

CLAYTOR PROJECT NO. 739  
APPLICATION FOR NEW LICENSE

STUDY PLANS UPDATE MEETING

NOVEMBER 28, 2007

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1           The following STUDY PLANS UPDATE  
MEETING came on to be heard on this the 28th day  
of November, 2007 at the Claytor Lake State Park,  
Dublin, Virginia.

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### INTRODUCTION

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9           TERESA ROGERS: My name is Teresa  
Rogers. I am heading up the Relicensing for  
Claytor. We will go around the room in a few  
minutes and everybody can introduce themselves so  
everybody knows who is here. The bathrooms are  
out in the hallway on the right. There is water  
and snacks in the kitchen. Just help yourself.  
The water is in the refrigerator. Also, just to  
clarify, you do not pay for parking. It is  
included when we rented the place. So if you  
paid for parking, that was a donation. You don't  
have to worry about paying for parking.

21

Also, I want to remind everybody  
that the meeting is being transcribed, so if you  
have any questions and any comments, and we will  
take questions as we go, we don't have to wait  
until the end or anything, just make sure you  
state your name so we can get it for the record.

1           Let's go ahead and we will start  
around the room with introductions. Just tell  
everybody who you are and who you are with and if  
you represent an agency or if you are just a  
citizen, just say you are a citizen, an  
interested party. If you are representing a  
group, let us know that as well, too.

8           (Thereupon, persons attending Study  
Plans Update Meeting introduced themselves.)

10

11           **TERESA ROGERS**: Let's go ahead and  
get started. This morning we have a little bit  
of glare on the screen. You may need to move  
around if you can't see very well. Also, I have  
mailed out a copy of the initial study report to  
everybody that is on the mailing list. It is  
also on our website. If you didn't receive a  
copy and you want one, just make a note on the  
sign-in sheet, and I will make sure I get a copy  
to you. It is on our website as well.

21           This meeting is for the public;  
anybody can come. All of our meetings are open  
to the public, and a lot of times I will send out  
an e-mail, a mailing, and we also have it always  
posted on our website as well. So if anybody is

ever interested in knowing what is coming up, go to the website. It is a place to really keep track of what is going on.

4           Also, I'm sorry, I forgot to tell you<sup>5</sup> John Smith of FERC is participating by conference call today. Is there anybody else on the<sup>7</sup> conference call?

8           JOHN SMITH: Well, periodically, Kristen Murphy and Ben Garrett will be joining in<sup>10</sup>

11           TERESA ROGERS: Okay, sounds good. We<sup>1</sup> will go ahead and get started. Since our last update meeting which was held in May, just to give everybody an overview of what was going on with the studies. The first year of studies have continued. We still have some things going on. It<sup>1</sup> is starting to wind down, though, as far as the<sup>8</sup> field studies.

19           We filed the initial study report with FERC on November 13th, and that is where we are<sup>1</sup> today with the Initial Study Report Meeting.

22           Just to kind of go over again the studies that we are doing for relicensing, we have Aquatic Resources Assessment, Cultural Resources, Debris, Erosion, Fish Entrainment and

Impingement, Instream Flow Needs and Reservoir Elevation, Native and Exotic Aquatic Vegetation, Navigation Systems, Recreation and Angler Use, Sedimentation, Water Quality, and Wetlands, Littoral (inaudible) Habitat.

6           The purpose of today's meeting is required by the Integrated Licensing Process that we are using for relicensing. The purpose is to update all the stakeholders regarding where we are in the study progress, discuss any proposals for modifying the studies if it is appropriate, and what we will be doing is each consultant will be giving you an overview of the data that they have collected, any problems they have encountered, and we can discuss it today if we want to modify anything or change the studies or add studies.

18           We also will be reviewing upcoming ILP due dates. That is why I always give out copies of the Process Plan because the ILP process is so schedule driven. It is very important to know when the upcoming final dates are

24           Also, there is a copy of the agenda over there. We try to stick to the agenda as

much as we can because some people are only interested in specific studies. They don't want to come for the whole day. So there may be some time between study reports where we will just kind of wait until the next one starts. That way people can come and go as they are interested in these studies.

8                    This morning we will be going over the Aerial Mapping and Bathymetry, Sedimentation and Erosion and we will break for lunch and then we will do Instream Flow Needs, Debris, and then Habitat and Aquatic Vegetation and Recreation and Angler Use.

14                    Tomorrow we will be going over Cultural Resources, Water Quality, and then we will have lunch, Aquatic Resources in the afternoon, Navigational Aids and Fish Entrainment and Impingement and then we will kind of go over Shoreline Management Workgroup.

20                    As far as the upcoming due dates, what we will be doing after this meeting is we will be filing what we call the meeting summary. We will file that by December 17th, and then participants have thirty days to comment on the summary and request any study modifications

and/or new studies.

2           We will file a response to those comments within thirty days, which would be February 15th, and then FERC will issue a study determination by March 16th.

6           I do want to make sure that everyone is aware that we are a little bit ahead of schedule because this meeting was scheduled for December 2nd, which is a Sunday, so we pushed it up a few days, but I do propose that we go back to the Process Plan to get us back on track. It actually gives you a few extra days for your filing if anyone has any objections. We will just do that, keep everything on track.

15           As far as the studies go, the next steps, the consultants will finish the first year of study, and each one of you will tell you that they have additional field work to do as they give their presentation, and then what will happen is we will draft a study report that we will be providing to stakeholders for review and comments and we will have work group meetings to discuss and answer questions on the study reports.

25           I do want to quickly go over one

change that has occurred that has impacted several of the studies, and that was we did cancel the draw-down for this year. That was sent out through E-mails going through that decision process, and it was hard one because, one, a lot of people had work planned for this draw-down and also I had studies that I need to have a draw-down for to complete.

9           The good thing about the ILP process is it does have a second year of studies built into the schedule. So even though it was cancelled for this year we do have next year to finalize the studies. The ones that are being impacted the most are the Cultural Resources because we have to look at the shoreline with the water down, the mussel study, we need a draw-down for to look for habitat, and Navigational Aids because they go out during the draw-down to see if there some raised hazards.

20           The reason it was cancelled is that we have been in a period of a very low inflow, and people who live on the lake may not have noticed it as much because our license allows us to release 750 or inflow, whichever is less. So as inflow goes below 750 then we just pass that

amount downstream.

2           As we go through the studies, especially Water Quality below inflow, I won't go into the details now, that low inflow did impact water quality and we did extend that study to capture that period, but if we do the draw-down and inflow stays low, we wouldn't be able to refill and that causes problems.

9           Low inflow also impacted our ability to do the high flow for the Instream Flow Needs Study and Tom will discuss that.

12           I don't know if you can see this. This is a snapshot of the Galax gauge. This is prior to Thanksgiving when I put this together, but this is where the water, CFS, the discharge water flow was, and you can see what the median daily statistic is. We were way below what typically you have.

19           Also, we were looking at what is the drought doing in the area and it is kind of hard to see right here, but the release that was November the 15th, right here in the brown and green, which is the drought is ongoing and there is some improvement. We don't know exactly when we are going to get back to normal flows, but it

is probably best to go ahead and cancel it for this year and we will pick up a little next year.

3           This is just a copy of the U.S. Drought Monitor as of November 13th showing that Pulaski County is the moderate drought.

6           Again, we have a Claytor relicensing website where we post all correspondence and all filings. So if anybody is interested in what has happened up till now you can go to the website and get caught up.

11           I don't know if there are any questions overall.

13           **UNIDENTIFIED SPEAKER:** Just to back up to the dates, the deadlines, you mentioned a summary.

16           **TERESA ROGERS:** We will file a summary of this meeting by December 17th and the participants have thirty days to file their comments on the meeting summary and request any study modifications or new studies. I will let everybody know that if there is a new study request it still has to meet that seven criteria from the FERC for a study, and that is on our website as well. Since it is a new study after the initial study plan has been approved by FERC,

there is a little bit higher level of justification. John, I don't know if you know a better way to explain it than that.

4                    **JOHN SMITH:** No, not really.

5                    **TERESA ROGERS:** We have on our own kind of modified some studies as we have gone into this process just because it made sense. Inflow Flow Needs was already modified to extend down into West Virginia. I told you about the Water Quality, we extended that monitoring period because we were in a low flow condition. We didn't want to stop it until we thought it was over so we could capture that whole event.

14                   **LAURA BULLARD:** Teresa, what about the Shoreline Management Work Group has not yet met? What is the status on that and is there going to be any reports since they have not actually even met yet?

19                   **TERESA ROGERS:** I am just going to kind of give an overview. There is not really any reports. We have not met, the Shoreline Management.

23                   **LAURA BULLARD:** Okay. Is there a plan to meet?

25                   **TERESA ROGERS:** There is. I guess

my goal had been by this point at least have all the stakeholders identified. Most of the actual guidelines need results from all the other studies first. I was trying to get some preliminary stuff out of the way and my schedule has just not allowed it. My new goal is to have a meeting the first quarter so that we can get some of that stuff out of the way because I am thinking draft reports will come out toward the beginning of the year and during that first quarter. I haven't forgotten.

12                    **LAURA BULLARD:** Back to that where you file the initial study report meeting summary, will we be able to look at that or is that the same as what you have on the next slide?

16                    **TERESA ROGERS:** The meeting summary will go out to everybody on the distribution list. That is the other thing, too, if you are not getting this... I have two different lists. I have an E-mail list that has more people on it than the official distribution list, but if you want to be part of the official distribution list, getting the actual paper copies of everything, make sure I know. I think everybody here is on the official distribution list, getting

hard copies, but, yes, everybody will get that so they can comment on it. That is why we are here today, to go over the study so you can start seeing where we are on the progress. You can start formulating your comments. Any other questions?

7 I am going to go ahead, we have about five minutes, I am going to go ahead and pull up the next presentation. So if you want to grab some water. Also, don't forget when you have a question or a comment, make sure you state your name.

13

14 **AERIAL MAPPING AND BATHYMETRY UPDATE**

15

16 **BRADY TODD:** My name is Brady Todd. I am the Survey and Mapping Supervisor for AEP out of the lab in Columbus, Ohio, and it was my responsibility to oversee doing all the land, topographic mapping and the bathymetry on the lake.

22 We have hired a company out of Columbus, Ohio, Henderson Aerial Surveys, and they are the ones that performed the aerial mapping. They created all the contour mapping

for the project. They used state of the art photography and a new system called LiDar. It is hard to see in this slide. This is a standard aerial photo that was captured during the process. They had something like 800 aerial photos taken of the lake region all the way down to Glen Lyn. This right here is the dam. If we didn't have all of that sunlight it would be a little bit easier to see.

10                    These are just some more pictures. Right there is the Lowmens Ferry Bridge. Right here is where we are today. That is the marina, and this is another view of the dam area. The dam is right here. There is I-81.

15                    The photography was really clear on these photos, and what we did with the photography was we also created what is called ortho photos. Ortho photos allow us to rectify the image and scale it and go reference it so that it can be used with GIS planning systems. It can be used with the contour mapping that was produced.

22                    This is an example of what we can do. This is at the Rock House Marina. The marina is right in this cove here. We can take the ortho photos, bring it up in the digital CAD

system and you can overlay all the contouring that was created from the photography right over top of it. It gives the planners a good way to look at things. They can see the digital graphics. They can work with the digital graphics. They can also see it in a picture view.

8            This contour map was developed down here at the dam. You can see the blue dash lines. That is all the bathymetry. That is all the mapping of the contours below the water level. We also mapped downstream and we went as far downstream with the mapping as the I-81 bridge.

15            This is the area that was covered by the photography. This dark line that goes around here was the boundary of the project. It is also the only region that we did the ortho photos, all rectified and go reference cards.

20            The larger boundary was the overall photography area, and that was taken in conjunction with the needs of the consultants. It allows us to see all of the drainage area down the New River and provided them with views of the river system as it goes down the Glen Lyn. Glen

Lyn1 is right here.

2            Now, for those of you who live in the3 area you may have seen ground targets out, either4 pluses or giant chevrons laying on the ground. That is what was used to control the area5 for the mapping. A certain amount of ground control has to be used, plus they used onboard6 GPS8 in the plane to help position.

9            Bathymetric surveys were performed by10 a company called Ocean Surveys out of Old Say11 brook, Connecticut. This company works world wide. They do everything from small ponds to12 ocean going bathymetric surveys. This is a picture of the vessel. Some of you, if you were13 on14 the lake, may have seen that running around during January and early February last year.

17           They used a multi-beam sonar system, and18 what the multi-beam sonar system does is it pretty much paints a picture of the bottom using19 sonar beams and in this case the unit they were using to collect 240 beams. So it just creates a20 swath as it migrates through, and these pictures here, it is a little hard to see again, but this21 right here represents a pipe trench on the ocean floor just as an example to show you what can be

seen with this technology.

2            This is another good example. I like to show this. Anybody that is familiar with Smith Mountain Lake, that right there is the old Route 122 bridge that was there before the lake was built. It is still intact. It is still on the bottom, and when they scanned it with their multi-beam system you can see that they found the bridge. You can also see from this the original channel of the Roanoke River.

11           This right here is all the bathymetry for the project area. This is the part down here at the dam. The dam is right here, and you can still see the original channel for the New River.

16           One of the things that we did was we used a sub-bottom profiler simultaneously with the multi-beam. This allows us to capture data about the sedimentation for the groups doing the sedimentation study. OSI provided us a full report on this. What the sub-bottom profiler does is if you look here this echo line right here is the top of the sediment and then these darker lines down here is where it is penetrating the sediment in the original bottom areas.

1            They also used a software called  
high pack. The high pack software is what  
controlled all the bathymetry on the boat. It  
allowed them to capture the multi-beam data. All  
the positioning on the boat was done in real time  
with GPS systems and these monitors allow them to  
see where they have been and where they are  
going, all the navigational aids that they need.

9            The final product on this project  
was to incorporate both bathymetry and aerial  
mapping, the composite contour map as I have  
shown you. The data for the mapping will be used  
for comparison of existing conditions on the lake  
with the original design, comparison of current  
volume tables with the established historical  
tables, baseline mapping for future design,  
analysis and other mapping, generation of cross-  
sections and map detail. It is used to determine  
the nature and extent of the silting, determine  
the condition of the adjacent areas, basically  
the run-off area. It is used to determine the  
current volume of the lake, determine the  
presence of any unusual land or lake bottom  
features, and the information has all been  
incorporated in the GIS system of the area. Any

questions? Yes, ma'am.

2                   **MARY RHODES:** I am Mary Rhodes. Did I read in your preliminary summary that this type of system has trouble with wetlands, reading accurately and also the areas that contain a lot of gas?

7                   **BRADY TODD:** In the sub-bottom profiling; the sub-bottom profiling does have a problem with a lot of debris. So if you have areas, especially in the coves where you have a lot of leaf and organic debris build-up, what it does is it tracks methane gas that just naturally comes out of the underground and out of the decaying process. When you are looking at a sub-bottom profiler, they have a hard time getting through those bubbles. The bubbles create a reflection that doesn't allow the sonar beams to penetrate.

19                   So there are areas where that is a problem, but it is not widespread.

21                   **MARY RHODES:** So how do you mitigate it because that is some of the most important areas as far as erosion and aquatic plants?

24                   **BRADY TODD:** There is a limitation to the sub-bottom profiler to begin with. It is

a matter of interpretation and there really is no mitigation for that, other than doing core samples, and there were a certain number of random core samples taken through the lake just to verify what we were seeing on the electronics.

6           **MARY RHODES:** But were they taken in deep parts or how was...

8           **BRADY TODD:** It was a representation.

10          **MARK RIEDEL:** I would like to speak to that. Sedimentation, it is being addressed by different methods.

13          **BRADY TODD:** Our sub-bottom profiler method was an initial overload. It was provided by these gentlemen and they have more specific ways that they deal with it.

17          **MARY RHODES:** Say there is no vegetation to interfere, after what depth can you really count on that system, like twenty feet, ten feet, clear water and not a lot of debris?

21          **BRADY TODD:** Oh, the system itself? It will work in hundreds of feet of water.

23          **MARY RHODES:** No, I mean the shallowest that you can count on.

25          **BRADY TODD:** Oh, the shallowest?

1           **MARY RHODES:** Without vegetation  
interfering?

3           **BRADY TODD:** Okay, the shallowest  
that we can get the boat into I believe was two  
and a-half feet of water.

6           **MARY RHODES:** You could count on  
that being pretty accurate if you didn't have lot  
of vegetation interfering?

9           **BRADY TODD:** Oh, yes. What that  
does is... Again, I apologize for the lighting,  
but in this photo right here is the sub-bottom  
profiler slide. That hangs over the side of the  
survey vessel and it floats right there just  
below the surface. It is seeing everything below  
it. So it is hanging below the surface but above  
the bottom of the boat. So if they are in two  
feet of water or two and a-half feet of water, it  
is seeing everything that is below, and if that  
water is four feet deep, it is seeing into that.  
Does that answer your question?

21          **MARY RHODES:** Yes. I was wondering  
about how shallow, but you answered it.

23          **BRADY TODD:** Yes, as shallow as the  
boat could get into, and in the areas that the  
boat couldn't get into, of course, we couldn't

measure with this particular instrument. The multi-beam, however, that scans the bottom to get the contouring, in the areas that the boat couldn't get physically into, they had the capability of tilting the head on the beam mechanism, and what that allowed them to do was shoot some beams out to the shoreline, and that had a range... They could actually sit a couple hundred feet off the shore and just pivot the boat and map the coves that they couldn't get into.

12                    **BILL KITTRELL:** How far upstream in the reservoirs did you go with this system?

14                    **BRADY TODD:** Allisonia. Anything else?

16                    **BILL KITTRELL:** Adam, I might just add, in areas with boats out there and the water is only 1845 or something like that, obviously, you can't get above 1845, but we do have high resolution plane method, it is also very high quality and when we are done we created a model of the entire project up to 1900, 1950 feet of elevation in that small gap. That is all filled in with the LiDar data that is taken by the airplane and so if it is below 1846 when the boat

was out there surveying and couldn't get in to shoot up to the shoreline up to 1846, that is all filled in with the LiDar. So we do have one continuous project and I will show some examples of that in a minute.

6                    **BRADY TODD:** Anything else? If anybody is interested I brought one flyer sheet, it of the dam area. It is just a typical part of what the contour mapping is like. Everything these days, you know, is computer driven. It is all digital. We don't create maps off the mylar and hand drawn; it is all done electronically now. So when people need a map, we can just pull it up on our CAD systems and send it to a plotter. So if anyone wants to look, there is a sample of the contour map up here on the table.

17                   **TERESA ROGERS:** As Brady said, it will also be incorporated into the GIS system. So we will have all of that information as a layer in the GIS, and other studies that are going on will also producing these layers so we can lay on top of each other so we can see what is happening in different areas as far as the elevations go and depths and that type of thing. We have some time before the next one starts.

The hard thing is you don't know what questions you are going to get when you are putting up your agenda. We are not supposed to start until 10:15 on the Sedimentation and Erosion. So I am going to pull this map out if anybody wants to look at it and Brady can answer questions and we will go from there.

8

9

### SEDIMENTATION AND EROSION STUDY

10

11

ALEX BRUNSON: My name is Alex Brunson. I am the Senior Geo Scientist at Baird & Associates. I am responsible for overseeing the erosion study on Claytor Lake.

15

A little bit about what I am going to present, just go through project elements of the erosion study, the objectives, updates in terms of the tasks completed, tasks remaining, some preliminary results, and then talk about the reports.

21

The purpose of the erosion study is to determine the effects of project operations on the erosion of the shoreline at the reservoir and also in the river within the Claytor project area and also downstream from the dam.

1           Just a quick overview of the study  
area, I don't think we need to go through that at  
all. In terms of the objectives, the first  
objective of the study was to look at the effects  
of the project operations on erosion of the  
shoreline of the reservoir and the riverbanks  
downstream to the 460 Lowmen's Bridge near Glen  
Lyn.

9           The second objective was to identify  
existing shoreline conditions and protection  
measures around the reservoir and develop GIS  
mapping layers depicting these data.

13           I am going to lump a bunch of the  
objectives together today because they were all  
tackled at once as far as the study methodology  
goes.

17           Objective Three was to identify the  
degrees of susceptibility along the project  
reservoir and downstream to the highway bridge,  
bank erosion.

21           Number Four, identify the areas  
subject to accelerated bank erosion, and I will  
talk a little bit about that in a minute.

24           Objective Five was to assess the  
relative effects of wind, recreation, boat

induced waves on erosion around the reservoir.

2           Objective Six, identify measures that could be implemented to reduce erosion along the reservoir and downstream including evaluating modifications to operation regime, physical structures and vegetative cover.

7           Number Seven, determine the effectiveness of erosion control measures contained in the Claytor Reservoir guidelines. Identify the conditions in which biological measures, riprap or bulkheads are adequate for controlling erosion and where also no additional protection is needed. Also, assess erosion control measures in terms of their effectiveness, cost, longevity, and natural compatibility.

16           Number Eight, also look at the need for annual draw-down for allowing construction of shoreline stabilization.

19           In terms of the relicensing relevance, while erosion of the shoreline as a result of project operations could result in property damage and also the accumulation of sediment and debris within the project reservoir.

24           We also need to consider whether the project operations are having an impact on

shoreline erosion downstream and determine the potential benefits or effects of changes in project operations and the need for remedial action in different locations.

5           Some of the methods that we have been using to address these objectives, in terms of Objectives One through Four we have conducted a literature review and collection of existing data. We are undertaking very detailed field work on the lake and the New River. We have constructed a GIS inventory and produced a large amount of mapping of the area. We are also undertaking several numerical modeling exercises in terms of looking at wind waves, the hydrodynamics of the lake, and also shoreline evolution.

17           In terms of shoreline erosion, it is necessary to investigate the erosion processes and performance of shoreline erosion to better understand these processes. Also, we need to develop recommendations for mediation if necessary, and as a little background we have extensive experience in investigating shoreline dynamics and impounded systems.

25           In terms of the field work, we

conducted a very detailed shoreline survey of the entire reservoir. This consisted of differential GPS enabled field PC system. So while we are out on the lake we are working directly in the GIS environment and we have developed a custom system for the lake in terms of what we are surveying and how. There are many pages of survey that include all of the shoreline erosion processes, shore protection measures, condition of shoreline protection.

11           Just to step back a little bit, we took the shore profile development. In any impounded system there is a certain response of the shoreline to being inundated. Normally what happens is you start with an existing shoreline and then within the range of water level fluctuations there is a lot of wave energy and long shore and cross shore currents, and these work to erode land, the natural shoreline, and generally this takes on a classical sort of S shaped profile as this bluff retreats and material is removed from the full shore system. This is what we see around pretty much every reservoir.

24           In terms of the tasks, well, we need to identify existing shoreline conditions, so I

guess we will go out and find out what is out there now, and then look at the protection measures and develop the GIS mapping. We have used field survey results with this and we also developed model scenarios to represent these numerically.

7            In terms of shore protection, we have a whole data base that we can now query and produce basic summaries. Approximately, thirty-eight percent of the shoreline is protected at the moment, leaving sixty-one percent unprotected or natural in some way, and we have under one percent that was unclassified, that either we couldn't navigate in or we couldn't see back into the cove to determine that, which was a very small amount.

17           And then within this we can see that of the basic amount of the shoreline that is protected, the dominant areas are timber wall and riprap with a small amount of concrete wall, ad-hoc, gabion or stone.

22           These are very detailed maps. Unfortunately you can't really see. We produced these maps for the entire lake and they will come as an appendix to the project reports. They are

all 11 by 17 maps because of the GIS, and they detail all of the shoreline protection all the way up from the dam to (inaudible), including the islands on the lake as well, and you can see that we had approximately 1,000 different shoreline segments that we identified within the field work system, and, essentially, what we do is we drive a boat around the entire shoreline and we divide the shoreline up into homogenous reaches. So if you have an entire reach of riprap or timber wall or an entire reach of eroding bank, then that becomes one reach in the GIS. It is all photographed and documented within the survey system.

15                    **BILL KITTRELL:** One question. I realize that probably the bulk of the rock that you are seeing is riprap, but how do you find armor wall versus rock wall versus riprap when you are out there mapping? Is there a difference in describing what you would consider a rock wall versus riprap versus an armor wall?

22                    **ALEX BRUNSON:** Well, I guess the difference is up for debate. To me a rock wall would imply that the rock has been placed, whereas riprap it is essentially ticked and

profiled. So that would be the main difference. In terms of armor stone versus riprap, it is more a question of size issue, I guess.

4           **BILL KITTRELL**: So it is more or less subjective while you are out there?

6           **ALEX BRUNSON**: It is subjective, yet consistent. In fact, in terms of rock wall, there is very little rock wall out there that actually consists of placed stone. A block wall would be regular blocks, you know, be they breeze blocks or brick. Timber wall is fairly obviously. Concrete, there may be a block wall that is concrete faced and would be cemented in there. So in terms of the way we divide them, it is more in terms of functionality.

16           **TERESA ROGERS**: How would like natural rock be classified?

18           **ALEX BRUNSON**: Unprotected, yes. This is purely artificial protection. What we have done is when we go in we classified the shore protection condition as well, and, essentially, this is in terms of high or low quality, which is again somewhat subjective, and then whether it is functional or in need of repair or whether it has failed completely. It

is fairly obvious when doing this sort of survey when a wall is functional, when it needs repair. Obviously, if it needs repair then it is generally there is either severe cracking to a concrete wall or there is a piece missing and you are starting to get bank erosion in behind there, or it has failed completely and it is offering exceedingly limited protection to the shoreline.

9           So we go through and we can classify all of these areas in terms of functionality. It is not an engineering survey. It is an assessment of the overall condition.

13           **LAURA BULLARD:**    Laura Bullard. Would you help me understand. We have high functional, high repair, low functional, low repair. I am having a little trouble grasping what you have there.

18           **ALEX BRUNSON:**    Okay, you can have high quality or low quality in terms of riprap. Low quality riprap may be stone that was wrongly selected. It may be the wrong size. It may not be angular enough. It may contain a lot of rubble material as well. Whereas a high quality riprap wall will be size appropriate to the area, it will interlock properly. So that is in terms

of it is more of the design or the intent, how it was built.

3 In terms of the functionality, it is possible to have a high quality area that is in need of repair because something has happened to damage the wall or a piece has fallen out, is missing. In general high quality areas will be functional as opposed to needing repair. When you get into the low quality areas, generally you see more areas in need of repair.

11 **LAURA BULLARD:** So high functional, but high functional but needing repair would be the second one there?

14 **ALEX BRUNSON:** Yes.

15 **LAURA BULLARD:** For instance, would you pick out one of those, like riprap there, so the larger area, it is hard to tell by the slide because of the lighting, would the...

