction?

A That's correct.

MR. PREDKO: Thank you, Dr. Woods.

MR. REICHEL: Good afternoon Dr. Woods. My name is Robert Reichel; I represent the Department of Environmental Quality in this proceeding. I just want to follow up on a few points raised in your direct examination.

CROSS-EXAMINATION

BY MR. REICHEL:

Q Counsel asked you, among other things, about water quality in the area within the Huron Mountain Club that's been the study -- the subject of varies studies that you testified to. Do you recall that?
A Yes.
Q And I recall that you were -- do you recall being asked about whether or metals or pesticides had been detected in water bodies within the Huron Mountain Club boundaries?
A I wasn't asked whether they had ever been detected, I was simply asked to describe the quality of the waters --
Q Fair enough.
A -- in terms of their presence, yeah.
Q Okay. And I believe that my notes reflect that you said that metals and pesticides had not been detected or were not a concern anywhere within the Huron Mountain?
A I don't think I said anywhere within the Huron Mountains.
Q Okay. What --
A Within some of the bodies of water in the Huron Mountains I have -- we have published reports on the levels of these things. But I've also spoken to people, and perhaps some state agency water monitors were there once when I was on site who were using Mountain Lake, which is the long skinny one there, as a sort of a baseline site for measuring concentrations. And that's a particular site where people -- where I have been -- where it's been -- where I

have been told that the levels are low enough to -- some of these are below the levels of detection of the instruments. And certainly the documents that are in reports to the foundation list the very lowest levels of most of these things for Mountain Lake. They're certainly not the same in all the waters of the club.

Q Thank you for the clarification. Do you understand mercury to be metal?

A Yes.

Q Is your testimony that mercury has not been detected in any of the -- either the lakes or streams or other surface water bodies within the Huron Mountain Club?

A No.

Q Is in fact --

A It's been detected but at very low levels in most of the waters compared to many other waters that I've seen.

Q Compared to other waters where?

A I'm not a -- I don't have a real breadth of familiarity with those because it's not my field. I'm acquainted with some measurements in the area where I work now and live in the Adirondacks of New York and lakes of New England. There's considerably higher area deposition of a number of things in that part of the country.

Q Okay. Fair enough. But if you don't know the answer to this question then tell me. But you've testified that a

major focus of your research is in the upper great lakes region; correct?

A Right.

Q Understanding your personal or --

A My personal research is, yes.

Q Interest is in forest issues primarily?

A Yes; yes.

Q But to the extent you have any -- you've had occasion to look at water quality data with respect to the location to the Huron Mountain Club, would you agree that in that region of the upper great lakes that it is very common to detect mercury in surface water bodies including, for example, Lake Superior?

A That's my understanding.

Q And is it your understanding, sir, that unfortunately mercury has been widely distributed into or deposited into surface waters in this area as the result of airborne deposition?

A Yes, that's my understanding as well from people, study, yeah, on water quality.

Q And again, is it your understanding, sir, that identify -- or sources or understood sources of this widespread deposition -- airborne deposition of mercury include coal-fired power plants, for example?

A That would be the general understanding that I'm familiar

with, yes.

Q Which, again, if you know this answer and if you don't just say so, but is it your general understanding as an ecologist that, again, unfortunately as the result that airborne mercury, for example, has been widely transported through the atmosphere and deposited into surface water bodies at many long distances from where it originated as a result of again for example coal fired electric generators?

A Yes, I understand that that is understood to happen, yeah.

Q You were asked a series of questions about the Michigan natural features inventory, which was tab M in the Exhibit 6-D, and specifically about the wooded dune and swale complex at the mouth of the Salmon Trout River. Do you recall testifying about that?

A Yes.

Q If you know, sir, how far is the mouth of the Salmon Trout River from the site of the proposed mine?

A I couldn't tell you exactly.

Q Well, let me ask you this. Do you have any reason to believe that the -- you've testified -- you commented on the proposed mine; correct?

A Yeah. I commented on concerns that related to it, yes.

Q Okay. Is it your -- it's not your testimony, sir, that what is proposed in the mining permit application or in the permit that has been issued to date by the DEQ would

authorize any dredging, draining or other physical alteration of the wetlands in the dune, swale complex at the mouth of the Salmon Trout River?

