UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Loup River Public Power District
Project No. 1256-029-Nebraska

# Loup River
# Hydroelectric Project
# (FERC No. 1256-029)
# Study Plan Discussion

New World Inn
Columbus, Nebraska
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The Loup River Hydroelectric Project
FERC Project No. 1256
9/9/10 Study Plan Discussion

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

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MS. MARY BOMBERGER BROWN, TERN AND PLOVER CONSERVATION PARTNERSHIP
MR. ROBERT CLAUSEN, LOUP POWER DISTRICT
MR. LEE EMERY, FERC
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MS. STEPHANIE WHITE, HDR ENGINEERING, INC.
MR. SHUHAI ZHENG, NEBRASKA DEPARTMENT OF NATURAL RESOURCES
MR. RON ZIOLA, LOUP POWER DISTRICT

VIA TELEPHONE:
MR. TOM ECONOPOULY, US FISH AND WILDLIFE SERVICE
MS. JANET HUTZEL, FERC
MR. RANDY THORESON, NATIONAL PARK SERVICE

(Whereupon, the following proceedings were had, to-wit:)

NEAL SUESS: Good morning, everyone. Welcome to Columbus, Nebraska. My name is Neal Suess. I'm the president and CEO of Loup Power District. I appreciate everybody turning out today for -- to listen to the results of our initial study report.

We've got a lot of folks here and a lot of new folks here, a lot of new faces, and so I'd like to go around the room initially and everybody introduce themselves.

We'll start over here with Stephanie.

STEPHANIE WHITE: My name is Stephanie White. I work for HDR. Today I will be the facilitator of this meeting.

JEFF RUNGE: Jeff Runge with US Fish and Wildlife Service.

SCOTT STUEWE: Scott Stuewe, HDR, senior fisheries biologist.

GEORGE WALDO: George Waldo with HDR, licensing consultant.

PAT ENGELBERT: Pat Englebert with HDR, water resources.

GARY LEWIS: Gary Lewis, HDR, water

resources.

MATT PILLARD: Matt Pillard, HDR, environmental scientist.

CHRIS PRACHEIL: Chris Pracheil, DEQ, water equality.

JOEL JORGENSEN: Joel Jorgensen, Nebraska Game and Parks Commission, nongame bird program manager.

MARY BOMBERGER BROWN: Mary Bomberger Brown, Tern and Plover Partnership.

MICHELLE KOCH: Michelle Koch, Game and Parks Commission, environmental analyst.

JUSTIN KING: Justin King, NPPD.

NICK JAYJACK: Nick Jayjack. I'm with FERC, and I'm a branch chief of the Midwest branch.

ISIS JOHNSON: I'm Isis Johnson. I'm also with FERC, and I'm an environmental biologist.

STEPHANIE WHITE: Did everybody hear that, Isis Johnson?

ISIS JOHNSON: I'm with FERC. I'm an environmental biologist with the Midwest branch.

PAUL MAKOWSKI: Paul Makowski, FERC, civil engineer.

MIKE GEORGE: Mike George, Fish and

Wildlife Service, field supervisor for Nebraska.

FRANK ALBRECHT: Frank Albrecht, Nebraska Game and Parks Commission, realty and environmental growth.

RICHARD HOLLAND: Richard Holland, Nebraska Game and Parks Commission. I'm a fishery researcher.

DAVID TUNINK: Dave Tunink, Nebraska Game and Parks Commission, fisheries management section supervisor.

JEFF SCHUCKMAN: I'm Jeff Schuckman. I'm with Nebraska Game and Parks out of Norfolk, district fisheries manager.

ROBERT HARMS: Bob Harms, Fish and Wildlife.

LEE EMERY: Lee Emery, FERC, Washington, D.C., Midwest branch. I'm the new project manager for the project.

JERRY KENNY: Jerry Kenny, executive director of Platte River Recovery Implementation Program.

SHUHAI ZHENG: Shuhai Zheng, Department of Natural Resources. I lead the program.

ROBERT CLAUSEN: Bob Clausen, Loup

Power District Board of Directors.

LISA RICHARDSON: Lisa Richardson, HDR, the relicensing project manager for the district's relicensing.

NEAL SUESS: Ron?

RON ZIOLA: Ron Ziola, Loup Power District.

JIM JENNIGES: Jim Jenniges, Nebraska Public Power District.

JIM FREAR: Jim Frear, Loup Power.

WENDY THOMPSON: I'm Wendy Thompson with HDR.

NEAL SUESS: Theresa?

THERESA PETR: Theresa Petr with Loup.

NEAL SUESS: And I believe we have a couple folks on the phone. If you're on the phone, would you go ahead and introduce yourself.

RANDY THORESON: Randy Thoreson, National Park Service, Hydro Program.

JANET HUTZEL: Janet Hutzel, Federal Energy Regulatory Commission.

TOM ECONOPOULY: Tom Econopouly, fishologist with the Fish and Wildlife Service.

NEAL SUESS: Is that it on the phone?

All right. Well, again, I appreciate everybody for turning out today. You have a copy of the agenda and probably the slides in front of you. Obviously we've got a long day ahead of us to go through all of this. I do want everybody to feel free to get up, move around as you need to.

Do speak loudly. Make sure everybody knows who you are when you're speaking so that we can move forward and make this as productive of a day as we can.

A couple things, obviously we started out this year -- I guess the good news is we had a lot of rain, a little bit of a challenge from completing some of the initial results that we wanted to get, and we'll talk about more -- we'll talk more about that as we get into the study reports.

But the good news is there's plenty of water and there still is a lot of water out there and that's good news, I think, from everybody's perspective.

The project, obviously, a 35-mile canal with two powerhouses, and that's really what we're here to talk about today and what we came through with.

So with that, I'm going to turn it back

over, I guess, to Stephanie. And I'll let you and the HDR folks -- for those of you who don't know, HDR is our consultant. We have hired them to basically help us manage the relicensing process and to help us get through it and get to a new license.

Our current license expires in April of 2014, so we've got a lot of things coming up on the board. We've got a number of boards around here that kind of explain both the process where we're at and explain the project. So feel free to take the time during the breaks and everything to look at the boards. And if you have questions, make sure you ask those at the time.

RON ZIOLA: I was going to say, you can get ahold of me.

NEAL SUESS: Yeah. You can either talk to Ron or myself or to Jim. We probably should be able to help you out and explain what's going on. If you really want to know, talk to Ron and Jim. I'll give you some answer that probably makes half sense to everybody. So we'll just take it from there. They know what's doing on. I'm just here.

So Stephanie, I'll turn it back over to you.

STEPHANIE WHITE: Okay. I want to

give you a couple of items of general housekeeping.

For those of you who are on the phone, there are three of you. I want to make sure that you have a copy of the agenda and the slides.

RANDY THORESON: This is Randy. I do.

STEPHANIE WHITE: Okay. Tom?

JANET HUTZEL: I have a copy of the agenda. This is Janet.

STEPHANIE WHITE: Janet, do you know where to find the slides?

JANET HUTZEL: Yeah. I'm on your website now.

STEPHANIE WHITE: Okay. I'll give you a second to find that.

Tom, do you have the agenda and the slides?

TOM ECONOPOULY: Yes, I do. I have both.

STEPHANIE WHITE: Great. The slides are numbered in the lower right-hand corner. So throughout the day we'll try to refer to the slide number. We'll try to give you verbal cues to let you know when we're advancing and when we're going back.

If we lose you at any time -- and I'm speaking to Janet, Tom and Randy, you guys on the phone -- if we lose you at any time, speak up and we'll stop and reorganize so that you can follow us today.

A couple of other things for those of you in the room. If you looked at the agenda, you'll notice there are no breaks. We're really going to push you hard today. You cannot get up from your chair.

I'm kidding. I'll call breaks when we need them. You're also welcome to come and go as needed as we move through the material today. We really do have a lot to cover. We'll try to be efficient and good stewards of your time.

I want to talk about restrooms, just out the door and around the corner. Your name placards -- so Frank Albrecht is No. 1. We did order them in number of importance. He's in the important corner.

No. Those are numbered so that our court reporter can attach the speaker to the name quickly. So if you can make sure at all times that your name placard is facing Kristin, that will help us expedite the meeting as well. She's already

interjected a couple of times today. If she can't hear you, she'll let you know.

Any questions about anything I haven't covered yet? All right.

Here is an electronic copy of the same agenda you have. We're going to talk -- Lisa will come forward in just a moment and give you a little bit of a process overview.

There are some new faces. I'm sure everybody is up to speed. But just to make sure we're all on the same page, she'll take 15 minutes and walk through that. I'm on Slide 2, for those of you on the phone.

We're going to -- she'll also give a weather report, 2010. We're going to talk a little bit about that and how it's impacted some of our work this summer.

At 9:15 we're going to talk about ongoing studies. One, two, three, four, five -- there are five studies that have not yet been completed. So our study team will spend some time today and tell you where they are in that process and what's happening in those five studies.

At 15 minutes after 10 we're going to talk about study results for fish passage, recreation,

land use, Section 106 and PCB fish tissue sampling. We've saved sedimentation for after lunch. We'll devote the entire afternoon to that for as long as it takes. And then we'll talk about next steps.

Okay. I want to give you just a quick overview of the goals for today. Those of you who have been with us every meeting up until now will be relieved -- I'm sure you are relieved to note that there aren't green, red and yellow cards at your place.

We're not voting, we're not looking for a consensus today. Today is about presenting our results to you. It's about the implementation of the revised study plan document as approved by FERC. That's the goal for today.

Lisa's going to talk to you about the process and what your role is in the process upcoming. So if you have questions about that, she's the person to ask.

We also would welcome your questions about the methods, the findings, as we're in the details of these studies. And ask when the question comes to you. Don't wait for the end of the study. When the slide is up, ask the question.

So goals: To present the results of

completed studies identified in the revised study plan and the study plan determination; also to discuss any proposals to modify the study plan by the district or other participants in light of study progress and data collected.

Lisa is going to talk a little bit more about how that impacts you and what that looks like. And in a second when she's ready, she can come up and give you an overview.

LISA RICHARDSON: All right.

STEPHANIE WHITE: One last thing about microphone etiquette. You have to look like you're going to finish your drink.

LISA RICHARDSON: Okay. Can you hear me?

NEAL SUESS: No. You've got to turn it on.

LISA RICHARDSON: How about this? Can you hear me?

I just have one question before I start. On the phone, are you able to here the discussion fairly well?

RANDY THORESON: You're cutting in and out a little bit.

LISA RICHARDSON: Okay. Well, we'll

try to speak as loudly as we can and as clearly with the microphone.

As Stephanie mentioned I'm going to just give you a quick overview of the relicensing process, kind of where we've been and where we're going.

The first box, the green box -- and for those on the phone, I'm on Slide No. 4. It has a bunch of green and blue boxes on it.

That first green box we -- basically was to gather information about the issues. We did that in conjunction with the agencies. We had a series of agency meetings a couple of years ago now, identified the issues.

Then in the blue box we refined those issues and developed a study -- a plan to study them. Again, we did that in concert with the agencies. We had a series of agency meetings last spring and summer.

And so now we're in that second green box, which is to study the issues. We have been implementing the study plan as we provided it in the revised study plan and as FERC amended it in the study plan determination. And I have so many things in my hand, I can't advance the slides.

STEPHANIE WHITE: That's fine.

LISA RICHARDSON: On to Slide No. 5.

As we mentioned, the study plan determination, FERC issued that on August 26 of last year. They removed three studies: Water Temperature in the Platte River, Fish Sampling and the Creel Survey, which was combined with Recreation Use. Those removals had already been approved by all the agencies participating so that wasn't any kind of a surprise.

There were three studies that were approved without modification, those being Fish Passage, Land Use Inventory and the Section 106 Compliance Study.

And then there were six studies that did have modification: Sedimentation; Hydrocycling; Water Temperature in the Loup River Bypass Reach; Flow Depletion; Flow Diversion; Recreation Use; and Ice Jam Flooding on the Loup River.

So it's those -- those nine studies that we'll be talking about today.

Next slide.

So the next step after today, I'm going to give you a preview of what's coming up after this. The district will prepare a summary of this meeting.

We're also preparing a transcript like we had from our other meetings. That's not what the summary is. The summary is basically meeting notes. We'll be submitting that on September 24.

And then those present will have about a month to review those notes, make sure that they don't have any concerns or questions about them, and then also to file your requests for study modifications based on the information that we've gathered so far. So that -- those will be due October 24.

Then after those are submitted, the district has about a month to provide any additional information and respond to those questions or comments.

And then by the end of the year, FERC will make a determination on any study modifications to request -- require that the district implement.

I have a question for the FERC folks. Is that -- is that the way you see it?

FERC REPRESENTATIVES: (Multiple yes responses.)

LISA RICHARDSON: The answer is yes, so that's good.

Okay. Now we'll move on to Slide No. 7,

which is a little bit of a discussion about weather. The weather in 2010 here in Nebraska has been a little wild. We had high winds in the spring. We had a lot of rain, much higher than normal, and there was widespread flooding across the state.

The majority of Nebraska's 93 counties, in fact, had areas of flooding and were declared -- most of them were declared disaster areas by the government, including Platte and Nance Counties here where the project exists. So that gave us some challenges as we were collecting our data.

Go to the next slide.

This shows the hydrograph at the Loup River near Genoa. This is from May until the end of July. You can see that the majority of flows there were above median, including some that were above flood stage.

The green line represents flood stage, so there was even a period there that was above flood stage at the Genoa gage. The Genoa gage is downstream of the project diversion.

And then to the next slide.

This is a hydrograph of the Platte River at North Bend. That is just downstream of the project Tailrace, about 30 miles. Is that right,

Pat?

PAT ENGELBERT: Yes, yeah.

LISA RICHARDSON: Again, you can see that the hydrograph shows that the flows were extremely high in the summer period, so that gave us some challenges in getting cross-section survey information that's required for part of the studies, also was a bit of a challenge getting some temperature data. But I think we've been able to get the data and hopefully we'll be able to use the results without any problem.

So now we go on.

LEE EMERY: Question, Lisa.

LISA RICHARDSON: Yes.

LEE EMERY: Lee Emery with FERC.

We were out there yesterday and seen some of the project waters. Are flows higher than normal for this time of year?

LISA RICHARDSON: It is still high.

Pat, you're the hydrologist, water resource guy. How high is it compared to normal?

PAT ENGELBERT: Yeah. If you go back a slide, typically the Loup in Genoa will be a couple hundred CFS, and the Platte just upstream of the Loup/Platte confluence would be a couple hundred

CFS.

So typically in that bypass reach you might see a couple hundred CFS. We're seeing probably closer to a thousand right now. So it's very wet, a lot of high sustained flows.

LISA RICHARDSON: Any other questions about the weather or the process?

Okay. Then I guess we'll jump right into the presentation of the studies. I'll turn it back over to Stephanie.

We are now on Slide 10.

STEPHANIE WHITE: Slide 10. So we will talk about hydrocycling, water temp. We'll move through these, Study 2, 4, 5, 8 and 12. So Pat Engelbert is going to talk to you about hydrocycling. Pat?

PAT ENGELBERT: Okay. I'm going to give you a quick update as to where we are with the hydrocycling study. But first I'd like to provide a review of the goal of the hydrocycling study.

The goal is to determine if project hydrocycling operations benefit or adversely affect the habitat used by the terns and the plovers and the pallid sturgeon in the lower Platte River.

The objectives associated with meeting

that goal is we will compare the subdaily project operations to the mean daily to get a relative degree of difference between the hydrocycling and what the mean daily discharge would be. We will also do that not only daily, but we'll do that for periods of weeks and months seasonally, et cetera.

The second goal is to determine the potential for nest inundation due to both the hydrocycling, the current project operations, as well as an alternative condition. The one alternative that has been identified in the study plan determination letter was a run-of-river simulation or a no regulation condition.

The third objective is to assess the effects, if any, that the hydrocycling has on the sediment transport in the system.

And the fourth objective to meet the goal is to identify the material differences and potential effects on habitat on the tern, plover and the pallid sturgeon, okay?

Any questions on the objectives?

All right. These are the -- these are the study sites that we will be evaluating or are currently evaluating as part of this study. We've got the Loup River near Genoa, the Platte River at

Duncan, the Loup River at Columbus, and then the Platte River sites at North Bend, Leshara, Ashland and Louisville. Those are our study sites -- gaged study sites for this hydrocycling study.

There are also two ungaged sites that we'll be evaluating. The first site is the area of the Platte River just downstream of the Loup confluence but upstream of the Tailrace, okay? So downstream of the Loup/Platte confluence, upstream of the Tailrace.

The second ungaged site we will be evaluating is located within five miles of the Tailrace Canal. So there are two of the ungaged sites. There's a third site near North Bend where we're collecting some data but we'll be incorporating a lot of the gage data with that particular site.

So these tags represent the gaged locations, and then I described the ungaged locations for the study.

Okay. Here's our update. We have obtained the historic gage and flow data for all of the gage sites. Based on that information, we have performed a hydrologic analysis looking at flow duration, flood flow frequency, and we've also done

an evaluation of whether the years are wet, dry or normal.

We are in the process of developing synthetic hydrographs at the gaged sites as well as the -- let me take that back.

We're developing synthetic hydrographs at the ungaged sites for current project operations. Then we will develop synthetic hydrographs at all sites, both gaged and ungaged, for the run-of-river alternative that we're going to evaluate.

Cross-section information has been obtained at the ungaged sites; however, due to the high flows that Lisa described, we were not able to -- we obtained them in early May and then late June to early July time frame.

The -- the current -- or part of the plan is to get cross-section information during low flow or at the end of the nesting season. We don't anticipate it will be typical low flow, but still in the vicinity of the nesting season. So we're getting a second round of cross-sections right now as we speak. They're doing it this week.

We are now on to Slide 17, and I will turn it over to Matt Pillard.

MATT PILLARD: Thanks, Pat.

So we're on Slide 17, and this is an update here on the portion of the study relative to the piping plover and least terns.

We've identified time frames using historical information, information we've received in reports to identify the time frames for interior least tern and piping plover arrival/nesting/departure dates for the nest inundation portion of the study.

The next steps will be to compare those dates with the -- with the information developed through the hydrocycling study to determine the current operations and run-of-river operations of the hydrographs. So we're looking at those periods where nests could have been inundated theoretically based on those hydrographs.

We'll evaluate the sediment transport parameters for the current subdaily hydrocycling operations and run-of-river operations using the methodology described in Study 1.

And then we'll compare those threatened and endangered species' habitat on other rivers with hydrocycling operations to conditions on the lower Platte River.

So these are things that we'll be doing

here in the next few months.

Yes?

ISIS JOHNSON: Hi, Isis Johnson from FERC.

I just wanted the know, where did you get the identified time frames for the arrival, nesting and departure?

MATT PILLARD: We've done some coordination with the Game and Parks and the Tern and Plover Partnership, and there's some generally agreed upon time frames of when those species arrive, when they nest. They can have one, two, three attempts at nesting, and there's a general time frame of when they leave.

So there's not one set date to where they come and one set date when they leave. But we had to select a date to use to begin and a cutoff date for the purpose of the study.

ISIS JOHNSON: Right. I just wanted to know if you had used several years of historic data in this area to arrive at those.

MATT PILLARD: Sure. There's several sources out there, you know, and the body of knowledge allows us to say this is a time frame where we typically begin seeing the birds, and

here's a time frame where we typically see them beginning to leave.

Slide 18, as part of the revised study plan we will be developing a 1D HEC-RAS model to study the effects of hydrocycling on interior least tern and piping plover nesting habitat. So we'll be using that HEC-RAS model to help us identify some of those habitat parameters associated with those species.

Again, the results will be updated in the initial study report on January 6, 2011. So we'll have the results for you at that time.

PAUL MAKOWSKI: Paul Makowski from FERC.

I know we discussed using sediment transport function within HEC-RAS. I don't remember the resolution of that. Was there a resolution of that?

PAT ENGELBERT: From our conference call that we had, we were going to evaluate the data to see what it showed us. Initially we will set up the model and make some runs to provide us an idea of how things have changed.

There's -- there's not a lot of sediment data in the vicinity. There's quite a bit down at

Louisville, in the general vicinity. But we will continue to evaluate the necessity of that after we get our data collected.

Currently we will be evaluating it based on our sediment transport calculations that I will be discussing this afternoon. But we'll continue to update you as we move through the process.

STEPHANIE WHITE: Any other questions?

Okay. So we're now on Slide 19, which starts a new section for us, those of you on the phone.