19 **ALEX BRUNSON:** Right, the larger area there is high quality riprap that is functional. Typically, if you look around the State Park here they have generally used high quality riprap that is functional. There are some areas of riprap that are lower quality, generally much older areas as well in need of

repair, where a stone is missing, perhaps it wasn't as good a quality stone to begin with, and you can see resulting effects in terms of bank erosion. So there will be examples in the reports, picture examples, so you can compare as well.

7 In terms of shoreline characteristics, we have detailed summaries of the shoreline on this survey in terms of shoreline materials, bedrock, sanding, a mix of materials, or where it is not visible, and generally when we talk about not visible, it is behind shore protection. Obviously, when we are surveying from a boat, if the bank is behind shore protection then we can't determine what it is.

16 However, this is simply a visual inspection from the boat. We also have the geological mapping of the area to work with as well. Then within this we also have geomorphic characteristics. The first one that we see is bank eroding, and in terms of eroding shoreline this is simply a visual inspection where we see that we have a bare bank that is not sustaining active vegetation on the face. Now, that procedure does not give us any idea of the rate

at which it is occurring, and, obviously, when you look at all the bedrock cliffs around the lake, we need to delve further into this database in order to tease out that information.

5           We also look at the height of the bank and the actively eroding scarp. The bank height here... I am sorry, the scarp height is the overall height of the bank and then we have the actively eroding bank height and then we can also look at the bank materials within this as well.

12           In terms of shoreline characteristics, we can then look at this. Most of the shoreline around the area is bedrock, varying and different types, and then we also have other materials in there and sandy banks as well.

17           In terms of eroding versus not actively eroding, we are looking at about a sixty/forty split and that simply means that, obviously, we have a lot of bare bank faces around the lake where the area is natural. I don't think anyone would dispute that.

23           We also collected very detailed GIS data. We developed a separate survey system for the river in terms of erosion data, looking at

overall catchment, morphology and latitudes to set the context of where we are, mean channel dimensions, cross sectional form, river bank types, materials, erosion mechanisms, also the riparian characteristics, boating bank site characteristics, and the potential, also if we see any areas that we think can be enhanced or maintained then these are included in the survey data. This was conducted in conjunction with the sediment survey as well. So I think Mark has some detail slides in terms of the overall results.

13                    So that was the first half of the study where we determine the overall characteristics of the shoreline at the lake and identified bank protection, bank erosion mechanisms, and what that allows us to do is really focus and get a clear idea of what is going on with the lake for ourselves, and then the second half is in terms of our numerical modeling. So any more questions on the first half of the study?

22                    In terms of the modeling, this really begins with Objective Five, assessing impacts of wind, recreation, and boating use waves on erosion, and we have included recreation

in addition because there are waves from other recreational sources other than boats, such as water skiers, for example.

4           We start with a literature review just to include studies in any other areas where we have some idea of relative impacts, where there have been studies done on characteristic boat waves, magnitudes of waves and frequency and so on to establish a background.

10           Field data collection I will talk to as well. We have been measuring waves and currents on the lake and then we have numerical modeling, two primary models, ST wave, which takes local wind data and generates a time series of wave climates for the lake, and then cosmos, which takes these wave energies and transforms them into a shoreline profile erosion model.

18           In terms of the wind data I just summarized one of our charts here. This is data for Pulaski from 1994 to 2007, which is actually the most complete local data set we could find, and even so there were several gaps in the data set in the middle of this period, but we have used this to establish the wind climate for the area for the past ten years, and we will then

extrapolate it back over the life span of the project.

3           What this shows is essentially in terms of reading wind roses the number in the middle tells you how often it is calm, which in this case is about 50 percent of the time. Then from this each of these bars represents wind from a different direction. If we look at the longest bar here we can see that wind is dominantly out of the west here. In terms the relative color and thickness of these bars, we can see that most of the time we have fairly low wind speeds. These are actually in meters per second, but in terms of... Actually, I can't do the conversion into U.S. units, but, essentially, this tells us that we have fairly calm winds here for much of the time. When we do get stronger winds they tend to be out of the west and northwest.

20           We need to then move from establishing the wind climate to the wave climate. Part of this is that we did take a series of wave measurements and the wave gauges were recorded for a month in the Summer, that is both wind waves and boat waves and five gauges

were deployed. In fact, we actually ended up deploying six gauges. So buy five and get one free.

4           Four of these units are wave pressure sensors that are integrated into the ADCP, which were the current measurement sensors which I will talk about in a minute, and then two were separate wave gauges that we can deploy because they were much smaller closer in on the shoreline to actually capture waves right at the edge of the lake, and they allow us to actually look at the long term wind data and calibrate it.

13           From this we can then take wind climate and produce a wave climate for it. We take the bathymetry for the entire lake and then we run the ST wave model over it using the wind data that we have established. The only thing I would add is that we had to fill in the blanks for those missing periods of wind data and so we had to synthetically insert some wind data just to make it complete time series of the past ten years

23           This generally shows... This is just one of the results. An ST wave can go around all of the compass directions, in fact, sixteen

compass directions, and we look at them at an entire range of different wind speeds, and then from that we can re-assemble the time series once it is broken out back into a synthetic wave climate for the area.

6            If I can just point out, this is the most extreme condition that we modeled. We are looking at a west wind of 25 meters per second. If you look here you can see that this generates approximately half a meter, so between one and two feet of waves on the east shore of the lake under a 25 meter wind. You go past the wave rows and you can see the maximum wind speeds that we are observing are in the sort of five to ten meter range.

16            So, essentially, what this is telling us is that in the grand scheme of things there is very little wind wave energy on Claytor Lake, except under extreme storm conditions. Now, this is really because the whole system is limited in fetch because it is not particularly very... There are all a very few conditions where you can get a long fetch from southwest wind. When you generally get the dominant westerly wind it is on quieter shore, it is on quieter shore

fetch across the lake.

2                   **LAURA BULLARD:** You saw only a foot to two feet of wave on each shore from that model?

5                   **ALEX BRUNSON:** Yes, and, of course, we measured the waves as well, and under general conditions we are seeing much less than a foot of waves out there. We see there are waves on Claytor Lake and there is a certain amount of shoreline erosion from waves around the lake, and we are leaning towards the fact that much of those waves are generated by boat wakes. We do have obviously from the wave gauge data we can show that in terms of where it was. We essentially split out what proportion of wave energy is from wind waves and what proportion is from boat wakes. We are currently looking into that in a more detailed analysis before we actually present that out to the public.

20                   We deployed a set of gauges called the ADCP's. It stands for acoustic doppler current profilers and these measures, we have done current velocities in terms of the direction of currents and also the magnitude of currents throughout the water column. Essentially, they

set on the bottom of the lake and look up through  
the lake and they take slices every meter through  
the depth of the lake and look at the currents in  
all three directions.

5           We had one ADCP for a month in the  
Spring and the results were unclear for that  
development. There were some technical issues  
with the units. We had four total units. We had  
one ADCP out for an extra month, so we essen-  
tially got five deployments out there this  
Summer, and while this data are a value in them-  
selves, the main reason for having them there was  
that we can calibrate the hydrodynamic sedimen-  
tation model that Mark is going to talk about. I  
will just show you that is what a unit looks like  
and they drop down into the lake and they sit on  
the bottom. They also measure the pressure head  
above the units as well, which, essentially,  
relates to waves.

20           Interestingly for the ADCP's the  
wave data a lot of the time is right on the  
bottom measurement that we took the units.

23           A sample of the data just shows that  
we get variations in May and June in terms of the  
current magnitude. There are also variations in

the direction as well. It is not very easy to visualize that. So here we actually made a little animation of the data. You can't see, but there is a gauge at the nearly upstream end of the lake, and here you get very high currents, essentially, because you have still got a lot of the influence of greater inflow and it is also very shallow here, as well. So velocities are high in the upstream area of the lake, and there we have a unit in the mouth of Peak Creek above where Peak Creek joins and then downstream from Peak Creek. Here the velocities are generally quite a bit lower simply because of the depth of the lake.

15            Then we have a unit down on the west side of the lake near the dam, actually just off shore from the farm, and there you can see that the currents are generally quite low. I can show people the animations on my screen afterwards if you are interested.

21            We also deployed, we also measured some detail temperature data, not that it is particularly relevant in terms of erosion, but we were out there anyway. So we deployed some temperature strings just for cheap thrills I

guess.

2           So in terms of the hydrodynamic  
modeling...

4           JOHN MASSEY-NORTON: This data will  
be provided to the other fishery studies that we  
are filing with...

7           ALEX BRUNSON: Yes. The hydro-  
dynamic modeling is directly relevant to Task  
Three, Four, and Six through Eight. The hydro-  
dynamic model was used as the ADCP data to  
calibrate it. It determines the along shore  
currents around the lake and also determines  
areas of slow flow where we are likely to see  
sedimentation. It is very valuable, especially  
in the area of looking at different scenarios.

16           In terms of the shore, Mark is going  
to actually talk to that. We have some results  
to present from that. In terms of the shoreline  
erosion modeling, essentially, we take a profile  
from an area around the shore that is representa-  
tive of certain sediment conditions on the lake  
and then we input the wave conditions that were  
generated by the ST wave model and over time we  
can see how this shoreline erodes.

25           Again, this is the model in action.

This is not from Claytor. We haven't animated the results of the COSMOS model yet, but, essentially, the same thing happens. You can see that the waves come in from offshore and as they get into the near shore zone the frequency and amplitude of the waves increases. As they are transformed they start to interact with the bed in terms of friction and so forth, so they tend to ramp up together, and then this wave energy is applied at the shoreline and the shoreline recedes over time and there is a certain amount of sand transport down the shoreline as well.

13                    **LAURA BULLARD:**    Do you have a sense already from your study how far the sediment is going into the lake in general in areas where there is erosion occurring? Is it staying near shore or does it tend to be drifting out, or is that too difficult to determine?

19                    **ALEX BRUNSON:**    Just from the approximations in terms of bank erosion and sediment it is not really that far because most of the banks are fairly steep. So I think it is fair to say that most of the material is in the near shore zone. I think Mark looks at the overall pattern of sedimentation essentially

because of the way the studies are split.

2           In terms of shoreline site selection, this is where we are at right now. We have four representative sites selected and we completed the wave modeling and we have extracted, at each of these four sites we have extracted the wave climate generated by the ST wave model.

9           The site selection was generally based on wave climate, wave energy, specific needs, to some extent shoreline geology and also to some extent development issues.

13           So the location is picked and you can see that we have one site at the mouth of Peak Creek and one site opposite of Peak Creek, and then we have a thin site just upstream from the State Park and then we actually have a double site that is down on the old property there where there is some active erosion going on and we have extracted two profiles out here just to make sure the positioning is right in terms of accurately representing them, but they will become one model.

24           So the reason for selecting these sites is a combination of reasons. At this area

there is a large amount of boat traffic, but you have a small fetch. So wind wave energy is quite low, but boat wave energy is quite high. In this particular area you get wind damaging from, essentially, the southwest and you get quite a lot of boat wave energy as well.

7            This area here is actually just inside the web of this cove. So while we are getting some erosion it is pretty much sheltered from all wind energy and in this area which is right on the mouth of Peak Creek is essentially to look at where we are getting influences of the tributary and flow as well.

14           So those are the sites that we have selected. If anybody has any particular thoughts on those, then we will certainly take them into consideration.

18           **MARY RHODES:** Is it time to ask a question about that now? I have a question.

20           **ALEX BRUNSON:** Sure.

21           **MARY RHODES:** You mentioned which way the wind is showing, the way the wind is coming from. All your sites are on the side that the wind is not coming from. Does that... The wind erosion would be on this side because of the

way the wind comes.

2           **ALEX BRUNSON:** Our sites Three and  
Five here is identified here on the east side of  
the lake. If you are talking about this particu-  
lar area here, it is a little more difficult  
because there is quite a lot of shore protection  
down in this area, and, essentially, in terms of  
the longest factor, it is this side here. It is  
just that the wind doesn't blow...

10           **MARY RHODES:** Most of your sites  
are on this side.

12           **ALEX BRUNSON:** Well, part of the  
sites are on the west side and part of the sites  
are on the east side of the channel.

15           **TERESA ROGERS:** You are saying the  
predominant direction is from the west?

17           **ALEX BRUNSON:** From the west, yeah.

18           **TERESA ROGERS:** So Five is...

19           **ALEX BRUNSON:** Five is actually  
quite sheltered.

21           **TERESA ROGERS:** That is on purpose,  
right?

23           **ALEX BRUNSON:** Yes, we get westerly  
wind. This is on purpose simply because the wind  
rate climate is not very high.

1                   **TERESA ROGERS**: These would be kind  
of four different types of...

3                   **ALEX BRUNSON**: Yes, exactly. Here  
is where we actually get the longest fetch. So  
when the wind does blow from this direction you  
will see some wave action.

7                   **LAURA BULLARD**: I am just curious,  
to me an even longer fetch is here. I am curious  
how you selected this versus say something a  
little bit further, a longer fetch?

11                  **ALEX BRUNSON**: To me it seems to me  
that you also get the greatest influence of boat  
wakes here as well. So in terms of the highest  
overall energy it would be that.

15                  **LAURA BULLARD**: That is true.

16                  **ALEX BRUNSON**: This is just a sample  
of what we can expect from the model results.  
Essentially, we take an initial shoreline profile  
and we have the observed shoreline profile. In  
the case of this project we have to estimate the  
historic profile because we don't have historic  
survey data, and then we can essentially  
calibrate the model to predict from the historic  
condition, which is a very conservative estimate  
and to the present condition and to see if we

calibrate, the red line here represents the actual model predictions and the black line is the observed conditions. You can see that we have actually calibrated very closely to the observed condition.

6                   Once we have this then we can use the model to spit out how much of this erosion is due to boat wakes versus wind waves and we can do that by running different wind wave climates and boat wake climates through the model and get an idea of what we see. The observed condition is wind waves plus boat wakes because that is what has happened.

14                   What we can do is create another synthetic wave climate that doesn't include boat wakes and from that we can see how much less erosion we would have predicted from that. So we start to get an idea of the relative roles of wind waves and boat wake erosion on producing shoreline erosion around the lake.

21                   In terms of Tasks Six through Eight, we have certain measures that can be implemented to produce erosion. Obviously, shoreline protection is the main measure here, and we can evaluate the effectiveness of those erosion

control measures around the lake. For example, where the models and the field observations tell us that we have very low energy conditions and there is a small amount of shoreline erosion, why would people go to the expense and trouble of riprapping the whole area and essentially removing a lot of the valuable natural habitat by doing so. So that is the sort of questions we are asking at this stage and that is the sort of recommendations we are looking to make in the study report.

12            Obviously, the annual draw-down is a very contentious issue at the moment and we will be looking at that. We can both run model scenarios to look at the effect of the draw-down and see if that is actually creating any erosion issues around the lake and then we can also review the field work data that is in the literature to see if there is any effects on it.

20            **LAURA BULLARD:**    Laura Bullard. With the draw-down, it seems to me that that allows landowners to get out there where they can do shoreline stabilization. So I guess to me that is more the issue of whether to allow draw-down or not.

1           The issue can be... If you get a storm when the lake is drawn down, then that can exacerbate erosion because generally shore protection is designed at this level, to protect here, which is where the actual erosion is going on and it generally protects this area here. If you draw it down by a meter or two you are suddenly attacking the near shore with wave energy and removing material from the near shore that is otherwise absorbing wave energy. So if you have long draw-down periods you can actually increase erosion on the near shore.

13           **LAURA BULLARD:** Teresa, the draw-down, other than causing more erosion, the other of allowing landowners to have time to work, is that being addressed under the Recreation survey or how are we getting a sense for people's need for draw-down.

19           **TERESA ROGERS:** We are addressing it somewhat through this study. We are also doing impacts of draw-down on the habitat, which is another part of balance. We are seeing the need for people to be able to go out and work. Some of our draw-downs in the past we have gone out and looked to see how many people have actually

gone out and been doing work. We have gotten those from those sites. You can tell if people are removing debris and that type of thing, where they are actually working. So that is some of the balance that we are looking at.

6           The other side of it, too, is it is easier for draw-down, is providing that ease creating... How do you balance the ease with what it is doing with the erosion and what it is doing with the habitat. It is going to be a balance. We will get together and we will be able to decide. We don't want the answer to be the people have just adapted their way of stabilizing the shoreline. It is done through the water side. How you do it up here, you all have a draw-down. So we are going to have to look and balance that, too. That is one of the questions, well, do you have it every year? Can you just plan for every other year? So these are all things that we will talk through in some of our work group meetings and it will probably be through Shoreline Management as a result of all of these studies that we try to figure out stabilization, what we need to do going forward. That is kind of where it is all going to come

together because we are going to know how it impacts the habitat and then sedimentation and erosion, that portion of it, too, and we are just going to have to look and see the extent in the long term.

6                   **LAURA BULLARD:** I know there is balance and I just want to encourage that landowners need to get to the shoreline to do the work is also an important part of that balance and not to be dismissed or not enter into it as well.

12                   **TERESA ROGERS:** Exactly, exactly. It is all going to come together probably in the Shoreline Management part. That is where we putting together the guidelines for activities that are occurring within the project boundaries, that is where we come together to make those type of recommendations.

19                   **LAURA BULLARD:** Right, I apologize for cutting into your time, Alex, but from the issue of ease and doing shoreline protection is it possible to do effective shoreline protection without a draw-down.

24                   **ALEX BRUNSON:** Yes, it is.

25                   **LAURA BULLARD:** And is it more

expenses for the landowner, and, if so, who is going to help with that.

3           **MARK RIEDEL:** There is plenty of time at the end of the day to discuss some of these things as well so we can stay on task with the presentations.

7           **TERESA ROGERS:** Right now there is really no contractors... I think they are starting to become some more contractors that do riprap from the water. Pile driving can be done more easily, but is that really what we want. So we kind of have to figure out what are the best ways of stabilizing the shoreline from not just shoreline stabilization standpoint, but also habitat standpoint, and how do we help that happen. So there are a lot of things that come together.

18           **BILL KITTRELL:** Bill Kittrell. I have seen situations years ago and up until recently and probably miles and miles of Smith Mountain Lake and other reservoirs, speculators of raw land gone out and cut all the riparian vegetation, all the trees down along the shoreline and come back in and put riprap in. Even though the bank was fully stable the way it

was they put riprap in to make it more appealing to landowners to buy because they specialize in what they do, sell land or sell houses. So that brings up the question, two-thirds of Claytor Lake now is classified as natural. When you are mapping that natural shoreline I know the riparian study is going to go in and categorize the vegetation around the shoreline, but did you categorize natural in the categories of woody vegetation, bedrock? I didn't catch that when you were going through your presentation. Did you map the natural, or did you just classify it as natural?

14                    **ALEX BRUNSON:** Well, there are several categories that we do map of the natural. We don't go through vegetation generally in this study. From an erosion point of view it is vegetation or bare, but I think we will tie in all the shoreline habitat and the riparian stuff. So I think all the information is there to make those decisions.

22                    **BILL KITTRELL:** Put all the pieces together and hopefully be able to look at natural, like if you've got a bluff, bedrock bluff, obviously, that is protected natural

versus, you know, unprotected natural which may be just bare land that is eroding away.

3           **ALEX BRUNSON:** Right. In terms of our4s, I mean we classify a bedrock cliff as unprotected.

6           **UNIDENTIFIED SPEAKER:** I think in our7reports we would note that as a bedrock shoreline.

9           **ALEX BRUNSON:** Yes, yes. One of the other things, of course, all the topographic data in1terms of shoreline slopes is very important from that point of view as well, and there is an argu2ment that, well, I think it is maybe something that needs to continue. Well, you don3t want to see a Smith Mountain situation here where the entire shoreline is covered in riprap. So4I think it is important to take this study and the5other studies and look at them objectively and6say, well, how much protected shoreline do we need here. I mean a naturally eroding bank at the7end of somebody's property is not necessarily a big deal if it is not eroding back at a rate of several feet a year.

24           **LAURA BULLARD:** It depends if you are8a property owner. If it is your property

that is eroding then it is a big issue.

2                   **ALEX BRUNSON:** Well, the point I am making is it is the rate of erosion that is the issue rather than the fact that you have a scarp face at the end. If you have a scarp face that is retreating one foot every thousand years, then why would you spend all of that money to destroy the natural shoreline and stop that one foot a year. You know, if you've got a 300 foot lot, it would be around...

11                   **BILL KITTRELL:** And that is where the Shoreline Management issue will come in. If you have trees protecting that shoreline, why remove the trees and implement some other thing that may be worse for aquatic habitat.

16                   **ALEX BRUNSON:** Yes; I mean you want to look at natural settings for shoreline stabilization as well.

19                   **TERESA ROGERS:** We are required to do it in the order of natural and then riprap and then bulkhead. There is a requirement in our license to do that. So we would do the same thing in Shoreline Management.

24                   **LAURA BULLARD:** Quickly, since you said it is more the boat waves than the wind

waves that are causing the erosion. Are you looking when you make your recommendations at the reservoir level, you know, the possibility of dropping the reservoir level when you anticipate high boat traffic?

6                    **ALEX BRUNSON:** Yes, but we don't want to do that. We want to keep it at a level so it is at the design level for the shore protection. We don't want to undermine the existing shoreline.

11                    In terms of deliverables, you see literature review, mapping, model results, field work results, the boat wake predictions, both the management alternatives for reservoir and river erosion and the reports are all going to be produced.

17                    In terms of time line, you can see here actually this is as submitted and it was current as of the end of October. Now we are working on completing the first five objectives and we are hopefully through the final modeling process. Over the next month or so we will be getting into some of the shoreline management issues as well.

25                    With that I would like to turn it

over to Mark because we are running a little behind schedule.

3                    **TERESA ROGERS:** After everybody's presentation we set aside for additional questions and you can go over that mapping.

6                    **MARK RIEDEL:** My name is Mark Riedel. I am senior hydrologist at Baird. I am in charge of the Sedimentation Study. We have actually made a lot of progress since the interim progress report was submitted to FERC and that you folks have probably seen, and we will talk about that.

13                   Here is the general area that we are looking at. The sedimentation study, the reason I am showing the watershed is for the Sedimentation Study we are considering activities that are going on in the entire watershed as well, though technically it is all outside the project boundary.

20                   I will go through project objectives, give you progress status update, tasks completed will have a checkmark on them. Tasks that are remaining are with an open box. I will talk about the deliverables and project reporting.

1 I have a lot of material here. The relicensing relevance statement, this is straight out of the scoping process. Sedimentation impact reservoir and downstream river, have a significant impact on recreational uses, shoreline development and project generation, identification of where sediment accumulation may be most pronounced, will provide information relative to the development of potential control measurements if needed. So this is the relevance statement.

12 The objectives, actually, what I will do is I will talk about the objectives throughout, determine areas of sediment accumulation, also, bathymetric maps and project mapping where available. It turns out that is not available. Determine sediment accumulation rate during the existing and new licensed terms, determine full modification impacts on downstream sediment dynamics, including assessment of how (inaudible), sediment impacts from the dam to the Route 460 bridge in Glen Lyn.

23 Objective Five, identify extent of problems associated with accumulation sediments within the reservoir and downstream of the dam,

including impacts on recreation, fishery, and aesthetics, and hereafter I will refer to that as sedimentation impacts.

4           Six, identify sources of sediment discharging into the reservoir, and, Seven, investigate methods to prevent or reduce reservoir sedimentation impacts.

8           I will note that right now if you look at the presentation that is available on the website, it has changed quite a bit. We have done a lot of work since then.

12           Project status update, there has been no changes in the study objectives. All the tasks are being completed as per the study document with the exception of we have added some methods to have better mapping of sedimentation areas, and the sedimentation study is on schedule to meet the completion date as per the study document.

20           Here is our schedule. We are into November now and we are wrapping things up, finalizing a lot of the modeling. We have actually already started working on the reports. We conducted a comprehensive literature review and data transfer. We pulled in all sorts of

water quality studies from different branches of government, TMDL's, also geology and soil reports, information on faults, bedrock control, that sort of thing, climatic data. We pulled in all of the reservoir management studies in the reports. We have observed data from climatic stations and USGS gauging stations, a plethora of GIS data, a lot of this data we shared with Brady, and then data for discharge, water levels, the bathymetric data, operations data, et cetera.

11           So all those data are being used to satisfy the objectives. Objective One, our complete literature review for that. We have historical storage volume tables from Appalachian. This is the current storage volume curve that was generated using the new mapping from the bathymetric data.

18           When we combine those we can do an analysis and look at how things have changed. We see how storage volume changes as a function of elevation and we can see where that change occurs, whether it is negative or positive, increases or decreases in volume. So a negative change would be a decrease in volume from sedimentation.

1            If we flip the axis we can look at it in a different manner. We see the elevation is down here and the change in storage volume is here, or, excuse me, the storage volume is here and what you can see are these bars for each slice of elevation. So from 1846 to 1850 we have had a little decrease. From 1844 to 1846 we had naturally a little bit of an increase in this area. That is where we have had some sedimentation.

11           Generally speaking, most of the sedimentation has been in the ten to forty foot depth range. That is where you have this bulk of sedimentation occurring, and this is going to be in the areas coming down the New River, Lowmens Ferry Bridge, parts of Peak Creek, et cetera, but then as you get into the body of the reservoir there is sedimentation there as well. It is occurring as a thin veneer, very fine sediments that are depositing in relatively placid waters.

21           Objective Two, determine the areas of sediment accumulation, and we went through a validation process of validating existing data, identified areas where new sources exist, looking at development, construction, also pulling

results from the erosion studies here on the shoreline erosion. Obviously, if you have erosion it is going to lead to sedimentation, and (inaudible) we are working on this right now. We know that it is not evenly distributed. There are going to be hot spots within the project area, et cetera, and that is what we are working on identifying.

9           The estimates from the sub-bottom profiling that Brady mentioned show if you see blue the sub-bottom profiler says there is very little sedimentation, that is where you get out into the main body of the lake. As you grade into green color you get more sedimentation, on the order of two to three feet where you get yellow colors. This is the area in some of the coves, the sub-bottom profiler is estimating little sedimentation. That is either because the boat could not get in there because the water is too shallow. For example, here is a large bar that has been identified previously as actually important in wetland habitat, or in areas where there are excessive deposits of debris and carbon dioxide built in the sediments and you can't get the attrition there. These are the data from the

sub-bottom profiler.

2           Generally speaking, they are quite reliable as you get into the main body of the reservoir, and these were validated with the core data. So where you see the sedimentation going down, Lowmens Ferry Bridge, and into the main reservoir itself. It actually accounts for validation in a sense because we also sent divers down. So all the time that we our ADCP's deployed in eighty foot plus of water we had divers down on the bottom and they would come back and report to us what the bottom looked like, thin veneer, fine silt, fine sediment. It was really cold because a lot of this was done in April and the water was like thirty-six degrees.

16           **TERESA ROGERS:** So the color coding, it was probably really good around Lowmens Ferry Bridge, the dam, and up higher you can't really rely on that color coding, right?