A I have no knowledge of any such proposal or its existence or not.

Q You also testified on direct examination about, in response to a question about rare and unusual mollusks. Do you recall that line of questioning?

A Uh-huh (affirmative).

Q And you indicated that you had -- or you had some knowledge mollusks had been detected. What I was unclear and I would ask you to clarify for the record is where were these mollusks -- where an unusual mollusk species detected.

A Actually some of the most unusual species are terrestrial that have been documented there on club lands are terrestrial ones, land snails. But also in several of the lakes there's a still a somewhat mysterious occurrence in Rush Lake, for instance, of a type of mollusk which is still unclear exactly what. It's another example of a distinct type, but its taxonomic is unclear but mostly in the lakes and some terrestrial mollusks.

Q You were also asked on direct examination, sir, to explain the nature of your concerns about potential effects -- or hypothetical effects, I should say, of the proposed mine on the area in the Huron Mountain Club as a reference area;

correct?
A Yes.
Q And you were -- you indicated as my notes reflect that if deposits of some substances -- it was unclear which -- but if some substances occurred onto the Huron Mountain Club property that that would raise concerns for you about the continuing use of that area as a reference area; correct?
A The substances of most concern to terrestrial ecosystem would be quite specifically materials that acidify groundwater or heavy metals. And it's well established that deposition of those do change ecosystem dynamics, groundwater chemistry and, therefore, the growth and health of the plant communities. So should such things -- should such deposition be significantly elevated above background level, there is a risk that there would be a degradation of the reference ecosystem value for research, yes.
Q Again, you have not undertaken or been asked to undertake an evaluation of whether such deposits of metals or -- sir, what was the other thing you said?
A Acids.
Q -- acids -- you have not been asked to undertake whether in fact such deposits of acids or metals will in fact occur as a result of the proposed mine activity?
A That's correct.
Q And you have no evidence that in fact they will occur if

this mine is permitted, do you?

A I have no evidence one way or the other, that I'm personally going to give.

MR. REICHEL: Nothing further. Thank you, sir.

JUDGE PATTERSON: Redirect?

MR. DYKEMA: A few questions, your Honor.

REDIRECT EXAMINATION

BY MR. DYKEMA:

Q Dr. Woods, Mr. Predko showed you some pictures of the Yellow Dog Plains and at least in the foreground of the photographs the ground was largely treeless. You responded in part by noting that the Yellow Dog Plains have never been like the Huron Mountains but they are instead a -- what you called a fire ecosystem. Can you explain to the Court what a fire ecosystem is?

A Oh, sure. It's a -- there are forest types throughout the continent that are -- that develop as they have developed because they -- because fire's a historical natural presence on the landscape, and so the symbolage (*3:37:20) of species that are present, the dynamics of the ecosystems that are there have evolved in that context. The Yellow Dog Plains is a very dry sandy soil type, extremely well drained as the soil scientists say. And as a consequence it's prone to in hot, dry periods to fire and the forests that occupied that area prior to settlement that the surveyors noted were

primarily jackpine mixed with some other species, Red Pine and other species in some areas, but a large extensive Jack Pine which is an entirely fire dependent species. It can only survive where there's fairly regular fire.

Q At what temperatures will a Jack Pine seed germinate?

A It's the shedding of seeds that's temperature related. The cones of Jack Pines are -- the term, the technical term is serotinous. It just means that they stay closed until sufficient heat to melt the resins of the cone allows the scales to open and the seeds to be shed and blown around by the wind. Typically that happens during and immediately following a fire. Sometimes on a very hot day they'll get hot enough to open. And it varies. Some Jack Pines are more inclined to open than others, but --

Q So how -- the photographs that Mr. Predko showed you of the relatively treeless Yellow Dog Plains are at least pieces of relatively treeless Yellow Dog Plains; is it likely that a time traveler would have seen very similar photographs periodically over the last 10,000 years?

A Certainly --

MR. PREDKO: Objection, your Honor; speculation. How can Mr. Woods testify to -- as what a time traveler would have seen?

MR. DYKEMA: Well, I'll lay more of a foundation, your Honor.