Just to take a quick poll, are you able to hear so far? I will take that as a yes.

One request I will make for those three of you who are on the phone, be careful about putting us on hold. Sometimes the elevator music or a beeping will come through. If you would not put us on hold, you're welcome to put us on mute, but just be mindful of that as we move forward.

Go ahead, Lisa.

LISA RICHARDSON: Stephanie mentioned we're on Slide 19, but we're going to immediately go to Slide 20. I'm going to kind of follow the same format that Pat did on the hydrocycling study.

The goal of the water temperature in the Loup River Bypass Reach study is to determine if project operations, essentially the flow diversion, materially affects water temperature in the Loup River Bypass Reach.

When we had our agency meetings last year, we agreed that there was particular emphasis on the reach between the Diversion Weir and the Beaver Creek confluence. But we're also doing some checking at the -- for the reach between the -- of the Platte River between the Loup River confluence and the Tailrace Canal. So that's the goal.

Moving to the next slide, the objectives then are to estimate the relationship between flow and temperature, both ambient temperature and water temperature, humidity, solar radiation.

The second goal is to describe and quantify that relationship, if there is one, so that we can determine if there are water temperature standard exceedances that occur in the bypass reach.

Moving on to Slide No. 22, this graphic shows the locations where temperature data is being collected. The yellow dots with the gray boxes noted to them, those are the two locations where USGS temperature probes have been installed.

The -- upstream of the diversion is called the Merchiston site. That is just a temperature location. The USGS does not have a flow gage at that location.

And then downstream of the project diversion at the Loup River at Genoa, which is a flow gaging station, the USGS also installed a temperature probe there for us in the spring.

Data collection began at those sites in May -- early May -- May 5, I believe. The Loup River at Genoa, the temperature probe and I believe the flow information was washed out during the high flows. So from June 10 to July 19 we do not have any temperature data at that location because of the high flows and it took that long for the USGS to be able to get out and get that probe reinstalled. So we're missing a little bit of data there.

But I think really we've all kind of agreed that the critical period is more into August and late July, which we do have that data. And data collection at those sites will continue through the end of September.

We also have some data collection that we're going to be doing using temperature data

loggers. At those locations we'll be collecting data basically to confirm the idea that upstream -- or immediately downstream of the diversion prior to the Beaver Creek confluence is the critical reach.

So we're going to be installing some temperature -- excuse me, we had installed some temperature probes, tidbits, so to speak, immediately downstream of the Platte River confluence with the Loup and then probes upstream both on the Loup and on the Platte. Those are the red circles that you see there on the screen.

The temperature data was collected for those in August -- August 13 through the 23rd. And prior to doing that temperature collection, we did an instrument variability check on the tidbit pieces that we were using to collect that temperature data.

We installed them coincident with the USGS probes to get an idea how much variance there is between the USGS readings and the tidbit readings. We found those to be very close. So that concludes the temperature -- water temperature data.

We're also gathering ambient air temperature data from the National Weather Service stationed at Genoa, the NOVA gage at Grand Island and the Great Plains Climate Center at Mead, so

we'll be using information from all of those sources as we continue on and actually do the analysis of the study.

As I mentioned, we have -- the USGS -- I guess I didn't mention the USGS temperature data is available on their website for the different -- for the two gages.

This is a plot of the data that's been collected so far. The red line is the Loup at Genoa, so that's downstream of the project diversion, and the blue line is the Loup at Merchiston, which is upstream of the project diversion.

You can see the gap there where the Genoa gage was washed away, but you can also see the temperature of the two gages is following along pretty closely. We haven't gotten into the nitty-gritty details of the analysis, but you can see that they're pretty close. And we'll be determining how much difference there is and what is the key driver of those differences.

So here's our update. The data collection, as I mentioned, will continue through September at the USGS gages. The tidbit data collection is complete. And then data analysis is

ongoing, as I mentioned, the critical reach confirmation.

The -- we'll be doing regression analysis to identify patterns and trends with a variety of variables and then trying to develop a relationship to predict conditions when the water temperature -- when the water quality -- water temperature quality standard would be exceeded.

And similar to the hydrocycling study, the updated initial study report in January of 2011 will include the results of the water temperature study.

Yes?

DAVID TUNINK: Dave Tunink, Game and Parks.

With the higher than normal flows this year in the Loup, how are you going to handle that in your data analysis in terms of not having any temperature readings on lower flows?

LISA RICHARDSON: Well, we'll compare it to the historical data and see what kind of relationships we can come up with.

We did look at should we wait for our data collection to try to see -- to try to get some lower flows. But looking at the ambient temperatures, if you got into September too much, the ambient

temperatures drop off so much that we didn't think that that was going to be a representative -- representative of what would be a normal low flow under hot weather.

So we had to kind of balance between the lowest flows we could get based on what's happening today, as well as the temperature -- ambient temperature.

So we'll see what the results say. But we got the data when we could. We didn't think we could wait.

CHRIS PRACHEIL: Chris Pracheil, NDEQ.

You said historic data. Do you have historic bypass water temperature data? That stretch of river, is there historic temperature data on that?

LISA RICHARDSON: No, there is not. The only temperature gage on the Platte River near the project -- the closest one is at Louisville. So we don't have any historical temperature data in the bypass reach. We do have historical flow data from the USGS gages, but there is not any temperature data.

Jeff?

JEFF RUNGE: Yes, a question about the Columbus gage. Is that location in the same location as where it was gaged previously, like in the '70s and '80s?

LISA RICHARDSON: It is. And actually, the USGS has stuck in a temperature tidbit of their own there, and I believe that's been reporting on their website. But yes, that's the intent, is we're putting the -- the temperature tidbits were placed close to that -- that previous location.

JEFF RUNGE: I would guess that would be like the 281 bridge or the --

LISA RICHARDSON: The 81 bridge.

JEFF RUNGE: Yeah, excuse me, the Highway 81 bridge, yes.

LISA RICHARDSON: Yes. Additional questions on water temperature?

Okay. We are moving on to the flow depletion, flow diversion study. That is back to Pat and Slide No. 25.

PAT ENGELBERT: The goal of the flow depletion/flow diversion study was to determine if project operations result in a flow depletion in the lower Platte River and to what extent the magnitude,

frequency, duration, et cetera, of the flows affect the Loup River Bypass Reach.

Secondary goal was to determine if project operations relative to flow depletion and flow diversion adversely affect the habitat used by the tern and the plover, as well as fisheries and riverine habitat in the bypass reach and in the lower Platte. And we're going to compare current project operations to an alternative condition. The alternative condition that has been identified to date is a no diversion condition.

Our objectives are to determine the net consumptive losses associated with project operations and compare those to the no diversion condition.

Second, we use current and historic gage rating curves to evaluate the change in stage in the bypass reach during project operations and that no diversion condition.

We evaluate the historic flow conditions on both the Loup and the Platte since project inception.

We'll determine the extent of interior least tern and piping plover nesting on the Loup River above and below the Diversion Weir.

The next objective on Slide 28 -- this is Objective 5 -- to determine project effects, if any, of consumptive use on fisheries and habitat on the lower Platte River downstream of the Tailrace Canal.

And finally, Objective 6, to determine the relative significance of the Loup River Bypass Reach to the overall fishery habitat of the Loup River.

Slide 29 shows our study sites that we will be evaluating. We have the Loup River near Genoa. Beaver Creek we'll use as part of the our hydrologic analysis, Platte River near Duncan, the Loup at Columbus, and the Platte River at North Bend. We also have -- those are our gaged locations.

We also have three ungaged locations that we'll be evaluating. The first ungaged location is a point just upstream of the diversion structure. And then two familiar points, the location just upstream of the Tailrace return and downstream of the Loup Platte confluence. We haven't come up with a clever name for that yet. And then the location just downstream of the Tailrace return.

Those are our three ungaged sites: Upstream of the diversion, upstream of the Tailrace Canal, and downstream of the Tailrace Canal.

A quick update. We have obtained cross-section information for the ungaged sites. A location just downstream of the diversion we were able to get in early April was the first site that we hit. And then we jockied around in May and June and into July for the other ungaged locations.

We have collected all the atmospheric data, that being pan evap, precip and ambient temperature. Based on the gage information that we have, we performed the same hydrologic analysis that I described in the hydrocycling study.

We're determining the consumptive use of the project reach, and then we'll compare that to the bypass reach for both current and the no diversion alternative, and then we'll be developing a 1D RAS model at the ungaged sites to evaluate the effects of current operations versus the no diversion operation and how that relates to the T&E species habitat.

So with that I will turn it back over to Matt Pillard.

MATT PILLARD: Thanks, Pat. We're on Slide 32.

And as part of the review from the current endangered species side, we've reviewed the

available least tern and piping plover nest counts above and below the Diversion Weir.

And if you recall the revised study plan, we were going to look at those counts to see if we could identify any statistical relationships between nest count information above and below.

Because there was such limited amount of nest counts above and below, we really couldn't, you know, develop a statistical relationship. Too few of counts for it to statistically be worthwhile. So we proceeded with the rest of the study knowing that, you know, with so few counts, we couldn't rely on statistics to tell us is there any relationship or not.

So the second part of the study was really to look at the characteristics above and below the Diversion Weir through a series of aerial photography and historical aerial photography in past years.

And so we established what river miles would be looked at using random number generators to randomly identify five miles -- five separate miles above and below the diversion structure. And we've gone out and done some field verification to look at aerial photography and the signatures that they

exhibit versus the characteristics that are shown on the ground.

These things will help us proceed with the rest of the study in identifying characteristics above and below the Diversion Weir, such as sandbar width, vegetation on those sandbars, characteristics such as that.

So I guess with that, again, an updated initial study report will be available on January 6, 2011.

And I guess with that, are there any other questions relative to flow depletion and flow diversion?

Yes?

MIKE GEORGE: Mike George from Fish and Wildlife Service.

When you say characteristics, you know, the Loup River characteristics both above and below, what characteristics?

MATT PILLARD: Sure. There's a handful of characteristics that we -- actually we've discussed what those characteristics would be with Game and Parks, Fish and Wildlife.

They'll be things like width of sandbars, are the sandbars isolated. Are they point bars or

islands? Are they vegetated or unvegetated? Width of -- I guess width of the channel, are the banks vegetated or nonvegetated from a predator standpoint? Those kind of -- I think those were the basic characteristics we'd be looking at.

MIKE GEORGE: Okay. Thanks.

MATT PILLARD: Okay. Having no other questions, we'll move on to the recreation use, and Lisa is going to address this study update.

STEPHANIE WHITE: Before we do that, I placed two mics at the end of that table. You sounded great, Mike, but I think when it comes around at the corners you may have to pass that. I'll try to give you a cue that you need to pass the microphone.

Same on this -- these ends of the tables. If you're speaking and we can't hear you, I'll bring you a microphone that's turned on when I figure out how.

RANDY THORESON: This is Randy. Can you hear me?

STEPHANIE WHITE: Thanks for that. It was cutting in and out. Thank you.

LISA RICHARDSON: Okay. Randy and those on the phone, can you hear when we're

presenting what's on the slides?

RANDY THORESON: This is Randy again. I sure can, yes.

LISA RICHARDSON: Okay. Great.

LEE EMERY: What about the other two people? Are they still there? Janet, are you there?

STEPHANIE WHITE: Janet, can you hear as well? Do you have a number for her? I'll call her and get her back on the phone.

LEE EMERY: What about the other person? There's three people, right?

MATT PILLARD: We didn't hear anybody hang up.

LISA RICHARDSON: Yeah. Do you want to -- I know recreation was one of the areas that Janet was interested in. We are a little ahead of schedule. Would you like to take a quick break so you can call her, or do you want to continue? Let's take five.

(Short break taken.)

STEPHANIE WHITE: Okay. Up next is recreation. I'd like to do a quick role call on the phone. Janet, are you with us?

JANET HUTZEL: I am.

STEPHANIE WHITE: Randy?

RANDY THORESON: I'm on.

STEPHANIE WHITE: Tom, are you there as well?

TOM ECONOPOULY: Yes, I'm here.

STEPHANIE WHITE: Okay. For those three of you on the phone, I've placed some microphones that are close to the receiver. It may cause some interference for you. So if that happens, raise your voice, let us know, and I'll reorganize the technology in the room.

But I think we're about to get started. We're ready to do recreation. So Lisa, I'll let you start.

LISA RICHARDSON: Okay. We are on Slide No. 33. That slide just shows a few photos of the district's -- some of the district's recreation facilities.

Moving on to the goal on Slide 34. The goal of the recreation study is to determine public awareness, usage, perception and demand of both the project's existing recreation facilities, including fisheries, and the Loup River Bypass Reach, including the Loup Lands Wildlife Management Area, and to determine if potential improvements are

needed and then to develop a recreation management plan to address existing and future recreation needs.

We had several objectives that go along with that goal. The first is to measure recreation usage of progress -- of project recreation facilities, both on the Loup River bypass reach and at the -- along the project; to document the types of recreation use that are occurring; and to determine whether the current facilities meet the demand.

Moving on to Slide 36, continuing on with the objectives, to determine the public's perception and awareness of project recreation facilities; to determine what species anglers are targeting and catch rates, that's kind of the piece that is the combination of the creel survey and the recreation use survey; and then to collect data for use in preparation of that recreation management plan.

So moving on to Slide No. 37, the study area for the project for the recreation use study was the power canal -- the entire length of the power canal, and then the developed recreation areas that the district has. Those include Headworks Park, Lake Babcock Park, Lake North Park, Columbus

Powerhouse Park, and Tailrace Park.

In addition, there were recreation use surveys that were conducted and are being conducted along the bypass reach. For those surveys we went to publicly accessible areas. There is a lot of private land along the bypass reach, primarily private land, but we were able to use a few public areas.

There were two public parks, four wildlife management areas that have a little piece along the river, and then three public road bridges where we were able to go and observe what's happening from a recreation standpoint.

So to give you a quick update on where we're at on the recreation use surveys, as part of the study plan determination, FERC requested that we conduct the bypass reach survey so we had to develop a plan to do that. That plan was developed in coordination with the National Park Service, the Game and Parks Commission, as well as FERC staff.

Then last winter we had some creel survey proctor training. The Game and Parks actually facilitated that training. We appreciate their participation so that we will get our proctors trained.

Then this spring prior to the surveys actually beginning, we did some outreach to the community to let them know what was going on and why people were going to be asking them questions and people that they might see along the project.

We did press releases. We had a paid newspaper advertisement, a website announcement, and then there were posted -- signs were posted at the entrances to the developed recreation areas notifying people that surveys would be going on and requesting their participation.

So the -- as I mentioned, the in-person surveys are ongoing. To date we have surveyed -- I shouldn't say to date -- through the end of August we have surveyed 41 days on the Loup Power Canal, and that includes visits at the developed recreation areas.

On those 41 days, we completed a total of 756 surveys for recreation and 313 creel surveys. We've also surveyed 16 days on the bypass reach and completed 76 recreation surveys. So that -- that's the data that's been collected, but we haven't begun analyzing that yet.

Trail counters is another portion of the study. Trail counters were installed on April 30 on

the three trails: Two Lakes Trail, Bob Lake Trail, and the Robert White Trail.

The trail use on -- from those three counters has been very consistent over the months that they've been installed. Two Lakes Trail receives the most recreation use, with almost twice as many people using that as the other two trails.

And then finally the recreation telephone survey. That one -- that study is complete. We've completed the phone survey, and actually I'll be presenting the results of the phone survey a little bit later when we go through the completed studies. Consider that to be a completed study.

As part of the study plan determination, FERC requested that we have an interim report completed by the middle of October. We have that report complete now, so we've included it in our initial study results and we will be reporting on that in a little bit.

I believe that is our last -- oh, no, one more.

So the results, after the data collection is completed at the end of October, we will be putting together our initial study report which will be issued on January 6 of 2011. And then we'll be

completing then -- working on the recreation management plan after we get the results of all of the studies.

So does anybody have any questions on the results of the recreation study? Randy and Nancy on the phone, any questions?

RANDY THORESON: This is Randy. Can you hear me okay?

LISA RICHARDSON: Yes.

RANDY THORESON: Okay. I've got three questions. If you don't mind, I'll just go through them. Is that okay?

LISA RICHARDSON: Sure.

RANDY THORESON: I understand the updated information is to be provided by January 6, and then subsequent to that will be the recreation management plan. So I follow that. However, I've got three quick questions here.

If you look at Slide 37, if you go back to Slide 37 it shows the areas -- the study areas and it shows on the bypass reach two public parks, four wildlife management areas and three public road bridges.

LISA RICHARDSON: Yes.

RANDY THORESON: But then when you go

to the document -- that entire document on Page 8.1 and 8.2, all it identifies as the bypass reach is the Loup Lands WMA as the study area. Explain why that -- it is you didn't identify other areas, just if you could.

STEPHANIE WHITE: Repeat yourself for the record.

RANDY THORESON: Okay. If you look at Slide 37 in your presentation, it identifies three main areas within the bypass reach that are the study area: Two public parks, four wildlife management areas, and three public road bridges. That's stated on Slide 37.

But then I have a copy of the actual study report itself, a hard copy here. On Page 8.1 going to 8.2 when it talks about the study area, all it identifies as the bypass reach is the Loup Lands WMA. I'm wondering why the other areas aren't identified as part of the study area.

LISA RICHARDSON: Okay. Randy, the reason that it's written that way, we're studying along the entire canal as well as along the bypass reach at these locations where we can have access to the river. The -- that -- those bullet points in the report were intended to identify locations where

we are gathering specific recreation data at those sites.

We -- we are not interested in getting recreation data at those public parks; we're only using those public parks as a place where we can access and observe the river. So that's why those are not listed.

When we complete our study report in January, it will have a copy of the bypass reach study plan, which will have some graphics that will show the exact locations where we were able to access the river at public access opportunities.

Does that make sense?

RANDY THORESON: Yeah, a little bit. I'm just -- yeah. Go ahead.

LISA RICHARDSON: So yeah. The bullet points on Page 8.1 and 8.2, those are district facilities where we're interested in the recreation that's going on at those specific locations, versus the information on the slide is just indicating the access points where we were able to observe recreation along the bypass reach.

RANDY THORESON: Okay. I think I follow that. I -- let me just think that over, what you just said.

LISA RICHARDSON: Okay.

RANDY THORESON: Let me go to my other two questions.

I believe in the study plan determination -- and FERC and Janet, you may be able to correct me -- was a question about whether a survey was going to be extended into the winter months. And a determination, I believe, was going to be made by FERC related to that. Does that ring a bell with you, Janet?

JANET HUTZEL: It does. I know that we were going to have them do the telephone survey, and based on the information, determine whether or not there should be winter surveys done.

But you can comment if you have a position on it, Randy. And I think that's what this report -- they did their telephone survey, and they did provide the data collected based on the survey.

RANDY THORESON: Is there a period of time where I can think that over and provide input to you?

JANET HUTZEL: Yeah.

RANDY THORESON: Okay. And then my third and last question is -- and maybe this has been explained before -- why creel surveys were not

included in the bypass reach, Table 8.1.

LISA RICHARDSON: The creel survey was not included in the bypass reach because the study plan determination specifically required recreation use along the bypass reach.

Now, we are noting folks that are fishing, and there are some questions in the recreation survey that are related to fishing. But we are not doing the actual Game and Parks creel survey.

And the other part of the reason for that is that the purpose of the creel survey along the canal is to help the district to manage those fisheries, determine if there's any need for stocking or other improvements. And that is not part of the purpose for the district along the bypass reach.

RANDY THORESON: Okay. Thank you.

LISA RICHARDSON: Any other questions?

Okay. If there are no other questions, then we will move on to the ice jam study, which starts on Slide 40. And I'll hand it over to George Waldo to give you a quick update on the ice study.

GEORGE WALDO: Thank you, Lisa. I'm going to talk really slow because we're getting too

far ahead of ourselves here.

The photos on Slide 40 were taken this late winter, early spring. And the 2010 weather continued to surprise us through the season. But what you're seeing is the appearance of a -- I would consider it a minor ice jam that occurred on the Loup River on the bypass reach.

The lower left photo is near the Genoa bridge crossing the river, and the photo in the upper right was taken a little further downstream. I think that's probably near the town of Monroe. Is that a fair characterization, Ron?

RON ZIOLA: Between the -- halfway between Monroe and Columbus.

GEORGE WALDO: Okay, halfway between Monroe and Columbus.

And the conditions were such that there was really serious concern about a serious ice jam happening. The governor kind of prepared the state for emergency conditions.