20           **MARK RIEDEL:** Right.

21           **LAURA BULLARD:** But that is accurate up at the top near the dam?

23           **MARK RIEDEL:** Yes, and that does reflect what the divers told us because we did have ADCP's units deployed deeply up there as

well. There was sediment there, but it was fairly thin. The core we actually sampled at the bottom and got a sample and it was also very fine. You can see the sediment has been deposited recently and then you get to what was originally the forest floor before the dam was built and they cleared all the trees, but you can see the old soils that are underneath those thin deposits.

10                    Now, in these areas where we don't have penetration, what we are doing is a process that is called geomorphic mapping. This is where Peak Creek comes in and bathymetric mapping was such high quality you can see all of those that existed before the dam was built. You can see foundations in some cases. You can clearly see the bottom of the old Peaks Creek channel. You can clearly see both islands from the photographs. Those islands were there, and you can see the old river channel. This area of the channel is eighty to ninety feet deep. You can see the terraces.

23                    What we do is we look at these features and we determine where you can still see original features that are not obscured by

sediment, and if you can still see them then you know that they can't be more than half a foot to a foot of sediment, otherwise the feature would be obstructed, it would be buried.

5                   So what we do is we go in these areas and different elevations we map where the sediments are, where they are occurring, what sediment will be exposed, and we also map a synopsis for the below water level, extent of sediment based on the features that we can see on the bottoms of the lake.

12                   It is a little difficult to see, but this white area represents land from 1846 to 1850, from that upper pool to the project boundary. Then our next color, it is hard to tell, there is actually green in there which is from 1844 to 1846 and then this yellow color goes to the historic low of 1837 point... I forget what the exact number is, but 1837 feet is the low period of record from the last twenty years of recent record.

22                   These are areas that will be exposed if the lake were at that level, and then, again, anything that is encompassed by these red lines, it is difficult to see here, I can show on this

screen much clearer, anything that is encompassed by these red lines, that represents the extent of the sub-bottom deposits of sediment that we observed.

5           Objective Three, determine sediment accumulation rate during existing and new license terms and this is where we start getting some of the hydrodynamic modeling. We looked at changes in the storage volume curves. We are looking at an upland version of sedimentation in Objective Six and the modeling reservoir sedimentation I will talk more fully about that in Objective Five. Basically, we have gotten through all those tasks all the way up to current conditions and now we are working on looking into future scenarios, how we would expect things to change over the next license term.

18           Currently, this is our working estimate right now at this time, but currently the average long term rate is 330 acre feet per year. It may not be that in any given year, but that is the long-term average, and, obviously, that is going to be a function of land activities, storms, all sorts of things affect that.

1            This is equivalent to .9 inches per year if you average that over the entire years of service, and this number is actually very consistent with numbers that we find with similar reservoirs that do hydro power operations in the southern Appalachians, .9 inches per year.

7            For future license term we are looking at alternative land cover in developed areas and also alternative climatic settings. The sedimentation model, we actually took the bathymetric model and broke it into a series of grids, basically, took the lake and broke it into a series of little, bitty blocks and on each of these little blocks we tracked how water moves and how anything within the water that the water is carrying along how that moves. It is a huge model. It is a full three-dimensional model. So it covers the entire lake, but also the entire depth, and we used six discrete riffle layers and I will show you some pictures of this to help you visualize what I am talking about.

22           It extends from (inaudible) the main tributary including Peak Creek and small stream, you can see that, full bathymetry across the full water depth.

1            So here is the bathymetric model  
that we used. It is from the data that Brady  
mentioned. We used flexible mesh grid across the  
main project. Here you see it zoomed in going up  
some of the tributaries, both at the State Park,  
again, just across the entire project domain.

7            Right now we are testing the model.  
So none of these results mean anything at this  
point in time because we have to test the model.  
It is calibrated. I am just showing you the  
progress that we are making.

12           Here is an example where we are  
running a steady state condition from November of  
2003 where we had a very large inflow of water  
and sediment from the New River. These are the  
general conditions. This was without wind, just  
looking at what would happen just to see how the  
model performs. You can zoom in on certain  
areas, towards the upper end of the lake, there  
is islands just downstream from Valasonia (sic).  
You can look at areas where you have flow  
conversions and flow convection. You know really  
concentrated hydrologic processes like you do  
here at Lowmens Ferry Bridge where you start  
getting some more complex flow bars going out.

1           The length of these arrows just reference these are currents. These represent the currents. In this case there is just one layer. It is a full three dimensional model, so we have broken it basically into a whole bunch of cubes. You can visualize it that way, filled entirely through ping-pong balls and we tracked every single ping-pong ball in three dimensions, and the length there is just to tell you how fast they move and the direction.

11           Here is a different scenario, the same areas. Here we said what if we have the worse possible event, not only do you have this coming in from the New River, but you have high flows and high loads potentially coming in from Peak Creek, from tributaries, plus you put in a big wind flow, five meters per second. You know from Alex's presentation that is pretty high when you look at actual observed wind speed. So this is the worse case scenario. We are trying to blow the model, will the model handle it.

22           You can see very distinct differences, as we would expect to see. As you go to more extreme conditions, environmental conditions, you see more response to the model.

But based on what we are doing, we run the model and this is an example of the model showing sediment concentration or sediment plumes for the worse case scenario. It doesn't mean anything because we are still in the testing phase, but, basically, what this does is it allows us to track sediment concentrations by particle size. This isn't a total load, this isn't some ambiguous thing, it is by particle size through the entire project.

11            If we zoom in, in this case near Lowmens Ferry Bridge, one thing we need to do is assume this certain particle size, in this case I believe we used the D-50 particle size, which is going to be in silt size and test the model and look at the model, is the model doing things that we are observing on the field. It is a tracer, which in this case these red sediment particles, you can see them being transported. The green areas is where they are depositing them.

21            As you can see, the buttresses from the bridge have a distinct impact on hydrologics and you see that below the bridge. You see that in the sediment in the patterns below the bridge, and as the currents move through the system they

are highly varying, it is a three-dimensional flow. There is a lot of mixing. It is not a highly turbulent mixing, but there is a lot of mixing of different layers when you have these large storm events coming in.

6                    This represents currents at all different levels across the lake, and you can actually see currents overlapping and wrapping across each other and you can see some sediments deeper being transported down this way and these are because the hydrologics of the lake are flowing over and they are going along the shore here.

14                   This is just to show you what we are doing with the modeling right now. Again, we are just into calibration and testing phase, but the final model, what we are going to use this model for is to document these areas where we have expected areas of sedimentation or any future conditions.

21                   Looking at downstream, okay, that is Objective Three...

23                   **BILL KITTRELL:** Have you incorporated discharge into that model as an input into that model or not?

1           **MARK RIEDEL**: It is a boundary  
condition.

3           **BILL KITTRELL**: What?

4           **MATT MCKINNEY**: A boundary  
condition, so, say, from New River to Peak Creek,  
tributaries, we get time series flow data, take  
sediment data, be it sediment from Brady,  
sediment data from a bed, input boundary  
conditions, wind speed, climatic variables, those  
come in, and those set the boundary conditions  
and then the model produces the hydrodynamics and  
tracks all the sheer sediment particles,  
determines if they are not sheer to main the  
particle and suspension of this particular ping-  
pong ball, if you will, and then moves it through  
and then we have the observed water level and  
discharge data and we have the invert elevations  
of the (inaudible) and that provides the  
discharge, so that is the other boundary  
condition, observed operational data for the  
project.

22           So downstream sedimentation impacts,  
we pulled in all sorts of existing data.  
Geologic setting is very important in the  
hydrologic control. It is very important in this

river. We conducted field reconnaissance down to the 2460 Bridge at Glen Lyn, identified hydrologic control, inserted cross-sections, took photographs, conducted channel stability analysis, river multiple assessment, hydrologic analysis as well, looking at sediment transport capacity and competence. That is just how much material can move, what size particles can be moved or may not be deposited throughout these areas.

10            This is a X-ray fractioned geologic map, and you can't see it, but there are red lines all over it. Facing the shoreline this entire region is riddled with faults. It is part of the reason Claytor Lake has the shape it has, but very importantly you see Claytor Lake here and you can see New River coming out where it is feeding the Andrew River or Louisville River, that means it has a flood plain and the river can have some control over its shape and form and the hydrologic properties within in. Every time we hit faults we get bedrock outcrops, Horseshoe Falls. We had Walker Gap. We got to Narrows. These are large sections of the river that have existed in geologic times, for thousands of years, and in these areas you have complete

bedrock control for what the river does and how it behaves and that has impacts, maybe a little bit upstream, but primarily through the reach and downstream as well. You see it as well coming in at the 460 Bridge.

6                   So the very large sections of the river where we expect the river to behave quite differently and quite dramatically (inaudible). That is part of the reason the project was put here was because of the geological controls.

11                   These are all the parent material rock types and so you can see with all these different fault lines there is a vast array of different rock types and out droppings on the New River. So these are the types of things that we took note of and surveyed when we went out and did our field work because for the sedimentation study we are looking at hydrologics, hydrologic control.

20                   This is a fairly course level longitudinal profile of the New River and this is just taken from (inaudible), but it does give us a general picture, and that general picture is this: We get below the New River, generally speaking, we have a fairly consistent grading.

These red dots represent the channel slope in percent on this scale. The little lines are just elevations, but what you see is that there are definite peaks where we have these bedrock controls. We have restrictions on the river. We have things going on that are dramatically changing the hydrologic nature of the river.

8           As we get way up in the Buck stream areas, this is Claytor Dam, here is Buck and Byldesby and Fries, and we see that it has a fairly similar slope, but this general area here, if you look at the slope here, there is a lot of grade change, a lot of elevation change. That is why the dam was put there, to take advantage of that hydrologic potential.

16           What this means is we are in the mountains; this is an area of huge amounts of sediment to deal with naturally, huge amounts of sediment transport. As you get up in the area you change into more of a transport regime. So this is just an example of the type of mapping that we are doing. From the Claytor Dam down we are looking at the hydrologic impacts, sediment transport capacity. Here is the dam right here. The green lines represent cross-sections that are

put in. In this case we have the Little River Dam, just below the Little River Dam. We have survey data. This just happens to be sediment transport capacity. This is the draft; we are still working on it a little bit, but this is what we are generating for these cross-sections down below.

8 Looking at downstream impacts, again, it is really important to not just sit there and look at the river. We need to know what kind of system is going on. Here, you can't see it, there is a huge sediment coming in from the Little River into the New River, and dams prevent sediment from moving downstream and one thing you really see below Claytor Dam is you see from the mountains, from Appalachian Mountains, you see very clean bottom sediments, a lot of gravel, a lot of cobble, embedment is very low low. You don't have these huge burdens of sand and fine sand that are typical in the Appalachian Mountains, but as these tributaries come in they bring in, generally speaking, fairly large loads of sand. You can't see that here, either, but Walker Branch is an area where there is hydrologic control just upstream from it, and

this is a picture of the bottom of the Walker Branch. It is laden with sand, just absolutely laden with sand and then this is a riffle that is nearby just as a reference, you can't see it, but these are the types of things that we are considering. As we move down through the system and more streams coming, what sediments are they bringing into the system, how is that affecting sediment load and sediment transport capacity.

10                    Sedimentation impacts, we have conducted literature review, reservoir sedimentation literature and also various reports and that will be incorporated into the results of the other studies, looking at the potential and effects of sedimentation on the project amenities and that is what we will be really teaming together with other study partners.

18                    Objective Six, identify reservoir sediment sources. There are watershed sources, we have already done our field reconnaissance and looked at the historic and current estimates. We are working on future estimates, looking at redistribution within Claytor Lake. We actually are not done with that; that shouldn't be checked, but we have current and historic from

the sedimentation mapping. The hydro-dynamic modeling is going to be used for forecasting the future, redistribution of sedimentation within the lake, and then, obviously, working with Alex on shoreline erosion to see the contribution from shoreline erosion.

7 I spent a week and drove well over a thousand miles, I lost count. I drove through the entire watershed into North Carolina, pretty much every major city and a number of random spots. We generated a map of the watershed and we did a random sampling across the watershed when we went out, validated landing against our aerial photography. There are a lot of errors in the National Land Type Data Sets and that are very significant. One from the 1992 to the 2001 data, there are a lot of errors, and so we had to correct all of those. There are a lot of land types that are mis-classified, particularly going from 1992 to 2001, as low density residential development. Part of that is all those data sets aren't produced, but they can't be taken at face value.

24 We look at erosion from development, forestry activities, mining activities. Here you

have a bunch of cattle running around in the stream. Also, we looked at areas where things are being done right, where forestry is being done right, where agriculture is being done right, where home development is being done right, and we provide examples of those in our reports. You know, here are some problems, here is how you do it right, and that will be in the report.

10           We looked at all the tributaries and we see tributaries where you have nice clean, coarse sand, gravel, cobble, substrate, and then (inaudible) that has been disturbed by land activities. The channels are completely laden with silt and sediment. This is just a verification of what we are seeing out in the field.

17           I just have this up because we talked about Byllesby and Buck Dam a little bit, Fries Dam, as well, because they are important. We drove along the river. One thing that you can't see in this photo, unfortunately, this is Highway 94 bridge west of Galax, and what you can't see is that the New River is almost totally a sand bedstream. There are a few cobbles poking out here and there, but there is a huge mass of

sediment that moved through this system and it is no surprise. Mountains erode naturally over time, and we also know that there is anywhere from, best estimate, a 70 to 100 year lag in sediment transport of sand materials out of the mountains. So a lot of this stuff that we see moving through the mountains now, we are paying for the sins of our fathers for stuff that was done in the 1900's. It takes a long time for the sediment to get through the system.

11                    So there is a huge sand berm in this region. There is also a lot of agriculture, flood plain agriculture, right along the river, and we move down river and you get to Fries Dam and Fries Dam is totally full of sediment, absolutely totally full of sediment. In fact they are hydrologically dredging on a regular basis, but Fries Dam is basically operated to run on the river. You can see Fries Dam way up there. If you go below Fries Dam, it is still, totally choked with sand and sediment, you know, fine sediment, because Fries Dam is no longer acting as a sediment trap. It is just naturally full, and when the materials are dredged from the dam, I don't know what they do with them, but I

didn't see dump trucks leaving the site.

2                   **TERESA ROGERS:** It is not one of  
ours.

4                   **MARK RIEDEL:** Yes, it is not one of  
theirs. So we move down river to Buck and  
Byllesby Dam, which are operated on the river, as  
well. They are very close together. These dams  
are in our watershed model I will say. We have  
their operations. We have the water levels. We  
have the discharge data. We have pulled all of  
these dams into our watershed model so we can  
track sediment and track through this complexity  
of dams, but, basically, what this shows is even  
at Buck and Byllesby Dam you still have huge  
amounts of sand and material moving through the  
system.

17                   This is an example that I will show  
read quickly. Basically, what you are seeing is  
as different silhouettes go through the system we  
have different gauges that measure precip, the  
coloration from white to blue represents the  
depth of overnight flow run-off, which is going  
to be a surrogate for generating soil erosion,  
and the colors of green and red in the stream  
channels represent sediment concentration. You

can see some pretty interesting things.

2            You can see almost a permanent... By the way, we are still calibrating the model. This is not a calibrated model, but we can clearly see the effects of Buck and Byllesby Dam and the results of this. It gives you a headache if you watch it too long, but this is what the watershed sedimentation modeling does. For all of these little silt watersheds we have broken up the land, we have soils data, we have geology data, we have climatic data across the entire region, and we have run this model for the entire period of the existence of the project, 1939 to present, and then we are using it forecast in the future under different climatic scenarios to determine hot spots of potential sediment, and what those look like is a map like this.

18            This is based on 2001 land cover and this is estimated sediment yield from all the watersheds and they are graded from green to red. Anything that is going to be green, which are pretty hard to see, some of these ones up in here where you are up in the mountains and it is all forest covered, those are typically going to be benchmarks for reference reaches. Your sediment

yield is going to be in the order of less than .002. We have one, two .5 tons per hectare, which is low. That is generally considered to be in more background type of condition. Obviously, when you get up in some of the areas where you have more land streaming activities, more agriculture, get up in the higher lands where you've got a lot of trees you tend to see increases in sediment yield, and this is sediment yield. The model tracks the sediment, leaving the watershed out in the flow through the river network, it's got to go through Buck and Byllesby Dam, which has very little retention because they don't have a large retention capacity, and so the term is, you know, how much is each one of these producing, these sub-watersheds.

17                    Okay, Objective Seven, investigate methods to prevent or reduce sedimentation impacts. We have already reviewed existing measures and methods and these are done at the state level to additional ordinances. We do need to get some additional ordinances I should say at the local level, working with counties. We have already done a little field work on that to see what implementation is, and then identify hot

spots; we have done that for existing conditions. For future scenarios where are we most likely to see development. If it happens where will it most likely occur, and there are a lot of development models out. There are socioeconomic models and they predict what parcels of land are going to have the highest probability of being developed, and they take into account things such as distance to the nearest transportation port, is the land deemed agricultural or forest? It is easiest to convert a agricultural land to a development than it is for forest.

13           What is the market of agriculture products versus forest products? That is going to determine whether a farmer or landowner is going to sell the property. Is it near an existing city that is already experiencing sprawl, that sort of thing. So we can look at future scenarios.

20           Identify protection measures that may be adopted to reduce further sedimentation. So we can look at what is existing and we can say okay, what if we increase it fifty percent, what if we double, something like that, how will that reduce projected sedimentation in the future.

1           Ultimately, we will be simulating  
the effects of watershed soil conservation  
activities on sedimentation. This will include  
both (inaudible) scenarios that I have talked  
about, as well as the climatic settings.

6           We have pretty much got the  
literature review done. Most of our methods and  
data have been summarized. We are in the process  
of finalizing figures for the storage volume  
curves that show sediment accumulation and  
change. That is nearly done. Identifying  
sediment sources and hot spots, and then, also,  
all the figures that show the downstream results,  
look at the hydrologic and sedimentation results  
downstream, narratives, talking about sedimenta-  
tion, downstream effects, methods to reduce  
sedimentation, and then digital data archive,  
which will be probably a couple DVD's full of  
data, model results, figures, the actual report  
itself, field work, field photos, all the photo  
forms, all of our field forms, survey data, all  
that stuff will be archived.

23           I believe with that... This looks  
really pretty on my screen.

25           TERESA ROGERS: These presentations

are on our website right now, too. I will be putting them in the summary report that goes to FERC on the 17th. I apologize, when I set up everything I didn't even think about the amount of flight that was coming in. So these are hard to see sometimes. I will keep that in mind for the next meeting.

8                    **BILL KITTRELL:** I notice in your document it says that road survey on Fries Dam. Did you go up and look at Fields Dam, also, the hydrologic dredging that goes on behind Fields Dam in the North Carolina line?

13                   **MARK RIEDEL:** We didn't go to Fields Dam. We didn't include it in the model basically for the reason that it is so hard to determine that any effect will be negligible and it is not going to show anything significant in our results. Fries, I actually talked with people that operate Fries while I was up there and that was interesting. I was happy to make it our safety. Talking to them about sediment management, but we determined Fries was the most important as far as having significant potential impact on sedimentation.

25                   **BETH OBENSHAIN:** Who operates the

Fries Dam? Beth Obenshain. Who operates the  
Fries Dam?

3           **MARK RIEDEL:** They are actually from  
England. I don't remember the name.

5           **LAURA BULLARD:** That one stream  
that you showed that was moving and showed I  
think the rain events and things like that, it  
looks like the sedimentation went to a certain  
point, the green and then stopped, it kept  
stopping, where was that?

11          **MARK RIEDEL:** You see a marked  
change at the dam.

13          **LAURA BULLARD:** That is where it is,  
okay.

15          **TERESA ROGERS:** Why don't we go  
ahead and break for lunch and we will meet back  
at 12:30.

18

19

20         (Thereupon, the lunch recess was taken.)

21

22

23

24

25          **TERESA ROGERS:** This is Tom Payne

from Thomas R. Payne & Associates. He has been doing the Instream Flow Needs portion of the study with Louis Berger Group.

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**INSTREAM FLOW NEEDS STUDY**

6

7

**TOM PAYNE:** Good afternoon. As Teresa mentioned, I am Tom Payne. I am the Instream Flow specialist on a team with Louis Berger Group, and I am doing a lot of the down river physical habitat modeling. Berger is doing other elements of the study as we get into the details of the presentation.

14

Some of this is going to be a brief review of the type of study that we are doing. I won't go into a lot of detail. If there are other questions about precisely what this model is about, we can get into that if we have enough time either at the end of the talk or later on.

20

The primary objectives, this is a restatement of the meeting we had earlier this year, to create incremental habitat indices. These are the relationships between physical habitat and stream flow. They are created as a result of the hydrologic and habitat modeling

that we will be performing. Part of interpreting those indices is to review the species life history as to when and where we might have different activity, whether it be spawning or fry or adult or juvenile life stages during the course of the year.

7 Part of this is a comparison of the regulated and the unregulated flow regimes to try to determine what the project effects are on aquatic habitat. Obviously, there have been some changes because of the operation of the project, not so much in terms of total timing of flow releases, because this project tends to just be a lot of peaking operations, so there is no real major change between flows during the Summer versus the Winter like there is in a lot of projects.

18 So the comparison of the flow regimes, using the habitat indices and the timing will help you evaluate the effects of project operations on aquatic habitat.

22 Then to relate the release volumes to the reservoir elevations, this is part of what Berger is working on and dealing with draw-downs and withdrawals.

1           Actually, during the course of our field data collection, just re-emphasizing the last point, there is no real way, we found this from several fishermen, there is no real way to know what conditions are going to be like so that you can trigger your fishing trips or your guide when you are running in clients. You don't really know where you should be going on under what flow conditions. So I think this element of the study could be quite useful in the longer run.

12           The primary components, as I mentioned, the physical habitat simulation that calculates the habitat indices, this is our element and then the elevation study of Claytor which impacts on recreation and the dynamic flow routing. This is where you get into what is happening down river. The travel time is very considerable, and we took advantage of that, fortunately, when we were gathering our hydrologic data for the calibration. When there was a flow release up at the dam we could follow that plume down and gather the data many miles downstream when flow conditions at the dam had been changed fairly considerably.

1           Then another element is the water  
temperature modeling. I will touch on primarily  
the physical habitat simulation and on the water  
temperature modeling. We haven't really done any  
modeling yet because we are still in the process  
of gathering all this information.

7           The elements of physical habitat  
simulation are to create a meso habitat map of  
all the different habitat types that are in the  
river over distance with the primary strati of,  
for example, pools and riffles, runs, lateral  
riffles, shoals, cascades, and then from that  
data base you pick study areas, study sites, and  
you have cross-sectional transects at many areas  
down through the river where you are going to be  
gathering your hydrologic data to do your habitat  
modeling.

18           So we have done the habitat mapping.  
We have done the transect selection, and we have  
done the intermediate stages of the hydrologic  
data collection. Big surprise, we are still  
waiting for our high flow data because we haven't  
had any. I was really hoping that this would  
have been completed by now. We were lucky to get  
what we got. We have a low flow and we have a

middle flow, and I will discuss this in a little bit more detail.

3           So we haven't gotten into any computer calibration. The habitat suitability criteria is the physical conditions that the fish use, the depths and the velocities and substrate and cover. There are criteria for each one of those conditions for each life stage, and they are linked back to the hydrologic to create the habitat indices.

11           This is one thing that we can actively work on in the meantime and I have a slide to kind of say where we are on that and then I have some other ideas to discuss. We will probably go back to a work group meeting where we get into some of the real details.

17           The linking of the habitat suitability criteria with the hydrologics give you this habitat index, which is more commonly known as WUA, Weighted Useable Area. More accurately it is a physical habitat index. It doesn't really have an area component to it, and so another name is PHI.

24           Then that is linked with the regulated and unregulated hydrology to try to

interpret the results.

2           The way things are interpreted are guided by the operations, potential effects on species, life stages, management priorities, you know any interests of the parties involved, the stakeholders.

7           As Teresa mentioned, we have extended now in consultation with West Virginia. The original study site ended at Glen Lyn, the study reach, in the belief that that was the upper extent of the influence of Blue Stone Lake, and it turns out that that was merely the Corps of Engineers description of the boundary, it wasn't the actual boundary, and so it is many more miles downstream, and so we have extended the study site, study reach, and added study sites down to Indian Creek in West Virginia.

18           So, as I mentioned, this are the meso habitat type strata. There were definitions that were sent out and circulated and commented on and those are the ones that we ended up using when we did the habitat typing.

23           We have a data base with GPS weight points that can be useful for anyone that wants to look at it for other purposes, but I think the

sediment transport studies have been done and they have different standards for developing study sites, primarily looking at hydrologic controls, may deposition, transport reaches.

5           For physical habitat we are trying to really model what is out there, all the fish we use. There is some overlap, but not entirely.

8           The habitat types have been measured by the different strata, by the distance, and this becomes the data base for the transect selection.

12           This is a frequency plot of what we found in the two reaches. We originally started with the Virginia side of things and when we were evaluating whether to extend the site physically or to use the data from upstream to represent the downstream, we habitat mapped the downstream in West Virginia, this is from Glen Lyn pretty much all the way down to Bull Falls, and the proportions are actually quite similar. So, initially, there was some discussion of whether we would physically have to have more representation down there. For a combination of factors it was discussed that we would add representation down there with an additional site and additional

transects. So that is what we have right now.

2           The process of selecting transects, we wanted to do a reach stratification because there are tributaries that are coming in. There are some transverse ridges that go through that create some physical changes. So from a combination of factors we didn't divide it into specific delineated reaches yet, but we did distribute all of our study sites down through the reach. So it wasn't just a pure random process whereby your study sites can just accidentally wind up maybe all clustered in one area. We did distribute them down through the entire study reach, and then within that geographical distribution then we looked at individual habitat features and then did a stratified random selection, and we looked at the least common meso habitat type as our random selector. So within different segments we looked for depending on what was least available just whether it was, say, a riffle, we would enumerate all the riffles and then randomly select a riffle and then go and if all other conditions were suitable that would be where the cluster of transects would be.

25           Then for the other meso habitat

types we would then put down an association with the one that was least available.

3           Then ultimately you wind up selecting a total number of transects that is proportional to the abundance of each of your habitat strata. So if you have more pools, you have more pool transects.

8           So that was the process that we went through and we circulated a report on this information and then scheduled a site selection visit with anyone that chose to participate, and it was primarily the fishery agencies that did participate, and so we went out, looked at where we proposed to do the transects and did a review and then placed individual transects with agreement of the participants.

17           We were playing with the projector and I think you can see this a little bit better. You probably can't read this, but by the general shape, this is down below where Claytor Dam is and winding down through Radford, we had a study site at Radford, got a little further and had another study site at Whitethorn, coming down a little further to Burton and to Eggleston, in the region of the transverse mountain ridges.