JUDGE PATTERSON: Okay.

Q I believe you just testified that the predominant tree in the Yellow Dog Plains pre-human settlement is Jack Pine.

A According to the survey records, yeah.

Q In your opinion is that likely to have been the case since glaciation?

A There's actually a very extensive body of Paleo-ecological research that's been done on the Yellow Dog Plains by Linda Brubaker and Margaret Davis who have shown the change in species -- the species composition of that area over the entire 10,000 years since glaciation. And during the coolest, moistest parts of that period other species have been more abundant, but during the majority of that time it's been predominantly occupied by the pines that are fire co-dependent.

Q So during those periods when it was dry and when the Jack Pines and similar trees dominated, --

A Yes.

Q -- do we know with a reasonable degree of scientific certainty that the Yellow Dog Plains were frequently burnt and treeless?

A There would -- yes, in any Jack Pine system there was periods after fire when they would be treeless for a period of several years.

Q Now, Mr. Predko also noted Aldo Leopold's somewhat

depressing commentary on the headwaters of the Salmon Trout in 1938. Can you offer the Court an opinion as to -- or a description of the studies that have been done of the lower Salmon Trout River in recent years and what they tell us about the biological richness and intactness of that river?

A They document a great deal of richness. They document a species assemblage that is largely consistent with the earliest records we have of the fish communities, aquatic communities of the stream which are approximately 70 years old at this point. That's the best measure of intactness that I can offer.

Q Mr. Predko also looked with you at a map and he pointed out something on the Salmon Trout River that's identified as the Lower Dam. Do you recall that?

A Yes.

Q Is that a functioning dam?

A I don't believe so. I'm not intimately familiar with it, but it doesn't look functioning to me.

Q The water's flowing right through it?

A Yeah.

Q And he also identified something on the map that's called the Burnt Dam. Do you remember that?

A Yes.

Q Is that a functioning dam?

A I've never been to it.

Q Do you have any reason -- any understanding as to why it's called the Burnt Dam?
A Presumably it might have been burnt, but I don't know.
Q Do you agree with Mr. Predko that the lower falls on the Salmon Trout mark the upstream limit of the range of the Coaster Brook Trout?
A I have no direct knowledge of that. I understand that upstream migrating fishes are typically limited by falls and dams, but -- and I have no knowledge of occurrence of the Coasters beyond that, but I have no knowledge of -- particular knowledge of their presence or absence at all.
Q If the waters of the Salmon Trout were acidified or contaminated with heavy metals, the consequences of that contamination would flow downstream not upstream; right?
A Presumably.
Q Mr. Predko also asked you about the treatment and the ATBI of the fish known of the mikush geronicus. Can you explain what that fish is and why it's treated the way it's treated?
A This is the Rush Lake trout I believe you're referring to; right?
Q Yes.
A Yeah. Lake trout have a complex structure in a number of lakes in North America in Lake Superior and some of the large lakes of Northern Canada. There are multiple forms -- morphs as we call it -- of lake trouts that seem to be

ecologically differentiated. Some inhabit deeper water, some shallower water and there may be other patterns of differentiation -- ecological differentiation that are poorly understood. Rush Lake is odd in that being the only small lake where such a polymorphate population is known to occur. It's odd because it's also very deep, so that may be related to it. But the genetic relationships among these morphs of lake trout are very poorly understood. And in fact, they're an object of current study by some researchers from the Great Lakes Fishery Commission because they're interested in managing the remaining diversity of lake trout morphs in lake Superior. Most of them have gone extinct since the arrival of the lamprey. And so those researchers have been a been over the last couple of years, in fact, working in Lake -- in Rush Lake. Part of the objective of that study is to assess the genetic distinctness of this entity which has been variably -- the way taxonomic authority works is that peer reviewed publication of a name for a genetically distinct entity is the sort of the gold standard, but there are many ambiguous situations especially where the genetics -- modern genetics have not been brought to bear on the situation and this is one of them.

Q You mentioned in response to a question by Mr. Reichel the use by some people as the lake -- the water of Mountain Lake as a baseline reference. Do you recall that?