And as it turned out, in spite of all the conditions and the melt off of a lot of snow and ice, that serious ice jam never materialized. So it may have been interesting, but we're thankful, I guess, that it did not happen this year.

Next slide, please.

The agreed upon goal in our coordination meetings was that we would evaluate the impact of project operations on ice jam flooding on the Loup and Platte Rivers between Fullerton and North Bend.

Now, I have to clarify that North Bend was a modification that was confirmed in the FERC determination. The DNR had requested that the study continue all the way down to the mouth of the Platte at the Missouri River. And we'll discuss that a little bit further on.

Next slide, please.

At this point I'm going to point out or remind some of you and inform some of you who weren't part of the process, there were actually two ice jam study proposals that were reviewed by FERC.

One was prepared by the district, the other was prepared as an alternative proposal by the Department of Natural Resources that they felt would better address their concerns.

And after evaluating the two proposals, FERC actually required that the district utilize the proposal submitted by DNR, which was -- if I can characterize it, it was more quantitative type

analysis and more comprehensive analysis than what the district had proposed.

And the district actually proposed a two-phase approach that would first evaluate the quality of the data available. And after comparing the two, FERC said, Well, the costs aren't that great. We want you to go ahead and do the more complete analysis, which is what is being done. And that included contracting the Corps of Engineers Omaha district office to do that work.

So the -- I have to go into a little explanation here because the objectives of the study which appeared in the revised study report -- or revised study plan had to be modified by the district because of the changes that came into the project due to the methodology proposed by DNR.

And so what you're reading here is our characterization of the way the study will be conducted to conform with what was requested by the DNR.

So the -- the first objective I'm reading now on Slide 42 is to evaluate the project operations on hydrology, sediment transport, and channel hydraulics on ice processes on the Loup and Platte Rivers. That portion of the Platte River was

included for reasons I'll get to.

Objective 2, to develop and -- that's a typo -- it should say an ice jam and/or predictive model to evaluate project effects.

Third objective is to identify structural and nonstructural methods for the prevention and/or mitigation of ice jams should it be demonstrated that operation of the project materially impacts ice jam formation on the Loup and Platte Rivers.

A little bit of clarification on Objective No. 2 there. It is a limitation that came out of the FERC determination that the model only look at project effects specifically and not be a regional type study or model, which was initially requested by DNR. So consider that a focusing in on project effects.

And objective No. 3, again, limits the consideration of mitigation and prevention methods to project effects only. It could go beyond that, but FERC, again, limited to project effects only.

Next slide, please.

So the study area was confined or restricted by FERC to the area of the -- of course, the Loup Bypass Reach below the diversion, but also it goes upstream about ten miles to the town of

Fullerton where another tributary enters the Loup River, and it goes downstream from the Loup confluence to the North Bend -- city of North Bend on the Platte River where you may recall there's a USGS gaging station.

And FERC limited that reach to avoid the complications of other tributaries coming into the Platte River further downstream and the fact that it would appear that project effects would be more easily identified and quantified in the vicinity of the project.

So let's have the next slide, please.

As we said, the district contracted with the Corps of Engineers to do the study. And that would involve using specific hydrologic field survey and sediment transport information that is being developed by other studies being done by the district that we heard of today.

A sedimentation study, hydrocycling and flow depletion and flow diversion studies contain components that the Corps of Engineers included in their work plan.

And after we discussed this with FERC and we discussed it with the Corps, it was concluded that the relative elements that would involve

duplication among the various studies could be utilized in the ice jam study.

So the -- specifically there's information on sediment transport that has been developed by Pat in the studies mentioned here and synthetic hydrographs and things like that which flow directly to what the Corps needs for their input. So that's handled that way.

The other item that was added was the Corps of Engineers was doing some of their own cross-section survey work in addition to using surveys that were provided from other HDR studies. And they ran into the same type of problems with high wind and high flow, and their surveys weren't completed until late July.

So the reason that this study doesn't have anything to offer in the way of results is because we're still -- it's ongoing. We're still pulling all of this information together. It is being done according to the alternative proposal of the DNR and using the DynaRICE model.

Let's go to the next slide.

They're going to analyze the ice transport using the DynaRICE model, which is a complex model. They're going to use the CRREL, the Cold Regions

Research and Engineering Laboratory, to do that.

And the HEC-RAS model was requested, and that's being used for analysis of ice affected hydraulics. And the corps will be identifying structural and nonstructural means to mitigate project impacts.

But that work is still in front of us. It will be completed, and the study report will be available in January 2011.

Do we have any questions of where we are on this study or on the somewhat confusing transition from what actually appeared in the original study plan and then the revised study plan?

LEE EMERY: Yes. Lee Emery with FERC.

Back to the picture where it showed the ice jam at the N-39 bridge, is that typically a site where that happens, where ice jam occurs?

GEORGE WALDO: I would say there's a long history of ice jams in the Genoa area. I don't know that they're specifically related to the bridge. It's just that was a photo opportunity.

LEE EMERY: Okay.

GEORGE WALDO: And to that same point, I would add that the district pulled together

at our suggestion a pretty good historical file of preproject flood and ice jam conditions. Primarily these came from the county museums and newspaper records.

And that was given to the corps to include in their analysis because their previous studies that are referenced in the discussion and the literature were all done after the project was built and operating.

And so there is a -- for -- whatever it means, we don't know yet. But there's a history of ice jams on the river before the project as well as after the project. And this will help determine the -- they're going back and using all the meteorological data, hydrological data for those early events, and that will be factored into evaluating what project effects may or may not be.

NEAL SUESS: This is Neal Suess with Loup.

The emphasis for this study basically was a 1993 report from the Corps of Engineers on an ice jam flood that occurred not in Genoa, but actually here in Columbus, just south of here. And that was -- within that report, that kind of brought up some of the ice jam flooding issues that the DNR

raised at the time.

So it just kind of depends on where you're at and what's going on in the river at that point in time. That was the emphasis behind what's going on here.

LEE EMERY: Thank you.

GEORGE WALDO: And I would add here -- and I apologize because some of you weren't part of these discussions we had on the previous ice jams.

But that was a hugely costly flood event both in Columbus and in other cities downstream on the Platte River and also on the Elkhorn River. So conditions in this -- in this region do lead to ice jams, there's no doubt about it.

So any other questions?

Okay. That concludes the ongoing study presentation, and I'll turn it over to Stephanie now for the next session.

STEPHANIE WHITE: Okay. We're about 15 minutes ahead of schedule, which is a good thing.

We're going to talk about now the studies that have been completed. They will be reordered a little bit for our discussion today, mostly just to save the big one, sedimentation. We'll devote the

afternoon to that. We may get started a little bit early, which I think would be a good thing as well.

So let's get started with fish passage.

Scott?

SCOTT STUEWE: Okay. Slide, please.

Slide 47 -- okay, 48, fine. That's fine.

Slide 48, the goal, Determine if a usable pathway exists for fish movement upstream and downstream of the Diversion Weir.

Next, please.

The objectives are to evaluate the hydraulic flow, velocity, and stage parameters at the Diversion Weir and the Sluice Gate Structure to determine whether fish pathways exist over the Diversion Weir, through the Sluice Gate Structure or by other means.

What we see here -- I better take the -- thanks.

Of course we're talking about the Sluice Gate, which is used basically intermittently for either debris removal or sedimentation or ice movement to keep them away from the intake gates.

Also the Diversion Weir itself was identified and was put in place to develop head to go down through the settling basin area down through

the production area.

The weir heights which are established either by the concrete weir, which is based basically at 1574, develops a head when you look at the Sluice Gate concrete weir, which is 1568. When you add the boards, you add another two feet to that of 1576. And these were used for developing the models when we were looking at the fish passage possibilities.

Methodology, Slide 51. Hydraulic model developed and analyzed to determine if usable fish pathways exist. We looked at using the HEC-RAS in developing some of this. The analysis was focused on the spawning migration season, which were established as April through June.

We compared the resulting Loup River flow velocities to both the critical and the burst swimming speeds of these fish species.

Now, this is information that was taken from the US Army Corps of Engineers interim report for the navigation system on the upper Miss and the Illinois waterway systems. These were -- these are still ongoing. These are being developed.

What we look at is the UCRIT or the critical swim speed. This is a map -- this is

determined by a specified amount of time that a fish can maintain itself without wearing itself out, and this was established at ten minutes.

Then you have what we call the burst speed, which is what a fish can maintain anywhere from 15 seconds to 2 minutes. And this is what they're capable of swimming through high-velocity areas. These are being developed also.

White bass, right now there's some preliminary information that shows it's between 6 and 8 feet per second. So there is more information as we develop this, as we deal with the Mississippi navigation system.

What we've seen is the Diversion Weir unfortunately is serving as a fish passage barrier 99 percent of the time. It's only submerged less than one day per the spawning season.

In other words, what we're saying is there's a flow of around 10,700 CFS, which equalizes the water flow above and below that Diversion Weir. The average velocities are 6 to 8 feet per second. As we said, there's few fish that can maintain that or get through on a burst speed. Critical fish swimming speeds are, of course, a 2.1 to 3.9 from the previous spreadsheet.

Maximum burst speeds -- if you want white sucker or walleye, they might be able to make it over that one day that might be available. What we show here is the probability of that Diversion Weir being submerged. And, of course, what we're seeing is about 1 percent.

The flow velocities -- again, this is another one showing that when it goes over the weir, we're in excess of the -- we're in that 6 to 8 feet per second.

We also looked at the alternate fish pathway. This is down the right side bank looking downstream. It's less than one day per spawning season, so that's not a good avenue either.

So again, it requires submergence of the Diversion Weir, and the weir is submerged, again, less than one day per spawning season.

Yes?

LEE EMERY: Lee Emery from FERC.

Explain a little bit for me, what is this right bank alternative? Is it the right bank looking downstream on the other end of the weir?

SCOTT STUEWE: Yes. I guess I ought to go back to the drawing.

What we're talking about is what's the

possibility of this water potentially going around that area. It's less than one day per year.

STEPHANIE WHITE: We're on Slide 50, by the way.

SCOTT STUEWE: Yes, Slide 50. I'm sorry.

Does that answer your question?

LEE EMERY: Yes.

SCOTT STUEWE: Okay then we looked at the Sluice Gates.

STEPHANIE WHITE: And now we're on Slide 57.

SCOTT STUEWE: Fifty-seven. The Sluice Gates, we were looking at different openings at different elevations and head pressures and the average velocities throughout were well above the burst speeds of most of the fish, averaging 9 to 14 feet per second with the -- when the crest was at 1576, which is at the level of when the dam boards are in place, and 7 to 12 feet per second when -- if the dam boards happen to be pulled out for whatever reason or, you know, the ice took them out or whatever.

Again, we just mentioned the critical fish swimming speeds of 2.1 to 3.9 feet per second,

again, well below what the average velocities might be. And again, we show that maximum burst speed of white sucker would allow passage during limited times when the flashboards are out.

These show the velocities through the Sluice Gates. Again, as you can see, they are all in the upwards areas that the fish could not be able to switch through at that time.

So the results. The Diversion Weir is submerged less than 1 percent of the spawning season and is generally a barrier to fish passage due to high flow velocities.

The Sluice Gate Structure does not provide a fish pathway due to limited operation and high flow-through velocities.

And lastly, an alternative fish pathway around the Diversion Weir on the right bank of the Loup River exists, on average, less than one day out of every spawning season.

Any questions?

RICHARD HOLLAND: This is Rick Holland from Nebraska Game and Parks Commission.

It appears that most of your analysis dealt with average velocities. How did you calculate those average velocities?

SCOTT STUEWE: They were calculated taking the -- we looked at the different openings for the Sluice Gates using the different flows, anywhere from 500 CFS upwards to 3,000 CFS, and those were averaged out, depending on opening size for the Sluice Gates.

And then for the Diversion Weir, the only time it could be calculated was when the water was going over, and that was so infrequently that the average was very small.

RICHARD HOLLAND: How would your analysis change if you used minimum velocities or a lower core tile velocity? Fish would not be gravitating towards average or higher velocities trying to pass a structure, they'll be trying to find minimum velocity areas.

SCOTT STUEWE: That's correct. Minimum velocities -- in this stretch, if the water is not passing over the Diversion Weir, then there's not going to be -- well, if you don't have 10,700 CFS, so you don't have the equal height, they're not even going to attempt to pass over anyway because they can't -- they're not jumpers. They're not like salmon.

So the only way that we could figure the

average is when the gates themselves are actually being used. So your average, if you look -- well, let's go back to the -- it might be easier to do it this way.

STEPHANIE WHITE: Slide 58.

SCOTT STUEWE: Slide 58.

When we look at -- the only time that the fish would be able to pass is if we have the flow somewhere in this range here (indicating). So you have equal height above and below the Diversion Weir with the dam boards, correct? Do you understand that part?

RICHARD HOLLAND: I understand that.

SCOTT STUEWE: Okay. All I'm saying is the Tailrace below the Diversion Weir is going to be the same height as the water above the diversion at that specified flow.

RICHARD HOLLAND: Right.

SCOTT STUEWE: Okay. So then what that gets us into is, if that's the case somewhere in this area, we're going to be looking at velocities somewhere in this area here, 8 to 12 feet per second. That's the only way we can figure it. Because otherwise it's an impassable barrier because they can't jump over it.

Am I missing something here that --

PAT ENGELBERT: Rick, are you asking -- we evaluated the average velocity. We looked at a velocity distribution across the weir or through the gate to suggest that maybe adjacent on either side might be a little -- lower velocities on either end, with higher velocities in the middle. Did we evaluate it that way, is that the point of your question?

RICHARD HOLLAND: Yeah. Anytime you use an average, you have distribution of velocity. The fish will seek out the lowest velocities they can to preserve energy.

I understand you have to equalize your elevations. I'm just trying to make the data look better. Just trying to help Neal out here.

NEAL SUESS: Thanks, Rick.

GEORGE WALDO: I tried that myself; it didn't work.

No, I did review the study that was done, not in my office, but I reviewed it. And my understanding of how they did the velocity analysis was -- for the -- for the Sluice Gates, again, which open from the bottom.

And so the only time that they use the

Sluice Gates, they need to consider the headwater elevation and the tailwater elevation. And when you have a low flow condition, the head is at its greatest differential so then you have more pressure pushing that water under the gate and it goes through pretty rapidly.

As the flow increases and breaks the tailwater up, you have less head driving it through the gate, but the gate is open wider in order for there to be more water in the Tailrace. And that's, I think, the way it was looked at. They looked at a variety of -- for each flow range, they looked at whatever that head would be.

And then, again, as we heard the -- in order to submerge the weir, it takes a pretty significant flood event. And those events don't occur that often, one day in that spawning season, on average.

And another clarification to your earlier question about the passage around the weir to the right bank, there's actually -- the concrete portion of the weir extends some thousand feet across the broad river valley.

And when you look at the photographs -- it's not so visible on the screen, but the ones here

on the boards in the room, through flooding in the past, that concrete weir is out of site. It's buried in the sand. But there is that broad river valley when you get a big flood. Water does go around the end of the weir. It can't go below the top of the concrete, though.

So there is an opportunity, under a significant event, for fish to skitter around the end of the -- what we think of as the diversion structure, as you see in the photo. And that was the consideration that was looked at.

SCOTT STUEWE: Rick does bring up a good point, though. If what we're seeing on the Mississippi -- the fish do seek out those lower velocities around the concrete structures, you know, where the -- that are supporting the Sluice Gates and so on themselves.

So there are some opportunities for less velocity if they hug the walls and so on, but those are very hard to measure unless you do, you know, all sorts of different things. There are some opportunities.

RICHARD HOLLAND: That's my point.

SCOTT STUEWE: Okay.

RICHARD HOLLAND: My guess is that

you can monitor average velocities across the entire structure, and you've got the modeling. But the whole concept behind fish bypass -- bypass structures is to create those velocity refuges throughout structures so that fish will be attracted to it.

So, I mean, fish, when they're faced with a barrier, are attracted to those weaker velocities, and they will migrate towards them.

SCOTT STUEWE: Right.

RICHARD HOLLAND: And so my point is that you're potentially underestimating the ability of fish to pass the structure under the normal situation.

Under the high water situations is when they'll probably do the majority of their passing of the structure, flood events and things like that. They'll make hay when that water rises above that north side.

SCOTT STUEWE: So noted.

RICHARD HOLLAND: South side. South side. Not north side, south side.

SCOTT STUEWE: Okay. Are there any other questions?

Thank you. On to the next, recreation use

telephone survey.

STEPHANIE WHITE: That's Lisa.

LISA RICHARDSON: Okay. You're stuck with me again.

We are now on Slide 60. That's just a repeat of the previous recreation slide that shows the photos of the recreation facilities.

These are the results of the telephone survey that we conducted. I'm just going to go over the goals and objectives that apply specifically to the phone survey.

The overall goal of the recreation use studies applies to the phone survey, which is to determine public awareness, usage, perception and demand of the project recreation facilities.

The objectives -- these are the objectives from the overall recreation use study that apply specifically to the phone survey.

The first objective would be to determine the public's perception and awareness of project recreation facilities; and second, to collect data for use in preparation of the recreation management plan.

So as Randy pointed out earlier, one of the other purposes of the recreation phone survey is

to determine if there is a need to extend the on-site in-person surveys beyond October 31 to gage more of the winter recreation. So hopefully the information we have in the phone survey here will give FERC all the information they need to make that decision.

So moving on to Slide No. 63.

The study area for the phone survey was basically Platte and Nance Counties. We determined -- we developed a 12-minute telephone survey that was conducted for 400 residents in both Nance and Platte Counties. It was conducted by a professional research survey firm, the MSR Group, between May 26 and June 9 of 2010.

Just a little bit of information about the demographics of the survey respondents. By county, 88 percent of the respondents were from Platte County, and 12 percent of the respondents were from Nance County.

That tracks pretty well with the population of the two counties. Platte County has about 90 percent of the total population between the two counties, so the 88 percent respondents was pretty close.

Additionally, by gender, we had 63 percent

female respondents and 37 percent male respondents.

On to Slide 64.

This shows the survey respondents by age group. The biggest age groups that were -- that responded to the survey were in the 45 to 54 age group, as well as the 65 or older age group. Nearly a quarter of the respondents were in each of those respective age groups. The lowest number of respondents was in the 18 to 24 age group. They were probably not home to answer the phone.

So going on to Slide No. 65, as I said, part of the purpose of the phone survey is to determine people's awareness of the district's facilities.

And specifically, less than 1 percent of all respondents were not aware of the -- of any of the district's recreation facilities. So in general in the two counties there is a good awareness that the district does provide recreation facilities.

Awareness about specific facilities, Lake North Park and Lake Babcock Park with the most familiar respondents, with more than nine of ten people saying that they were familiar or aware of those two parks.

The facilities with the lowest awareness

were the trails, with -- less than five of ten respondents were aware of each of the trails. So in general, the awareness of the facilities is pretty good.

We also asked about usage of the recreation facilities. The respondents who were aware of recreation facilities, we asked them how often -- or if someone from their household had visited each of these facilities within the last 12 months.

The two areas with the highest usage were Lake Babcock Park at 57 percent and Lake North Park at 55 percent. The two areas with the lowest usage were Tailrace Park at 22 percent and Headworks OHV Park, the off-highway vehicle park at Headworks at 20 percent.

When asked why they didn't visit the district's recreation facilities if they were aware of them, most people responded that they didn't use them because of location -- or I'm sorry, when asked why they did use it, they've used it because of location. When asked why they didn't use the sites, it was because they were too busy or not interested in recreation, were the reasons that they gave.

The survey also asked about various months

of usage at the district's facilities. This slide shows the highest and lowest months of use.

All of the sites had the highest usage in July. The month with the lowest usage varied, but all of the sites saw the lowest usage during the winter months, as we would expect. And actually, they showed significant lack of use in the winter months.

Of the respondents who mentioned that they were aware of the facilities, those who stated someone from their household had visited sites in the winter months between November and February ranged from about 3 to 10 percent is all that had -- somebody in their household had visited one of the sites in the winter months.

And to put that in a little bit of context, in July more than 50 percent of respondents were aware -- who were aware of the district's facilities indicated that they or someone from their household visited the district's facilities during July.

So moving on to the next slide, Slide No. 68.

This slide shows ratings of the district's recreation facilities. We asked people to rate the

different -- not the individual parks, but the different facilities that were available, everything from trails to picnic areas to restroom facilities and boat ramps.

Respondents were given five categories: Excellent, above average, average, below average and poor. We've combined the two highest categories and the two lowest categories in this table.