Proceeding further down at a further site at Ripplemead and down just above Glen Lyn we have a study site at Rich Creek, and then we extended down into West Virginia and from Glen Lynn here to Bull Falls. We have another site at Shanklins Ferry.

7           We were a little bit fortunate with that because when we went there it did appear to the participants it was representative and that was fortunate because that is about the only place you can actually get into the river in this section. You always try to do a combination of access and representativeness. You don't want to just go where you can go. In this case we didn't have a whole lot of choice, but that seemed to work out fairly well.

17           The effective end of the region, we really kind of stopped as far as our distance computations at Indian Creek because the area between Indian Creek and Bull Fall, which, what did we figure, is three miles or so, that is intermittently affected by the elevation of Blue Stone Lake. So when you try to do a hydrologic model and you have a backwater effect it gets extremely complicated to try to incorporate that.

It is like trying to do a model in a tidal estuary where your controls are changing, and that is... The effect of your releases are overwhelmed by your back water, whether it is tiddling up and draining down. So that is effectively for our hydrologic modeling purposes the end of our study reach and the beginning of Blue Stone Lake.

9           A little bit more detail, I won't go through this too much, but at each of our study sites we have at least four or five cross-sections and in some of the sites we included islands. We tried to include islands roughly in proportion with their percentage throughout the entire reach. So not at every site do we have islands, but we do have in quite a few.

17           You probably can't read this, but in Radford we had a slow riffle transect, a run, a deep pool, a regular pool, and a glide. So we represented the five predominant habitat types. There are some minor types that we did not represent because they were such a small percentage of the total distance and they didn't appear to have any really unique habitat characteristics that would warrant discussion.

1                   **UNIDENTIFIED SPEAKER:** Is it  
upstream of the sewage out fall?

3                   **TOM PAYNE:** Yes, they are all  
upstream. This is where the sewage out fall is  
right here.

6                   **UNIDENTIFIED SPEAKER:** That is a pump  
station. That is the old sewage...

8                   **UNIDENTIFIED SPEAKER:** Right. I was  
wondering if there was any fact of chlorine.

10                  **TOM PAYNE:** I didn't personally  
gather this data, so there are some minor things  
or major things that I might not be able to  
discuss in detail. I know there is a lot of  
concern and I understand particularly with the  
mussels that there are point source outflow  
discharges that might be related to the mussels.  
We are dealing here primarily not with water  
quality but with the total water quantity and its  
effects on the depths and the velocities and  
substrates, but that is an element that very  
definitely needs to be considered in all the  
interpretations of the output. Where is the new  
outfall along here there?

24                  **UNIDENTIFIED SPEAKER:** That is fine.

25                  **TOM PAYNE:** This is the correct one?

1           **UNIDENTIFIED SPEAKER:** Yes.

2           **TOM PAYNE:** Okay.

3           **UNIDENTIFIED SPEAKER:** It may be  
above and so it is not an impact, but I would  
think any fish moving upstream might have an  
impact on that.

7           **TOM PAYNE:** They could be. These  
models that we are doing are more an occupation-  
al, a habitat occupation type of study, and like  
if the fish is in a certain location and then the  
discharges change, what does it do to the depths  
and velocity ranges.

13          **UNIDENTIFIED SPEAKER:** This is not my  
bailiwick. I just used to fish that piece of  
river and there was a big dead spot in there  
below the sewage treatment plant because of the  
pouring and I just want to make sure you were not  
in the middle of it.

19          **TOM PAYNE:** Well, if we were in the  
middle of it as far as our purposes it wouldn't  
matter. It does definitely matter, and I am glad  
you are asking the question, because, you know, a  
lot of these studies can be quite mystifying and  
obscure and it is always helpful to have the  
discussion about it.

1           **BILL KITTRELL:**    These transects are  
representative of physical habitats throughout  
the entire river so a site specific impact like  
that wouldn't really have an effect on what we  
are doing here.

6           **TOM PAYNE:**    Right.

7           **UNIDENTIFIED SPEAKER:** I thought  
these sites were going to be used for collecting  
more data than just impacts to habitat.

10          **TOM PAYNE:**    No; like Bill mentioned,  
there are physical representations of the  
potential habitat that is out there.

13          **UNIDENTIFIED SPEAKER:** Like I said, I  
am talking way out of school here.

15          **TOM PAYNE:**    The Berton site, this  
one at White Thorne, I won't spend a lot of time on  
these. If anybody wants to read this, where the  
actual transects are located and the habitat  
types that they are, I can come back to them. We  
had a very cooperative relationship with the  
ammunitions folks. They don't look kindly on  
people jumping off with all sorts of gear next to  
their electric fences or whatever is there. They  
were very cooperative. I think I had some  
contact from Baird about getting into there. If

you need any phone numbers of the guy to talk to, I've got that.

3                   Down at Berton, this is getting into the 4.. I don't know whether... It would be interesting to talk to the sediment transport people and geologic people as to why the river is so wide down in this area. It seems like when you are going into these transverse ridges that it would get much narrower, but this is actually one of the widest parts of the river, and I don't have a good explanation for that, but, anyway, what we did by putting a study site here was to gather data on the wider range of the potential available habitat that is out there in addition to the narrower ranges. So we have been covering the spread of what might be available for the fish in the reach.

18                   A little further down, right near Eggleston, a glide, full riffle run, pool, and a deep pool. That right there was in that scour bend right there, so it was actually quite narrow but it was extremely deep. I think the deepest that we found in the whole area, we went down through the whole reach with a depth finder as we were doing the characterizations, and I think we

found one spot that was like 84 feet deep, that is pretty serious.

3           We just finished doing a study on the Roanoke and the Smith Mountain. I think the deepest we found down there was like fourteen feet. It is different geologies, different histories.

8           Down at Ripplemead, a slow riffle, run, pool, glide, another pool. Down at Rich Creek, pool, glide, another pool, slow riffle run, a little island cluster that we've got there at Rich Creek, and then down at Shanklins Ferry a glide, riffle, run, and a pool.

14           So altogether, this is what we had as far as the representation.

16           **UNIDENTIFIED SPEAKER:** One quick question before you start on that. Here in this report you talk about a process of profiling and substrate and cover coding. Would you explain what you mean?

21           **TOM PAYNE:** I will. I will be discussing that as far as the data that we have collected, yes.

24           So here we have meso habitat types that were included in the modeling, the number of

transects that we have in each of those types, the number of those types that actually cross islands and then what percentages of the total reach that is of these five major types, and then, basically, dividing the representation by the number of transects and then you can see what the weight per cross-section is and they are all under five percent.

9           When you are doing this type of study, it is generally a pretty bad idea to have any one transect representing a very large area. It is better to divide it down so that you won't have all your eggs in one basket, so to speak.

14           Originally studies of this type back in the eighties were done with seven or ten transects, and in that case if you had one transect that was different from a lot of the others you could wind up having it dominate your results. So over time as these studies developed more transects generally became more acceptable for a more robust study.

22           So we have on the high end of transects in this study and we are well below five percent representation on each individual transect, and along each cross-section we will be

using the acoustic doppler data collector and we can have in the range of probably two hundred, maybe three hundred depth and velocity sample points as we go across the river. So this gives us a really large robust data set to work with, to be able to simulate the habitat indices.

7                    **BILL KITTRELL:** Obviously, those transects cover the majority of habitat types. What about your riffle, lateral riffle, SA situations that aren't represented in transects, how do you factor that in or do you?

12                   **TOM PAYNE:** I don't.

13                   **BILL KITTRELL:** You just exclude them because of the...

15                   **TOM PAYNE:** We exclude them for a couple reasons. One is based on biology and that there are not that many species that might exclusively utilize those higher radiant, high energy type habitats. There are hydrologic problems trying to put transects and do some modeling in those types of areas where they can get extremely complex with differential water surface elevations.

24                   One of the toughest areas that we were trying to look at that we managed to get

around was, going back up to the Berton area, if you went right up here and put in transects there is about a thirty degree angle, there are loft ridges of about a thirty degree angle, and so if you try to put a transect across there, which is generally perpendicular to the flow, you would go over a sharp ridge at a different water surface elevation, and so to try to model that really gives you some physical problems.

10           We were fortunately able to get right in close proximity to similar areas like that without having... So we did get the higher velocities and velocity shoots without actually jumping over a rock ledge. So there are physical limitations and there is generally the biological limitations and then there is also the low frequency of occurrence issues. It is fairly common to exclude rare habitat types in these circumstances.

20           Now, there are other areas, of course, where those types are highly abundant and then you have to get into issues like maybe doing some two dimensional modeling or some much more complex types of habitat modeling. If you want to think about that some more, we did propose it

earlier this year that we wouldn't be doing that.  
I don't know what to say.

3           **RICHARD ROTH:** Tom, I have sort of  
a related question. I was sort of thinking  
about this on the way over. It is just sort of a  
fantasy of developing, you know, weighted useable  
areas and so on for kyackers, for example,  
considering it as a species.

9           **TOM PAYNE:** Can be done, has been  
done.

11          **RICHARD ROTH:** Has been done, that  
was one question.

13          **TOM PAYNE:** Whether it means  
anything or not is another question.

15          **RICHARD ROTH:** Well, that particular  
species really likes that fall that you didn't  
want to include because it is too difficult.

18          **TOM PAYNE:** There is a lot of tubers  
in there, too.

20          **RICHARD ROTH:** Yes, right, that is a  
different species. I mean as far as relating the  
recreational study to the flow needs which at  
some point theoretically we are going to do, how  
do we get at that? I mean, obviously... Well, I  
don't know if it is obvious or not. Modeling

probably isn't the way to do that, but how do we do that? I guess just ask the boaters satisfaction levels.

4                    **TOM PAYNE:** Generally, it works very differently, generally by a survey, and you will have survey forms and you will do interviews. Jot Splenda of Berger I think is going to be talking about that this afternoon and you can ask him specifically about that.

10                    Generally, that is more of a subjective call because it really depends on the experience of the kayaker and what they are preferring and whether they can be there on weekdays or weekends. It generally is not compatible with this type of physical habitat modeling because their criteria generally doesn't really match up that well. So I will punt that one.

19                    Okay, so we started the process of the hydrologic data collection after we selected all of the cross-sections. We were using the standard one dimensional velocity patterns predominantly. We do have some potential to do some two dimensional modeling, but primarily around the islands to determine what the flow

splits are at different discharges. This gets pretty complicated to try to model. If you are trying to model a wide flow range there will be some side channels that will become dry at certain flows, and as the water increases you will get more and more of a percentage of total flow into the side channel, and it is often not really linear, like it won't be like fifty percent in each channel all the time.

10           So we are gathering data at three different flows. We will go over the flow splits at those different flows, but when you are trying to project then it becomes questionable as to whether what you saw there at that time will be persistent, and so we do have some two dimensional capabilities that we are incorporating into this data collection effort.

18           Our target was to get three stage discharge pairs to calibrate the hydrologic rating curves and then one full set of velocities that would then be used to simulate habitat over the range of flows.

23           I thought it was interesting that they were using the ADCP technology out on the lake to look up and see velocity patterns and

wave heights and such because that was the original purpose, well one of the original purposes of the acoustic doppler current technology. It was actually developed in San Diego to look at sewage out falls in the ocean, but anyway, for habitat purposes we take them and point them down and then move them across the river and by doing that you can get the depths and velocity patterns all the way across a river and get a very high rate of data collection with relatively little effort, much different than the way these things used to be done. You had to be out there with a bom or weight, you know, go across on a cable. Thank goodness for technology.

16 Edges and shallows with just a Price AA17 a rotating cup meter like an anemometer. Target flows were originally to be one thousand, twenty-five hundred, and five thousand CFS, which would then give us an extrapolation range of about forty percent of the low and two hundred and fifty percent of the high just as a general rule. It doesn't always work that way. Sometimes you can't go that high, sometimes you can reasonably go beyond that. So that was our

target. We were able to get the thousand. We didn't twenty-five hundred at the dam. We wound up getting two thousand at the dam, but with the accretion at the time we did get higher flows down below. So I am pretty satisfied with what we got here. The five thousand is going to bear some further discussion, and I will talk about this as I go a little bit further.

9                    **RICHARD ROTH:** Can I ask you a question? I guess I am thinking in terms of flow duration terms. What does five thousand come to in terms of percent exceedence? I mean is that why those were chosen?

14                    **TOM PAYNE:** Why those were chosen is so we could cover a very good portion of the total hydro graph. Generally, the target is to try to get up to around the eighty or ninety, the ten or twenty percent flow exceedence where a very small percentage of the time you are ever going to have flows higher than that. I don't remember off the top of my head what percentage twelve thousand, five hundred is, but it is up there pretty good.

24                    **RICHARD ROTH:** But five thousand isn't.

1           **TOM PAYNE:** No; five thousand itself is actually fairly rare. It seems that the flow duration curves are really pretty stable. It is only when you really get some very intense tropical storms or some very intense thunderstorm activity that you get a short duration high intensity flows. So this range is the predominant flows in the New River, and when you get up to the extrapolation limits then you are covering a great majority of the common flows. Is there a flow duration curve in the pad?

12           **MARK RIEDEL:** It is the same type of numbers we are working with.

14           **TOM PAYNE:** Okay, so far what we have managed to collect have been two staged discharge pairs. We have the target flow as I mentioned at a thousand and twenty-five hundred CFS. We have gotten both of those and we have River Two-D data sites where we have them selected at the higher flow and we will be gathering some more information there.

22           We have done the stream bank bottom profiles, which means that if you want to be able to extrapolate upwards you better know what the stream banks are like if you are extrapolating

upwards and so we used differential surveying techniques and tied into a benchmark, and so we then did march up front with water up the banks so that we can continue the higher model flows.

5           So in all of our transects we have been able to do the outer water profiles. We don't have it in a lot of our transects yet because we will be linking that with our ADCP data to get all the in-water bottom profiles. So everything we need to do for the modeling except for what is in the water we already have that, and we have done the substrate and cover coding according to the proposed coding methods that was in the original study plan, and so all the way across all of our transects we have a description of the particle size, the substrate type and then also the presence and absence of cover elements and aquatic vegetation.

19           So we did map out the areas of (inaudible), we did the water bottoms, and even in some cases there was some more filamentous algae or even something that looked like kelp and we couldn't really tell what that was, but we described that. So we know all the physical characteristics that go into the habitat modeling

of all of our transects. Some things we might not have criteria for. There are some more things to discuss that we can kind of approach here generally and then maybe get into more detail if we have time or very definitely once we get into a work group.

7            These are the flows that we managed to acquire. Up near Radford we got just about a thousand CFS and this is the average of all of our transects. Like I said, the reality, does a strange wave intervene and what are the ways that it intervenes. I was trying to get the dam operators in trouble because I was look at the Radford gauge and it would be steady for awhile and all of a sudden it would go up 400 CFS. I would go what in the world is going on.

17            After a little investigation it turned out that the City of Radford has a little hydro plant sitting there in the Little River and when their inflows are less than 400 CFS they fill the reservoir and then they drain it at 400, they fill their reservoir and they drain it at 400. It is absolutely beyond AEP's control and also it turned out to be beyond their control. They couldn't do anything about it. The only

thing that they could do would be to open the gates and just let it be run in the river, which they weren't about to do no matter how nicely I asked them. So we had to deal with that.

5           Fortunately, that pulse would attenuate as it went down the river and because we used the ADCP we were able to get instantaneous measurements or nearly instantaneous, so when those pulses were coming through we were still able to get an accurate discharge. So while these are the means, they do vary around that, but that is not an issue for the hydrologic modeling fortunately.

14           So we do have the thousand CFS to fifteen hundred down into the Shanklins Ferry site down in West Virginia and we have 2180 down to about 2500 down at the lower end.

18           So this is good data; it is a nice range. It is almost a full log cycle between the two so we will be able to get good spacing on our stage discharge pairs. The question is what do we do next and I want to talk about that some more.

24           I should have moved this until later. I want to come back to this particular

one. As far as the other study elements, this is what Louis Berger has been working on. They have started organizing data to do the hydrologic analysis and to do an IHA evaluation. The IHA is a method developed by the Nature Conservancy that does a statistical analysis of how the hydrology of the system has been altered, whether it be over the course of a year, which doesn't really happen here, like whatever comes in in January goes out in January, and so on, but the natural flow also doesn't fluctuate the way the peaking operations do, and so the rate of rise and fall on the hydro graph will come out in the analysis for the indicator hydrologic alteration, and then all the people involved and the biologists will have to try to figure out what that means, whether it means anything or if you have to do anything about it or not. So that is in the process of developing data.

20                    Reservoir elevation information is being collected, evaluating the relationship to operational factors, power generation, flow releases. There is also constraints that have been developed with Virginia Game and Inland Fish that protect small mouth bass spawning. There

are some existing restraints on river flow fluctuations at different times of the year. That also has downstream influences that are currently controlled and will be no doubt discussed further once we get some more results back from the habitat modeling.

7 Berger is now also working on the dynamic flow modeling and how we get flow information out to the public. To date there is not really anything as far as a result, but this is actively being worked on by the Berger Group.

12 The downstream water temperature monitoring, this was added on from the original study plan because the water quality that was proposed to be collected was not sufficient intensity to be able to do an actual model. This is primarily in relation to the mussels and the point sources of pollution. So this component was expanded and additional locations for putting in thermo graphs were identified and the thermo graphs were actually deployed.

22 In May of this year there were sixteen continuous water temperature monitors installed along with three air temperature and relative humidity monitors to be able to then

know what the air temperature is and the humidity because those are very critical components to be able to simulate what the water temperature is going to be in relation to the discharge.

5           The purpose is to be able to say if you are releasing X amount of water what happens to that water as it goes down river and at what rate does it warm in relation to the physical conditions.

10           I don't know how well you can see this but those sixteen monitors were located here at the dam, down Route 114 Bridge, at White Thorne, Big Falls, Eggleston, Ripplemead, one put into Walker Creek, the lower confluence, and then down at Wolf Creek and down at Glen Lyn. Teresa, you mentioned that the water quality was extending into West Virginia.

18           **TERESA ROGERS:** Not the water quality.

20           **TOM PAYNE:** Not the water quality, okay.

22           **TERESA ROGERS:** Just the transects. Oh, you mean the period of time reflecting the water quality data?

25           **TOM PAYNE:** No, thermo graphs

actually put in to monitor.

2                   **TERESA ROGERS:** No.

3                   **TOM PAYNE:** Okay. This could be  
extended further down, but by the time you start  
getting down this far, which is for 52 miles I  
believe, you start reaching equilibrium of your  
weather conditions, and so unless you are at very  
high volumes of releases then what is released  
then becomes equilibrium with the local  
meteorology.

11                   With this validation noted right  
here, if West Virginia wanted the information,  
that could be projected down to Indian Creek.  
You wouldn't have validation down there, but you  
would have the model. So I don't know at what  
point that will be addressed. We may want to  
have further discussion about that, but with the  
data that we have we would be capable of modeling  
down to Indian Creek.

20                   **UNIDENTIFIED SPEAKER:** Is that  
temperature gauge above the out fall for the  
power plant?

23                   **TOM PAYNE:** Generally, no. It takes  
a very large amount of water at a temperature  
that is different than the main river to be able

to change it very much. There aren't any real major tributaries... Well, we do have Little River, above and below Little River, that was big enough to warrant monitoring. Walker Creek and Wolfe Creek very definitely, but if there is a thousand CFS coming into the river or coming down the river and there is twenty CFS in a sewage out fall, that is noise level.

9                    **UNIDENTIFIED SPEAKER:** No, I am talking about the power plant.

11                   **TOM PAYNE:** Oh, the power plant, you mean the power plant at Glen Lyn?

13                   **JON MAGALSKI:** You wouldn't be able to monitor it.

15                   **TOM PAYNE:** What is the volume of water that is discharged out of that?

17                   **JON MAGALSKI:** It is a fair amount, a fair amount of water.

19                   **TOM PAYNE:** We will find out because if we don't account for it, then our models won't match the predicted, and that is one of things, it will come and say right here you can't match that. Why not, and then you start looking for things like that.

25                   This is a really wide river as a

rule, so it doesn't get much topographic shading and it doesn't get much riparian shading. So the interaction with the air is going to be very considerable, and so it may be that that is coming and is changing things, but there is really nothing you can do about it because of the dam, but it will stand out as far as being able to see whether there is something that is not matching.

10                    **UNIDENTIFIED SPEAKER:** It really depends on where your monitor is. If it is on the north bank you are not going to catch it because the flow is going to be on the south end.

14                    **TOM PAYNE:** And that is true, which is why ordinarily when you have a known tributary coming in you will have one above, one in the tributary and then one below, but when you have this plume, when that plume comes in it could actually stay along the bank for many miles.

20                    **UNIDENTIFIED SPEAKER:** You can see from the air.

22                    **TOM PAYNE:** These models are, you know, average across the entire width. So if you are really concerned about that you have to use a totally different model and a very different

approach. Maybe when they come up for re-licensing then you can hit them up for it.

3           This is an example of the data that is being collected at different locations just as an example for the month of September. You can see that there are little fluctuations exhibited at different sites. The dark line here is at Claytor. So that fluctuation is probably a result of maybe where the water is coming from out of the lake. I am just guessing here, because ordinarily that flows to the dam and you would get more of a constant temperature. It may be far enough down that there is some weather influence there, but as you get further down New River at Eggleston and all the way down... See, this is Walker Creek. So Walker Creek tends to come in a lot colder than the New River itself. So that would be an influx in cooling the main river, depending on the volume.

20           This is the New River at Glen Lyn which I think is the small solid line there. It is really hard to see, but in some cases it is warmer by a couple degrees. In other cases it is colder because the weather then will cool the water that is coming out of Claytor and in other

cases it will warm it. So this is what will be modeled, based on what is coming out at different points down the river you will have a model result that should match the observed.

5           **RICHARD ROTH:** Tom, did you build a lag time? Does that take into account the lag time? It looks like it does.

8           **TOM PAYNE:** Travel time is very definitely one of the factors and this is raw data, and so...

11           **RICHARD ROTH:** So you would expect them to be offset.

13           **TOM PAYNE:** We expect them to be offset, yes. It is really hard to see how much that is offset. Like I said, this is just an example and you might have to see how it models and it may be possible that it would require that we have to split the model because if the travel time is two days then these are daily time steps and so we would have to divide it and then restart to be able to go further down.

22           Okay, as far as schedule goes, I have some little checkmarks here that we did. We did do the Pre-Study Meeting in January. We looked at the habitat strata and the target flows

in March. We did our habitat mapping May. We did the hydrologic data collection in June and July. I think we actually got into August and we were still doing some substrate cover coating in September. We didn't get the high flow. So that means that we are not doing any modeling analysis in October, in August through October, and we are having a progress meeting, but as to whether we are going to have a preliminary report, it is not going to happen in November, which is why there is a question mark, and we are not going to have any meetings in December to discuss results, either, and I don't know when we are going to have a final report. I don't think it is going to be June. Does anybody know when it is going to rain enough to be able to get enough water? I certainly don't.

18                    **BILL KITTRELL:** Your mapping and your cover coating was done in late Summer into September. The seasonality would play a part in when you need to do high flow measurements, wouldn't it, or not?

23                    **TOM PAYNE:** No, the...

24                    **BILL KITTRELL:** As far as vegetation you know in the transect, as far as, you know,

vegetation cover being present in the transect, does that matter?

3                    **TOM PAYNE:** It does matter and it also matters as to whether you have that in the criteria, and I think that is one of those topics for a more detailed work group meeting, but we can model with or without vegetation and I think we probably should. When we get our velocity patterns it will be at a high enough flow that the vegetation won't affect the velocities. They will be inundated enough and powerful enough to lay it down, but when we the flows are lower we can change the (inaudible) where we know that there is vegetation and then we can slow the water down more than it would be predicted by the model. So we can do it with and without the vegetation being present.

18                    Then we can model the fish habitat with and without the vegetation being present, because when we did our substrate cover coding, we not only coded what the vegetation was and where it was, but what was it was growing at. So we know what the substrate is underneath the vegetation. So we can do it either way, with or without. So there are influences of the

vegetation on the velocity pattern and we can deal with that to whatever extent we really choose to be warranted, and if nothing else we would have to link that back to our suitability criteria, as to whether vegetation is one of the components... I mean, obviously, there are some species, especially fry, younger life stages that readily seek out the vegetation and will use it strongly as cover. So it should be included as far as an element for those life stages when they are present and the vegetation is present. So we are getting down into the weeds, so to speak.

13                    **TERESA ROGERS:** Terry asked a question about the process for coding. Did you cover that?

16                    **UNIDENTIFIED SPEAKER:** I think he just said coding was something that was identified in the proposal. When you are talking about profiling, you are talking about profiling as going down a water's edge and surveying the elevation and habitat outside the water's edge?

22                    **TOM PAYNE:** Yes, yes.

23                    **UNIDENTIFIED SPEAKER:** I understand that now. The way it was written I wasn't sure what you meant by profile.

1           **TOM PAYNE:** Yes. Well, we have  
longitudinal profile with our depth finder and we  
have lateral profile out of the water. We don't  
have all the lateral profiles in the water yet  
because that will come from the ADCP work.

6           The coding system, did you get a  
copy of the coding system?

8           **UNIDENTIFIED SPEAKER:** I have your  
proposal. I will have to go back and look at  
that.

11          **TOM PAYNE:** It is a fairly generic  
system. It has been used quite a lot in Virginia  
and North Carolina. I think it is compatible  
with the suitability with the criteria curves we  
have right now.

16          **UNIDENTIFIED SPEAKER:** Is the purpose  
of the coding to input into the model?

18          **TOM PAYNE:** Yes; it is not the  
hydrologic aspect, but it is the habitat aspect.

20          **TERESA ROGERS:** When you were saying  
we need to have a work group meeting to nail down  
what was that?

23          **TOM PAYNE:** Well, we can discuss it  
here for the next couple of minutes. We need to  
discuss three primary things, what we are going

to do if we don't get a high flow or if we only get an intermediate flow how are we going to deal with that so everybody is not entirely satisfied but at least roughly satisfied that we can proceed without this coming to a crashing halt. There is quite a few things that we can do that way?

8                    We also need to address how we are going to do the seasonality of the habitat modeling, you know, what periods, if that is desirable, whether we include or don't include the aquatic vegetation for certain periods and certain life stages, and then the last thing is the suitability criteria.

15                    I wanted to go back to that, this one. In the near future what we will be do is write up and circulate our initial proposal. This is the species list that was developed in the initial study plans and we went through to find out what was available for all of these species from different sources, and in some cases there are many sources and in some cases there is only maybe one source. We have the list of the species and then in parenthesis we have the life stages for which criteria are available and for

like log bass and small mouth bass we have fry, juvenile, adult and spawning. So we have the four primary life stages. For others we don't have them all. For muskies we only have one. We don't necessarily have big mouth chug, but we have a generic chug. For logperch we only have two life stages, but we did find some criteria for the different mussel species because it is a work that USGS did on Shenandoah. There are macro invertebrates that we can model all three species.