A Yeah.
Q Can you explain to the Court what you were referring to?
A Yes, it's anecdotal. I encountered some people from the State -- one of the State agencies doing water samples there one time and that's what they told me.
Q And why was the water of Mountain Lake of use to them according to them?
A Because they regard it as the least -- regarded it as some of the least contaminated waters in the region. Again, what they told me on the side; they had their mobile lab there and their Teflon moon suits sampling.
Q Mr. Reichel also noted that there is mercury present in the region generally?
A Yes.
Q Would you be concerned if a consequence of the operation of this mine were to increase the levels of mercury in the lands and waters?
A Certainly all of these things, the consequences of any of these pollutants and especially things like heavy metals is entirely concentration dependent in any ecosystem. So if there were increases over existing levels, that would have expected effects on ecosystem function.
Q Mr. Reichel also asked you how far the mouth of the Salmon Trout is from the mine site. If the operation of the mine or the collapse of the mine were the result in a significant

reduction in the water flow in the Salmon Trout, would that likely have an adverse impact on the biological richness of the dune and swale complex at the river complex at the river's mouth?

A Very likely, because the wetlands and -- the swale wetlands are a consequence of -- are maintained hydrologically as a consequence of the rising and lowering river flows interacting with the lake water in terms of their backing into the swamps and so forth. So a lower -- generally lowered flow of the river would -- probably would be -- it would be -- it could be anticipated that it would have consequences, particularly for the wetland part of that system.

Q And if sulphur -- acid causing contaminants or heavy metals were to flow downstream through the Salmon Trout or be deposited directly through the air on the dune and swale complex, would that likely have an adverse impact on the biological value of the area?

A Absolutely.

MR. PREDKO: Objection, your Honor. No foundation, calls for speculation; it's a leading question.

MR. DYKEMA: I'll lay a foundation, your Honor.

JUDGE PATTERSON: All right.

Q Do you have any basis for opining as to whether the biological richness of the dune and swale complex would

likely be compromised if the waters of the Salmon Trout flowing through the complex were contaminated either by acid causing materials or heavy metals?

A Ecosystem acidification is probably one of the most strongly established generic threats to ecosystem diversity and function in North America. It's very well studied in a wide range of aquatic and terrestrial ecosystems. So acidification of water input to any ecosystem beyond substantial increases in acidity would have -- would generate cause for concern about degradation of the ecosystem. Heavy metals are a more complicated story and I don't know as much about them, to be honest, but I would have to -- from what I do know I would be concerned about any increase in concentrations because they are generally toxic.

MR. DYKEMA: Thank you, Dr. Woods. No further questions, your Honor.

JUDGE PATTERSON: Any other questions?

MR. PREDKO: Just a couple, your Honor.

JUDGE PATTERSON: Okay.

RECROSS-EXAMINATION

BY MR. PREDKO:

Q Dr. Woods, you just said a few things about the flow of the river and effects; correct?

A Uh-huh (affirmative).

Q Now, I take it you are not a hydrologist; correct?
A Not myself; no.
Q It's not your specialty; correct?
A That's correct.
Q And so you do not have an expert opinion on the effect of the proposed mine on the flow of the river; correct?
A I have no opinion on the effect of the mine on the flow of the river. I have understandings from research reports and colleagues as to the effect of hydrology on these systems. Those are two separate things.
Q Fair enough. And so you are relying solely on the expertise of others in making that statement; right?
A Others whose work I have as director of the Research Foundation sent propose -- their research proposals to peer reviewers in hydrological fields, so it's not simply that I'm reading their claims about these systems without other expertise coming into the picture. So that in fact is one of the things I do as research director is send proposals to peer reviewers in those areas.
Q You have no independent expert opinion regarding the hydrology that's going to be affected or not affected by the mine site; correct?
A I do not.

MR. PREDKO: I don't have anything else. Thank you.

MR. REICHEL: I have nothing further.

JUDGE PATTERSON: Thank you, Doctor.

(Witness excused)

MR. DYKEMA: Your Honor, we do not have another witness for today, so --

JUDGE PATTERSON: Okay.

MR. DYKEMA: We'll get an early break.

JUDGE PATTERSON: Okay. Tomorrow at 8:30.

(Hearing adjourned at 3:51 p.m.)

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