Trails had the highest -- were the highest rated facility, with seven out of ten people responding that they were excellent or above average. And the three facilities that had the lowest -- that had the highest below average or poor ratings were the children's playground, restroom facilities and swimming beach, each of which had more than 10 percent of respondents that gave them a low rating.

So although boat ramps had the lowest above average or excellent rating, there were not included in -- there were not very many people that rated them as below average or poor.

You'll notice that these percentages do not add up. That is because there was an option for folks to say that it's not applicable, they aren't aware of that particular facility, so they -- that's

why the percentages do not add up to a hundred.

We also asked folks who were aware of the district's facilities what were the most important recreational opportunities to them. If they were aware of the facilities, the most important were relaxing, hanging out and using the trails. And the least important were jet skiing and water skiing. So that was a little surprising to me with Lake North being a pretty popular area.

For folks who were not aware of the district's facilities, their most important activities were the children's playground and relaxing and hanging out. And again, the least important was again jet skiing and motorized boating.

So that is the conclusion of the results for the phone survey. Does anybody have any questions about the results?

RANDY THORESON: This is Randy, National Park Service.

I just want to acknowledge in your presentation there that this information will be used for the recreation management plan as well as land use. So it provides good information for that plan.

LISA RICHARDSON: Yes.

JANET HUTZEL: This is Janet from FERC.

The distribution -- the phone distribution ages, is that pretty representative of the county? I know that there was a lot of 45 and 50 and then above 55. Was that a typical distribution for the county itself?

NEAL SUESS: This is Neal Suess from Loup Power District.

Yeah, Janet, that's a pretty typical distribution in the county. We're getting older by the year, quite frankly. The younger kids are moving away, and so it's -- I would say you find that fairly typical of both Nance and Platte Counties. Nance County I would guess would probably be even a little bit older than that; Platte County is probably a little bit younger because of Columbus.

JANET HUTZEL: Okay. I was just wondering.

Is there any skiing, like cross-country skiing done on the trails or is it groomed for that in the wintertime?

LISA RICHARDSON: No, the trails are

not groomed for cross-country skiing. They still are used for running and walking.

NEAL SUESS: We don't -- again, we don't groom them for cross-country skiing. But people can -- people will go out and use those if they have -- the snow is just right for a portion of it. But we don't do anything in particular to make it useful for them that way.

RON ZIOLA: And this is Ron Ziola with Loup.

The wintertime weather and the terrain is very, very flat. It's not conducive to cross-country skiing in this particular part of the country. Normally the snow is anywhere but on the trail, and it's generally very flat.

LEE EMERY: Lee Emery from FERC.

I visited some of the sites yesterday. Is the swimming area the one near the intake diversion or is it someplace else on one of the lakes that you reference in the study?

LISA RICHARDSON: We didn't specifically -- we didn't ask them about specific swimming areas.

LEE EMERY: Oh.

LISA RICHARDSON: It was, in general,

swimming areas. Now, we can probably dig down into the data and find out who was aware of certain facilities. And then if those facilities had a swimming beach --

LEE EMERY: Okay.

LISA RICHARDSON: -- what was their perception of it. But there are swimming facilities available at multiple places. There's some at the Headworks as well as at Lake North, not at Lake Babcock.

LEE EMERY: But the other question would be in terms of recreational activities trapping, ice fishing, hunting? Any of that kind of thing occur at the project.

NEAL SUESS: Neal Suess. Ice fishing, obviously, at Lake North. You have to do it along the canal because of the flowing water. But at Lake North you can do ice fishing.

Trapping, I'm sure there's folks that do trap out there a little bit. And hunting, yeah, I mean, we have people who hunt along the wooded areas around there.

LEE EMERY: Any idea of the scale of that activity? Is it small, large, medium?

RON ZIOLA: It would be small.

Because first of all, the lakes reside within a Wildlife Management Area, so in the lake area within a half a mile north, southeast and west, there is no hunting.

Again, as the canals run through the Columbus area and Genoa area, state hunting laws would not allow you because of proximities to facilities. So out of that 35 miles all that's available really to hunting would be the canal. And then, you know, there are probably 50 miles of canal that would be available for someone to get out and walk the banks.

But again, the canal right-of-way is rather small. It's 300 feet, with the canal taking upwards of a hundred feet, so that leaves less than probably 50 feet of a grass or in some cases timber type areas that would allow you to hunt.

And then again, you have to realize the land on either side is private. So if you do do hunting, you've got to watch where you're shooting. Because if you're on the private property --

LEE EMERY: I'm just curious to get a better feel for the area.

DAVID TUNINK: Dave Tunink, Game and Parks.

I have a question on the telephone survey. You talked about the lack of younger people. Do you get your numbers off of land line phones? Is that where you get your numbers for the people to call?

LISA RICHARDSON: I believe so. I'd have to double-check that.

DAVID TUNINK: Well, the newer generation does not have land lines, they all have cell phones. So that might be one of the reasons you're a little lacking on the number of younger people.

MICHELLE KOCH: This is Michelle Koch from the Game and Parks Commission.

And the gentleman sitting next to me wanted to pass along this question, but he was wondering if any consideration was given to a bilingual survey or if there was a need for that in this area. We wanted to make sure that the nonEnglish speaking population was represented accurately in the surveys.

LISA RICHARDSON: We did not perform a bilingual survey. There is some limited Spanish speaking population. The district has bilingual signs at some of their facilities, but we did not do a bilingual survey.

LEE EMERY: Lee Emery from FERC.

Yesterday when I was out looking at the project, most of the fisherman I saw yesterday were Hispanic at the various sites.

LISA RICHARDSON: And we are approaching them for the surveys. And if they -- what we found in past experience is that a lot of people that maybe speak Spanish sometimes don't want to be interviewed. So, I mean, we're not forcing anybody to be interviewed. If they don't want to be interviewed, we just leave them alone.

LEE EMERY: Of course you have somebody that speaks Spanish, right? If they speak Spanish, they ask the questions in Spanish?

LISA RICHARDSON: The survey proctors do not speak Spanish.

MICHELLE KOCH: That's a concern as well because he noticed a lot of Hispanic people down there fishing, and he wanted to make sure they were accurately represented.

NEAL SUESS: I believe some of the proctors do speak Spanish and can speak Spanish. I don't think all of them are like that, but I think some of them there are like that so they would have that ability to do that.

Yeah, Ron.

RON ZIOLA: Ron Ziola with Loup. Usually within the group, once they understand what's going on, there is an individual in that group of Hispanic people that can speak English. So they are being interviewed if they choose.

That's why we outfitted our proctors in the lined yellow reflective vests. We tried to make them not look like the state and highway person. Most of the time they're in orange.

And we provided them with a ball cap of a white design that was definitely not any kind of indication of a state type agency coming in. So we tried to take our proctors -- make them look as friendly as possible.

And usually within a group of two or three, once they understood, they -- we are getting the Hispanic interviews.

MARY BOMBERGER BROWN: This is Mary Brown with Tern and Plover Partnership.

I noticed that most of your respondents -- it was female biased. You're two-thirds female and one-third male. I wondered if you noticed a pattern in the responses based on gender. Are females more likely to use the facilities in some ways and males

others and if you see -- if that's reflected in your data in any way.

LISA RICHARDSON: That information is available in the cross tabs of the report. I haven't dug into those specifically to look at that trend. That's something that we'll be doing as we look more at the information to develop the recreation management plan.

MARY BOMBERGER BROWN: Okay.

LISA RICHARDSON: Other questions on recreation?

LEE EMERY: Janet, any other questions?

JANET HUTZEL: Not at this point.

LISA RICHARDSON: Okay. Well, I guess it's good that they can hear on the phone.

Randy, did you have any other questions?

RANDY THORESON: No.

LISA RICHARDSON: Okay. Let me get my stuff organized here. You're stuck with me again.

We're going to go to the land use inventory. Again, this is another study that is completed. We'll go through it briefly.

The goal of the study was to determine the

specific land uses of project lands and adjacent properties to identify any potential conflicts and/or opportunities relating to project operations, public access, recreation, aesthetics and environmental resource protection.

The objectives of the study were to identify and record current and proposed future land uses; to identify and record current and authorized future land uses of adjacent properties -- excuse me, project lands and adjacent properties; to identify and map all existing public access points to the power canal, the regulating reservoirs, and the defined recreation areas; and to identify and map any areas or project lands potentially being incompatible or conflicting with adjacent land uses.

This one we had a lot of objectives for this study. On Slide No. 73, Objective 5 is to identify and map opportunities for improving public access to project lands; to identify potential opportunities to improve aesthetics on project lands and recreation areas; to identify potential opportunities to enhance public safety; to identify potential solutions for any land use conflicts that were identified; and to provide information on land use, land use conflicts and access that would be

used in conjunction with the other -- with the recreation study to develop the recreation management plan.

LEE EMERY: Lee Emery from FERC.

New to the project. Bear with me if I ask a question I should already know. I'm trying to get an overview of some of these things.

There's quite a bit of project lands here, whether it's 5,000 acres or 2,000 acres, I don't know what the answer is, but something like that. Is much of that right along the canal, or are there large portions that are off or away from the project site?

STEPHANIE WHITE: Did you all hear that on the phone?

JANET HUTZEL: Barely.

RANDY THORESON: A little bit.

STEPHANIE WHITE: Okay. Great. And Lisa, maybe when you're answering the question, if you could restate it a little bit.

LISA RICHARDSON: The question is basically that there are a lot of project lands. There's about -- over 5,000 acres of project lands and where does most of that land exist.

It does exist primarily along the canal.

There is obviously a larger area at the Headworks and at the two regulating reservoirs. But otherwise it's primarily just a parallel corridor along the canal.

LEE EMERY: Thank you.

RANDY THORESON: How about the bypass reach? This is Randy.

LISA RICHARDSON: The bypass reach was not included in the land use inventory.

RANDY THORESON: Was there a reason for that or is that just something that we didn't talk about or --

LISA RICHARDSON: It was not included in the study plan or the study plan determination. I don't recall for sure if we had any discussions on that over the last couple of years, but it was not something that came out of the meetings that we had with agencies and study plans.

NEAL SUESS: Randy, this is Neal. We don't own any of the land around it, so that's why we didn't have to do a land use inventory on it. We don't own the bypass reach, we only own the canal and the right-of-way along the canal.

And around the Loup lands WMA, we did perform a land inventory. Anything around where we

own, we did. But if you go down more off the bypass reach, since we do not own any of that, we did not do a specific land use inventory at that point in time.

LISA RICHARDSON: Yeah. Randy, the project boundary is what we used to kind of determine where we were evaluating land use, and the project boundary does include the Loup lands area. So we looked at all land uses adjacent to the project boundary.

Isis?

ISIS JOHNSON: Hi. Isis Johnson from FERC.

And so again, we're -- most of us are new to this project. So the project boundary does not include the bypass reach, is that a good assumption? Based on what you just said, that's what I --

RANDY THORESON: I couldn't hear any of that.

LISA RICHARDSON: The question was --

NEAL SUESS: Right, Isis. We only own the canal and what's around the canal and then some specific areas adjacent to the canal, like the Loup lands, Wildlife Management Area and -- where we actually have little bit larger ownership than just

that hundred feet along the canal.

Mostly the only thing that Loup owns is that right-of-way along the canal and then 50 to a hundred feet on each side throughout the whole area from that.

And the bypass -- the bypass reach, that's just the normal riverbed, which was -- and there's private ownership on both sides of that.

ISIS JOHNSON: So I know you don't own it, but you also don't have any other easements or rights around the bypass reach?

NEAL SUESS: No, we do not.

ISIS JOHNSON: Okay.

MIKE GEORGE: Mike George, Fish and Wildlife Service.

Excuse my ignorance, but are there any irrigation intakes in the bypass?

NEAL SUESS: Yes. We have approximately 80 --

PAT ENGELBERT: No, in the bypass.

NEAL SUESS: Oh, in the bypass? That I couldn't tell you. We don't -- there might be, but we don't know.

MIKE GEORGE: I guess too that would be useful information on the land use inventory

because just of the nature of the water demand. If there's irrigation, it's going to expand and what the soils are and stuff like that. That strikes me as it could have a pretty significant impact on the water going through there.

NEAL SUESS: That would be up to the DNR. I mean, it's nothing that really we would be concerned about.

We have -- obviously in the canal we have irrigation that comes out of the canal, approximately 80 or so that come out of the canal. But on the bypass -- you know, once it gets by us then it's really up to the state and the Department of Natural Resources to determine who's got the water use at that point in time.

LISA RICHARDSON: Yeah. Irrigation was not considered a factor in the land use study as the study plan was defined.

STEPHANIE WHITE: You're up. Go ahead, Lee.

LEE EMERY: Lee Emery from FERC.

That brings up a question. The 80 withdrawals that are occurring within the canal itself, are those screened or anything? Are they swallowing tags, or are fisheries being sucked up

into their piping for irrigation?

NEAL SUESS: I wouldn't think so. I can't say that they're screened for sure.

RON ZIOLA: Usually they're screened more for trash, and because of that, they would be screened for fish. Director Clausen, would that be correct?

ROBERT CLAUSEN: Bob Clausen, director of Loup.

I would say probably they are all screened.

LISA RICHARDSON: Other questions before we go on?

GEORGE WALDO: Just a point of clarification for those that aren't familiar with the project and the irrigation.

There are no turnout type structures or anything like that. It's purely inserting a pipe and a pump.

RON ZIOLA: And the other part of clarification is any of those water removals for irrigation are controlled by the state. It is not Loup's determination of whether someone can do that. That all goes through the Department of Natural Resources.

The Department of Natural Resources, they actually get a water application and, you know, an ability to take the water. So all we do is facilitate it.

LISA RICHARDSON: I had a feeling last night when I was getting ready for this that this was going to be the one that had the most questions.

MIKE GEORGE: This is Mike George.

I understand the state is responsible for that, but it strikes me that irrigation wouldn't be occurring if the project wasn't in existence. So it seems somewhat of an inherent part of the project, whether it's directly from the Loup District or -- but the fact that the project exists strikes me with irrigation so therefore it strikes me as if it deserves some level of analysis. And I'll leave it at that.

LISA RICHARDSON: Go ahead, Pat.

PAT ENGELBERT: We are evaluating that, Mike, the consumptive use associated with the irrigation.

Just as a frame of reference there, about a million acre feet are averted every year. About 2,000 acre feet are pulled for irrigation. So it is

a number, but a fairly small number. And that will be part of our flow depletion/flow diversion analysis, is the consumptive use associated with the waters.

NEAL SUESS: And Mike, I would guess if there is irrigation in the bypass reach, it's not going to be more than probably a half dozen at the absolute most just because most of the time there's not that much water going down the bypass reach.

MIKE GEORGE: Okay. The only thing I'd add to that, though, is the analysis doesn't have to just be what's occurring now. I mean, you also have to take a look at what is the potential and I think, you know, that's going to be more of a soils issue. I mean, it's forecasting, I got that. But I think some level of analysis needs to be done on that.

So again, that's my point, and I'll leave it at that.

GEORGE WALDO: Let me add to that irrigation discussion. Maybe you may change your proposal that it needs to be studied further.

The irrigation rights for the withdrawal of water from the canal -- going back to the nexus between the canal and the -- if it wasn't there, for

example -- the irrigation rights apply at point of diversion on the Loup River. They actually are not tied to the canal. And I don't know why that is, but that's -- that's the way they're written.

And Loup has -- in addition to the need to get a permit from the state for irrigation, there's a requirement -- I believe it's an easement, is that the right term, Neal, that you use in your --

NEAL SUESS: Right. They must get an easement from us to pass on our property because they're actually putting their property on our property.

GEORGE WALDO: Right. But they only get the easement after they've requested and obtained their water right from the state. And the easement reads that there's no obligation for Loup to deliver water to their outtake points. It's purely a convenience if there happens to be water there.

So there's no obligation to the district. I think this is a key point. There's no obligation for the district to deliver water to anyone for irrigation or any other purposes. It's maybe a little confusing, but that's -- I think that's a correct statement.

NICK JAYJACK: This is Nick Jayjack from FERC.

I'll just add to the discussion that about a year and a half ago we scoped the issues on the project, and these very discussions took place with regard to irrigation. So you can go to our website and actually take a look at our scoping document. And I think irrigation was one of the issues on it, or at least it was discussed.

And there are also meeting transcripts that explain and give a history of the discussions that got us as where we are at today with regard to the irrigation issue.

So just a general reminder that information is available to look at and review for more information on its history.

LISA RICHARDSON: Thanks, Nick.

MIKE GEORGE: And that's the FERC website?

NICK JAYJACK: That's correct.

LISA RICHARDSON: They're on the Loup relicensing website as well. They're probably easier to get to. You don't have to have the docket number and all that good stuff.

But if you go to www.loup.com and click --

on the right-hand side there's a relicensing button. That will take you to the relicensing website and the documents page has all of those documents that -- the FERC -- the scoping documents and then we also have transcripts from the previous meetings up there.

MIKE GEORGE: Great. Thank you.

JEFF RUNGE: One question here for FERC. You know, I read the -- a lot of the diversion sections in the final study determination. But for me, what I still have a difficult time understanding is these access authorizations, does FERC have any regulatory role when it comes to these or are these completely independent of FERC's authorization?

NICK JAYJACK: This is Nick Jayjack. The irrigation withdrawal points?

JEFF RUNGE: The agreements.

NICK JAYJACK: If it's not part of the license, then it wouldn't be under our jurisdiction. I think that these are state matters, which we generally don't get involved with, particularly water rights.

JEFF RUNGE: That's good. That's clear. Thank you.

LISA RICHARDSON: Anything else before we go on?

Okay. We are going to Slide 74, for those on the phone.

The study area -- we talked a little bit about this in the previous discussion -- the study area for the land use inventory was the project boundary and the immediately adjacent parcels.

There was some additional focus on the land uses at the developed recreation areas, at the Wildlife Management Area, the Lake Babcock waterfowl refuge, the north and south sand management areas, the siphons, and any areas with evidence of heavy informal usage, as well as the urban areas of Genoa and Columbus where the canal goes through those areas.

Other questions about the study area?

Specifically one thing I will mention is that the revised study plan did not identify a specific distance that we were going to look at land use. So as listed in our study report as a variance -- I don't know if it's actually a variance, but it's just a clarification -- we took an area that was 500 feet from the project boundary to see what the land uses were within that area

adjacent to the project boundary. So those are the -- that was kind of the limit of what we looked at.

Okay. The results of the land use inventory was that the field verified land use maps were developed. Those are included in the report showing the land use as both inside and outside of the project boundary.

Public access locations were identified and included in those maps as well. And then potential land use conflicts were identified. And it was determined, basically, that all of the adjacent land uses are compatible with the project.

The project is really a passive use through the majority of its length, the exceptions being at the powerhouses and at the -- at the Headworks. But those areas were determined to be compatible.

There was a couple of areas we looked at a little more intensely. Those were the industrial uses. There are a few industrial uses along the canal that have a discharge into the canal.

Those discharge points are regulated by the state, by the Department of Environmental Quality, and it was determined that that was a

compatible use, that the DNR -- excuse me, DEQ's jurisdiction to determine if those were acceptable uses and discharges. Those are all permitted through the DEQ, so we determined that those were compatible with the project.

Another area that we did look at as a possible conflict was the Columbus rifle range, which is adjacent to the canal. The rifle range is very well signed so that people on the -- by the canal know that there is rifle activity going on there.

There is not direct public access immediately adjacent to the canal right there. I believe it's a mile or two miles either direction to be able to get onto the access roads.

So again, we determined that that really wasn't a conflict. It was adjacent private property that seemed to be compatible with the project.

So our conclusions, again, we found that the project land use and operations were compatible with the adjacent properties. The future land use plans for Nance County and the City of Columbus don't indicate any future land use changes that would be incompatible with the project. Those are the only two jurisdictions that actually have a

comprehensive plan that identifies future land use where the project exists.

The restricted operations areas were determined to be safely separated from publicly accessible areas and that they do not conflict with recreational opportunities, the biggest area being the Headworks, which is gated and has -- is safely separated from publicly accessible areas.

And finally, the -- approximately 90 percent of public lands are accessible to the public from numerous locations. There are a lot of county roads that cross the canal where there's public access.

There's -- there are -- excuse me, public maintenance roads along nearly the entire 35-mile length of the canal that are open to the public and can be used. Virtually the entire project is available on foot. So we determined that there was a good accessibility for the project.

And that is my last slide on land use. Anybody have additional questions?