12           The crayfish and the hellbender, there are no criteria as far as I know. They haven't been included in any instream flow studies. Using the depth and the velocity and substrate cover combination that PSM was based on might not be the best way to look at those species. Maybe that is why they haven't been modeled yet or at least that I know about. So those warrant some additional discussion.

21           The last time we talked about riparian vegetation and water willow. I was hesitant because there is no criteria for those, but I think there is another way to address those, and that has to do with the presence/

absence of the riparian species and the water willow in relation to the water level, because we do know where they are located because of our cover coding and we will know where they are in relation to the water depth. So we can cycle through the flows and find out as a function of stage discharge where those species are and where they aren't and try to derive that presence/absence as a function of the operations and maybe the overall flow regime.

11           So by using the staged discharge relationship we can address potential impacts on riparian vegetation and on water level. So whether that is going to be fully satisfactory or not, that is going to bear some additional discussion.

17           So what we will do here is take a proposal and work through that, either by comments or by some additional work group meetings.

21           **UNIDENTIFIED SPEAKER:** Tom, what is the time frame for that proposal and getting those things on that?

24           **TOM PAYNE:** Well, we don't have to have those finalized until we start doing our

computer analysis, and we can't do a computer analysis until we sort out the high flow. So I would say, roughly, from right now we probably four to six months before we are going to actually need these.

6                    **UNIDENTIFIED SPEAKER:** So we are not going to get an E-mail dump in the middle of December?

9                    **TOM PAYNE:** Well, you might, but it wouldn't ask for an answer until January 1st.

11                   **RICHARD ROTH:** This is probably yet another stupid question, probably more for Teresa. You could let out 5,000 CFS, so why don't you do that?

15                   **TERESA ROGERS:** I guess it is because what we would have to let out and the duration of what we would have to let out.

18                   **RICHARD ROTH:** So it would be too much, lower the lake too much?

20                   **TERESA ROGERS:** Exactly.

21                   **TOM PAYNE:** Anybody object to dropping that...

23                   **LAURA BULLARD:** Suits me.

24                   **TOM PAYNE:** That is the problem.

25                   **RICHARD ROTH:** It would take me too

long to do all the transects.

2                   **TOM PAYNE:** That's right. We can probably do about eight transects a day. It gets more complicated around the islands. We would need four or five thousand CFS to persist for probably four days. If we had that then we could probably get all the transects and all the data. By doing it now, of course, the days are short so we don't have the time to take advantage of the daylight.

11                   As I mentioned, we will have to figure out what we are going to do if we can't get 35,000 CFS. You know, maybe we could get 4,000, maybe we could get 3,000. In those cases we can't extrapolate as high. If we don't get anything more, there is even some things we could do with the data that we have right now, and it is obviously not as robust as it would be if we had more data, but I can even do a reasonable analysis on all of this with the data we already have. I wouldn't propose doing that except as a final last ditch, you know, salvage the studies.

23                   **MARK RIEDEL:** Tom, I looked up that flow duration; 5,000 is about 18 percent.

25                   **TOM PAYNE:** It is already at 18 and

that is on the high end. It is always where there is duration that exceeds.

3           **MARK RIEDEL:** The percent I see is about 18 percent or 5,000. Your 2,500 value is about 50 percent, and about 90 percent for your 1,000.

7           **TOM PAYNE:** Yes; so only about twenty percent of the time are flows greater than 5,000. What about the total 50, what does that run?

11          **MARK RIEDEL:** I can't tell from this. I am going to say three percent maybe.

13          **TOM PAYNE:** Okay, so we can cover virtually the entire range of the common flow if we get to 5,000 for our calibration.

16          **BILL KITTRELL:** Just out of curiosity when your folks are profiling the bottom types and doing the cover coating on the transects, how do they describe submerged vegetation in terms of entering it into the cover type. Are there some qualitative or quantitative component to that profile, or is it just a type that is submerged vegetation?

24          **TOM PAYNE:** I would have to go back and look at it. I haven't looked at it specifi-

cally, but ordinarily we describe it as two things, one as the type that it is and then the other is the type of cover that it provides, whether it is over edge cover or instream cover. So the combination of those two should be able to describe whether it is emerged or submerged, but, again, to be able to tell what effect that has on the species you have to have the matching criteria for whether they prefer an emerged or instream or over edge. Those have to match up.

11           **BILL KITTRELL:** I think we have pretty close, you know, some of the vegetation types profiling...

14           **TOM PAYNE:** And they could lay down and not be emerged anymore.

16           **BILL KITTRELL:** Right, be functional cover types for certain species.

18           **TOM PAYNE:** At this point we have the data to model it in many different ways and that is one of those subjects for a more detailed discussion for our targeted work group. You know, we can customize it to match what the needs are

24           **TERESA ROGERS:** I guess what I propose is that we are going to have to do a work

group meeting. We will have a conference call and work on it and then we will follow up with a meeting because this will probably be more than we can just do on a conference call or comments back and forth. In the meantime we will schedule as far as our time line.

7                    **TOM PAYNE:** So we will circulate the initial document for discussion and also provide as many alternatives as we know about and then look to you guys if you have any other ideas that we are not aware of or we have overlooked.

12                   **UNIDENTIFIED SPEAKER:** I know Jot Splenda is looking at recreational uses. One of the requests that we heard early on was a request from the Parks and Recreation Department to have some gauge or whatever, not a gauge, excuse me, a probability indicator. If they wanted to offer a kayaking class in McCoy Falls and they need to be able to time it to coincide with when the water got there, is your study going to give Jot the results he needs to put that predicted model together?

23                   **TOM PAYNE:** My elements of that won't, but Berger's elements will and, in fact, that is one of the... We just discussed that over

lunch because there is three sequences. There is what AEP might do tomorrow based on demand and things like that. That is only moderately known and it also may be there are certain people they don't want to know as to whether they are generated or not. So I don't know how much availability that has, but I think to a reasonable extent you can probably tell what is going to happen tomorrow if it is today, and then you have what they did. That is the second one, that has been released, and so immediately down below the dam you could have a mechanism for saying all right, what is it doing now, and then you also will have a third component which is, all right, that has been released yesterday or the day before. What is going to happen as you go down river all the way into West Virginia because that has already happened yesterday or the day before. So you have those three components, tomorrow, today, and then yesterday or the day before, and I think there is some real value and I think that is one of the elements that will be discussed by Berger about how to make that available to the public. It could be a real time website that is then tied into the,

say, Radford gauge, so somebody could just go to an interactive map and click on something and then you would have a graph of what is going to happen for the next day and a-half or two days. I think that is reasonably cost effective and very doable, but I mean that depends on how that actually works out with all the details that would be required for that.

9                    **UNIDENTIFIED SPEAKER:** Teresa, you are not required to publish on a weekly basis your proposed release data?

12                   **TERESA ROGERS:** Post release?

13                   **UNIDENTIFIED SPEAKER:** Proposed release.

15                   **TERESA ROGERS:** No.

16                   **UNIDENTIFIED SPEAKER:** I have been working on the Philpott 216 Study with the Corps of Engineers and because they have a contract to sell their power to Carolina Power or Duke Energy or somebody, they publish on a weekly basis on their website the times and amounts that they are going to release. Apparently, they are contracted to buy power at certain times. So they publish it on a weekly basis and it is that frequency, apparently the amounts that they

generate is adjusted but...

2           **TERESA ROGERS:** I guess...

3           **BRADY TODD:** They are part of a  
different power consortium and that is why they  
do that. The power consortium that we belong to  
there is a central crew that dictates what AEP  
does and what other utilities that are part of  
that group do and it is like Claytor and Smith  
Mountain and some of our hydroelectric systems  
are on I guess you could say a spot basis. They  
look at the overall grid in their managed area  
and determine where to draw power from. So  
sometimes they don't know except a few hours in  
advance as to what they are going to be asked to  
provide.

16           **UNIDENTIFIED SPEAKER:** I guess that  
is the beauty of a hydro plant, you don't have to  
keep the water level.

19           **BRADY TODD:** If your time is ten to  
fifteen minutes, whereas, you know, it is days or  
weeks with a profiling system.

22           **TERESA ROGERS:** We do recognize that  
people... I get calls all the time. They want to  
know whether or not to even bother coming, and we  
do recognize that and we are trying to work... It

is easier after we have released it to be able to tell you when it is going to come, when and where downstream, but what we are going to do tomorrow may be difficult to work something out. We would be guessing. We are going to try to work through some of those as best we can. It does impact...

7                    **UNIDENTIFIED SPEAKER:** Unless you are planning and scheduling for something like kayaking.

10                   **TERESA ROGERS:** Exactly. Let's go ahead and get to Debris. We will get the power points set up.

13

14

#### **DEBRIS STUDY**

15

16                   **MIKE HREBEN:** Good afternoon. My name is Mike Hreben. I am with Kleinschmidt and I am working on the debris study. I have quite a few slides here. I don't think it will take a lot to go through, but if you have any questions as we go along, by all means shout out and we will do our best to answer. There is a photo. I see with the glare it is difficult to see. This is just a cover photo. You see some docks and, obviously, sliding boards for swimming and things

like that, but you can't use this area when that picture was taken because it is all inundated with debris.

4           There were five main objectives of the debris study, fairly straight forward. Determine the amount, the content of debris accumulating on the surface of Claytor Lake, characterize debris types and determine sources for where do they enter the lake. Determine or define what is beneficial debris and what should remain in the lake. Try to determine the relationship between debris and flow, and assess methods or programs for assessing and removing debris.

15           The result of these five objectives could be used to achieve the main goal, which is to develop a debris management plan.

18           The first thing we needed to do, when we say the word debris an image comes to everybody's mind and it might be different. So we tried to define what we mean by debris for this study. Debris, based on our definition here, is natural or manmade material occurring at or below the high water mark within the water body, in this case Claytor Lake and the New River

just upstream from the lake, that was not intentionally placed for a specific purpose or that was intentionally placed but is no longer providing the functions for which it was intended. It can be either secure or stationary.

6           To break this down a little bit, natural or manmade material. Those of you who have spent time on this lake or any lake you have seen everything at some time or another, trees, logs, branches, that would qualify as natural debris. You have also seen tires, barrels, bottles, all types of things that for lack of a better term not really belong there.

14           For this study we put that material that occurred below the high water mark or which would subject to enter into the water as a debris pertinent to this study, and, you know, once it happens there, there by happenstance and it wasn't intentionally placed there for a specific purpose.

21           If it was placed there for a specific purpose, something such as a dock but is no longer serving its intended function or it is free floating, it is no longer where it was intended now it becomes debris and there is a

fair bit of that that occurs in all lakes and Claytor is no exception.

3           We further broke it down to talk about natural debris. Natural debris we define it as debris consisting of naturally occurring biodegradable materials, such as trees, logs, stumps, branches, and while generally that is less noticeable than other organic material such... well, generally less noticeable. Other organic material such as leaves, yard waste, grass clippings, in other words the smaller stuff, and detached aquatic vegetation, they are all components of natural debris. They don't oftentimes cause as much concern as large trees, logs, and things like that that can obstruct people from assessing their docks or they can run into with their boat or they become a problem when they are lodged on their shoreline.

19           Plants that are still plants, including trees that are still growing or in an upright position are not considered debris in terms of what we considered here.

23           By default, any type of debris that is not natural debris can be considered manmade debris. So this will be in a report, but this is

what we felt was a good basis to put down in the report, to get everybody to think along the same lines because depending on your perspective, whether you are a fisherman, a property owner, a water skier, you are going to have different perspectives on what is debris and what could be beneficial debris or non-beneficial debris.

8                   Why are we even concerned about it? Well, boating safety, limitations for one. Areas of high debris loading make boating very difficult. That coupled with, you know, either boating at high speed or recreating such as water skiing, it can cause a danger, aesthetics. You folks have a beautiful lake here and that is why people want to be here. They don't want to look at piles of debris.

17                   Limits to recreation, well, if you have a high concentration of debris in an area you might not be able to recreate in that specific area, like the slide where we showed docks and swimming facilities that were inundated with debris. You couldn't use them at the current time until something was done to either remove the debris or the debris moved out on its own. Pollution, due to manmade materials, as I

have said, everything you can imagine ends up in the debris in the lake, whether it is metal, plastic, unfortunately, probably troweling pods and other residues which are in some of these containers that you see floating in the lake.

6           What is good about debris? What are the benefits of debris? Here I specifically talk about woody debris and we show a photo here of some trees that have fallen down and are providing habitat in the lake. In this case, regardless of water level, these particular trees would still be providing some habitat function over a wide range of water levels.

14           If you are a crappie fisherman or a bass fisherman, you are going to like this kind of debris. Submerged and floating debris increases habitat structure for fish, (inaudible) vertebrates, amphibians, and reptiles. Floating debris probably, if it is free floating, probably doesn't provide as much habitat value as some of the submerged or secured debris.

22           Large mass of debris in flood plain area, they help establish riparian vegetation to stabilize banks from erosion by absorbing wave energy. What I mean by helping to establish

riparian vegetation, and I think Sarah will talk about this a little bit, we see some of this woody debris getting packed in the back of some of these coves where once it is there it becomes fairly secure and it doesn't leave. It remains in those areas and we see a lot of emergent wetland vegetation growing up through there. So it is kind of an evolution process, if you will. Once that gets in there I think it is establishing the right organic matter for those plants to grow and that was fairly common on a number of the smaller coves that we looked at on the lake.

13            Large branching trees such as these provide complex littoral habitat. Like I said, if you are a crappie fisherman, those are the kinds of areas you are probably looking for. Imbedded woody debris, if it is embedded along the shoreline, once again, it acts an energy dissipater. That wave energy can be absorbed by the debris as opposed to the shoreline itself, which would help protect against the erosion.

22            **LAURA BULLARD:**    May I make a comment?

24            **MIKE HREBEN:**    Sure.

25            **LAURA BULLARD:**    I notice that some

of that... I don't know if you consider it embedded woody debris, but when there are logs laying up against a shoreline sometimes you get, at first glance it looks like yes, it is dissipating wave action, but if you look closer and if it is not truly embedded...

7                    **MIKE HREBEN:** So in other words, it in itself is moving into the shoreline?

9                    **LAURA BULLARD:** Well, that or you have a little bit of water back behind there and it still has enough energy to bounce back and forth between that log and the bank, and I have seen increased erosion resulting from that.

14                   **MIKE HREBEN:** I don't know the specific circumstances there, but that log might be absorbing some that the erosion would even be greater if that log wasn't there.

18                   **LAURA BULLARD:** My observation it has been even worse in some cases.

20                   **MIKE HREBEN:** Okay, thank you. Study methods, one of the components of the study requires to conduct some on site surveys and we are going to conduct four on site surveys where we tour all shoreline of the lake, document areas of debris based on their type, amounts, areas of

accumulation, and also have aerial photos to kind of back that up, and the aerial photos were really intended to look at those events where we have water inputs of the great hurricanes.

5           For instance, Hurricane Francis, Ron and I were talking earlier and he was showing me some photos from Hurricane Francis. The debris loading was substantial. Those types of things you can best assess from the air. We didn't have any of those types of events this year. The highest flow we had occurred right at the end of October and I think flow was up around 10,000 CFS; and we mobilized and did one of our surveys at that time and we did not see a whole lot of difference in debris compared to what we had seen in September or late Spring.

17           This is just an example of an aerial photo showing some of the shoreline and what there is is a very small debris accumulation there, and this is, basically, our boat based tour of the shoreline. You can see this dock. This is after that October event. This dock is starting to get inundated with some debris.

24           We have gathered information on the amount of debris from knowledgeable sources,

particularly Friends of Claytor Lake. They have been conducting a debris removal program for a number of years now and they know more about it than anyone. So we have a good sound foundation to go by there. We talked to other lake users about debris and some of that input has been after large events, large storm events is when it readily becomes a problem.

9            Now, obviously, if you have a dock or a piece of shoreline that even small amounts of debris accumulate on a regular basis, then it is a bigger issue for you, but largely what we have been finding out is it appears to be due to very large rain events.

15           Types of debris, talking about man-made debris. Overall, this is a very small part of what we see on the lake. By in large I am going to guess 98 percent of the debris coming into the lake is natural material. If you go either by volume or weight, however you want to look at it, but this small volume of manmade debris, whether it is bottles, styrofoam, toys, barrels, tires, it becomes the most noticeable, the most unaesthetic, if you will.

25           You know, once we are going out

looking at all these debris piles over time you really start looking at what is in there and what really stands out are the bottles and the plastic and the things like that, but they are a small component of it all.

6           One of the things that was particularly surprising, once you really start looking at these piles, how many plastic bottles are like quart oil containers or gallon antifreeze jugs, things like that that have toxins, and there are quite a few of those, and whether they come from outside the watershed or lake users, I couldn't tell you, but there is quite a bit of that material.

15           These photos on the right show some abandoned free floating docks that are also debris. Once again, they had an initial purpose, but they are no longer serving in that function. You can't see it very clearly there, the number of tires, styrofoam type material, things like that.

22           Natural debris, as I said, it is the most abundant type. You could grade it, if you will, by sizes. Small items could be yard clippings, a lot of pruning, trimming of

branches, things like that. That might not be a big deal if you ride around the lake cruising in a pontoon boat, but if you are a water skier even small branches, they don't go very well.

5           Large woody items, root wads, large logs, items like that, they are also part of the debris load. One thing that we did see a fair bit of, a lot of this woody debris has what I will call saw marks. A lot of these debris items have been handled previously by someone, whether they were in their yard or along their shoreline, you can see a lot of these are cut logs is what I am getting at. So while a fair number of items can come in from just natural tree drop or limb drop, wind throw, things like that, we do notice that a number of them have been handled before and are either just left along the shoreline and the next high water event gets them or intentionally dumped in the lake.

20           So debris can be beneficial and debris, for lack of a better term, can be a nuisance. So what debris should be removed? As with all of these issues we need to come up with a balance. We need to balance ecological needs with other needs such as safety, which is

primary, recreational needs, and residential needs. If it affects recreation and enjoyment of the lake, it is an issue. If it is along your shoreline and it is preventing you from enjoying your shoreline, whether it is your view or just accessing the water, that is an issue as well.

7           So debris generally subject for removal, what we come up with was any manmade material, plastic, tire, barrels. That seems to be a no brainer, if you will. Take that material out when you can.

12           If material is free floating or likely to float along the main channel, shoreline or non-channel areas, if it is free floating it is going to cause a problem and you can get it out of the lake, by all means then remove it.

17           If it is embedded but in the main channel areas or high boating traffic areas, then, once again, if it is creating a hazard that should be subject for removal.

21           The debris appropriate to leave, this is where it probably becomes more debatable depending on your perspective, but woody debris embedded or secured along the shoreline or away from main channel areas, that in other words is

embedded, it is not going to become free floating. It is in a permanent location and it is out of main boating areas, that will provide habitat functions.

5                   So this is how we define beneficial debris, natural woody material located outside of navigation channels that is secured in place or otherwise unlikely to become a free floating boating hazard.

10                   Now, secured in place, you notice I didn't say embedded there, because one of the things that could be done with debris is actually securing it. In other words, you have a tree that falls into the water and it has the potential to become free floating at some point, but if that is cabled and secured to a shoreline, then it becomes secured habitat that is no longer going to become a boating threat.

19                   There was a tree right here along the State Park that we had observed on a couple of our trips and each time we were there people were fishing at it. Aesthetically it probably wasn't the greatest thing, but it wasn't going anywhere. We came back the first week in November and it had been cut down and removed,

but if that had been secured where it wasn't going to become a problem, that, once again, was providing habitat and the fishermen were taking advantage of it.

5           Sources of debris, where does it come from? We think the largest source of debris is from the tributaries, largely from the New River, also from Peak Creek. Is it Matt Creek?

9           BILL KITTRELL: Max, M-A-X.

10          MIKE HREBEN: There, as well, but all the tribs to some extent will have debris inputs. Most of the water is coming in from the New River. So, likely, we think that is where the most debris is going to come from, and based on where the historic accumulations have been the greatest, which is the upper portion of the reservoir, if that seems to make sense. Human activity along the lake, nearby areas; every drainage ditch, storm drain, all the roads and everything else have litter in them. Based on its ability to decompose and its buoyancy, you get enough water running through that system it is going to end up in the lake. So we see that.

24          One thing I don't have on here along with littering is probably just outright dumping.

We have all seen areas where, you know, historic dumps where back at the end of some dirt road along some ditch that is where the community historically dumped their trash, and whether it was woody, lawn type trash or the old refrigerators and old washing machines, those types of areas contribute to debris as well and just the legal dumping that still occurs along road sides and things like that.

10           Recreation related pollution, while it might not be a large percentage of what we see in the lake, we all see the bottles, the coffee cups, like I said the motor oil containers, the bait containers, a lot of that ends up in the lake, too.

16           Shoreline clearing, we noticed there are a number of areas where you can consider either shoreline clearing if it is on the large scale or even just yard work where landowners would take their branches, trim them, cut down trees, but it is stacked on the shoreline where it is susceptible to the next high water event to get washed away or some outright where it was even pushed over and into the water where it was still maybe secure for that point until you got a

high flow event or high wind event and it would then push it out into the lake. So that kind of goes in with residential yard maintenance, but we did see a lot of that intentional "I'll just put it in the lake and then I won't have to deal with it." It will be somebody's problem downstream," essentially.

8 I have what I call natural deposition and by that I just mean dead trees that fall over, wind throw, limbs drop, things like that. I don't know about where you live, but I have a yard full of maple trees and every wind storm that comes by I spend a couple hours cleaning up limbs and things of that nature.

15 Locations where debris is accumulating. One of the things that we did on our survey is where we saw debris accumulating we took a GPS point, and this is the upper end of the lake here. It doesn't mean it is the only places on the lake where there are debris. It is where we documented them when we were out. Here is another slide of the lower portion of the lake.

24 As I said before, most of the debris is woody material. A lot of it is small to

medium size under these conditions. When you have these very high flow events then you see a lot of the larger material, the pulled trees, the logs, the stumps.

5           Historic data indicates that the coves are primaries of accumulations, and that is what we have seen as well. I think it comes that wave action, once that debris is in the lake you get the wave action, whether it be boat or wind generated waves, and it pushes it to the back of these coves where then it is somewhat protected and it lodges back there.

13           There are some examples of some of the coves that have been noted as having debris issues in the past and that is from the Friends of Claytor Lake.

17           Here is some sites on the lower end of the reservoir where we documented debris. As we talked about this morning, I think Alex and Mark talked about the prevailing winds are out of the west. You can see maybe some of that here, but it is hard to define by this. You would have to look at the size of the debris accumulation, things of that nature. There does seem to be a fair bit of the debris pushed to the west side of

the shore.

2                    Relationship between debris and  
flow, trying to develop a correlation to the best  
of our ability. It is going to be very qualita-  
tive in nature, but no surprise here, higher  
flow, higher debris inputs, but we are still  
working on that.

8                    Management methods and programs, and  
I think this is the part that a lot of folks have  
more interest in. You know, what can be done to  
help manage debris. Let's face it, no matter  
what you do you are going to always have debris  
to some extent. It is the natural part of the  
system, and it is never going to be all cleaned  
up. There are benefits to it and it is needed.  
It is part of having a reservoir that you like to  
use in this part of the country.

18                    So looking at the current clean-up  
efforts which are done by the Friends of Claytor  
Lake, and, basically, they use a conveyor to go  
out and collect debris, load it up into roll-off  
dumpsters, and ferry those dumpsters on Number  
Two here to an off load site and that would be at  
the pier. Jump in here if I am wrong about any  
of this, Ron. Then they take it to a site where

they let it dry out. Manmade material is removed to the landfill and after it is nice and dry they will burn all the woody or natural material.

4 As they state, they are looking for better alternatives, and that is one of the things I will talk about in the next couple of slides.

8 The annual clean-up effort for the Friends of Claytor Lake from 1996 to 2007 debris totals were over 11,000 tons, highly variable, from 700 to over 2,000 tons per year. Average cost for removal per ton is a little over \$30. These are some photos of some docks that were inundated with debris and after the clean-up efforts they were able to clean them all up.

16 So that is what is being done here. We looked at what is being done at other reservoirs, both FERC licensed projects and other projects as well. The vast majority of dam owners deal with debris when it reaches the dam. There are very few that work at removing debris out in the reservoirs or upstream of the reservoirs. What is done when it reaches the dam depends on the facility. Some places sluice it downstream. Some sluice it as much as they can

and then remove the rest and some outright just remove what they need to.

3           As far as debris management plans go, a number of facilities for debris, they are required to put more back in the river downstream of their project, either leave it at the spillway till flows are high enough to wash it downstream or to actually go downstream and intentionally place it in locations, and that is strictly for habitat and for shoreline protection measures. That is becoming more and more common where river reaches have been determined to be starved of debris, if you will, because this is a substrate, you know, cover for fish species, but also food and cover, your micro vertebrates, it kind of supports your whole food chain.

17           Those that do conduct removal efforts on the lake, a lot of them support organized community clean-up efforts where there might be... One is called trash bash that they have each Spring. It is a community event and there are different areas of download, to put debris in dumpsters. It is a celebration as much as anything. Where you work all day and celebrate a little bit at night kind of thing,

but get the debris cleaned up for the recreation season.

3 Others do some regular removal of debris as needed, only when there is a safety hazard or if there is something in the main navigation channel. They also support efforts to secure debris in place because sometimes it is more efficient to do that than to try to remove it.

10 There are a few examples I was able to find where there are actually attempts to reduce debris inputs in the reservoirs. We will look at those in a minute. They are debris collection and diversion devices, but one of the other things is just general regulations, whether they are local ordinances from municipalities or shoreline management plans about limiting storage and disposal of materials along the flood plain. In other words, if you are going to put something in the flood plain it has to be either secured or it can only be certain types of items. Obvious that Hurricane Francis or whatever event to come through and then it will basically scour that area clean.

25

**LAURA BULLARD:** I think this

question is for Teresa, actually. Does AEP do debris removal in any other reservoirs?

3                   **TERESA ROGERS:** We do; we have  
skimmers in Leesville as part of Smith Mountain  
Project.

6                   **LAURA BULLARD:** As part of what?

7                   **TERESA ROGERS:** As part of the Smith  
Mountain Project Leesville is included in that.  
That is the only place.

10                  **MIKE HREBEN:** And the skimmer is  
similar to the conveyor here, similar in  
function.

13                  **LAURA BULLARD:** AEP finances that  
and does that and supplies the employees for  
that?

16                  **TERESA ROGERS:** They have what they  
call TLAC. It is quasi-governmental. There are  
three counties around Smith Mountain that do  
special debris projects on their own. We are not  
the only people that do debris down there.

21                  **LAURA BULLARD:** Is that something  
that could happen here at Claytor, that AEP would  
supplement?

24                  **TERESA ROGERS:** That is one of the  
things while we are doing the study we will

figure out what works best, and, you know, it is not to say either that we will continue... We are doing a re-study down there for our relicensing and we will do the same type of thing, does it make sense, or is there a better way to do it down there.

7                    **BILL KITTRELL:**    Are those skimmers at Smith Mountain and Leesville used primarily around the base of the dam or are they used throughout the problem areas on the lake.

11                   **TERESA ROGERS:**    There is one skimmer, and our first priority is to keep water flowing through. It is not an issue at Smith Mountain Dam just because of the way the lake is, but at Leesville we do get a lot of debris from the intakes, and that is one of the main reasons we have it, but it is not all the lake. Then we start looking at problem areas, which are usually up in the head water. It is a much different lake, much different. It is so linear, it is bigger. We have huge fluctuation.

22                   **MIKE HREBEN:**    One of the things here at Claytor, during high flow events you will actually spill water, spill flow, and it helps, probably not enough to folks satisfaction, but

you do pass debris and pull some debris down to the dam and it will pass it there. Smith Mountain you don't have that opportunity. Basically, Smith Mountain catches all the debris and keeps it from going downstream.

6                    **TERESA ROGERS:** You would have to have a pretty big event to spill.

8                    **MIKE HREBEN:** I am just going to show a couple different debris collection diversion devices that we were able to locate. I will go through them fairly quickly. I know if we have other things to talk about. If anybody would like to see these, I would be happy to show them to you. They will be in the report.

15                    The first one is in Lake Pond Oreille which is in Idaho. It is one of the largest, I think it might be the deepest natural lake in North America, one of the deepest in the world I believe. You can't see very well here, but this is the Clark Fork River, which is the main tributary going into Lake Pond Oreille.

22                    Here is a little close-up of the mouth of that river or that piece of the lake. As you can see, it is very much a traditional delta type formation with a number of braided

channels going through here. I am afraid we are not going to be able to see this very well, but I have three areas designated here which are part of this debris diversion device, and what these are are basically trash booms, here, here, and a containment boom that goes around here, and I will zoom in on those a little bit.

8            This first trash boom, now, water is flowing this way. Debris coming into the lake would follow along this trash boom and be diverted to this side channel. This trash boom is I believe 3300 feet long to give you an idea on the magnitude and size. This break in the middle is to provide access for boaters to go upstream.

16            What makes this system work is largely the geographic configuration here, have these side channels to be able to utilize them and to have a place to put the debris essentially, divert it and put it. Here is just blocking off. As you go further downstream debris would be coming down this way and you don't want it to go back out in this side channel. You want to keep popping it along the way you want it to go. So you have another boom

of about 1700 feet in length.

2                    **LAURA BULLARD:** What is that  
constructed of? What is the boom?

4                    **MIKE HREBEN:** The boom is  
constructed of logs, essentially. I think they  
are 16 inch diameter logs with board facing on  
the front of them. There is permanent piles  
situated, I don't remember, maybe every 20 feet  
or something like that, throughout its length.  
These remain in place year around. This year  
maintenance just on the booms to basically pull  
the vegetation off that is growing and not  
replace anything but maybe some hardware and  
things of that nature, I think it was going to be  
four man months just for maintenance.

16                    As you pass that boom, which they  
call the B boom, you get into this area here  
which you can see is quite a bit of boom around  
here and it acts as a containment area. You  
probably can't see this, it is call Driftwood  
Yard Row, but all the debris, basically comes  
into this area and depending on accumulation they  
go in once every five to ten years during the  
Winter draw-down period when this is left high  
and dry and they stack it all up, push it around

with equipment, and burn it.

2           There is a number of things that make this work and it is all in the setting. First of all it is great channels, having the ability to do that, where to put it, you know, where to divert the debris, good road access, to be able to get in there and handle it and deal with it, that is a primary consideration because you need the equipment in there. You need access, and, also, very important, you don't have any residences around here.

12           You know, while the lake is pretty heavily recreated, this area here isn't. You are not impacting property owners, lakefront property owners by stacking debris up in front of them or causing them an inconvenience.

17           This is all done by the Army Corps of Engineers, by the way. That is who operates and maintains this system.

20           Another one found in Germany on the Arzbach and Loinbach Rivers, and I believe this is the only that is actually being used. I am not sure if they are using the one on the Arzbach yet. This is, basically, just a schematic of what they are doing and I will show you a photo

in a minute. The river flows this way and, basically, you have an inverted beam here, which have two foot diameter field pipes anchored into the substrate. They are filled with concrete and there is nothing between them. Spacing is just dictated based on the size of debris they want to collect, and all debris collects in that V and they go in and remove it as needed.

9 One of the problems they are having with this, and with all these systems that I will show you, the three that I will show you today, is sediment accumulation. Basically, you are forming a dam in front of them because not only do these collect debris, it also provides areas where sediment collects.

16 So this is when they had a draw-down period and they go in and remove this sediment. That is an ongoing issue with the system on Lake Pond Oreille as well. They are concerned about how they are going to deal with sediment.

21 The third and final one that I am going to show you today is the Cumberland Trash Gate. This is on the Cumberland River near Lake Cumberland in Kentucky. The river flows this way and hopefully you will be able to see the next

photos a little better. Debris, basically, collects along this angled rack, if you will, and then is diverted towards an off-flow ramp. This is a very passive system where it collects it and they can come in from what is the equivalent to a large boat ramp and remove it from that location.

7           They have a very large, I want to say it is a couple acre parking lot here where there is a work area where they remove the material and then they have a twenty acre site adjacent to it where they then haul the material and let it dry out. That gives you an idea on the size of that structure. If you look at the photo, these are people standing near the water's edge and this is the size of the structure here.

16           That is just a photo of some of the debris it collects. They go in, basically, four or five times a year and empty this out. It is very effective for what it collects there on that side of the river and it does a pretty good job. They originally had designed it such that it had a boom, a floating boom that extended on upstream to help collect debris and put it in there. They don't use the boom any longer because they couldn't keep it from blowing out. Every time

they did any type of debris event, the four inch steel cable that is holding it would just snap. That will give you an idea of the forces we are talking about. I am not saying engineering couldn't be done to overcome that, but they don't use it anymore.

7                   Once again, this is the Army Corps of Engineers that also constructed and outbreaks this system. This is a photo of debris collection there.

11                   There were some design issues with this one. They think it is very effective and does very well, but once they started accumulating a lot of debris they get a lot of back gates forming and it actually flushes debris out of there. They also have a lot of build-up of sediment as I mentioned. They think it is probably the single greatest factor that might limit their continued operation of this system because every time they remove debris they go in and remove about ten cubic yards of sediment and once they remove that they have to do something with it, and that is part of what is going in that twenty-acre site and it has become a problem where they are going to have some permeating

issues of their own as far as removing the sediment and then disposing of it.

3            Their original idea was great. It made a lot of sense on paper when everybody did it or everybody planned together. They were going to remove the debris. They were going to sort out material that was suitable for firewood or lumber, put it to one side, take all the rest of it, chip it and make it available as mulch. The public could have the firewood as they wanted and they could have the mulch if they want it. Well, there is very little interest and they ended up with a lot of piles of mulch and a lot of piles of wood. So they, basically, burn it. They landfill the manmade material and they burn all of the woody material. To do that they bring a portable incinerator in once a year. It burns real hot and over a couple days they can just dispose of all the woody material.

20            As I mentioned, the boom failed. It is no longer being used. There are some design issues there. The location of it is very good. There are large amounts of debris and it is collected there and it is not near a residential area. The closest residence, I believe there is

a church located not too far from this location. They had lots of complaints from them initially and now the people have come to accept it, but one of the things they cautioned us, just talking to these folks, they said, "You don't want to have this type of thing anywhere near people." You have this large, unsightly, smelly debris piles and you want to keep it away from folks.

10                   They are spending about seventy-five to a hundred thousand dollars per year just to operate and maintain that gate there.

13                   One of the things I wanted to mention in association with that Cumberland Trash Gate, they also have a skimmer that they use out on the lake to collect debris on the lake. Lake Cumberland is quite large. It is over twice the size of Smith Mountain Lake to put it into perspective. It is very large, and it is largely undeveloped and mostly woody shoreline, but it is heavily recreated. So they will take debris and they try to do the same thing that you are doing here and that they do at Smith Mountain, where they collect it, they take it to off load sites and then dispose of it. It was just to

inefficient to do that type of thing. So much of the time is spent in actually hauling the debris to an off load site and then dealing with it afterwards.

5           So what they have come up with and that is something in the work group that we can talk about, they have a pretty nice system, their skimmer. They have a way to pick up the logs and the debris, and they have a chipper on a barge that they tow with this. They chip it and put the chips right back into the lake. So the woody materials go right back in the lake. They chip it and that is what they decided to do with it.

14           What their experience is, the chips float on the lake for a matter of hours rather than days and they really don't cause too much of a problem unless you are operating a jet ski because they will suck them up. Another option, just trying to be more efficient.

20           Collection areas, like I said, they are really complex. They have to be the right situation and it has to be workable. Site considerations are the primary factor that make them work. If they are not there to divert and hold debris, who owns the property, you need access

for maintenance and removal and what are the effects on adjacent property owners.

3           Folks might like this if they are downstream, but if you are upstream of it it might not be the nicest thing to have in your neighborhood.

7           Recreation, these devices themselves can provide limited passage through certain areas or navigational hazards, and, you know, one of the things that we are trying to avoid is a navigational hazard or safety issues.

12           There is also dangers of just concentrating debris loads in any one location. Obviously, you don't have a lot of bridges here, but the Lowmens Ferry Bridge, for instance, you wouldn't want to do anything to concentrate debris around a bridge piling or bridge piers any more than it already occurs. There are plenty of examples of bridge failures due to debris.

20           So, as I said, the ultimate goal is to come up with a debris management plan which, and the million dollar question is, how do you efficiently manage debris to accommodate various uses of the lake and environmental considerations. Is what is currently being done the best

that can be done? Does it need to be drastically different to make it more efficient?

3 A plan will be developed in conjunction with the work group and components of the plan will likely include removal or debris reduction components, clean-up efforts, habitat concentration for the lost habitat due to the debris removal and public education.

9 The majority of the data for this study has been collected. There are some things we need to resolve yet and we are still working on<sup>12</sup> We still have one field survey that we would like to conduct. To the best of our ability we are<sup>4</sup> trying to plan these things around high water events, and, as everyone knows, this hasn't been a high water year. So we would like to do one more<sup>2</sup> this Winter before we put the draft report out<sup>8</sup> We have done various components of the study report and we anticipate the draft report will<sup>d</sup> be on schedule and available this Winter, and<sup>1</sup> all we need is one little critter that appreciates a good pile of woody debris.

23 **UNIDENTIFIED SPEAKER:** Just a comment. Dovetailing your report is the Shoreline Management Plan report and I would

suggest you have a look at the Smith Mountain Lake Shoreline Management Plan, how we manage shoreline woody debris and things like that in that plan because I suspect we will see a similar plan on this lake and if we are all singing off the same sheet of music, that would be helpful.

7                    **MIKE HREBEN:** Good point, very good point.

9                    **TERESA ROGERS:** Just for the rest of the group, how that is done, areas that are identified as being beneficial habitat for woody debris, they are classified in such a way that you can't just go in and do anything. You have to consult and you may have to do some mitigation as well. So keep that kind of in the back of your mind when we start defining what those areas of beneficial woody debris are. We need to be able to map it, delineate it, and put guidelines in place to protect it.

20                   **LAURA BULLARD:** There is that on line somewhere? Is Smith Mountain Lake's management plan on line somewhere?

23                   **TERESA ROGERS:** Yes, it is. If you go to [www.smith.mtn.com](http://www.smith.mtn.com), and then mountain is abbreviated, mtn. com, and you scroll down a

little bit but on the right-hand line you will see Shoreline Management Plan.

3                    **MIKE HREBEN:** If you do a search for Smith Mountain Relicensing that home page will come up. There is not a lot in there on the debris management components. They define large woody debris and they have components in there for shoreline clearing, if you remove material that is six inches in diameter you have to compensate and replace that. I think large woody debris there is defined as logs at least ten inches in diameter, things like that, but they are working on developing a debris management plan at Smith Mountain Lake. It is not a large part of what is currently on the shoreline.

16                   **UNIDENTIFIED SPEAKER:** The Debris Management Plan is not part of the Shoreline Management Plan, but the Shoreline Management Plan's habitat components have the components as a result by the Game and Inland Fishery, the same kind of standards we are going to be wanting to apply to Claytor. So I just wanted to make sure we weren't developing a parallel but not equal system.

25                   **MIKE HREBEN:** Our goal is to be down

the same path. Any other questions?

2                    **TERESA ROGERS:** We are behind  
schedule. So if you need to get some water, go  
get it real quick.

5

6

7

### **HABITAT & AQUATIC VEGETATION**

8

9                    **SARAH ALLEN:** I am going to cover  
kind of the miscellaneous categories I like to  
call it. It is all the habitat studies including  
wetlands, riparian, bald eagle, the littoral zone  
for habitat studies and we are also asked to do  
inventories and mapping of aquatic beds including  
both invasive and native species.

16                    A lot of this you have already seen,  
so I apologize if I am repeating it. The wetland  
and riparian habitat objectives are to identify  
and map the wetlands and riparian habitats along  
the shoreline, to separately quantify. The  
majority of the interest of the study was to look  
at wetlands that fall within the influence of the  
reservoir and we have used Brady's topo and  
bathymetric to accomplish that.

25

We wanted to assess the effects of

current project operations on those wetland and riparian habitats. Again, we were both seeing draw-down zone for the wetlands and in the riparian areas we were looking more at land use, such as logging and some residential development activities.

7                   We were asked to assess the effects of sedimentation and erosion on wetlands and riparian habitats and then originally our work scope requested that we specifically go out and look at shoreline sedimentation and erosion, but as we have seen earlier, Baird was also doing that. So we will be using Baird's data to apply to our analysis and Baird is also doing upstream sedimentation sources which will be much more significant I think.

17                   Finally, we are to identify measures that will protect or enhance wetland habitats and riparian habitats along the lake.

20                   The study area for wetland and riparian habitat areas included Claytor Lake and its tributaries up to within 1,000 feet out from the water's edge. So we wound up with a buffer around the lake and I will show you the limits of our work going up some of the major tribs.

1           For the riparian habitat, that extended 2,000 feet downstream of Claytor Lake Dam as well. To start the mapping process we used the aerial photos taken by AEP back in March of this year. They are black and white, on a scale of one inch equals 800 feet, which is ideal for us. They are in stereo, so we get to see a three dimensional image and map the wetlands.

9           As Brady described earlier, they developed bathymetry and topography to two foot contours which we will overlay on our wetland mapping to analyze where wetlands were occurring.

13           Using those maps we delineated and cover typed all the wetlands and riparian habitats within the study area. Again, those wetland cover types, we loosely used for those of you who are familiar with this, we loosely used the Cordian, et al classification, which was developed back in 1979 and it is widely accepted and it classifies types of wetlands as aquatic beds, emergents, shrub wetlands and forested wetlands, and then within each of those categories there are sub-categories that are useful when describing the type of vegetation and the type of hydrology that wetlands experience.

1            Again, we concentrated on those wet-  
lands that are reservoir influenced. We were  
able to get our mapping units down to half an  
acre and in some cases if there is a well defined  
type of wetland we were able to go smaller than  
half an acre.

7            This is a summary of the cover types  
that we found in the Claytor Project area. I  
didn't mention that it is hard to map wetlands  
without mapping the uplands. So we decided to do  
that, too. I think that will be useful to you as  
we go along, and we did very crude upland  
habitat, upland type mapping. We, basically, had  
three categories of forested, grasslands, and  
residential, commercial. So you have to remember  
that, and then we have some sub-categories of  
shrub lands and log areas and things like that  
that I will show you in a little bit.

19           We defined the flood plain areas  
according to both topography and location along  
the watershed. Primarily, the flood plains were  
concentrated at the northern end, I am sorry, the  
southern end of the lake. Wetlands I have  
already described.

25           Aquatic beds, again, because we had

that separate study going, I will deal with those in a little bit, suffice it to say that the aquatic beds were mapped in a slightly different way that I will discuss later. Then, of course, we had the reservoir.

6           So if you look over... You can obviously see I am showing both acres and percentage of the total study area that each cover type composes and what jumps out at you, of course, is that the upland dominates it by almost two-thirds, and then the reservoir dominates almost the other third, which doesn't leave very much room for the wetlands, aquatic beds, and flood plain habitat. For any of you that are familiar with the lake, that is probably no surprise.

17           Wetlands are less than one percent. The aquatic beds are two percent, and flood plains are even less.

20           This is an example of the cover type mapping, and it is in color on my screen. I am not sure what happened there. That is really unfortunate. We will blame it on the glare, but what is evident is that the few colors that do come through are the green... Just to get your

oriented, these colors will cover through the whole presentation, but these little tiny areas in here and here, that is a pond, that is actually one of the debris areas that Mike Hreben was talking about.

6           Along this section, which this is Peak Creek coming in just for orientation, along this section and actually going well north of here there is very little wetland development and most of it, this lighter gray... Well, the darker gray here is the upland. This lighter gray is residential. So those are the two... I am sorry, upland and forest, those are the two dominant types.

15           This is further down or further upstream on the river, and this is that last bend or the first bend as you are coming down the stream. That is the most extensive wetland development. It is right in there, and that, again, is probably no surprise to you.

21           **UNIDENTIFIED SPEAKER:** Is that Horseshoe Bend right there?

23           **SARAH ALLEN:** I am sorry.

24           **UNIDENTIFIED SPEAKER:** Is that Horseshoe Bend right there?

1           **SARAH ALLEN:** I don't know. I don't  
know the name of the bend. Lowmens Ferry...

3           **UNIDENTIFIED SPEAKER:** That is  
Hiwassa.

5           **SARAH ALLEN:** Yes, it is close to  
Hiwassa.

7           **UNIDENTIFIED SPEAKER:** I was looking  
for the bridge.

9           **SARAH ALLEN:** The bridge is further  
up

11          **UNIDENTIFIED SPEAKER:** Hiwassa Bridge  
is further upstream?

13          **SARAH ALLEN:** Lowmens Ferry Bridge.

14          **UNIDENTIFIED SPEAKER:** To the right.  
Now Hiwassa Bridge is...

16          **UNIDENTIFIED SPEAKER:** Is south of  
there, right?

18          **UNIDENTIFIED SPEAKER:** Right.

19          **SARAH ALLEN:** Railroad Bridge, yes,  
that is up here.

21          **UNIDENTIFIED SPEAKER:** It is just  
off the picture.

23          **SARAH ALLEN:** Yes, it must be a  
little bit further down here.

25          **UNIDENTIFIED SPEAKER:** That is the

State Park right there on the side.

2                    **UNIDENTIFIED SPEAKER:** No, no.

3                    **UNIDENTIFIED SPEAKER:** So that is  
not4Horseshoe Bend campground?

5                    **UNIDENTIFIED SPEAKER:** No, no. That  
is the last curve before you get to a spot called  
Little Ripplefield (sic) in Draper. Draper is to  
the8 left.

9                    **UNIDENTIFIED SPEAKER:** Okay.

10                   **UNIDENTIFIED SPEAKER:** Do you know  
where the bed and breakfast is above the bridge?  
That is right above Sarah's head there.

13                   **SARAH ALLEN:** What I wanted to point  
out4about this is that the most well developed  
wetland that occurs on Claytor Lake and it is a  
mix6 Again, it is hard to see, but it is  
dominated by forested wetlands. It has got a  
beautifful under cover and a lot of areas of  
sedges which implies that it is periodically  
inundated, which makes sense during Spring.

21                   There are some emergent marsh. You  
can2see some of it here and there is some more of  
it2out in there is not really showing up well,  
and4then this white, which I hope will show up  
better later is aquatic bed, and that is one of

three large wetland complexes on the lake.

2           Just to show you a quick breakdown, these are the general covered categories for the upland and the flood plain. This little tiny strip up here is what we considered to be flood plain, and I think this is the most northerly ridge of the flood plains. When you come back down here you get more extensive flood plain again along here and this purple is also flood plain. So flood plain is also in short supply on Claytor Lake, mostly because of just the steep terrain.

13           So, again, getting back to the upland, it broke down to predominantly forest. There is a little bit of shrub, a little bit of grass, which I considered to be either agricultural or in some cases some large extensive lawns on some of the larger houses towards the cover type.

20           Residential and commercial collectively formed about 1,500 acres or almost twenty percent. Again, the flood plain was a very small percentage. If you recall, it was less than one percent, and it broke out into predominantly residential and commercial, which is interesting

for management purposes.

2           In the wetlands the forest again composed about 65 percent. Most of the forested wetland occurred in that image that I showed you earlier on the Hiwassa Bend there and then there were some very small little cove wetlands at the tips of these coves. Scrub run was a very minor component and then emergent was the second largest component, again because of some of the larger beds formed... Of the three large wetlands that I describe, one of them was dominated by emergent marsh and that is where the bulk of that twenty-nine acres is coming from. Then open water areas where the small ponds are scattered within that 1,000 foot buffer.

16           We also were tasked to do a littoral study which will be handled by the fishery component of our group. Again, that is going to be cruising the entire lake shoreline in a boat with GPS and a laser range finder mapping all the substrates exposed during the draw-down when it occurs, and as Teresa described earlier, that has been postponed possibly through the year. If a draw-down occurs for some other reason, we can actually get out there quickly to do that. It

will take us probably ten days to do the entire thing, but when we do that we map substrates by cover type, breaking it down into categories of cobble and sand, looking for some of the debris. I might describe we will be looking for areas of erosion, looking for all habitat criteria. It is primarily concentrating on fish habitat. So we are looking for those characteristics that are important for fish habitat.

10                    **LAURA BULLARD:**    Do you look at sedimentation?

12                    **SARAH ALLEN:**    I am sorry?

13                    **LAURA BULLARD:**    Sedimentation, the amount of sedimentation, or would that not allow in that littoral...

16                    **SARAH ALLEN:**    That would be a difficult thing for us to pick up simply because... We will be mapping sediment textures, so maybe we can imply that a fine texture sediment is deposited through sedimentation, but I think I would rather leave that to the Erosion and Sedimentation guys. We will provide our data to them.

24                    **LAURA BULLARD:**    How does that impact fisheries? I mean quickly, can you just

give us an idea. You know, the fine sediment that is coming off of a bank, is that negatively impacting, say, spawning or whatever activities of fish in that immediate near shore area?

5           **SARAH ALLEN:** I would refer to the fishery guys. I do wetlands, and I am not real comfortable answering that.

8           **BILL KITTRELL:** It certainly can.

9           **SARAH ALLEN:** I imagine it could vary, any kinds of beds or those things. This is that cliff forest that I showed you down at Hiwassa. It is a beautiful area.

13          **UNIDENTIFIED SPEAKER:** Is that the same place that you had in the map prior?

15          **SARAH ALLEN:** Yes.

16          **UNIDENTIFIED SPEAKER:** That is further on up the lake.

18          **UNIDENTIFIED SPEAKER:** No; that is where I was talking about. That is where Horse-shoe Bend Campground is that New River State Park purchased and is developing as a state park. We have a leased property with AEP at the west end of that island as a public access place and a canoe stop on the New River.

25          **UNIDENTIFIED SPEAKER:** Is that then

right below the Hoover Bridge?

2           **UNIDENTIFIED SPEAKER:** It is down-  
stream from the railroad bridge at Hiwassa.

4           **UNIDENTIFIED SPEAKER:** Right, right.

5           **UNIDENTIFIED SPEAKER:** You have to go  
around the bend. The bridge is here and you have  
to go around the bend.

8           **UNIDENTIFIED SPEAKER:** Right, right.

9           **SARAH ALLEN:** And there is a chance  
I am confusing issues here, too, because we took  
photographs of everyone and I thought I had to  
the correct location, but I may have...

13          **UNIDENTIFIED SPEAKER:** I remember  
that tree. You are on the right site.

15          **SARAH ALLEN:** The bald eagle study  
is ongoing as well. We were tasked to identify  
and map all the potential bald eagle habitat on  
the reservoir and identify any kind of known or  
proposed construction activity that could disturb  
the eagles or their nest, and then also look at  
any project impacts, if there are any, on the  
bald eagles or their habitat.

23                 We subcontracted most of this work  
to the Center for Conservation Biology out of  
William and Mary, Brian Washburn, I don't know if

you are familiar with his work. He has done extensive surveys, mostly aerial surveys for bald eagles throughout Virginia. He flew over Claytor Lake in March and identified one nest. He revisited that nest, it had eggs. There was one bird attending the nest both times he flew by it, which indicates that there is an egg or multiple eggs in the nest.

9           He revisited that nest in May and found it deserted. So the next failed for whatever reason and there was no evidence of the adult birds, which indicates to him that they have abandoned that nest. They may re-attempt next year.

15           Along with that he also did a habitat assessment of the lake looking for other areas suitable for boating or nesting or roosting. He is compiling that data. We have yet to see it, but he tells me that it will be coming very soon.

21           Once we get that data we will fold it into our GI System and start talking or start thinking more about management considerations and work back and forth with him to develop some proposals if any are necessary for the lake.

1                   **UNIDENTIFIED SPEAKER:** May I regress  
to wetlands for a second?

3                   **SARAH ALLEN:** I am going back to it,  
too, but go ahead.

5                   **UNIDENTIFIED SPEAKER:** There are no  
maps of the wetland and flood plain zones down-  
stream of the dam?

8                   **SARAH ALLEN:** No. We are not  
mapping wetland habitat below the dam?

10                  **UNIDENTIFIED SPEAKER:** And why is  
that? I mean Tom Payne's study was going all the  
way down to Indian Creek or whatever it was. So  
why not look at wetland areas there as well?

14                  **TERESA ROGERS:** It wasn't in the  
scope. Part of the reason why we wanted to  
identify the wetlands within the project boundary  
is that within the project boundary we can expect  
to protect them from being disturbed in the  
future with expanded development or whatever.  
Downstream we have no control over who does what  
where.

22                  **UNIDENTIFIED SPEAKER:** Yes, but the  
hydrology affects those wetlands to a great  
degree. All the flood plain and the wetlands on  
the river are affected by the flow regime.

1                   **TERESA ROGERS:** I guess in the  
instream flow needs we were looking at elevations  
at different flows, but I guess the idea is if we  
were proposing a change to operations that would  
have a negative impact to any degree on wetlands  
downstream. Right now we are not proposing  
anything. So that is pretty much of our base-  
line. John, if you have any comments, please  
jump in. You know, our base line is where our  
current operations are and we are not proposing  
any negative impacts.

12                   **BILL KITTRELL:** Any of the photos  
that have been taken downstream, are they the  
quality that can be digitized?

15                   **TERESA ROGERS:** We can ask Jot if he  
could produce some of those, and then, Brady, do  
you know, are photos taken all the way down the  
river?