RANDY THORESON: This is Randy, National Park Service. It's my understanding -- correct me if I'm wrong -- that recreational site inventory analysis will be (inaudible) and the sites

themselves being looked at, that's correct, right?

LISA RICHARDSON: Can you repeat your question for me real quick?

RANDY THORESON: Well, the land use inventory talks about any conflicting land use (inaudible) I follow on the various sites identified, but the actual inventory analysis of the various sites themselves will be done through the recreational management plan?

LISA RICHARDSON: Oh, as far as what is available at each of the recreation areas, what types of uses are occurring there?

RANDY THORESON: Right. The inventory of what's there and analysis of that, right?

LISA RICHARDSON: Yes. That's occurring as part of the recreation study. And as we move into the recreation management plan, that will be covered there.

RANDY THORESON: Okay. Thank you.

LISA RICHARDSON: Additional questions on land use?

STEPHANIE WHITE: We're doing pretty good on time. Would you like a five-minute break?

I would. Let's take a five-minute break.

We'll come back and talk about Section 106.

(Short break taken.)

LISA RICHARDSON: I would just like to clarify a little bit on the recreation study that you were asking some questions about, the Spanish speaking.

Mike Gutzmer actually was the main person who did the surveys. And talking with him, we were able to get a lot of surveys from the Hispanic population either through a younger member of their family that interpreted or the proctors being able to speak a little bit of Spanish to get those responses.

As part of the study we are trying to gather some demographic data as far as white, Hispanic, black, other races. So we are getting that information and will have a good idea when we compile it all what percentage we're getting of the Hispanic population or what percentage of the Hispanic population is using project facilities.

So Mike is here. He just came in at the break. Does anybody have any questions about that specifically for Mike? We'll put him on the spot.

Okay. Well, if there are no questions we will continue on to the Section 106 study, which

starts with some nice photos of the powerhouses on Slide 77.

Then as we go on to the goal of the study, the goal is to achieve compliance with Section 106 of the National Historic Preservation Act through a programmatic, ongoing consultation relationship between the district and the Nebraska State Historic Preservation Office.

The objectives of the Section 106 study were to review existing information with FERC and the interested parties, including the SHPO and tribes, to identify the consultation needs and additional archival and field data collection requirements.

The second objective is to gather sufficient information to identify any historic properties that may be affected by the project.

And finally, to conduct field studies to identify and evaluate those historic properties, including archaeological properties and any elements of the standing structure/built environment, as well as any properties of traditional religious and cultural value important to the Native American tribes.

Those were the goals and objectives of the

study -- oh, there's more objectives, sorry.

Another -- the fourth objective on Slide 80 is to document the historic properties in the area of potential effects and then present management recommendations for those properties, prepare an ethnographic memo and a historic district documentation package. Those are part of the field studies.

And then to develop, in consultation with the SHPO and the tribes, a historic properties management plan, and then to implement a programmatic agreement to incorporate that into the project license.

That, I believe, is all of the Section 106 objectives.

The study area for the Section 106 study is the project boundary. That has been defined as the area of potential effect. That encompasses the entirety of the district's holdings that are subject to the FERC relicensing.

And that -- the Nebraska SHPO concurred with that -- with the project boundary being the area of potential effect back in January of 2009.

So the methodology for this Section 106 compliance, there were basically four studies or

reports to be developed and then the management plan and programmatic agreement.

The first study was a Phase 1A archaeological overview; and then a Phase 1-2 archaeological inventory and evaluation of sites in the field; develop some documentation of the ethnographic consultation; and then a historic district inventory and evaluation.

So what are the results? The Phase 1 archaeological overview was completed back in the late summer, early fall of 2009. It was determined that a field exam was necessary for eight areas within the project boundary that appeared to have the potential for intact archaeological resources or that were near existing archaeological sites.

The SHPO concurred with the recommendations of the Phase 1A in November of 2009, and that report was filed with FERC as privileged information in December of 2009.

So that Phase 1A report led to groundwork for the Phase 1-2 archaeological inventory and evaluation report. That report was completed this summer.

Eighty-three shovel tests were completed and prehistoric archaeological material was found at

three of those shovel tests and historic artifacts were recovered in four of those.

One site that was identified, a new site is recommended as eligible for listing on the National Register of Historic Places, and there were other sensitive areas both in the eight areas identified by Phase 1A as well as along the entire corridor that was identified for management in consultation with the SHPO.

So there are recommendations in the report that these areas should require some coordination with the SHPO prior to earth moving or disturbing activities.

And that report was submitted to SHPO for their concurrence on August 27 of this year. So that report was not included in our study -- initial study results report. And when we do get concurrence with the SHPO, we will file that. But we will file that as privileged information because of the sensitive nature of archaeological sites.

Before I move on to the next one, does anyone have any questions about the archaeology portion of the Section 106 study?

JANET HUTZEL: Yeah. This is Janet from FERC.

What do you mean by other sensitive areas? Were they not known to the national register, or --

LISA RICHARDSON: There were areas where it was determined that there could potentially be some additional artifacts that might be discovered. They are not at this time determined to be eligible. Those are areas that were recommended by the archaeologist who did the survey. We haven't -- as I said, we haven't discussed those with the SHPO yet.

JANET HUTZEL: You have not? Were they part of the report, though?

LISA RICHARDSON: Yes, they are. They're part of the conclusions in the report.

JANET HUTZEL: And were you proposing any mitigation for those or not as of this point?

LISA RICHARDSON: We haven't started to consider mitigation at this point. We're waiting -- we want to confer with the SHPO about the findings of the report and get their concurrence on what areas need to be monitored as part of that agreement and then we'll work on the next steps.

JANET HUTZEL: Thanks.

LISA RICHARDSON: Any other questions about the archaeology piece?

Okay. On to Slide 85. This is the discussion of the ethnographic documentation.

There has been initial coordination with the tribes both by FERC and by the district. There are six tribes in the area: The Ponca Tribe of Oklahoma -- or six tribes, I should say, with historical presence in the area -- Ponca Tribe of Oklahoma; Ponca of Nebraska; the Omaha Tribe; the Pawnee Tribe; the Winnebago Tribe; and the Santee Sioux Nation.

In the initial coordination with those tribes, none of them responded with any information about places in the area of the project that are of traditional cultural importance to them. And the Winnebago Tribe did indicate that they don't have any land in either Platte or Nance County, and so they're not interested in participating in relicensing.

So when the Phase 1A report was completed, it was provided -- the tribes were provided an opportunity to get a copy of that report and to review it. None of them requested that report based on the information in the letter that was sent to them.

And then the Phase 1-Phase 2

archaeological inventory, which really has more of the details and information that the tribes may be interested in, we did send copies of that report to all of the tribes, with the exception of the Winnebago.

So it's been provided to them for comment. We will be following up with them in the next few weeks to see if they received that and if they have any comments or wish to consult on it.

JANET HUTZEL: This is Janet.

You said you did send them copies? I'm sorry you were cutting in and out.

LISA RICHARDSON: Yes, we did send the Phase 1-2 reports to the tribes.

JANET HUTZEL: Okay.

LISA RICHARDSON: Those were sent to the chairman of the tribe directly, with a copy of the letter to the tribal historic preservation officer.

JANET HUTZEL: Okay.

LISA RICHARDSON: Additional questions on the ethnographic side?

Okay. With that we'll keep pressing on.

The historic building inventory and evaluation. The -- everyone agrees that the project

is a -- is considered a historic district that's eligible for the national register. And as a result of early coordination with the SHPO, the district agreed to develop an inventory and evaluate the district as a -- the project as a potential district.

The results of that inventory identified 16 individual properties that are -- exhibit individual eligibility and then 21 properties that are not eligible on their own but contribute to the historic district that is the -- that is the Loup Power Hydroelectric Project.

So there were also numerous noncontributing properties in the project boundary within the area of potential effect. Those types of properties would be modern county bridges, county road bridges, those types of things.

That report was also submitted to SHPO on August 27 of this year for their concurrence.

Any questions on the historic buildings study?

Okay. Then we'll move on to Slide No. 87.

The last two pieces of the Section 106 study are to develop a historic properties management plan and then execute a programmatic

agreement related to that plan.

Those two pieces have not begun until -- we won't begin those activities until after we have gotten SHPO concurrence on the field studies and those have been submitted then to FERC. Then we'll begin developing the historic properties management plan.

That concludes the presentation on the Section 106 study. Are there any additional questions?

JANET HUTZEL: Yeah. This is Janet.

You said the Winnebago Tribe did not wish to participate. Have you filed that document with FERC?

STEPHANIE WHITE: Janet, I believe actually that the Winnebago Tribe was responding to FERC's letter when they said they didn't wish to participate. So I believe that that document is filed with FERC, but I can double-check that.

JANET HUTZEL: No, that's okay.

LISA RICHARDSON: I think it was actually an e-mail.

JANET HUTZEL: Okay. And the HPMP, will you be developing that in consultation with the tribes as well as the SHPO?

STEPHANIE WHITE: Yes, that is our intent. We have really not gotten any tribal participation to date. So getting them to participate in the development of the HPMP may be difficult.

JANET HUTZEL: But you will send them copies and let them have the opportunity to comment?

LISA RICHARDSON: Yes.

JANET HUTZEL: Okay. And since some of this has not been confirmed by the SHPO or the tribes, do you intend to have follow-up in your January meeting?

LISA RICHARDSON: Yes. We would give an update of the SHPO concurrence on those reports at the January meeting.

JANET HUTZEL: Okay. And an update of the status of the HPMP?

LISA RICHARDSON: Yes, we would.

JANET HUTZEL: That's all I have.

LISA RICHARDSON: Other questions?

I can see the rest of you are more interested in fish and things like that than historic properties.

So let's move on to the last completed study other than Pat's long sedimentation study for

this afternoon.

PCB Fish Tissue Sampling is the last study. This really wasn't an official study. It was a question that was raised by the Fish and Wildlife Service and other outside agencies of concern about the possibility of PCB contamination.

So what was agreed to was that the -- there wouldn't be an official study, but that the Nebraska Department of Environmental Quality, which has a fish tissue sampling program, would add a site to their sampling for 2009 that included an additional site along the project and that the results of that would kind of indicate -- would determine what future steps are needed.

So there's a -- on page -- Slide 88 there's a nice photo of a fish.

So just to be consistent with the other studies, we developed a quick little goal: To determine if project operations affect PCB transport and subsequently fish resources in the project area.

And then the objective was to determine if the tissue of bottom-feeding fish collected from two locations within the project area contained PCBs.

So the study area was two locations along

the power canal. The second item there on Slide 90 is the Tailrace Canal at the U.S. Highway 30 bridge. This is the location that the DEQ normally samples as part of their fish sampling program. And then the additional location that was added in 2009 was a sampling out of Lake Babcock.

So NDEQ conducted the sampling in, I believe, August -- let me get to my notes here. Yes. Sampled it in August of 2009 at both locations. And then it was -- it was sampled consistent with the standards under the Environmental Protection Agency Region 7 Ambient Fish Tissue Monitoring Program, RAFTMP.

So once the fillets were sampled, that information was then sent to the EPA Region 7 lab, which conducted the PCB analysis.

The results of the analysis indicate that PCB concentrations in both samples were below the applicable reporting limits. So these results have not yet been officially reported by the DEQ because their full sampling program results are not available. It will be included in the 2009 fish tissue report once all of the statewide data has been analyzed.

So in our discussions with NDEQ after the

results were available, they indicated that the current fish consumption advisory that exists for the Loup Power Canal will likely be removed once that 2009 fish tissue report is issued, which is likely to be in late 2010 or early 2011.

Yes?

FRANK ALBRECHT: Question. Frank Albrecht, Game and Parks.

For PCBs is there a standard on the size of the fish or the age of the fish so that there's adequate time?

CHRIS PRACHEIL: Chris Pracheil, NDEQ. I believe carp are in the, like, 21-inch range. I want to say 18 to 24 inches. It's in our methods, the EPA approved methods for the sampling of fish tissue. They take into consideration bioaccumulation and biomagnification.

So they try and target fish that we would assume will accumulate the material, and we try and target size and would have adequate time to biomagnify.

FRANK ALBRECHT: Thank you.

LISA RICHARDSON: Additional questions?

All right. Additional questions related

to the PCB sampling? Yes, Jeff?

JEFF RUNGE: Yeah. I've got a number of questions here for Chris.

Well, first of all, I guess I'll take a step back.

I was under the assumption that fish within the Tailrace section which they found positive findings for PCBs, that that was the -- or could be a result of fish migrating from the Tailrace up through the lower portion of the canal. But within that section upstream of the Tailrace, there hadn't been any samples. Now -- and that it is difficult or impossible for the fish to migrate up the pen stocks to go into that middle section in between the Monroe Powerhouse and the Columbus Powerhouse.

And based on the transcript information, John Bender said that the PCB levels in fish were clean in the upper parts of the Loup River system. And so basically what we recommended was a measurement of the sediment samples.

And what came about through the final study determination was an indirect measure of PCBs in the sediment, which is the fish tissue sampling.

And for me, since contaminated fish can't

migrate through the pen stocks and fish upstream of -- within the Loup system is clean -- I'm not sure what the term clean is that John Bender mentioned within the transcripts -- but for me it's like any levels of contaminated fish -- of PCB contaminated fish in that middle section would be a -- sort of a cause for pause and reflection that, you know, maybe there's a potential for PCB latent sediments.

Now, there's two aspects of concern for us. First of all, is the PCBs within the fish tissue, but second of all, too, the lower Platte River is a impaired water body when it comes to PCBs. And so our concern too was any discharges that would be released into the canal system which would eventually make its way into an impaired -- a currently impaired water body, which is the lower Platte River.

And so this would be additive to the current level of impairments, and these were concerns. I'm not sure if they're realized or not, but that's what this fish tissue sampling was, is to help us answer those questions.

Now, first of all, I guess what's the difference between reporting limits identified in

the report and actual water quality limits or water quality limits -- yeah, if that's the correct term?

CHRIS PRACHEIL: So the fish tissue limits are not the same as the water quality standard parameters. The water quality standard parameters we have tested -- I couldn't tell you a number of times off the top of my head, but we have tested for PCBs in the water column and have not found it in the water column at numerous sites throughout the state. It is a different standard in fish tissue.

As far as the issue with upstream of the Columbus Powerhouse, I think the Lake Babcock sand dune design was to help perhaps alleviate some of your concerns about contamination between the upstream part of the power canal and (inaudible).

The Lake Babcock samples came back below detection levels. And the reason I think we sampled Lake Babcock was in order to find out if there was contamination above the Tailrace because there is potential for fish from the lower Platte section, which you did mention, to enter the Tailrace during a high flow event.

So it's sort of a chicken and egg as to the tail -- are they contaminated in the Tailrace

because of the power canal, or are they getting from a contaminated section of the lower Platte into the Tailrace. And right now we don't have a way to answer that.

And the Babcock sample helps point to the direction that the power canal above the Tailrace does not have PCB contaminations.

JEFF RUNGE: Okay. And so when it's at or below the reporting limits, meaning there's no contamination present?

CHRIS PRACHEIL: Our assessment method is to take on half of the reporting from the data and assume that as the contamination of the fish. That is the methodology. So we take the reporting limit and divide by two, and that is the number applied to all of our assessment criteria.

It's more conservative. That way there's less risk. We try to take half of the reporting limit and give the benefit of the doubt to protect the consumer that there is contamination.

JEFF RUNGE: Okay. So this is a very -- if it is present, it's at a very, very low level, even below the reporting limits?

CHRIS PRACHEIL: Yes. As of the -- the current sample -- 2009 samples both came back,

and I believe several of the 2005 -- I don't have the -- I could dig through the data here, but I believe several of the 2005 samples also came back below the reporting limit for PCBs.

JEFF RUNGE: Okay. This is very helpful.

As far as carp too, just thinking about carp and my preference for fish when it comes to consumption, I guess why was carp used and not another common species like catfish?

And I guess this is a two-part question. Would it matter? Would the intake be similar for both species?

CHRIS PRACHEIL: First of all, the collection technique somewhat limits the success. We try to get a predator and a bottom-feeder from every sample site.

And the last -- the most recent 2006 and 2008 report of the 97 sites we collected, we were only able to get a predator and bottom-feeder at 17 of those sites.

So it is -- part of it is just success in getting the fish that meet the requirements for size considerations, you know, the biomagnification sort of aspect, as well as getting species that -- a lot

of reservoirs will have both carp and catfish, perhaps. They both fall into our bottom-feeder listing.

Our predators are bass. And most of the bass species -- I would direct you to our fish tissue methodology. It's available on our website.

But in this particular case the -- a carp collected from the canal, because of the depth and the homogenous -- it's a steep channel, basically, and it's very hard for us to electroshock catfish from that. Carp are much easier to catch, and so they fill the role of bottom-feeder in our methodology, which is an EPA approved methodology.

As far as the Lake Babcock carp sampling, I'm not sure if we attempted to get a different species because I believe the methodology specified we get carp because that's what was on the impaired water bodies list.

JEFF RUNGE: Okay, then. And it seems like, too, for bottom-feeders like catfish and carp that those would have similar levels of intake and things like bass.

I'm not even sure if that's -- to what extent that's present in those lakes at all. So pretty much it seems like a lot of the intake is

similar amongst a lot of the common species.

CHRIS PRACHEIL: I think we're going to angle -- I mean, on your carp comment, I think we're going to angle to try and get rid of as many of the carp -- once that site goes on the list, it has to be sampled for that species again.

I think the person that's in charge of our fish tissue program now would prefer to capture catfish if possible. Sometimes methodologies -- it's very difficult for us; not necessarily for anglers, but just for us. If we can get some volunteers to go catch catfish we'd probably sample them.

JEFF RUNGE: I'll have to talk to my boss about that. I appreciate your information. Thank you.

CHRIS PRACHEIL: No problem.

JEFF SCHUCKMAN: I'm Jeff Schuckman with the Game and Parks Commission.

If any samples are needed, fish tissue samples from other species, DEQ can contact Game and Parks. We conducted some fish sampling on the canal system and Lake North this year, an abundant number of flatheads, various sizes, that we collected. If you're interested in channel catfish, we have some

channel catfish. So we can get those species without any problem.

So if any further analysis is needed for tissue, just get ahold of us. We'll help you out.

CHRIS PRACHEIL: I think it would be interesting just because I think that's what most of the fisherman in the canal are going after are channel flatheads.

JEFF SCHUCKMAN: Correct, and white bass. From what we've noticed this year, white bass, catfish, channel catfish and carp.

CHRIS PRACHEIL: I think as we move forward with our fish tissue, outside of FERC, I think we'll take you up on that.

LISA RICHARDSON: Any other questions related to the PCB fish tissue sampling that was conducted?

If there are no more questions that concludes the other noneventful studies and leaves us with sedimentation.

Ron, do you know what time --

ROBERT HARMS: We'll be eating out in the courtyard. I don't know if they're quite ready yet, but I'll find out.

LISA RICHARDSON: Okay. Do you want

to go ahead and start, or do you want to take a break?

STEPHANIE WHITE: I think we should move ahead. We'll start sedimentation before lunch. We'll just get a head start. Is that all right?

LISA RICHARDSON: I'll turn it over to Mr. Engelbert for the sedimentation discussion.

PAT ENGELBERT: Just a little update here relative to how we're going to progress through the sedimentation results.

I'm going to use a slightly different format than what we've used so far. I will, as in the past, review the goals and objectives. But then thinking --

RANDY THORESON: We're getting feedback on the phone here.

STEPHANIE WHITE: It's because we're all chatty. Hold on. Is that better?

RANDY THORESON: Yes.

PAT ENGELBERT: Okay. So we'll review the goals and objectives. And then instead of going through fairly lengthy discussion of the methodology, I'm going to provide the conclusions that we reached as a result of our analysis first so that as I go through the methodology, that may help

you gain a better understanding of what we did, why we did it, and how we got to where we were. And I will wrap up again with the conclusions that we came to as a result of our study.

So without further ado, we shall move forward.

To review, the goals of the sedimentation study were to determine the effect, if any, that project operations have on stream morphology and sediment transport in the Loup River Bypass Reach and in the lower Platte River.

In addition, we will compare the availability of sandbar nesting habitat for terns and plovers to their respective populations and to compare the general habitat characteristics of the pallid sturgeon in multiple locations. Those were the goals of our study.

The objectives that were identified through our numerous meetings to reach those goals were Objective 1 on Slide 95, To characterize sediment transport in the Loup River bypass reach and in the lower Platte River through a series of sediment transport calculations which include evaluation of the effective discharge.