19                   **BRADY TODD:** Yes.

20                   **TERESA ROGERS:** So we may can use  
some of that.

22                   **BILL KITTRELL:** Theoretically, they  
can be digitized also.

24                   **UNIDENTIFIED SPEAKER:** I see a  
disconnect. We don't that the correct regime has

had an impact on the wetlands if we don't know where the wetlands are.

3           **TERESA ROGERS:** The baseline is what we are doing now. We are not going back to our pre-dam.

6           **JOHN SMITH:** Teresa, what was the question that raised this issue? I was in the hallway just a minute ago.

9           **TERESA ROGERS:** The question is why aren't we mapping wetlands downstream. Like we are mapping the wetlands that are within the project boundary on the reservoir. Why do we not map wetlands downstream.

14          **LAURA BULLARD:** Not only map, but look at the impact of flow.

16          **UNIDENTIFIED SPEAKER:** Right, although I can see weaseling out of doing that, but it seems to me if there is going to be any kind of change in operation we want to know where the wetland and the flood plain areas are so you could estimate what the impacts would be, even though you are not proposing to do anything different now, you might.

24          **TERESA ROGERS:** This wasn't part of our scope.

1           **SARAH ALLEN:** We are mapping  
riparian flood plain habitats down...

3           **UNIDENTIFIED SPEAKER:** 2,000 feet.

4           **SARAH ALLEN:** ...2,000 feet.

5           **UNIDENTIFIED SPEAKER:** But when we  
are talking about in terms of known flow regime  
effects, we talk about fifty or sixty miles.

8           **SARAH ALLEN:** Yes, I believe that  
fifty or sixty miles is more water quality and  
temperature related than...

11          **UNIDENTIFIED SPEAKER:** Hydrology is  
a huge part of what makes wetlands wetlands.

13          **SARAH ALLEN:** Oh, sure.

14          **UNIDENTIFIED SPEAKER:** It just looks  
like an omission to me.

16          **UNIDENTIFIED SPEAKER:** How large an  
area outside the reservoir did he photograph for  
eagle nest?

19          **SARAH ALLEN:** Well, I think it  
called for 2,000 feet, but he actually didn't  
feel that that was enough. So he did his aerial  
surveys out to half a mile.

23          **UNIDENTIFIED SPEAKER:** Is he going  
to try to establish the population of the bald  
eagles around the lake?

1                    **SARAH ALLEN:** No, no.

2                    **UNIDENTIFIED SPEAKER:** There are so  
many bald eagles, you see them all the time, and  
you don't see a nest.

5                    **SARAH ALLEN:** Well, the birds that  
we saw during our survey were all... We saw one  
adult, we saw mostly immature. If other people  
get reports we are interested. I think we saw  
three or four during our survey. We are always  
looking for data.

11                   I don't know if you can see that  
itty bitty spot where that the arrow is pointing,  
but that is the bald eagle nest that we did find.

14                   Another study were tasked to do was  
to look at native and exotic vegetation. The  
objectives of that study was to first of all map  
it and look at species composition. One of the  
big interests was to look at the native  
vegetation and see where it occurs and,  
basically, what the effects of the invasives have  
been on it and see if there is anything that we  
can do to enhance those beds of natives and also  
to assess the exotic vegetation, the aquatic beds  
and see if we felt that they needed any  
additional management.

1            Our methods for doing this kind of came from a variety of sources. We looked for background info from local and state sources and also from private sources, and that includes some of the Friends of Claytor Lake people as well as several individuals who have been involved in vegetation control. There is an active program of vegetation management, primarily in front of lake owners' homes to allow boat access because there are places where especially these exotic beds occur that are extremely dense and difficult for boats to get through. So we contacted them to find out what kind of management they did and where they did it.

15            We performed a site visit in mid-July to basically take a look at some of the beds and see where we should place some permanent sampling transects. We mapped vegetation beds from aerial photographs. Brady's photos were taken in March. Those are not useful for aquatic beds because they basically are not visible in March photographs. So we used a set of oblique, just basically some photos taken from a plane to identify some things that we had not detected during our ground work, and, again, every time we

encountered them on the ground we would make note of that.

3           In mid-August we came back out and tried to document some of the vegetation beds. We laid out 50 transects and had a minimum of three plots on each transect. The transects and the plots were located in the GPS so they can be relocated in the future should anyone want to go back and take another look at the data.

10           Just as a matter of note, one of the issues that we had is that especially with something like aquatic beds that can change very quickly we have only this 2007 snapshot of what is present on the lake. We don't have a good sense of how the trend is, if these beds are rapidly expanding or if they are quite stable. So that is the one draw-back of our study, but these 50 transects will sort of start that baseline process and we will provide our data to AEP and if they want to go back in a year or five years and take another look at these beds to look at both the species composition and extent, these will be useful.

24           We are revising the maps now. They are waiting for one more set of oblique photos

which I just actually got today. So we will go back and fine tune some areas that we knew we needed to fine tune. Just to give you an idea, I was laughing when I came up because everyone else was doing the fancy acoustic doppler things. We take a view tube, which is basically a long tube with a glass bottom, walk it over the side to look at our aquatic beds.

9 In areas where we have enough water clarity, that is a fine technique and that will give us the overall percent cover of the bed and that was effective in the downstream portions of the lake where the water clarity is a little bit. When you go further upstream the sediment load rendered this technique basically ineffective. So our other technique is to use a rake, where you literally take a garden rake and you rake it across the bottom and see what you bring up. It is a very relative measure, but if you do it enough times you get a good sense of percentages and we can certainly get species composition this way. This is an example of the rake. It is an extendable handle so that we can get down to about twelve feet, which was all but in one case deep enough to sample this lake.

1            This was an invasive species coming  
up here, which is brittle naiad. We were also  
looking at beneficial or native aquatic beds and  
this is just an example of one of them. We  
actually found very few that were solely native.  
they were usually intermixed with some of the  
exotics. This is water celery.

8            You see a little bit of this slide,  
but this is breaking it down in a different  
method. On the reservoir of the 4,400 acres that  
we had within our project area, 93 percent of it  
is open water, seven percent of it is aquatic bed  
and that is including those extensive beds at the  
northern end, the southern end of the reservoir,  
I am sorry I keep doing that.

16           We also got about four acres of  
debris that formed a large enough mass for us to  
be mapping.

19           These are the dominant species of  
vegetation and they are organized roughly in the  
order of abundance on the lake. The top two,  
hydrilla and brittle naiad are both exotics.  
Elodea, which is elodea canadensis, is a native,  
but that is actually a distant third to the top  
two in terms of abundance. Curly pond weed is

the other dominant exotic on the lake, although we did not find that in huge abundance. The remaining species shown here are all native species, and they were actually very low in abundance compared to the other four.

6 This is giving you just a quick look at the distribution. We found kind of a very interesting trend on the lake where the northern end of it up by the dam is dominated by brittle naiad. These are the coves up by the dam. The dam is at the far edge of your screen. These are the coves that lie there, and the dark numbers are our transects. I am sorry, but the yellow doesn't show up much better. You can sort of see the highlights. For instance, this is an aquatic bed running around here. So we laid transect 18 and transect 17 through that aquatic bed. Almost all of those beds were dominated by brittle naiad.

20 As you get a little further upstream on the reservoir, this is Blackberry Lane I believe... No, this is Paradise Point. This large white strip is an aquatic bed dominated by hydrilla, as is up there. This is Browns Hollow. Up in here are all aquatic beds. What is

interesting is you can see the aquatic bed running along this area. The other cover typing clue here is that this is residential all in here and this is one of the areas that has been treated by aquatic plant control. So we are not seeing aquatic beds or treated areas.

7            Again, the dark kind of stripes are sampling transects. So should we choose to go back in the future we will be able to see what the change has been.

11            At the southern end of the project, this is up in Allisonia, this is the ripples coming down about to here, so we stopped our transects, calling the limit of the influence from the reservoir to be approximately here.

16            This area is kind of a mix of aquatic bed and open water. These are dense aquatic beds. The dominant species there is the elodea. So elodea is common at the southern end and elodea dominates the middle of the reservoir and brittle naiad is dominant at the northern end.

22            The other piece that we need to do is obviously tie all this information into the water quality, sedimentation studies, and if there are other relevant studies, the littoral on

the study will also be relevant to what we need.

2           Once that piece is done we will be able to kind of move on with our analysis, looking at project impacts and any management proposals that might enhance either the native vegetation or managing or decreasing the amount of exotics in the project area.

8           The piece that we will all have to discuss as to what is most important, as vegetation a nuisance for boat owners, it is also highly beneficial for fish populations and it can be detrimental in the Winter to dissolved oxygen levels. So it is a very complex question and I guess the question becomes what is the most important piece out of all of this and how do we want to put it together to best manage the lake as a resource itself.

18           For example, a lot of people, you know, turn up their noses when hydrilla is discussed, but if you go down to those hydrilla beds, and I am not a fish person, but there are a lot of supposedly juvenile small mouth bass in there and a number of other species that are using those hydrilla beds for cover. So it is certainly providing a function.

1            Our schedule is a little bit up in  
the2air, just like everyone else, mostly because  
we were not able to complete the littoral zone  
survey. We are on schedule going up through  
basically November, 2007. We submitted our  
progress report. The littoral field survey was  
scheduled to occur just about this time. So,  
obviously, that has been delayed, and if it  
occurs in November of 2008 we will have to  
discuss how that will impact the report that we  
are1producing.

12           Obviously, the bald eagle report  
doesn't depend on the littoral study, but the  
wetland habitat and the aquatic bed surveys do.  
We1are scheduled to submit a draft report in 2007  
and6that also needs to re-thought and we will see  
how7it goes. This, again, is Mike's woody debris  
serv1ing as turtle habitat. Any questions?

19           **LAURA BULLARD:** Do the low inflow  
and0the high temperatures make any difference in  
your findings do you think in July and August?

22           **SARAH ALLEN:** I doubt it. I doubt  
it23 There might have been some nutrient release  
that didn't occur, just because there was very  
vigorous growth and it might have been a little

more vigorous than usual, but no, I don't think that is the case.

3                    **UNIDENTIFIED SPEAKER:** The 288 acres that you came up with aquatic beds, was that based on the large photos or was that based on oblique photos or a combination of both surveys and the oblique photos?

8                    **SARAH ALLEN:** Correct, the latter, and that is one piece that we are trying to do with this next set of photos. It is difficult to map aquatic beds from the air unless you've got either infrareds or a terrific way to go. The obliques give us a pretty good definition for some of the more surface, you know, some of the matted surface plants, and I am hoping it will give us some clarity at the Allisonia end. That was a really difficult area to map because the vegetation is so patchy in there.

19                   **UNIDENTIFIED SPEAKER:** We would tend to think that... We think that the hydrilla came into the lake, that is where it was introduced, and eventually it probably moved down obviously to a higher lower reservoir and possibly even out to reach the brittle naiad out here.

25                   **SARAH ALLEN:** It is in there. We

definitely find it mixed in there.

2                    **UNIDENTIFIED SPEAKER:** The problem also goes beyond that as to what is going to happen when it really starts passing the dam and getting into the large pool areas in the river.

6                    **SARAH ALLEN:** Well, to me one of the important management concerns is that we certainly want to minimize that transport if you can and it looks like some... I don't know if people are actually harvesting it literally by physically cutting it up. You see large masses of floating hydrilla moving downstream and they have probably been torn off either intentionally or just by boats passing through these beds, and, again, that is certainly a concern in terms of expanding population. Whether hydrilla competes with the brittle naiad, I am not sure how concerned you want to be about that.

19                   **UNIDENTIFIED SPEAKER:** It doesn't really matter about that, but it will be monotypic all around this part of the reservoir.

22                   **SARAH ALLEN:** It will; the brittle naiad definitely allows other species to co-occur with it and that is where we have (inaudible). Although that is a really difficult problem,

every lake has hydrilla and has huge problems controlling it.

3           **LAURA BULLARD:**    It is a worse  
problem than the brittle naiad, the hydrilla?

5           **SARAH ALLEN:**    It is a very  
aggressive plant.

7           **LAURA BULLARD:**    It is worse because  
it is more aggressive, is that the issue?

9           **SARAH ALLEN:**    It is huge. Brittle  
naiad is a lighter plant. It does not form the  
really dense, heavy bottom to surface mats that  
hydrilla does. Just by the sheer volume it tends  
to out compete other native species and probably  
brittle naiad as well. We find that the small  
amounts now and that is the importance of a trend  
study is to know how stable is it up here, is it  
expanding like it is likely to be doing, but we  
have no way of knowing.

19          **LAURA BULLARD:**    It has just occurred  
up here. I have never seen it up here before. I  
just noticed it this Summer.

22          **SARAH ALLEN:**    This year?

23          **LAURA BULLARD:**    Uh-huh.

24          **TERESA ROGERS:**    Jot, have you joined  
us yet?

1           **JOT SPLENDA:** Yes, I am here.

2           **TERESA ROGERS:** Okay, I am going to  
pull up your presentation.

4

5

6           **RECREATION & ANGLER USE STUDY**

7

8           **TERESA ROGERS:** Let's go ahead. Jot  
Splenda is on a conference call. He is with the  
Louis Berger group, and he will be giving the  
presentation on the Recreation Assessment and the  
Angler Use Survey and I will be flipping through  
for him. His wife is expecting any day and there  
is no way I was going to tell him he needed to be  
here.

16           **JOT SPLENDA:** Teresa has been  
extremely accommodating for me on this. My name  
is Jot Splenda with the Louis Berger Group. We  
have been contracted by Appalachian Power to do  
the Recreation and Angler Use Study as outlined  
in the FERC approved study plan.

22           One thing that I have kind of found  
out earlier on the earlier presentations, I can't  
hear the audience questions clearly, so either  
speak up and stop me and speak up, or maybe,

Teresa, you can help. It sounds like you are close to the phone.

3                    TERESA ROGERS: Yes, I can do that.

4                    JOT SPLEND: This presentation is designed as an update to everyone who is involved, basically an update on the status of where we are with the Recreation Study to date. I have organized the presentation. It is basically a review to go over the objectives of the Recreation Study. I know a lot of the people in the room were involved in development of the study plan and development of some of the surveys that were used, and also at the last study update meeting during the Summer. So a lot of this will be review, and, again, stop me at any time to get on to matters that people might have or issues.

17                   I know that I did hear some comments, it seems like there is some interest on the New River type section information, so I will touch on the update on that.

21                   My strategy is to update by method and then going over the recreational use assessment first and then the angler use study. with the Recreation Study up until now knows that there is a lot more specific language and

Teres

objective details in the study plan, but for the purpose of this update meeting I think it could be distilled down to these four objectives: Basically, document the facilities that are existing there within the project boundary and what activities are occurring there. Collect information with the use of surveys and spot counts on what type of activities due to preferences, perceptions. This information in the surveys can be combined with other studies as we are getting actual user responses and their perceptions and opinions.

13            You take those existing uses and forecast that into the future and there is also an element to characterize the spacial boating that is going around Claytor Lake.

17            To refresh everybody's memory on the geographic scope of the recreation study, the Claytor Lake map slide shows the public boat ramps around Claytor Lake, Allisonia, Lowmens Ferry, the two commercial marinas, Rock House and Conrad Brothers on Peak Creek, Harry DeHaven County Park, Dublin public access, and the Claytor Lake State Park, and the New River access directly below Claytor Dam, which is actually

near the top of the slide.

2           Appalachian Power does have a group picnic site on the north shore of the dam that does have a boat ramp. The use of the picnic site is by reservation only for group picnic activities. So we have that information or information for that site through Appalachian Power.

9           Study sites along the New River include the thirteen public boat ramps or public launch sites between, basically, the Town of Radford, Riverview Park to Glen Lyn, and this map also shows the three basic zones that the sampling was stratified into, an upper zone, a middle zone, a lower zone, so that each zone has four to five public boat ramps that were used during the study or that were sampled during the study.

19           Can we go to the next slide, Teresa. Recreation Assessment Study Components, the main components, again a refresher for everybody, the inventory, existing use and activity estimates, future use and activity, and boating density.

24           What I would like to do is go through each of these components and give a brief

synopsis on the methods that were used and then give everyone an update on where we are. We are at the end of the field season, the last week slated. So I want to update everyone on pretty much everything has gone up until now.

6 Starting with facility inventory, the basic method was to conduct site visits and field work on the ground at the public access sites within the project boundary and pass and photo document them and collect information through Appalachian Power or Virginia Game and Inland Fisheries or managers of those boat ramps on their capacities and materials used and amenities at those sites.

15 The next slide would be Slide Eight. It is a picture of Allisonia boat ramp from the air. Basically, we have finished the initial work. We have photo documented all of the sites. We have general layouts, parking. We understand the parking patterns, what amenities are at these sites, and we are, basically, finalizing the inventory for the reporting phase of the project.

23 You can see in the Allisonia picture of the aerial photo the oblique that say this is a site managed by Game and Inland Fishery, a

basic rectangle, unmarked parking spot, gravel parking lot. It is a single concrete ramp with a concrete ADA parking space with concrete level pathway to the boat ramp.

5           So for each inventory, each site will have an inventory showing photographs and the description, a narrative, a table describing what opportunities exist at this boat ramp or other places like the State Park. Overall inventory has been going well and nearly finished, ready for reporting.

12           On the public use and sampling effort, everyone is familiar with the development of the study plan and with the study to date. Remember, we had agreed to nine months of field work with field sampling. We would have field staff doing interviews and spot counts from March 1 through November 30th, twenty days a month, weighted more towards weekdays, six weekend days. We split the public ramps up into two zones. So, essentially, there is four public access areas with any zone. Each one of those was polled about ten times a month. It turned out with having so few number of sites to visit that it allowed field staff more time at a site,

which helped collect more interviews throughout the study period, as opposed to a system where people were visiting more sites for a shorter duration of time where you would get more spot counts but less interviews.

6            Now, this plays into some of the reporting on how many interviews we have gotten to date so far.

9            The New River section, Slide Ten, the study plan, if we remember back to the map showing the pre-zones, we agreed to do the public launch site from the same time period, March 1 and November 30th. The field staff would be in the field nine days a month sampling each of the three zones an equal number of times, three times a month, with equal weight probabilities between the zone, eight hour sampling day, and time at each site would be roughly equal minus the travel time between the sites, and, again, having a low number of sites throughout a study sample day allowed more time for interviews, which I think is a good thing, getting more feedback.

23           How well did we do or have we done so far? Slide 11, Teresa. As of October 25th you can see around Claytor Lake we have close to

700 interviews. Since this is the last week of sampling I know that we are up over 740 around Claytor. Along the New River we will be well over 500 just interviews alone.

5            Again, the spot counts, these numbers are difficult to understand without understanding each site, but we have been out there a number of times to document how many people are using it, what activities and how full the parking lots are and things like that.

11           Since the study has been going on we have been out there collecting lots of interviews at lots of different conditions throughout the year. If everyone remembers back, this study started in early March. At that time Claytor Lake still had ice on it and some of the private ramps or private docks didn't have their boats in the water yet. There was a lot of ice around there.

20           April there was a shooting at Tech, which everyone probably remembers, and up until now we have had the field staff sampling under all of these conditions.

24           Slide Twelve. Any questions up until now?

1           **BILL KITTRELL**: Are those party  
interviews, estimates over party interviews?

3           **TERESA ROGERS**: Bill Kittrell is  
asking whether these are parting interviews?

5           **JOT SPLEND**: Yes, these are  
designed to be exists, as the party is exiting.  
That wasn't uniform...

8           **BILL KITTRELL**: Party.

9           **TERESA ROGERS**: Party; I can't hear,  
I'm sorry. Party interviews, how was that  
handled? I guess if there is more than one  
person in a boat coming out.

13          **JOT SPLEND**: Right; so the strategy  
that was employed was that one person was chosen  
as the spokesman for the group. So if they  
identified themselves we said, "Would you answer  
for the group? How many people are in your party  
today," and they would say four, and then they  
would say, "What activities did you participate  
in?" and they would list probably all the  
activities that that boat, if it was a boat, or  
beach goers would participate in. They would  
choose a primary activity.

24           So, yes, it was for the group, but  
then some of it, you know, we get into the

demographics, age, gender, that was for that individual.

3           But to get back into the exit interview part of it since I started to go into that tangent, what might happen is a field staff might be at a site, say, for instance, at Allisonia, from 6:00 to 8:00 a.m. in the morning and not see anybody there and then somebody shows up at 7:45 before the staff is scheduled to move to another site, and so in circumstances like that I advised them to ask them how they felt after fifteen or twenty minutes of their trip, because there is still a lot of useful information that can be gleaned from their experience then rather than just skipping the interview altogether. So what we will also have is the time of the interview and the time that they arrived, so we will know how long that person has been there after they gave that interview.

20           There are some areas where the study did fall short or our field works has some glitches, bumps in the road, reality creeps into the study. Slide 12 should be on the screen, the points for discussion. Interviews and spot counts in April and May, the number of interviews

and spot counts scheduled for those two months fell short of what was identified in the study plan. We do have a lot of interviews, but the number of days that the staff were out there reached about half, and that is something that I want to make sure the study team and the work groups are aware of.

8                   What does that mean for the study? It is something we can discuss right now, but I think use in April and May, the water is still cold. We are talking mostly anglers. We are not talking about too much crowding at those sites, so the interviews are really focused on the angler population.

15                   We do have an aerial photo to help supplement the spot counts, and we do in some cases have where available traffic counts and other sources of information to help piece together the overall character of recreational resources at those sites during those months, but this is an update meeting and I want to make sure that everyone is aware that the final study report or the draft study report will show less than twenty days a month for interviews and spot counts for April and May. Any concerns that we

need to discuss on that now?

2           **TERESA ROGERS:** What I can also do is sort of summarize this in the study update meeting report because that will go out to everybody. These things are kind of highlighted for comments.

7           **BILL KITTRELL:** He is saying the survey days were about half of what was in the study plan for April and May; is that right?

10          **TERESA ROGERS:** You are saying that the days of the actual interviews and spot counts were about half of what we had proposed in the study plan for April and May; correct?

14          **JOT SPLEND:** That is right; that is exactly right. It is roughly half. So if Allidsonia was scheduled for ten, we have five right now.

18          **TERESA ROGERS:** We have some supplemental data through the aerals.

20          **JOT SPLEND:** Right; we can patch together... I guess the question also is: Is it appropriate to use surrogate information from the Fall fishing season as surrogate for the Spring fishing. If we know from the interviews that we do have that the users are primarily anglers

fishing in April or May and we need to supplement that, is it okay to use September and October if we really need to, and that is a question rather than an approach that I am going to take to the group.

6                    **BILL KITTRELL:** Just the recreation component that was missing during April and May?

8                    **TERESA ROGERS:** Is it just the recreation component from April and May?

10                   **JOT SPLENDA:** Yes; angler use I am going to address later, the angler use study, the creel study. This is just the recreation at the boat ramps.

14                   **TERESA ROGERS:** These are interviews at the access sites?

16                   **JOT SPLENDA:** Yes, and then in the same vein, the traffic counters was another tool that Berger was using to help characterize recreation use and activity around the site. During the pre-study work and setting them out, we identified four sites as appropriate for handling traffic counters. We know that there is a counter at Allisonia that the New River State Park manages and that Claytor Lake State Park has their own traffic counter, and some of the sites

just are not conducive to having a counter just on the general layout and there is no primary entry or exit points, but we identified four locations that would take a counter. Two of the locations the counters malfunctioned for June, July, and August - that would be Dublin and Harry DeHaven County Park. This is only limited to the recreation access sites at Dublin and at Harry DeHaven it was just the counter there, and to take a step back, what these counters are useful for is to help understand use characteristics during the day or volume of use, how much traffic is entering or exiting the site, and it is often useful to combine it with interviews to calculate overall use at a site.

16                    Now, not having traffic count data for those months is not going to be the end of the world, in that we still have spot count and interview data for those months, plus aerial photography so that we can still figure out or there is still a method to figure out use estimates for those sites, but, again, this was something that I felt that needed to be put in the study update report that Teresa puts together and I just want to make sure that I disclosed it

in this update meeting. I don't think it was a point that would hold up the rest of the study. It is just something that I wanted everyone to be aware of.

5                    **BILL KITTRELL:** Do you feel like the lack of that information during April and May produces enough error that you have to throw out April and May for the recreation completely?

9                    **JOT SPLENDA:** I don't think there is enough diversity in the activities happening then to make it a problem, and what I mean is we are not in June and July when we have a lot more of the water sports where you get people cruising and the jet skiing and the water skiing going on. If we had a low sample during that period, then I would actually be more concerned, but especially in April the water is still really cold and even at spot counts we had zero water skiing. We are talking anglers, you know, almost exclusively in both those months.

21                    I wasn't planning on giving this actual number as to how many interviews we had that month, but I know we are in the twenties to thirties for those months. So even though it was low sample data, we still have a pretty good

amount of interviews for those times.

2           **TERESA ROGERS:** I think they are  
going to be thinking on it.

4           **JOT SPLENDA:** I would expect as  
much.

6           **BILL KITTRELL:** Is that just on  
Claytor or the entire river?

8           **TERESA ROGERS:** Is that just Claytor  
or the entire river?

10          **JOT SPLENDA:** No; this is just  
around Claytor.

12          **TERESA ROGERS:** Just around Claytor.

13          **JOT SPLENDA:** The New River sampling  
is more robust and much more... You know it is  
right on the study plan goals and objectives.

16          **UNIDENTIFIED SPEAKER:** Jot, the  
track counter at Allisonia that was installed by  
the park only measures those people using the  
park part of that parking lot, right?

20          **JOT SPLENDA:** The New River Trail  
State Park actually has... Allisonia is probably,  
what would you say, maybe a-quarter to a-half  
mile away from the bridge, the railroad trestle  
bridge that crosses that part of Claytor Lake and  
that is the New River Trail in that area. There

is a parking lot at the bridge which according to someone I talked with at the State Park said that is the parking lot, but, yes, people do use the Allisonia parking lot and get there on their bikes or whatever and use the trail, but we do have the spot count to help supplement who is using the actual site, you know, boat launches versus bike and trail users.

9 Allisonia is an interesting site in that there is an extremely large parking area, but in our experience and observation it is rarely used. It is well below its capacity.

13 **UNIDENTIFIED SPEAKER:** I think that is because there was a trail user parking lot added to the boat access parking lot so that trail users wouldn't take spaces that were originally established for boating capacities.

18 **TERESA ROGERS:** I think we've got a picture of it. That is Allisonia, right?

20

21 **UNIDENTIFIED SPEAKER:** Yes.

22 **TERESA ROGERS:** So you are saying there is a trail user parking lot somewhere else?

24 **UNIDENTIFIED SPEAKER:** No, that is part of that.

1           **TERESA ROGERS:** Okay, it is part of  
that. So this was expanded so they could have...