Second goal was to characterize stream

morphology in the Loup River Bypass Reach and the lower Platte River by reviewing existing data on channel aggradation, degradation and cross-sectional changes over time.

The third objective, moving on to Slide 96, is to determine if a relationship can be detected between sediment transport parameters and tern and plover nest counts.

And fourth, To determine if sediment transport is a limiting factor for pallid sturgeon habitat in the lower Platte River, okay?

So that is a review of our goals and our objectives, okay?

Objective 1, again, as a quick reminder even though I just went through it 40 seconds ago, is to characterize sediment transport in the Loup River Bypass Reach and in the lower Platte River through sediment transport calculations which include the effective discharge.

Now I will go through very quickly the conclusions that we reached relative to Objective 1. After I go through the conclusions, I will go through a fairly lengthy discussion of the methodology to show you how we got there.

So to coin a phrase of a friend, I'm going

to show you the car, and then I'm going to show you how we built the car, okay?

The conclusions relative to Objective 1. Both rivers at all locations were determined to be not supply limited. Our spatial analysis of both effective and dominant discharge, the sediment transport calculations, they are consistent in increasing in the downstream direction, as we would expect, which is natural and consistent with natural river processes.

The effective discharge and the associated river morphology has not changed since the early 1900s where the research directed us.

Sediment transport calculations show that the channel geometries are in regime. Nothing appears to be constraining either the Loup or Platte River from maintaining the hydraulic geometry associated with the effective discharge.

And the combinations of slopes, sediment sizes and effective discharges result in all locations being well within the braided river morphologies, with none being near any thresholds of transitioning to another morphology.

Okay. So there's the car; now I'm going to show you the parts of the car and how we got

there.

And Ron, you're waving in the back.

RON ZIOLA: Lunch is going to be ready by the time we take a little restroom break. In about two or three minutes, everything will be out on the buffet table.

PAT ENGELBERT: I can compete against the air-conditioner and I can compete against background noise but it's tough to compete against a ready lunch. So I'm thinking maybe we should cut it now or I'm going to get stuff thrown at me. Is everyone in agreement?

(Lunch break taken.)

PAT ENGELBERT: Can you guys hear me okay? I put on a remote mic thing. Do I come across okay? Do you want me to take it off?

RICHARD HOLLAND: We don't want you to take off any more than --

(Laughter.)

PAT ENGELBERT: That was Dave Tunink.

(Laughter.)

PAT ENGELBERT: Thanks, Rick, thanks for making that comment.

RICHARD HOLLAND: It's to be expected.

It's awful chilly in here. We're off to a great start here after lunch.

I think I'll go ahead and move on. Would anyone like me to repeat the conclusions again? Dave says absolutely not. Okay. We'll move forward.

So going into the objectives and the tasks, getting to a little bit of the detail. To reiterate, Objective 1 is to characterize sediment transport in the Loup River Bypass Reach in the lower Platte through a series of sediment transport calculations which include evaluation of effective discharge.

In order to meet that objective we identified some tasks. The first task that we did was to establish or evaluate the sediment budget. We then performed -- in order to do that, we had to evaluate the sediment transport components of the system, and then we coupled that with some regime analysis.

The sediment budget. The calculated sediment yield for the Loup River and its tributaries downstream of the Diversion Weir as well as downstream of the Tailrace was adjusted based on the documented reductions of dredging by the

district from the settling basin.

Here's a graphic -- a historical graphic of -- from Loup's records on how the amount dredged out of the settlement basin has been reduced.

STEPHANIE WHITE: And I might say, Pat is on slide 102.

PAT ENGELBERT: Okay. Between approximately 1945 to 1960 they were pulling out an average of around 4 million tons per year. And that began to level off in the late '60s and early '70s. And from '75 on they were pretty consistent at around 2 million tons of sediment they were dredging out of the sediment basin area.

Okay. The reduction factor was based on the ratio of the amount dredged from '75 to 2009 and the amount dredged from 1940 to 1974. As I had mentioned, the average annual dredged amount between '75 and 2009 was around 2 million tons per year, and the average amount from 1940 to '74 was 3.75 million tons per year, resulting in a reduction ratio of 0.53, so a little over half.

We applied this ratio above the diversion, in the yield of the Loup basins below the diversion up to the confluence.

This is a -- on Slide 104 this is a -- the

table that is shown in the report, and I just wanted to point out a few locations, the first being the subbasin total above the weir.

The Missouri River Basin Commission report identified a sediment yield or the supply to the system at that point of a little over 7.8 million tons per year. Reducing it based on a reduction factor takes that down to right around 4.2 million tons per year. So the supply available to the system upstream of the Diversion Weir is around 4.2 million tons per year.

Below the Diversion Weir in the bypass reach, the total that is available in the bypass reach is around the -- the supply is around 2 million tons per year. That accounts for flow taken out of the settling basin, flow passing down the canal. And then the sediments in the south side management area actually get reinitiated into the bypass reach so those are added back in.

And then we have the summary totals at North Bend, Leshara, Ashland and then Louisville. Which I will reference as we continue down this sediment budget analysis.

So we've established what the supply -- the available supply -- or potential available

supply is to the system. Now we want to evaluate the capacity or the sediment transport component of the basin.

The first step in evaluating the sediment transport is we generated sediment discharge rating curves. From that we generated collective sediment discharge curves, and I'll show you examples of these in the upcoming slides.

As part of our evaluation we determined sediment transport indicators, which are effective discharge, total sediment transport, and dominant discharge. And then we evaluated the regime or the morphology associated with those sediment transport calculations.

In summary, again, all these graphics are located in the report. The locations that we evaluated the sediment budget were the Loup River near Genoa, the Platte River at Duncan, the Loup at Columbus, and then the Platte at North Bend, Leshara, Ashland and Louisville. Those are the gaged sites that we evaluated the sediment transport.

We will be evaluating the sediment transport at the ungaged sites, which include the Loup River between the confluence and the Tailrace

return and just downstream of the Tailrace. That is based on data that we collected.

The data, as we had mentioned this morning, came in June, July time frame. We weren't able to process it in order to get it in the report prior to QC, production, et cetera. So that will be reported in the July 9 sets of study results.

Okay. Standards -- I have to throw an equation up. The equation that we used to develop our sediment discharge rating curve is Yang's Unit Stream Power Method.

And the variables associated with that are velocity, depth, energy slope, particle size, kinematic viscosity and fall velocity.

This relationship or this method has been applied and was developed based on data from the middle Loup system. So it has been applied on sandbed systems in our region.

The other thing I wanted to note about the required variables is that the majority of them were -- we obtained based on measurements taken by the USGS and literature. And I'll go into those here very briefly.

Velocity and depth, we got those from each of the gage locations from the USGS measurements for

the period of record. The energy slopes were based on GS publications and some study models we used for -- to help us to establish those.

The particle size came from USGS both suspended and bed measurements. Kinematic viscosity and the fall velocity were based on relationships that we pulled from the Corps of Engineers that they have used in this area, okay?

This is an example -- I'm on Slide 110 now.

This is an example of our sediment discharge rating curve analysis that we used to calibrate our curves. On the Y axis we have the sediment discharge in tons per day; on the X axis we have the discharge.

And the plots, the red squares -- and I believe this is located in the report, if not it's in the attachments -- the red squares are suspended measurements from the USGS gage. The thin red line -- it's a little tough to see -- is the best fit line of the suspended measurement. And the blue line is our sediment discharge rating curve.

Now, I felt very comfortable that our predicted sediment discharge rating curve fell right in the heart of the measurements, primarily due to

the variability associated with those measurements.

If you look, for example, at a discharge of around 2,000 CFS, the measured suspended sediment ranged from approximately 200 tons per day to up to probably 3,000 tons per day. So there's a great range of variability associated with those measurements.

Similarly, at 10,000 CFS, you had measured suspended sediment of roughly 10,000 tons per day ranging all the way up to approximately 200,000 tons per day. So we felt we captured the data very well, had a very good fit on our sediment discharge rating curve.

And feel free -- if you have any questions about this as I move along, jump right in.

So from -- based on that sediment discharge rating curve, we developed a collective sediment discharge curve. That is -- the collective sediment discharge curve is a combination of a flow frequency curve and our sediment discharge rating curve, which I just showed you.

Now, what is a flow frequency curve? Flow frequency curve is you take the daily mean discharge from the USGS gage for whatever time period you're evaluating. You sort those flows based on uniform

ranges or bins -- and I'll show you a graphic of it here shortly -- and then you create a histogram of the number of times that that particular discharge occurs.

So as an example, this is at North Bend for 2003. So a flow ranging between 500 and 1,200 CFS occurred approximately 17 percent of the time during 2003. So it's a simple rating and categorizing of those flows for the time period in which we're evaluating, okay? So this is -- this is our flow frequency histogram, okay?

So what we did next is we married our flow frequency histogram with our sediment discharge rating curve. So the blue lines are the flow frequency curve, the red line is our representation of -- a barred representation of our sediment discharge rating curve. And multiplying those together results in our collective sediment discharge curve, okay?

So those are three definitions or three terms I want you to be familiar with. As I continue through the slides, I will refer back to those, okay?

Any questions? This is similar to the exact same presentation I gave back last May.

Hopefully it's a refresher to everybody. If it's not, feel free to raise your hand. I can slow down. I tend to talk fast at times.

Yes, Chris?

CHRIS PRACHEIL: I just have one question on bed load in both the Platte and the Loup. I know you said that the red squares were suspended sediment load. Is that a composite suspended sampling from the USGS and is bed load incorporated into any of these calculations as well?

PAT ENGELBERT: Those were just the suspended measurements that we used to calibrate. The bed material sample that they pulled obviously is much courser.

The D50 that we used to generate our sediment discharge rating curve was a combination of both the suspended load and the bed material load.

When we evaluated the suspended material versus the D50 of the dredge material at the north and south sand management areas, the suspended D50 was quite a bit finer so we thought we would probably be overexaggerating the transport capacity.

When we compared the D50 of the bed material to the D50 of the dredge material, it was much coarser, so it was underestimating the

capacity.

When we did a composite D50 between the suspended and the bed material, it laid almost exactly right in with the dredge material. So we felt the dredge material was a real good surrogate for the total bed material load, which is what Yang's equation produces. So we felt really good about using that composite D50.

CHRIS PRACHEIL: Thanks.

MARY BOMBERGER BROWN: On the Slide 102, the sediment budget graph, the amount of dredge removed is quite high and then it drops down and levels up. And then you use 1974 as a breaking point.

Did district operations change at that point, or what -- why the break point? What happened? Did something change?

PAT ENGELBERT: Okay. Mary asked what changed, why the change in this graphic.

For those of you on the phone, I'm back on Slide 102, which is the Loup Power District settlement basin dredging amounts. Is that what your question is about, Mary?

MARY BOMBERGER BROWN: Just curious.

PAT ENGELBERT: We've discussed this

amongst the group, and probably several reasons for the explanation.

Farming practices changed in the late '70s to prevent -- well, for conservation and to prevent soil runoff. Some dams were built, you know, upstream, diversion structures, those types of things.

And probably one of the smaller less likely is maybe just the way in which it was calculated. In the early years they were still kind of developing the basin, so some of that amount may have actually been the basin itself. But not to any great extent.

To me personally, it seems to make sense that a lot of the farming practices changed, terracing and those types of things.

NEAL SUESS: Mary, one key, we did not change our operating practices in that at all. So I even had the same question when I saw this, what did we do differently. And Pat said, I don't think you did anything differently. But the Sherman Reservoir and Galvins were both built right after that.

So it would have been -- so there's some thought process that there's more of that sediment

being stored in those two reservoirs that was coming down at that point in time.

MARY BOMBERGER BROWN: Okay. That makes sense. Thank you. Thank you.

ISIS JOHNSON: This is Isis Johnson from FERC.

I just wondered if you could go back to Slide 113. And I'm a person trying to make sense of all this. So I just kind of wanted to -- if you could go back over how you got to the total sediment discharge again? I just wanted to make sure I could wrap my head around that.

PAT ENGELBERT: Okay. Then after I explain it to you, if you could explain it to me I'd appreciate it. Don't feel bad.

This -- what we did is took the amount of flow for a given day and we multiplied it by the tons per -- the sediment discharge rating curve, which is tons per CFS, and then that results in a tons calculation. There's an adjustment factor in there to get the units correct, but that's how it's done.

But the sediment discharge rating curve is the amount of sediment for a particular discharge. And when you marry that with the discharge, you get

the tons. Does that makes sense?

ISIS JOHNSON: Uh-huh.

PAT ENGELBERT: George?

GEORGE WALDO: You might want to explain that this isn't something we just came up with. This is an established methodology.

STEPHANIE WHITE: Can you repeat yourself?

GEORGE WALDO: George Waldo, HDR.

I just wanted to make sure that it was clear that what Pat is describing here is an established methodology that's out there in the literature. It's not something that we developed specifically for this study.

It was discussed at length when we were going through our study planning meetings and Gary was very valuable in explaining it and helping everybody understand how it works and why it applies well in this instance.

GARY LEWIS: This is Gary Lewis with HDR.

George's point is well made, that this is a procedure adopted by all of the agencies that work with the Platte, represent the Platte, and some applied it to the lower Platte.

It might help if you look, for example, at that chart at the bars around 3,700. There's a yellow bar and a blue bar above that. And the yellow bar is the amount of sediment transported by flows in that range. You can see how much higher that is than the flows themselves.

So an important point here is that the flows that occur, which are the blue bars, are to the left of the flows that are transporting sediment, the yellow bars.

So the interest here is in finding out which range of flows is moving the most sediment. And the reason for that is the universal definition of what shapes the river is a set of flows that shape -- that move the most sediment because the shape of the river is based on the amount of sediment moved.

So we're trying to get a handle on what flows are moving more sediment, and from that, then, what flows are shaping the river. And then, of course, we'd like to see if that's changing over time, is there a natural phenomenon going on. Those sorts of things are what we're looking for with this kind of approach.

Hopefully that helps.

ISIS JOHNSON: It does.

PAT ENGELBERT: Okay. Moving on.

The -- based on that relationship that was developed, the sediment discharge rating curve and the flow frequency curve and the collective sediment curve, we took from that or calculated from those relationships the total sediment transport capacity. We evaluated the effective discharge and the dominant discharge, and I'll go through those definitions.

Now, the total sediment transport capacity, that is the total sediment that's carried for the period of interest, whatever period we're looking at, years, decades, a period of record. Based on that sediment discharge rating curve, it corresponds with a hydrograph. So we're using measured data to evaluate what the sediment transport capacity is for the system.

The effective discharge is something that is calculated from that collective sediment curve, and that is the discharge or the range of discharges that transport the largest fraction of the total sediment load, the total bed material load.

And it's important to remember that it's for that time period that you're evaluating, so you

can adjust that time period, whether it be years -- you know, a year, five years, ten years, et cetera.

It's the effective discharge, that discharge which conveys the largest fraction of sediment that results in the average morphologic characteristics of the channel. Since it is moving the largest fraction of the sediment, it is responsible for the largest channel morphology.

So as a result, you can assess, based on that effective discharge calculation, how you may have -- what type of width and depth you would expect based on measurements that were taken, how those could change if the effective discharges change.

Due to its subjectivity, however, it is suggested in the literature that it's only used for long-term analysis for a year or greater. And I'll show you an example of that subjectivity in an upcoming slide.

So that is the effective discharge, it's that range of flows for that given time period which convey the largest fraction of sediment.

Now, the dominant discharge -- and the dominant discharge was not identified in our study plan. It's another sediment transport calculation

that we brought into the analysis once we realized the range of subjectivity we had associated with the effective discharge.

Part of our charge was to evaluate how the effective discharge changed seasonally and monthly. And again, based on subjectivity, we weren't able to get a lot of, I guess, meaningful information for anything less than a year, so we looked at another term called the dominant discharge.

The dominant discharge is that discharge, if it were maintained over the entire period that you're analyzing, would move the total amount of sediment for that period.

So if you -- if the total amount of sediment that was moved in a given year was a thousand tons -- I'm going to do that different.

If the total amount of sediment that was moved in a hundred days was a thousand tons, that's approximately -- you would find the discharge that could move ten tons per day. And if that discharge were maintained over that hundred days, it would move that thousand tons of sediment, okay?

And I'll show you a graphical example, and hopefully it will make more sense than my wording does.

The nice part about the dominant discharge is you calculate the total amount of sediment that is transported for the period you're interested in. You divide it by the number of days of the period of interest to get your daily sediment -- amount of sediment moved. And then you correspond that to a discharge so there's no subjectivity. It's simple arithmetic that gets you that dominant discharge.

So that became helpful to us in evaluating how the dominant discharge may change the alternative conditions. And you can also relate the dominant discharge back to width and depth relationships, the channel morphology, what shape does that channel want to take based on that discharge, okay?

Any questions on that?

Here's a graphic which is also in -- I don't believe that this is in the report. We generated this for the presentation.

Here's an example. This is North Bend in 2003. And it's calendar year 2003 and the blue line is the total sediment, the total sediment transported by day based on the hydrograph and our sediment discharge rating curve.

So for -- pick a particular day, say,

around late March. On that particular day about 5,000 tons of sediment were transported. The total for the year -- if you looked at the other area under the graph or if you summed all these up, the total sediment discharge was approximately 1.1 million tons of sediment was transported in 2003 based on our sediment discharge rating curve.

This light red line -- I don't want to call it pink -- but this light red line is the dominant discharge. If a discharge of around 3,500 CFS were maintained for the entire year, that would move the same amount of sediment that the natural hydrograph, okay? Does that make sense?

The dominant discharge -- if you didn't have all this range of variability in flow that moved the 1.1 million tons, if you had just 3,500 CFS for the entire year, it would also move 1.1 million tons of sediment, okay?

Lastly, this green box is our effective discharge for 2003. It was that range of discharges which moved the largest fraction of the sediment. So graphically represented, that -- I think in this example it was around 4,700 CFS.

And if you recall from the previous graph that, discharge was -- occurred approximately

16 percent of the time and yet moved the largest fraction of sediment, okay, for the range -- for those range of flows, okay?

Now, that was a graphical representation. How did we get to the effective discharge calculation? And here's where some of the subjectivity hopefully will become clear.

Again, the blue line is our flow frequency curve, the red line is our sediment discharge rating, curve and the yellow line is our collective settlement discharge.

In this particular example the peak of the -- not in this particular example.

The peak of the collective sediment discharge curve is your effective discharge. So in this example, the effective discharge is -- is in the range of flows between 2,600 and 3,900. That's where your effective discharge would be. It's that flow that transported the largest fraction of sediment, okay?

Now, where you get into a little bit of subjectivity -- I've got a graphic coming up -- sometimes you've got two and three sets of bars that form the peak of that curve and you -- you're tasked with trying to pick which one you think best

represents the effective discharge. So there's some subjectivity to it. It's not a clean calculation like the dominant discharge, okay?

Now, without any burning questions on this, I'll move on to an example.

TOM ECONOPOULY: This is Tom Econopouly. I have a question about Page 118 -- Slide 118.

PAT ENGELBERT: Okay. Go ahead.

TOM ECONOPOULY: (Inaudible.)

STEPHANIE WHITE: He said the Y axis is tons?

PAT ENGELBERT: Yes. That is the -- that is the total amount of sediment, sediment transported in tons.

TOM ECONOPOULY: All right. And then you said that the dominant discharge was 3,500 CFS, so how can that be if the Y axis is tons?

PAT ENGELBERT: I knew what it was. It's not graphically represented up there. We worked the example back at work.

TOM ECONOPOULY: Okay.

PAT ENGELBERT: That was an error on my part in insinuating that that was related to the discharge.

Okay. Did everybody understand his question? This is actually the tons bar and I was relating the flows based on the tons unit and not the CFS.

NICK JAYJACK: So is the red line 3,500 CFS? It's not corresponding to the Y axis?

PAT ENGELBERT: That's not corresponding at all.

Okay. Does that make sense? Sorry for confusing something that's very confusing.

GARY LEWIS: Again, this is Gary Lewis.

What's missing here is the fact that we determined the number of tons per day that would be equivalent to the total sediment transported, find the average tons per day. Then we go to the sediment rating curve. Tons per day comes down to discharge in CFS.

So Pat didn't show you that process, but if you go in with the average tons per day from the total sediment transported here, enter that curve, come down, you'll find that discharge at 3,700. That's how it's done.

JERRY KENNY: Jerry Kenny with PRRIP.

Not to belabor us, but the area under the

red line, is it the same as the area shown in blue?

PAT ENGELBERT: Yes.

JERRY KENNY: Thank you.

PAT ENGELBERT: Okay. I'm going to walk us through just a little example to illustrate how the effective discharge is calculated and how it relates to other, you know, maybe slightly larger events.

This example was based on the North Bend gage in 2008. So if -- and I'm on slide 120 for those of you on the phone.

If we looked at a flow rate of around 17,000 CFS and that was an event that occurred in 2008, for that single day, that discharge transported, assuming that capacity based on our sediment discharge rating curve, approximately 48,000 tons on that particular day.

The event itself lasted approximately nine days. So we evaluated the total amount of sediment that was transported during that event. And it transported -- that event transported, assuming at capacity again, around 152,000 tons for that event.

If you look at the -- and that was for the discharge -- or an event that peaked at around

17,000 CFS.

The effective discharge in 2008 which ranged between 3,200 and 4,500 CFS, those discharges occurred over 125 days during that particular year, which conveyed approximately 640,000 tons per day.

The point we're trying to illustrate is that the peak events do move a large majority of the sediment; however, it's the lower, more frequent events that occur throughout the year that move the largest fraction of the sediment.

That's -- the effective discharge is linked to the morphology in that since it moves the most sediment, it is responsible for providing the shape of that particular system, okay?

Any questions on that example? Does that make sense?

NICK JAYJACK: What's the significance of the 1.5-year return interval? Is that the bankfull -- trying to match up to the bankfull discharge?

PAT ENGELBERT: Yeah. It just so happened that the 17,000 on that particular year, if you looked at a flood flow frequency distribution, it was approximately the 1.5, which is -- which is

often referenced to a bankfull discharge, or in this case we wanted to show that for a sandbed system like this, it's likely a discharge much lower that is doing the majority of the shaping as opposed to the one and a half year.

Okay. Any other questions on that? Any other questions while I'm on this slide?

So we performed these sediment transport calculations and determined both the effective and the dominant discharges at each of the gaging locations.

This particular table is in the report, but I just wanted to point out a few stations.

I'll refer a lot in this presentation to the Loup at Genoa, so we've got one gage on the Loup, and then the Platte at North Bend, which is downstream of the system.

But based on our hydrologic calculations that we performed, the mean daily discharge of the Loup at Genoa is around 950 CFS. The effective discharge is in the range between 1,800 and 3,000 or 2,400 that we settled on. The dominant discharge is around 1,350.

And from a flow duration perspective, the number of times that that flow is equal or exceeded,

the effective discharge is -- on average, was exceeded 7 percent of the time. That means in a given year, that would occur approximately 21 days.

The dominant discharge, on average, in a particular year would exceed -- would be exceeded about 60 days out of the calendar year.

Similarly at North Platte -- and this is just to provide you a feel for the relative magnitude of the event of the discharges that we calculated -- at North Bend the mean daily discharge is around 4,600 CFS, the effective discharge is around 5,600 CFS, and the dominant discharge is around 5,300 CFS.

Again, based on flow duration, that is just a ranking of the number of times that it occurred.

The effective -- both effective and dominant discharge equal or exceeded approximately 26, 27, 28 percent of the time, which, on average for a given year, would be about 90 days in a given year is how often you would see that effective discharge, or -- I hate to belabor it -- that discharge which moves the largest portion of the sediment, okay?

And again this table is the table that's

in your report. I think it's Table 5 something. And for those of you on the phone, we're on Slide 121.

Okay. So now we've -- well, the first step, we've evaluated the supply. We adjusted the capacities based on the reduction and the amount dredged. We have now evaluated the capacity of the system, how much sediment can it transport. And in evaluating the two side-by-side, it will give us an indication of whether the system is supply limited or is not supply limited.

This -- consistent at every gaged location, the yield or the supply of sediment available exceeds the capacity of the system. So that tells us, based on this analysis, that the system is not supply limited. It is not supply limited, okay?

Just for relative numbers, the Loup at Genoa has the capacity to convey about 1.8 million tons per year; its yield or its supply is approximately 2 million tons per year. So the supply is exceeding the capacity.

The Platte at North Bend has a capacity to convey or to transport approximately 2.9 million tons per year; the supply or potential supply

available to the system at North Bend is approximately 5.8 tons per year, okay?

JEFF RUNGE: We've talked about this before, but I guess, for example, in North Bend, how is the total yield calculated for North Bend?

PAT ENGELBERT: The yields were developed by the Missouri River Basin Commission back in 1975 and they evaluated, using universal soil loss equations and other equations, the sediment that comes off of the adjoining property as well as the bank and bed sediments within the stream and developed what would be the supply of those particular locations.

We've got a little -- I don't think here, but on the capacity -- on the yield side there's a table -- I think it's 5.1, possibly -- that lists what the Missouri River Basin Commission came up with as far as yields.

TOM ECONOPOULY: This is Tom Econopouly. You're fading in and out. It's hard to hear you all the time.

PAT ENGELBERT: I'm fading in and out?

TOM ECONOPOULY: Yeah.

PAT ENGELBERT: I'll try and talk

more in the center of the room. Hopefully that helps.

Jeff Runge had another question, so I'm going to hand the mic back to him. He's not going to walk in the middle of the room, though.

JEFF RUNGE: For example, let's say North Bend, that there's a particular yield from the Loup River at Columbus, that the Loup provides a particular yield to the Platte River at North Bend and the Platte River -- the upstream portion of the Platte River provides a particular yield. And so to me, if you add the Loup River at Columbus and Platte River at Duncan, you get, like, maybe a thousand less than the total at North Bend and so is the remainder of that that creep or erosion that comes into the system, or --

STEPHANIE WHITE: Did you folks on the phone hear Jeff's question?

PAT ENGELBERT: Jeff was asking about the difference between if you added the Platte at Duncan and the Loup at Columbus, it is slightly less than the amount of the Platte at North Bend, which is the next downstream gage.

They also took into account Shell Creek, which comes in there, as well as the stream itself,

that 30-mile stretch between there. They factored in for some of that supply as well.

JEFF RUNGE: Okay. And let's say -- let's just look at Loup River at Columbus, for example. The yield is 2,960,000, but the capacity to transport is 1,260 -- or 1,260,000. That is the ability of the river to move sediment to North Bend. But of the total yield, I guess, is there another mechanism which that sediment moves and is recognized at North Bend?

PAT ENGELBERT: The question was if the Platte at -- you know, between Columbus and North Bend only has a certain amount of capacity to continue to add to the supply.

It's two separate calculations, two separate theoretical calculations of both the supply and the yield.

Is there a way to translate it? I'm not aware of any. Gary, are you? Do you have any thoughts on that?

GARY LEWIS: I'll speak loudly -- and I guess I have a mic here too. If you read the Corps of Engineers report that we reference in our documentation, they puzzled a little bit with that too.

And the point they make is the reason that they concluded that the sediment was not in short supply is the evidence of huge amounts of sediment in the banks and in bed forms.

So you shouldn't expect that the transport capacity will move the yield, and that's what happens when you have a braided stream like the Platte River. It's building itself up over time.

There's -- the yield exceeds the capacity to transport it, and over time sediment accumulates in bars and on banks and on the sides of the -- the Platte has been called the backbone of Nebraska because in many locations it's elevated above floodplains.

The definition of a braided river is a river with sediment in much greater excess than the ability to transport it. And if that was ever changed, it might transition towards a different regime or different morphology, meandering or other forms.

But don't try to rationalize easily why the yield is not all being transported. The corps, in their report, actually said probably the best estimate of the yield is what's being transported.

So what we're showing here are estimates

by MRBC in 1975 of the yield when they take into account everything, the soil erosion and everything, and they add all that up. The -- whether that is actually getting into the river and being stored there because the capacity is less than the yield is not resolved.

They concluded in their report that probably the best estimate of the yield is what it's -- what it's transporting. And the reason they say that is because it is in equilibrium. They don't see it changing.

If this was continuing every year, year after year, these yields in that great excess of capacity, you folks that live out there or those of us that are interested in you folks that live out there would see an awful lot of sand dunes accumulating out there.

So I think their conclusion is they didn't address -- well, they said that the MRBC methods are an indicator at best. So don't take these yields as absolutes that -- and then try to figure out well, what's happening to all that sediment? They are indicators of whether or not the yield exceeds the capacity, and that's what we're trying to demonstrate here.

And like them, I'm a little bit inclined to say -- we don't see it in our report -- that probably what's being transported is what's being delivered because we have an equilibrium issue. We don't see changes occur.

If you had a lot more sand coming in than being transported, it would aggrade; if you had less sand coming in than being transported it would degrade. And all the reports of the studies convincingly state that none of those are occurring.

So the key here and the point that I think Pat really is trying to make is that by the procedure that was applied, the one requested, the one we all approved or agreed to, it definitely shows that the yield exceeds the capacity to transport; therefore, it is not supply limited. That should be about all we can conclude from this.

Does that help?

JEFF RUNGE: Actually, that discussion is really helpful here. And just looking at the numbers, just looking at, you know, as you mentioned, the capacity side of things, if you add up the Loup River at Columbus and Platte River near Duncan, you get a total capacity of about 2 million tons per year.

But your transport capacity at North Bend is 2,890,000 and so there is a higher transport capacity. More sediment is being transported away or through North Bend than what is being supplied from Columbus and Duncan.

PAT ENGELBERT: On the capacity side, you really can't -- you really can't add those. The capacity is based on the river condition at Duncan and the river condition at Columbus. They're discreet channel --

JEFF RUNGE: But those are average annual capacities, right, based on the period of record?

PAT ENGELBERT: For the Loup River -- for the Platte River in the vicinity of Duncan and for the Loup River in the vicinity of near Columbus at the Columbus gage itself. And it's based on the measured depths and velocities of the channel at that location.

So the Platte downstream of Columbus is different than the Platte at Duncan plus the Loup at Columbus. So it's based on the channel hydraulic characteristics of the river. So you couldn't add the capacity of the two to get the resulting capacity.

JEFF RUNGE: So changes in local hydraulic characteristics are resulting in a change of about 900,000 tons per year, resulting in that difference, then, or --

PAT ENGELBERT: Well, we haven't calculated yet what the Platte River near Columbus is. We will be doing that based on the measurements that we took, albeit --

JEFF RUNGE: Okay.

PAT ENGELBERT: -- it's a little fuzzy because it's based on one year's measurements as opposed to these capacities being developed based on 30 years or 50 years of hydraulic measurements. So this is --

JEFF RUNGE: Yeah, yeah, I see.

PAT ENGELBERT: -- it's different than the yield where they were adding it as they went downstream.

JEFF RUNGE: But as you're getting closer to North Bend, you're eliminating a lot of that variability, then.

PAT ENGELBERT: Yes. I mean, because we had the actual gage data of the channel and its associated hydraulics, slope, particle size, all those things that factor into the capacity, that

really long Yang's equation we talked about.

Go ahead, Rick.

RICHARD HOLLAND: The capacity indicates the amount of sediment that the water will hold; is that correct?

PAT ENGELBERT: Assuming it's transporting at capacity, that's how much the river can transport.

RICHARD HOLLAND: What determines the -- I'm assuming that you have -- sediment size, particle shape determine part of how much that is, but the main part is how much water you have moving past the point?

PAT ENGELBERT: Yes. And the measurements are USGS gage measurements at the gage stations themselves. They record --

RICHARD HOLLAND: They record the flow.

PAT ENGELBERT: -- the discharge for that day and the suspended sediment and bed sample sediment for that day. So that's what gets us all to the factor that --

RICHARD HOLLAND: Is the volume of water the main determinant of the amount of sediment?

PAT ENGELBERT: It is a function -- going back to Yang's equation, it's a function of the velocity and the depth and fall velocity, viscosity, those things. So it's a hydraulic --

RICHARD HOLLAND: I understand that, but --

PAT ENGELBERT: So volume --

RICHARD HOLLAND: I'm just -- if you were to portion the capacity, what determines that capacity? I'm sure the speed of water, the velocity is going to be a certain amount. The same volume going slower is going to take less sand, et cetera.

PAT ENGELBERT: Yes. And not linear.

RICHARD HOLLAND: I understand. I guess what I'm interested in is just, in general, given the fact that particle sizes -- I don't know how much they change over the linear distances we're talking about. Do we have any indication of that from the Corps reports about particle size and distribution?

PAT ENGELBERT: We've got the particle sizes by gage either in the report or in the attachments. We did calculate that composite D50 and it increases as you go -- I think it -- I'd have to check, Rick. I don't want to say.

I don't know for sure.

GARY LEWIS: But it's different.

PAT ENGELBERT: Yes.

GARY LEWIS: And on your question -- well, Pat will show you later -- yes, your observation is correct. You're in a period of declining flows. Dominant discharge, for example, is going to decline if you think about it because it's directly related to flow.

RICHARD HOLLAND: Well, the key thing I'm looking for is the -- is a spatial relationship. And since everything we're doing is based on the spatial distribution of the gaging stations, how those relate and where we calculate these characteristics will give us a little more insight into the impact of the operation of the -- of the hydro.

I mean, you go a hundred miles downstream, you're going to have a whole different picture in terms of sediment transport relative to right at the Tailrace area because you're dealing with sediment-starved water. So it's going to have a different impact, different capacity.

PAT ENGELBERT: Real quick, and then I'll turn it over to George.

We are tasked to evaluate the effective, dominant, all the sediment transport calculations at a point within five miles of the Tailrace as well as a point upstream of the Tailrace. So we will be doing that now that we're getting the data in from the collection.

RICHARD HOLLAND: The other point I wanted to make is that when you conclude dynamic equillibrum, that is also a spatial -- has a spatial context, okay?

I mean, if you narrow the spatial perspective, whether you're in dynamic equilibrium or not with the total sediment transport thing, in my mind, can make a big difference.

GARY LEWIS: Rick, I'll comment on that. We'll see that when we complete this analysis.

RICHARD HOLLAND: I'm hoping that will give us better insight.

GARY LEWIS: That will answer that question, and it's a very good reason why we want to do it.

GEORGE WALDO: One comment I want to make is what I'm hearing here is there's a desire, I think, in these questions to get at a A plus B

equals C kind of simplicity. And I -- my understanding of it, which doesn't begin to equal these two gentlemen, but I look at these things like as indicators of capacity and indicators of sediment yield from a watershed rather than absolute values.

And take, for example, the gaging stations that you mentioned. Well, we know exactly where they are spatially, but the gaging information that you recover from the stream gage is not perfect. It's approximate.

RICHARD HOLLAND: Sure.

GEORGE WALDO: And the sediment values used in these calculations, the D50, is just a medium value of the different sediment that's in the samples that were taken and analyzed. So at best, this tool is an approximation of a very complicated system.

The thing I -- looking at this table on Slide 122, the thing that I think we're -- we should all be looking at and appreciating is that the yield, with whatever precision it's made, exceeds at all locations the capacity of the river as determined by the various factors involved in that part of the calculation.

What we have is a consistent excess of

sediment at all of these locations on the river. And in that it appears to be consistent -- we'll see some other references I think at the end of this presentation -- there are none of the major studies in the literature that disagree with this.

And the concept of dynamic equilibrium is also not an absolute, it's a characteristic of a stream flow.

And Gary had a short definition of it yesterday. Can you recite that for us, Gary? It varies but around a constant trend. That's what I think we're coming to with this analysis.

GARY LEWIS: Yeah, the report has definitions of dynamic equilibrium quoted in there from their recommendation from the Corps, who've addressed that in the studies that we cite.

But generally they describe a stream system in which there's variability -- width, depth, number of bars, number of anatomizing braids, variability in that but not deviating about a long-term condition.

So dynamic equilibrium doesn't mean it's always the same; it means it varies. We need to look at, over time, parameters like effective discharge. Because effective discharge defines

the -- what's shaping the river because it's moving the most sediment.

So if effective discharge is declining due to some reason, natural or not, then you'd expect that morphology to be changing and I'd be concerned it might be transitioning toward something other than a braided river.

But dynamic equilibrium, by all of those observers that George mentioned, they find the horizontal line, they just don't see anything in the variability that indicates a downward or upward trend in the morphology.

Dynamic equilibrium. It's an equilibrium that's varying or changing.

PAT ENGELBERT: And I think the important point to know note is the budget analysis that we performed is just one piece of evidence. It's one way to look at the situation. We're evaluating other methodologies to try to help us paint the picture.

JOEL JORGENSEN: I've got a quick question, just more out of a curiosity. And I apologize at the onset (inaudible) hydrology discussion since I don't know anything about it.

But George mentioned there's too much

focus on the absolutes here and there are errors in the -- sort of the values. And I guess I'm curious, then, is it possible to carry the error -- I mean, has the error been measured regarding the gage station and is there a way to bring those error values forward, especially since those values are being multiplied so the errors are, in fact, potentially being multiplied as well? I mean, I agree that one absolute number probably is a little bit misleading because there probably is some degree of error there.

PAT ENGELBERT: Maybe it helps smooth out that error if it was evaluated over a 25-year period. I'm not quite sure. Is there any GS folks here with a level of confidence they have in their suspended sediment measurements, the gage measurements, et cetera?

GEORGE WALDO: If I can respond to that, first of all, I don't know that I said the word error. If I did, I misspoke. It's imprecision, is what I'm talking about. It's not -- to me error, in many contexts, means you've done something incorrectly and I want to clarify that.

But what I'm saying is that these tools are not perfect. And GS -- I wish someone were here

to address this -- but what GS does is they don't publish their records immediately at the end of the year for a reason. They go through and they massage that and they check it and they rationalize differences and so on.

But they do, in fact, publish average daily flow values, and they do, in fact, publish the temperature and the sediment information they have when they consider it suitable for consumption and use.

And so the error analysis, I would say, is already accommodated by the time they publish that information. And the users of that data, many of the people in this room, routinely go to the GS database and use it for analysis. But there's an expectation that -- or call it an understanding -- that that data is imperfect.

And so you cannot use two -- call it two gages -- I've run into this example many times. There's two gages on two streams that come together at the confluence, and many people expect the sum of those two flows, that it will equal the gage on the main stem and that's rarely the case. And that's because of this imprecision.

It doesn't mean that the two smaller

streams that combine into the larger ones are measured wrong, it's just the system doesn't take away that kind of variability.

RICHARD HOLLAND: He's not talking about a wrong measurement.

GEORGE WALDO: I understand.

RICHARD HOLLAND: He's talking about the measurement error associated with any measurement.

GEORGE WALDO: I understand, but --

RICHARD HOLLAND: What he's asking, I think, is when we put up an absolute like that, it's plus or minus a certain amount of deviation, you know, whatever.

JOEL JORGENSEN: And being someone that doesn't understand how this is calculated, it would be useful to know whether the percent error is 1 percent or 50 percent, just to get an idea.

RICHARD HOLLAND: Just trying to get a measurement of the imprecision.

JOEL JORGENSEN: Yes.

GEORGE WALDO: I'm not the person that could tell you what that is. I doubt that there's anyone that -- here that can.

The reality of it is -- take the effective

discharge method, for example. It's been studied and tried and validated against measured data in multiple instances, including in this river system. Going back to when we were coming up with the study plan, it's the best tool available.

And we're not here to defend the method or its development. That's not what we're here to do. We're saying that we took these data sources and applied them using this method to come up with some indication of what's going on in this river. Is it in equilibrium or isn't it?

And I think it's fair to say, Pat, that we didn't impose any bias into it that we could be criticized for. It's simply taking something that is -- it's like the difference between an interval and an absolute equation. It doesn't have the precise perfect answer.

PAT ENGELBERT: And I guess I'm not sure, you know, applying -- I'm trying to think through how we would do that, taking the measured data and its potential variability and popping it into the equation and coming up with the result. I'm not quite sure how we would do that.

JOEL JORGENSEN: I don't either. I'm just curious if there are error values for the

components that go into the Yang's equation or whatever and they're dropped off as a result, then you lose that bit of information. I don't know anything about it. I don't know if the information -- I'm just curious whether -- you know, maybe to get a sense of how much error there is with this data and the end result product.

PAT ENGELBERT: I think Gary Lewis can address it.

GARY LEWIS: Gary Lewis.

I've had quite a few occasions to address this question of uncertainty, and that's probably a better term than error to look into this.

USGS does rate their records in categories of good, fair and poor. I have had occasion in using those to try to assign percentage uncertainties to them. And it can run about 5 percent if it's a good record and 15 if it's poor. So those are out there and you can find those in USGS manuals.