3           **UNIDENTIFIED SPEAKER:** I was  
wondering where the traffic counter is; is it at  
the inverse so that it measures all users coming  
into that lot?

7           **TERESA ROGERS:** We are looking at  
Eight.

9           **JOT SPLENDIA:** Hold on and let me  
flip to that. The traffic counter at Allisonia  
is right across the entrance. There is a post  
which you can't see there with a sign, a small  
stop sign I think at the entrance right across  
where the gravel meets the road there. There is  
a hose counter that runs right across there. So,  
yes, it does get all, and that is the only  
entrance into the parking area, so it does get  
all traffic going into that parking lot. So it  
is combined use.

20          **TERESA ROGERS:** I am going back to  
Twelve.

22          **BILL KITTRELL:** The spot counts  
that were done during April and May, what was the  
frequency on that for the recreational assess-  
ment?

1           **JOT SPLENDA:** The question is what  
was<sup>2</sup>the frequency on the spot counts?

3           **TERESA ROGERS:** Right, for April and  
May<sup>4</sup>

5           **BILL KITTRELL:** You said there were  
still<sup>6</sup> spot counts that were done during April and  
May<sup>7</sup> is that right?

8           **JOT SPLENDA:** That's right. The  
study<sup>9</sup> plan said we would be on the field twenty  
days<sup>10</sup> a month and we divided it into two zones so  
that<sup>11</sup> each site would get sampled ten days a  
month<sup>12</sup>, but at Allisonia we are looking at about  
five<sup>13</sup> spot counts.

14          **BILL KITTRELL:** I think that is  
some<sup>15</sup>thing we can talk about in the work group  
meet<sup>16</sup>ing.

17          **TERESA ROGERS:** Okay, on to  
Thir<sup>18</sup>teen.

19          **JOT SPLENDA:** Another part of the  
recre<sup>20</sup>ation study was to survey shoreline home-  
own<sup>21</sup>ers and people within the surrounding  
count<sup>22</sup>ies, both around Claytor Lake and around the  
New<sup>23</sup>River, and we did successfully mail out and  
rece<sup>24</sup>ive back surveys. We mailed out 1100 surveys  
to<sup>25</sup>the shoreline residents or shoreline property

owners and 1100 to the regional residents. We have those already entered into a data base and we are processing that for reporting purposes.

4 I can report, if anyone is interested, that the return rate for the shoreline homeowners was about thirty-six percent, which was about what I expected in developing 1100 initial mail-outs.

9 **TERESA ROGERS:** Did you think it would be more or less?

11 **JOT SPLENDIA:** No, I think I was right on. I expected a thirty-five percent return and we got thirty-six, and that was enough to get into what we would think is the ninety-five percent confidence rule.

16 **TERESA ROGERS:** This isn't really related to recreation, but I was trying to remember. In the shoreline resident survey did we ask them if they utilized the draw-down? Do you remember?

21 **JOT SPLENDIA:** Yes, there is a question in there. I don't know the wording off the top of my head. "Do you find it as a convenience or inconvenience, necessary or unnecessary," I think those are the type of

words.

2                   **TERESA ROGERS:** I was hoping that  
got3 in there.

4                   **LAURA BULLARD:** This is Laura  
Bullard. I guess my concern with putting it in  
the6 recreation study is that it can be looked at  
as aiding in recreation, but it can be just a  
matter of shoreline property protection and  
preservation and maybe someone who was not so  
much a boater, a recreater on the lake, but who  
wants to protect their property may not be  
interested in filling out that survey because  
they think it is a recreation survey. It wasn't  
in1 the cover letter. It seemed to be skewed  
towards recreation and I wondered if this way of  
assessing draw-down need was sufficient to really  
get7 a feel for what is needed.

18                   **TERESA ROGERS:** I don't think we can  
put9 everything into that survey.

20                   **LAURA BULLARD:** Right; I just  
wondered if there was another way to address that  
that would provide an accurate assessment.

23                   **JOT SPLENDIA:** Well, I would say  
let4s hold off and see what the assessment is.  
It2 may have even gotten into the regional survey

as well, but the question is: Is recreation the place for that? I think if you are a shoreline homeowner and received a letter from Appalachian Power and a cover letter on Appalachian Power letterhead that you would be inclined to open it.

6                    Now, a lot of people chose to throw it away or not return it, but of the thirty-five percent that did return it, I am sure they took the time to at least consider if they as a shoreline homeowner have a feeling towards the draw-down, the late Fall draw-down.

12                    **TERESA ROGERS:** I think she is just wondering if everybody was so focused or recreation minded, not thinking about erosion control minded. I think that is her concern, but we can kind of look at the survey, and we won't put all those eggs in that survey basket. It is getting late, but I know where you are coming from, too, but that was just one way to kind of capture, one aspect of the draw-downs.

21                    **LAURA BULLARD:** Sure, right.

22                    **TERESA ROGERS:** Okay, keep going.

23                    **JOT SPLENDIA:** Just a kind of footnote, sprinkled through the presentation are various obliques of different access areas. This

one is Claytor Lake State Park taken on Monday, 5/21 before the beach was really open and used, but it just shows the boat ramp does have some use a low amount of use for a Monday.

5 Our next slide. After we get baseline existing use numbers and activity information then we will make an attempt to project this out into the future of what might be a future license. We will incorporate local population trends into our estimate as well, and this will be activity based. So we can look at changes in activities through time, making predictions forward.

14 This hasn't really started yet because this was dependent on the existing use information. So once all of our interviews and our spot counts and our photos and our traffic counts are taken for the last time here this week then we can start looking at what is existing use and then the next step would be projecting that forward.

22 That is a picture of the Harry De Haven Park in the lower corner. I don't know if it is showing up well down there for you or not.

1           One of the last components of the recreation study is the existing boating density analysis, looking at the spacial distribution of boats and boat at one time counts, if you will, taken during the Summer or taken during the study period.

7           In the project area we did thirteen flyovers between April 21 and October 20th. So it is not between Memorial Day and Labor Day. Three of those flights, the pilot and the photographer extended down the New River and took photos of the access areas and the use on the river down to Glen Lyn. We had eight weekends, four weekdays, and Labor Day Weekend. It shows the Saturday of Labor Day, and we are in the process now of getting those photos and digitizing them into a GIS system where we can analyze them on the water for density and then also compare them against our spot counts that we have on the New River, see how well we are doing.

21           **TERESA ROGERS:** Those dates were April 1 to what?

23           **JOT SPLEND:** April 21 to October 20th.

25           **TERESA ROGERS:** Okay.

1                   **SARAH ALLEN:** So everything on this task of the study is proceeding as planned. I know that there were a lot of comments I think earlier, I think during Tom Payne's presentation, about correlating the dynamic hydrologic modeling with the interview results from the study, and that is something that we are planning to do. Here at Berger we are working on the hydrologic modeling and the survey for the New River people we have the date, time and location. So then using the hydrologic model we can calculate what the flow was at that time and then we can look at how different activities and users utilized different flows. That is something that we are planning to do in the New River component of the draft report. Were there other concerns related to that as well?

18                   **TERESA ROGERS:** I think Bob has a question.

20                   **UNIDENTIFIED SPEAKER:** Yes, Jot, if I am hearing you correctly, and my hearing is not very good, you are talking about correlating flows with different types of recreation uses?

24                   **JOT SPLENDIA:** That's right. What we have are the interviews over the last nine months

which would occur at different parts of the river over different times over different flows and what we can do is coordinate those date, time, and location with a flow, and then we chart those out

6           The New River sampling survey had a bunch of questions that targeted that specifically, "How did flows affect you today? Did you come here specifically based on the flow? Was it too high, too low, too fast, too slow," type questions. We can put all of those to a flow at the end and then chart those out.

13           **UNIDENTIFIED SPEAKER:** Did you hear my question to Tom earlier today about whether his information would be useful to you in developing a prediction model if Claytor Dam generates power and releases X CFS how long it takes that to get to the various access points along the river?

20           **JOT SPLEND:** That is being developed as part of the dynamic modeling, the hydrologic modeling. For instance, a hypothetical is if it they release, I am just going to make up numbers, 7,000 CFS for five hours at the dam then what would that be at Eggleston and

sixteen hours later you would get 3,000 CFS for nine hours. That type of information is...

3                   **UNIDENTIFIED SPEAKER:** That is the kind of stuff that I had asked for guidance on. So good.

6                   **JOT SPLENDIA:** I think that would really enhance the existing situation where they just have the Radford gauge and the Glen Lyn gauge and say, well, it is Saturday and it is this much and I just know it rained for four days and I feel like going kyacking today. So this could be an improvement. They wouldn't have to wait for a storm event.

14                   **TERESA ROGERS:** We are on Sixteen.

15                   **JOT SPLENDIA:** Yes. A brief review of the objective of the angler use study is to use an on the water creel survey to quantify angler use, quantify their effort, catch and harvest, understand the angler preferences, quantify their expenditures, as well as also collect information on their home zip code, why they chose to fish at Claytor Lake, species preference, and then supplemental questions for the striped bass fishermen or anglers.

25                   Here is a picture of Lowmens Ferry

Bridge a Saturday morning in July. The basic method for the creel on Claytor Lake, it is a roving creel survey on the water, but it also includes a single access point interview at the VDGIF boat ramp directly below Claytor Dam.

6                   There are two sampling zones and sampling will be stratified between the two zones. The focus was on evenings as opposed to mornings, and since the last update meeting, and what we have done on Smith Mountain Lake is we have agreed to take the raw data and share it with VDGIF modelers and run it through the VDGIF models to make it consistent for their own understanding of their fish resources there and then they would supply that back to us and we would put it in the final report.

17                   **TERESA ROGERS:** That is so that it is a form that is comparable to previous angler use surveys that have been done so it is apples and apples. Correct me if I am wrong. When we first did it... The first time we did it at Smith Mountain there was some question as to whether it was using the same methods and that type of thing. Vic is working with us to make sure it is in the right form.

1           **JOT SPLENDA:** I have already  
talked...

3           **BILL KITTRELL:** Did they resolve  
those issues at Smith Mountain Lake?

5           **TERESA ROGERS:** Everything was  
resolved at Smith Mountain; correct?

7           **JOT SPLENDA:** That is correct.

8           **TERESA ROGERS:** Because there was a  
lot of questions about the data format, right?

10          **JOT SPLENDA:** There was some back  
and forth on that and then there was also some  
questions that Vic had with the model itself, but  
a big step to help make it a smooth transition is  
to pre-process it on our end, to prepare it so  
that when he enters it into model it can proceed  
rather quickly.

17          **TERESA ROGERS:** And we know what to  
do

19          **JOT SPLENDA:** We do, and Vic is  
available here this Winter to help put it high on  
his priority list. So that is a good thing.

22          We are in the process of finishing  
the surveys and interviews. This is the last  
week of field work. We will pre-process the raw  
data and temporarily share that with VDGIF. They

will run through the models, they will have the output for their in-house use and then also supply it back for reporting as part of this process.

5           There is we are finding or have found through this whole study that there are a lot of night fishing tournaments, private tournaments that either occur through the commercial marinas or clubs that are appearing that aren't fully captured by this creel. I know this was a concern raised earlier in the process. It is just one of the areas of the study that is not... There are a lot of effort and some tournaments that may not be captured in the creel census, but what we can do is have a narrative discussion on what we gleaned from interviews with the tournament host, how often they go, how many anglers are out, how many boats are on the water as part of their tournament. So we can supplement that information to some respect.

21           The expected results in our draft report, we expect to have an inventory with all the sites understanding what amenities exist there, expect to show visitor profile information, what are the users, where are they coming

from, what are the typical activities, what are the levels of use at different times, primary activities, user preferences, what are our perceptions on things like crowding, safety, lake levels, aesthetics. We expect to make predictions on future activity levels, characterize the boating density on existing conditions and also the angler use study we will have an angler effort, catch and harvest numbers, and angler species preferences.

11           The schedule today, obviously, the update meeting, this is the last week of the field work. So now we will get the data out of the field staff's hand we can crunch the numbers and start reporting it and we talked with Teresa and we have a deadline for January for a draft Recreation and Angler Use Report. So lots of work between now and then to get that out, and we should be busy doing it. Any comments, concerns, update fatigue.

21           **KRISTEN:** This is Kristen from FERC. I was just listening in for this part of it. Can you hear me all right?

24           **JOT SPLEND:** Yes.

25           **TERESA ROGERS:** Yes.

1                   **KRISTEN:** Great. I have actually  
taken over the recreation aspect of the re-  
licensing from Jack (inaudible) who retired. So  
I actually wasn't here for all the survey  
development. I just wanted to double check on  
the spot counts that you only got half of for  
Claytor Lake. You are not planning on re-doing  
those this Spring, right, as of now?

9                   **JOT SPLENDA:** As of now I don't...  
Personally, I think that the original study plan  
was robust and maybe over samples because we are  
talking about eight public sites and we would  
sample four on a day. I don't think there is a  
need. I think we can supplement our understand-  
ings of the use at those times with other means.

16                   **KRISTEN:** Okay, so your report for  
this will kind of explain why the spot counts  
that did occur will be adequate for characteriz-  
ing the sites?

20                   **JOT SPLENDA:** Yes, I think so. You  
know, like Teresa said, she was going to  
summarize the meeting results and maybe people  
will think about it and digest it for awhile and  
maybe have a real interesting point to make later  
on down the road, but I think that April and May

spot counts and interviews is not going to be the end of the world for the study by any means.

3           **KRISTIN**: Okay, thank you.

4           **TERESA ROGERS**: Any other questions on Recreation and Angler Use?

6           **JOT SPLENDA**: Everyone still awake?

7           **TERESA ROGERS**: Yes, but it has been a long day, though. Thanks, Jot.

9           **JOT SPLENDA**: Well, I am sorry I couldn't be there, but I appreciate your understanding, too.

12          **TERESA ROGERS**: Good luck with everything.

14          **JOT SPLENDA**: Let me know if you want to have follow-up with any of the points here in the update as well.

17          **TERESA ROGERS**: Okay, sounds good. Thank you.

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#### **OPEN DISCUSSION**

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23          **TERESA ROGERS**: This is a time where we can have just open discussion or follow up with any outstanding questions that you may have

or what those next steps are and then we have a few people that came in after the beginning presentation. I am going to go ahead and call that right back up to get those dates for you so everybody knows what the next steps are in case they don't come back tomorrow. If you did come in late, make sure that you sign in. Let me call those dates up real quick.

9                    **BILL KITTRELL:** Teresa, I have a question. Did you say it is open discussion now?

11                   **TERESA ROGERS:** Yes.

12                   **BILL KITTRELL:** Your meeting summary is going to go out in December and, yet, a lot of what we have been presented today is still additional work that needs to be done. Our comment period on the ILP process is January 16th to have any additional studies or any modifications to current studies or any other comments on the meeting summary.

20                   **TERESA ROGERS:** Right.

21                   **BILL KITTRELL:** If we don't have a good idea of how the current studies are going, how can we make a proposal for either modification to these studies or new studies by that January 16th date?

1                   **TERESA ROGERS:** I guess this is an update on where we are in the process of the study as it was submitted to the FERC and approved. So I guess we have to look at this in a couple different ways. Are we on track to complete the study as we proposed it and so far we are. The big thing is that whole draw-down portion which we are planning on doing in 2008 for that part of it. We have already kind of discussed the additional data that we have collected. I guess the question is: Is there anything that we missed?

13                   **BILL KITTRELL:** Will the work group meetings be prior to that January 16th date or after?

16                   **TERESA ROGERS:** We are not going to have any...

18                   **BILL KITTRELL:** Because it seems like there are a lot of big question marks about some of the results of these studies that we aren't going to know for sure whether there are proposed modifications or additional studies by that January 16th date.

24                   **TERESA ROGERS:** This is just an update on where we are in the process right now.

I guess the next steps after... I am looking at the process plan and where we are.

3           **BILL KITTRELL:** The way I read it, that is our only opportunity to propose modifications or new studies, that January 16th deadline.

6           **TERESA ROGERS:** Well, is there anything that is giving you heartburn so far?

8           **BILL KITTRELL:** Well, for example, if we don't even have a work group meeting on the Recreation and Angler Use assessment, then we may want to recommend April and May being done next year, for example, doing it over since it is already paid for. I mean that was included in the study plan, but, yet, we are not going to know. If we don't have the work group meeting to sit down with Jot and talk about it we may not have that issue worked out before the January 16th deadline.

19           **TERESA ROGERS:** And we wouldn't at that point.

21           **BILL KITTRELL:** That is just one example. There may be others.

23           **TERESA ROGERS:** I am trying to think as far as modifications to studies that we have done in other projects, and a good example is the

logperch. We weren't able to answer the questions, tell me if I am saying this wrong, we weren't able to answer all of the objectives with what we had done in 2006. So we did a second study here in 2007 because we couldn't answer all of those questions.

7 Right now with Claytor I think we are on track to answer all those objectives of the studies. What will happen next is a draft report will be coming out to all the work groups and you will have an opportunity to comment on the draft before we finalize things and if you feel like we are not answering the objectives of the studies then we will need to sit down in work groups and try to work through those issues.

16 **BILL KITTRELL:** So there isn't another opportunity past that January 16th date to propose additional studies?

19 **UNIDENTIFIED SPEAKER:** You will be commenting on the final studies, the draft study reports, the results. So at that time if you feel that missing those two months of data is inadequate and you comment on it then, then it would have to be addressed.

25 I think the intent for this round of

modifying or proposing additional studies is totally new information that came up that we didn't know about or the stakeholders didn't know about beforehand or if we are just totally off track on where we are going with the study plan. So missing a couple months of data doesn't necessarily... I don't think it needs to be in this comment package. I mean certainly if you feel like you want to make them do it, you will have a chance to comment when the draft report comes out. If there is missing data that doesn't make good conclusions of the study, then certainly you can comment on that.

14                    **TERESA ROGERS:** And I think we tried to avoid some of that by going ahead and expanding some of the scopes of the existing studies up front because we could see where there could be unanswered questions if we didn't do it. For like the water quality, if we had just stopped or whatever, we knew that there would be some unanswered questions, so we just went ahead and did it. Just based on what you have heard so far if there is something that is obvious that you are wondering about...

25                    **BILL KITTRELL:** I am going to have

to digest it a little bit, but what I was thinking is obviously we have had a drought year, and let say for example some of the quality of the information that was produced during the river recreational assessment part of it was maybe not what we were looking for because of the low number of energies for example. We are not going to know that until we see the results of what Jot has worked up. We are not going to have that information by January 16th. So we can't say, well, we really strongly believe that we should do an additional season's worth of field work or something like that. I mean I am just sort of throwing that out.

15                    **TERESA ROGERS:** I understand. The ILP process is very regiment. The schedule kind of depends on when you start your study and when you have your update how much information you have to review at that time. So I can understand what you are saying.

21                    **JOT SPLENDIA:** Teresa, I would also like to say, John and Bill, by all means we do have surveys on the river. It is just around the lake in April and May, and the question that I guess really needs to be important is what is so

different from the users there and their perception of the use in April and May that we couldn't glean from the numerous interviews we have in the rest of the studies, the other seven months.

6                   **TERESA ROGERS:** I think part of the question is because downstream we were passing inflow at certain times. Actually, yes, inflow which was below 750, how would that possibly have impacted some of that recreation downstream because we are in such a low... This is like a worse case kind of year. In some ways it might be good because it was worse case for water quality, but it might be bad because of recreation.

16                   **JOT SPLENDIA:** You don't get the diversity in flows to get a wide range of user interpretation.

19                   **TERESA ROGERS:** So we will just have to kind of work through that.

21                   **BILL KITTRELL:** And I am not picking on that particular study. I am just using this as an example.

24                   **JOHN SMITH:** Teresa, I think I would like to ask some folks before I say anything from

our perspective, because I think it is a good question.

3                   **TERESA ROGERS:** It is.

4                   **JOHN SMITH:** I mean I don't really have an answer without checking around to see what we have done on other projects. It just seems a little difficult to respond to the need for studies without having the studies completed. So I kind of would like to check around.

10                  **TERESA ROGERS:** Okay. Would you be able to get something to me so I could put it in the summary for everybody?

13                  **JOHN SMITH:** I was hopefully going to say something tomorrow. It is getting late. I don't know who all is around here now.

16                  **TERESA ROGERS:** I am trying to look ahead at the process plan because we have another update meeting this time next year, we have another update meeting, which by then the studies will definitely be complete. We will have already had the draft reports out and commented on and finalized by the next update meeting.

23                  **BILL KITTRELL:** The opportunity for comments would sort have been passed up in terms of if there was something else that you really

needed.

2                    **LAURA BULLARD:** Could the study year extend another year into 2009? I mean if in this summary of next November of 2008 it was apparent that something needed to be done, could more studies be done in 2009?

7                    **TERESA ROGERS:** Let me look at the schedule. I guess I want to wait and see what the draft reports say to see which reports are indicating that kind of thing. I mean that is why they built that second study year in there. At the same time, you know, you've got to really look at it. I mean that is a ton of money. If we need to, we need to, but if it is just to gather additional information we need to really look at it, but I do see where you all are coming from, and I guess that is one of the reasons we send out draft reports so that it is not part of this process, that is just something we have just done, so there is that opportunity to highlight things like that.

22                    Another example would be that we don't experience in here on the reservoir because of the way you can pass inflow or 750, whichever is less, but if we had to release a lot more than

inflow we could have been down on reservoir elevation which could have impacted recreation on the lake. So, you know, we have seen some of that, too.

5           One of the things you do is you make sure that that is clear in the report the conditions that the studies were held under and how you can address those things going forward.

9           **UNIDENTIFIED SPEAKER:** I think it is a very valid point. If we can use prior experience and good judgment from other similar situations to project what use figures might have been had this been a normal water year. You know, Game and Fish has done some creel studies here during normal water years. Maybe we could even look at some of those to use data like that to help tweak data from this year. But we almost don't know if whether we have a problem until very late in this process, and that I think is the point that Bill is making, that for us to know we have a problem we have to almost get through the process first to go, "Wait a minute, this is not working."

24           **TERESA ROGERS:** We are still collecting data for some of them.

1                    **UNIDENTIFIED SPEAKER:** Along the same lines, the Shoreline Management Group hasn't met; so we don't know what we are doing, and, likewise, to us that is an important piece and, likewise, comments, you know, having not even started the thought process of that, I am not sure... Since I am not sure what we are doing, I don't know if we would even be able to comment, but I am saying as a principle that that group is even more clueless than all the studies and so forth might be at this point and with the participant comment time coming up, it looks to me like we will not have done anything by then. I don't know if that is a valid point, but it is a concern.

16                   **TERESA ROGERS:** If you haven't been through the process of putting together a Shoreline Management Plan I can see where it looks like nothing has been done.

20                   **UNIDENTIFIED SPEAKER:** That is probably the perspective of the people that would be in the work group.

23                   **TERESA ROGERS:** But from the perspective of gathering the information that you need in order to put together a plan, that has

been started. It just hasn't been formalized with that group and that vision shared.

3                   **UNIDENTIFIED SPEAKER:** But once we see that will we say oops, wish we would have... or do you think everything we have got is completely adequate?

7                   **TERESA ROGERS:** Based on putting together one for Smith Mountain, when we were designing these studies the information that we are gathering is the same type of information that we are going to need. It doesn't mean that something unique is not going to pop up, but the main components, we have been collecting that information.

15                   **BILL KITTRELL:** It seems like at the very minimum on the ILP process, which we can't do anything about, but there should be a draft final report given to the participants prior to the thirty day deadline for commenting requesting modification for new studies and we don't get anything to review other than just a cursory overview on the screen here.

23                   **TERESA ROGERS:** Right, and I am sure you all aren't the first people to bring this up to FERC, too. I mean this is part of the

process. Did you hear that, John?

2            **JOHN SMITH:** I couldn't hear that  
one3

4            **TERESA ROGERS:** It just seems like  
there is not a lot of time between getting the  
study results and proposing modifications and new  
studies.

8            **JOHN SMITH:** I think the intent was  
that folks would have the study results. So I am  
going to have to look into it to see what we have  
done.

12           **TERESA ROGERS:** Well, I mean I know  
we are still collecting data.

14           **JOHN SMITH:** Right.

15           **TERESA ROGERS:** On some things.

16           **LAURA BULLARD:** Teresa, back to the  
Shoreline Management work group, is it correct  
that we are going to be using the information  
that the study groups are discovering to create  
correct management.

21           **TERESA ROGERS:** Exactly.

22           **LAURA BULLARD:** So we pretty much  
have to wait until we have the...

24           **TERESA ROGERS:** This is the failure  
on my part. I should have already shared that

process with that group so they would not feel like it is just not being done. It is, but they don't know it.

4           As far as the deadlines coming up, we will file that meeting summary update by the 17th and then you guys will file your comments on the meeting summary, request for study modifications, and our new studies within thirty days and then we will file our response within another thirty days and then FERC will come back with their study determination.

12           **LAURA BULLARD:** And what is that study, what do they say in that study determination?

15           **TERESA ROGERS:** If they get requests for new studies then we will respond to it and they will say either yes or no based on... An example would have been Paul's comments about why aren't we mapping wetlands. Well, it wasn't in that study, in our study that we are doing now, but if he feels like there is enough justification for doing that he can put together that justification and send it to FERC and if they say yes then we would need to do it. That is how that works.

1           **BILL KITTRELL**: I think we requested  
or at least discussed mapping riparian vegetation  
downstream. FERC didn't approve that. I could  
be wrong about that.

5           **TERESA ROGERS**: Any other questions?

6           **LAURA BULLARD**: Could you go to the  
next line, Teresa?

8           **TERESA ROGERS**: Yes, that one you  
are talking about?

10          **LAURA BULLARD**: Yes.

11          **TERESA ROGERS**: They are finalizing  
and putting the reports together and we will send  
out a draft report. That is when we really get  
into the work groups and start answering the  
questions that you have on the reports prior to  
finalizing them. So you will have an opportunity  
to ask the consultants questions on the draft  
reports.

19          **LAURA BULLARD**: So those draft study  
reports will be provided when?

21          **TERESA ROGERS**: Some will be the  
first quarter, and they are all different times.  
Some will be in January.

24          **LAURA BULLARD**: So the summary that  
you are going to provide by December 16th or

whatever...

2            **TERESA ROGERS:** It is just a summary  
of this meeting.

4            **LAURA BULLARD:** Of this meeting,  
okay, thank you.

6            **TERESA ROGERS:** Any other questions?  
We still have a long way to go. We are getting  
there. All right, we will be meeting back  
tomorrow at 9:00 and tomorrow we will be going  
over Cultural Resources, Water Quality, Aquatic  
Resources Assessment, Navigation Aids, Fish  
Entrainment and Impingement, and then give you a  
little bit of update on the Shoreline Management  
Work Group. Thank you guys for coming. Make  
sure you sign in.

16          (Thereupon, the meeting was concluded for  
the day.)

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