I did want to mention, we don't have it in the presentation. We did a sensitivity analysis on Yang's equation. We did vary the parameters by a half or a whole standard deviation of the data we had, and the results are in the report.

So there was an effort to show, at least through Yang's equation, calculated on any given day what the uncertainty might be in its calculation.

You saw Pat point out the rating curve showing at a given discharge the range in variability of measurements out there. So I would agree that any estimate of the total transport capacity that day would conceivably have somewhat that same variation in it.

But you also saw Pat show you -- and there's a lot more that goes into it -- on how we selected those rating curves to be conservative. Some of that's written in the report, and we can certainly describe more of it here. We erred on the side of conservative and on each occasion that I recall we had discussions as to understating or overstating the capacity of the river moving sediment.

Probably the only measure we would have of the question you asked -- these are values and accumulation of daily values over the period checked, whether it's a month, year, or the entire record.

Statistical analyses usually states that variables that are in themselves the sum of many

other variables tend to fall in normal distributions. So you could apply probably a bell-shaped curve to the -- let's say the annual values that we have here and get some idea plus or minus one standard deviation.

We felt sensitivity analysis clearly showed what Yang's equation can or can't do for you and then relied upon -- I think the point that George and Pat made -- all of us rely on USGS flow measurements. So we're not apologizing for that. I think the point is we relied upon them and used them without debating the uncertainty in those measurements.

MICHELLE KOCH: Okay. This is Michelle Koch from the Game and Parks Commission, and I had one question about the yield which is -- you said was the total supply of sediment that would be available.

Does that -- is that just free-flowing sediment or does that include any sediment trapped in stabilized sandbars or any other stabilization structures?

PAT ENGELBERT: I believe that would be the total supply available, and I would imagine they would account for -- they did account for

sediment being removed from the system. For example, at Loup's diversion structure, they assumed 2 million tons would be pulled out of the system so that came out of the supply. They a assumed 700,000 tons remained in suspension going into the canal, and that half of that stayed in the canal in the regulating reservoirs and half of that got back into the system. So they did account for some of that being trapped or taken out of the system.

MICHELLE KOCH: That would include the stabilized sand bars as well? What I'm trying to figure out, if there's a certain amount of sediment available but half of that is trapped in the sandbar and it's never going to move downstream, is that included in that yield or not?

PAT ENGELBERT: I didn't dig that deep into their calculation of the bed and banks component. If they did factor that in, I don't know. Michelle, I don't know the answer to that.

MICHELLE KOCH: Thank you.

PAT ENGELBERT: Jeff has a question.

JEFF RUNGE: Yeah. Just getting back to what George said previously, recognizing that there is error possibly through the hydrology study -- and I'm not sure if this is being done

already -- but you can add the flow values for the Loup River at Columbus and Platte River at Duncan and see how close of an agreement that is to Platte River at North Bend. I mean, is that going to be done for the flow analysis part?

PAT ENGELBERT: Yes. We are developing some hydrographs at the area just downstream of the confluence based on gage data at Duncan and gage data at Loup. And we accounted for historical reach gains and losses associated with those. And we continued to add hydrographs as they came through the Tailrace, et cetera, and worked our way down. So yes.

JEFF RUNGE: So that would help as far as maybe not from an accuracy standpoint, but from a precision standpoint if they're in close agreement with each other or if they're far apart as far as total values at North Bend, I think maybe that could help shed some light as to the precision aspect of things.

PAT ENGELBERT: Any more questions? Yeah, Nick?

NICK JAYJACK: Just so I'm clear, so the capacity numbers you have, there those are numbers you all calculated, whereas the yield

numbers are from published sources?

PAT ENGELBERT: Yes.

NICK JAYJACK: So you have -- I would assume that you have a very good idea of the uncertainty involved with the capacity numbers because those are numbers you calculated, and that by using USGS flows, the uncertainty that's in your numbers is pretty much the uncertainty that anybody's going to have in a calculation that uses USGS flows, and that that uncertainty is pretty well accepted, that we've all learned to live with that, you know, based on technology, et cetera. Anyway, I just wanted a confirmation so I'm sure of what you're saying.

Where I would have less confidence as far as knowing the uncertainty would be with the yield calculations, only that after having read the report, it's not clear if they did that type of analysis where they looked at their precision in coming up with those numbers. And I mean, you all -- I don't think anybody, in reading that report, could really tell, from what I recall, anyway, so just a comment.

PAT ENGELBERT: And again, I just would like to reiterate this is just one piece of

the overall puzzle, supply limited and not supply limited. What do all of the other pieces -- do they point us in this direction or do they point us in another direction? So it's just one component of the overall analysis.

PAUL MAKOWSKI: Paul Makowski with FERC.

I just want to draw the distinction between uncertainty, error and variability. With the sediment discharge rating curve, you've got seasonality. There's going to be a lot of variation. And I don't know if you can do a confidence interval.

If you have, like, a mean, a line that goes through that represents the data points and there's a variability, whether or not you have a confidence interval to say, you know, here's capacity with a regression line versus, you know, what the answer might be.

I don't know if that's been done or if that's possible, but, you know, that might encompass -- if you put that on the rating curve, you can kind of see what you actually are including within that capacity calculation.

PAT ENGELBERT: Yeah. We did do a

sensitivity analysis in the report. But the report -- what our calculation showed, it was most sensitive to both slope and particle size.

So we spent quite a bit of time researching, using every piece of information available to be as solid as we could on both the slope as well as the particle size, both measure points within a degree of uncertainty.

PAUL MAKOWSKI: I think a lot of people are trying to walk away with the capacity number. The capacity of springtime versus summertime versus wintertime are going to be different because the sediment supply just -- all the characteristics are going to -- they change throughout the year. So it's not one number.

PAT ENGELBERT: Yes. And this capacity was developed using the 25 years of record of our study period. You are correct, yeah.

TOM ECONOPOULY: (Inaudible.)

STEPHANIE WHITE: Would you mind repeating your question, please?

TOM ECONOPOULY: Sure. Looking at the table on Page 122, down the capacity column, at Genoa you have almost 50 percent more capacity than you do down at Columbus. Would you say that there's

sediment building somewhere between Columbus and Genoa?

PAT ENGELBERT: That is -- Tom, is that you?

TOM ECONOPOULY: Yes.

PAT ENGELBERT: That is a factor of the data used to develop the sediment discharge rating curve. At Genoa we had 25 years of measurements to develop it; at Columbus we had 1 year's worth of measurements to develop it.

So I -- I would be a little more confident in the Genoa number based on 25 years of data, as opposed to the Columbus number, which was just based on 1 year of data. They reestablished the gage at Columbus about a year and a half ago.

TOM ECONOPOULY: Okay.

PAT ENGELBERT: So we only had one year's worth of data. We did our very best to calibrate it, you know, based on that -- the limited amount of data that we did have. But you're right, that seems a little peculiar that you'd have less at Columbus than you do at Genoa.

TOM ECONOPOULY: Thank you.

PAT ENGELBERT: Anything else?

Anybody need to go to the bathroom or

anything? No? Only about four people sleeping, so we'll move on. Next slide.

LISA RICHARDSON: Pat, why don't we take a break after you finish Objective 1.

PAT ENGELBERT: That could be 5 o'clock.

This is just a schematic just showing the same thing, the table, so I'm going to go right by that one.

The next part of the analysis -- and again, this was not introduced in the revised study plan or in the study plan determination letter. But we wanted to try and get an idea of what type of morphology is associated with our effective discharge calculations.

With the effective discharge -- going back to the -- that's discharge which moves the lion's share of the sediment, resulting in the average conditions of the channel -- what type of morphology would be associated with that effective discharge.

And so we used a couple regime charts to help us establish what type of morphology we would be expecting based on slope, D50 and that effective discharge.

This is a pretty busy graph, and I'm on

Slide 124 for those of you that are on the phone.

On the Y axis we have the slope of the river divided by the square root of -- the square root of the D50. And then on the X axis we have the -- what we used for this particular discharge is the effective discharge.

And looking at all the gages, they are seeded fairly solidly in -- right along between Region 4 and Region 3, which in this case is steep braided streams, braided point bar and light bed streams. So that showed us that, you know, you're looking at a braided system based on our sediment transport calculations.

The other interesting thing to note is you'd have to have a pretty large variation in that effective discharge to get it to move away from that particular region or that regime classification based on this graphing.

Another regime graph that we used was developed by Lane, again, describing river morphology.

And I'm on Slide 125 with slope being on the Y axis and the discharge on the X axis.

And what we have here are a couple lines. You have a braided streamline and a meandering

streamline with things in between as intermediate streams.

For this particular system, the points for Louisville, Ashland, Leshara, all the gage locations are very close to the braided stream. They are tending toward the braided stream.

Again, it would take quite a bit of movement one way or the other either in the slope or in the effective discharge to get it to move away from that type of morphology.

So based on a couple of regime graphics and our sediment transport calculations, that being effective discharge, we were looking pretty solidly at a braided morphology or braided regime, okay?

Any questions on that?

TOM ECONOPOULY: Okay. This is Tom again.

On the Chang's regime morphology chart, you have those two points marked, one section 1900 and the other 2000. And then in your report you said you don't look at those because they were done under bankfull conditions, bankfull discharge instead of effective discharge. Can you explain that for me a little bit more, please?

PAT ENGELBERT: I -- a couple things

there, Tom.

One, those points are for the Central Platte river in the vicinity of Overton. And I will let Gary Lewis elaborate on that a little further.

GARY LEWIS: Yeah, I'll start by saying these charts were used by the Bureau of Information in their Platte River history report. So the precedent was set there, and they were looking at the same issue, what morphology would you expect and how stable is it? Are we close to transitioning? Is the river in jeopardy with the slight change in slope or the slight change in effective discharge or transitioning to something that we don't want?

So these are from the bureau. We took their lead and adopted their charts and plugged our data points on them.

The two red points, as we pointed out in the report, the bureau of information looked at the river in 1900 and then in 2000. So they were looking at a big span of time.

They determined the bankfull discharge by a fairly undocumented method and came up with those two values for 1900 and 2000.

There's really no reason to use bankfull discharge as the channel forming discharge in the Platte River. We tried to illustrate that a while ago with comparison of the one and a half year flow and the magnitude of that compared to the effective discharge.

The one and a half year or bankfull flows are too infrequent to move much sediment. There's kind of a misnomer out there that you've got to have a giant flow down through there to reshape the river, and that's not the case with braided rivers. The workhorse flow is, the ones that shape that river, are on the order of these effective discharges we've been showing here, the dominant discharge.

So all we're saying is those two red points were based on their interpretation of bankfull flows. They didn't do the effective discharge calculations.

But if you read their report and if you read Lane's report, both imply the horizontal access, either bankfull or mean discharge, are what they interpreted to be the channel-forming flows. We just happen to disagree. Bankfull is not the channel-forming flow in the Platte River.

So the points are repeated there, and we tried to explain our understanding of what they did. And we say a couple times in the report that why bother to estimate the channel-forming flows we're going to have through flood frequency on a braided river. It's unprecedented.

And secondly, why not just calculate it. It's easy. If you can develop a sediment rating curve and pick a high curve or low curve, whichever you'd like, and then apply that or convolute it with the daily discharge. You'll get the total sediment transported, and you'll learn which flows are moving more sediment.

Why assume that it's the mean annual flood or that it's bankfull? And I don't know how you find bankfull flow in a braided river, especially in a bankfull. A bankfull could be from Kansas to South Dakota in a river with a really high braided stream bed.

So it was a choice at that time. That was the technology at that time. And there's a common -- and the literature supports in many rivers, like meandering rivers, you can use the one and a half year flood flow as an estimate of the channel-forming discharge. This should not be

something acceptable to the Platte River, in our view.

And more importantly, why not just calculate it? Find out what flow is moving the sediment because that is the channel-forming flow.

Does that help you?

TOM ECONOPOULY: That did. Thank you very much.

RICHARD HOLLAND: This is Rick Holland from the Game and Parks Commission.

That makes a lot of sense in terms of the entire morphology of the river. But when we focus in on specific habitat features, then there's a need to look at different types of flow events.

And that's where we're getting into the bankfull flow and when we're starting to look at formations of high isolated sandbars for a certain tranport period through the year.

And so it's not just what transports most of the sediment throughout the year or throughout the number of years, but what transports sediment enough to form certain habitat forms in the river that need to be used for the birds and the fish and things like that.

So it's two different -- it's really

two different ways of looking at how sediment is used and what sediment is being -- doing to the river.

Our concern is a little -- it's similar to what you were saying, Gary, but it also has some very specific subcomponents to that that make the bankfull flow, that higher flow, more important in certain issues than others.

PAT ENGELBERT: Anything else? Any other questions?

Okay. Very quickly I'll reiterate the conclusions that we reached as part of Objective 1.

That the rivers at all locations were not supply limited. The spatial analysis of effective and dominant discharge reveal the increase in the downstream direction, which is what we would expect as part of natural river process.

Effective discharge and associated morphology has not changed since the 1920s. Sediment transport calculations show that the channel geometries are in regime, and nothing appears to be constraining either the Loup or the Platte from maintaining that geometry.

The combinations of the slopes, sediment sizes, and effective discharges result in all

locations being well-seated within the braided river morphologies, with none of them appearing to be transitioning away from that.

So with that, that would bring an end to our Objective 1 analysis.

We can take a break right now if people would like to. We've seen a lot of yeses and smiley faces. It's the first time I've seen it since lunch was announced.

(Short break taken.)

PAT ENGELBERT: Okay. Why don't we go ahead and get started here. We will move on to Objective 2 of the sedimentation study. We're 25 percent of the way in. Not to deter anyone's participation.

But the second objective is to characterize stream morphology in the Loup River Bypass Reach and in the lower Platte River by reviewing existing data and literature on existing aggradation/degradation.

So similar to how we had done the first objective, I'm going to go ahead and go quickly through the couple of conclusions, and then we'll get into the meat of the analysis.

So based on our literature review of the

existing data as well as our sediment transport calculations, the literature and the analysis indicate that the rivers are in dynamic equilibrium with no indications of aggradation/degradation or channel geometry changes over time.

Combining the literature with the calculations show that the Loup River Bypass Reach and the lower Platte River are in regime and well-seated within the regime zones classified as braided streams.

Okay. So that's the ending. Now here's the story, how did we get there.

Okay. The tasks associated with the objective were to review and utilize the existing literature to assist with the characterization of the stream morphology. And then we're going to compare our sediment transport calculations and evaluate the associated stream characteristics based on those calculations.

Those of you on the phone, I'm on Slide 131 now.

A lot of the literature that we reviewed as -- was published in the last 20 years from the federal agencies, the Corps of Engineers, the Bureau, the USGS. The Game and Parks commission

came out with a study back in 2007. This is a lot of the literature that we cited.

I'll put up on the screen some of the quotes from that literature. But in general, the theory was that the Platte River is neither aggrading or degrading in the lower Platte River, and a lot of the regime analyses and things show that it's an aggraded system.

So based on the review of other -- some of the federal agencies resulted in the conclusion that the system is neither aggrading nor degrading and that it's within the braided system. And again, I didn't want to go through and read every little quote that we had pulled.

So are there any questions, or would anyone like to comment on the findings of the literature that we reviewed? Anyone?

JEFF RUNGE: The purpose of these meetings here is to develop information so that if there's a need for changes in the methodology, that those can be proposed.

And really, you know, I've asked a lot of questions, but there's really only one proposed change in methodology and it really isn't all that much work.

The trends and channel gradation that was identified in the USGS 1999 report, a lot of that information is dated. It's all the way out to 1996. And it would be good to update that information up until -- up to present.

And really, it takes a minimal amount of work, that you just need the -- all the different rating curves since '96 and then develop those same methods here. They provide you with a lot of the historic information. They provide you with a reference discharge as well.

And so I think that it really isn't all that much extra effort, and that would really help to conclude from '96 to present there hasn't been any changes.

And especially too like Columbus, it shows a slight aggradational trend. They found that to be significant, the Loup River at Columbus. But it's really a limited amount of data, limited amount of years, from '67 to '74.

What I'd like to see is -- that sounded as if you're using the same bridge segment. And knowing how that bridge has been in place for a long time, if there isn't any significant changes in -- I don't think that there would be significant changes

in channel geometry, it would be nice to see where those points lie within that distribution.

And I know that's not conclusive, but I think a lot of that supplemental information would be helpful.

PAT ENGELBERT: And I guess just as a form of protocol that will be included in a letter or something?

JEFF RUNGE: In a comment letter, yes.

PAT ENGELBERT: Comment letter, okay.

And relative to the Loup River at Columbus gage, I know now it's been reestablished at Highway 1, but I don't know if the original one that went from the '40s to the '70s, if that was on the UP bridge --

RON ZIOLA: No.

PAT ENGELBERT: It was also on 81?

ROBERT HARMS: I'm pretty sure that gage has always been 81 or was close to the same place.

PAT ENGELBERT: Any other question or comment relative to the literature review that was performed?

LEE EMERY: Just a comment to the

record, any idea what that would add to cost or time going forward?

PAT ENGELBERT: That's a good question. I'd have to review the number of gages.

LEE EMERY: That would be something that we at FERC would look at when we look at deciding what happens in the next stage.

PAT ENGELBERT: Okay. I guess I'll go ahead and move on -- I'm sorry, Lisa had a question.

LISA RICHARDSON: And this question, I guess, is for Nick and Lee, others at FERC.

I think our interpretation was that any study modification request would need to follow the same protocol and criteria as the original request, so it would -- you know, Fish and Wildlife, if you could indicate what additional information would be gained, the relevance of what you're asking for as part of those seven criteria that we talked about as part of the study plan determination -- study plan development.

JEFF RUNGE: Yeah. And I believe too FERC has some further points to -- five points that help to define, you know, is this a result in changes in regulatory -- of a regulatory nature, you

know, why wasn't this brought up before. There's all sorts of criteria that you have to go through to justify the inclusion of that, and we will do that.

LISA RICHARDSON: Okay. I just want to make sure we were all on the same page so when the end of October comes around, we all have the same expectation for where we begin.

JEFF RUNGE: Yeah, yeah. And I do believe this is a simple way of moving ahead too because a lot of the rating curves are developed from USGS, so it's just taking that information and plugging that into a graph, this -- a lot of the graphs that are present within that publication, it's just expanding on that. So I do think that it's a minimal amount of work.

LEE EMERY: Will it change the findings of where it's at right now, do you think, by adding that, or not?

JEFF RUNGE: I mean, that's just it, you don't know until you do the work.

LEE EMERY: I thought you might have some clue as to what you've seen or read and how it might compare.

JEFF RUNGE: I know too that you see the differences in sediment transport and I know

that George mentioned a lot of imprecision associated with that.

A lot of that could be evidence through aggradation or degradation with these gages, so let's carry these through and let's just be conclusive and comprehensive and move on. You know, I think that that little bit of data really helps to address a lot of the uncertainty.

PAT ENGELBERT: Okay. Thanks, Jeff.

The next part of the analysis is we looked at annual trends in flows in effective and dominant discharges.

And again, for comparison or for example purposes, we looked at Genoa and North Bend. We also looked at seasonal annual -- seasonal trends of the channel hydraulic geometry and how that could potentially change. And then we also, again, evaluated the regime implications of those trends.

The first graphic that I would like to show you is the -- and we're on Slide 136 for those of you on the phone -- is the effective discharge, the dominant discharge, and mean daily flow by year on the X axis, based on -- this is the annual effective and dominant discharge at Genoa, to give you an idea of how that varied over time.

A couple things I'd like to point out. The effective discharge is the blue squares, the mean daily discharge are the -- no, let me take that back.

The effective discharge are blue diamonds, the mean daily discharge are red squares, and the dominant discharge is a green triangle.

A couple things that we noted is there seems to be a pretty good correlation between the effective and dominant discharges and the mean daily discharge. There seems to be a correlation there.

Another thing to note was kind of a slightly downward trend in both the effective and the dominant discharge, which I think is indicative of the time period that we studied. From '85 to '94 was kind of a downward trend in the flow data. And I'll show the period of record flow data which shows it's actually increasing, except for the last 25 years has a decreasing trend.

Similarly, this is at Duncan, Nebraska. The effective dominant and mean daily discharges have a very similar relationship to what we saw at North Bend, a slightly declining trend. They seem to mirror very closely what the mean daily discharge is -- I'm sorry, to Genoa.

And finally, this is North Bend. Again, the effective dominant and mean daily discharge have a pretty good correlation between themselves, again, with a decreasing trend in both the effective dominant and mean daily discharge, again, which is a holdover from the period that we selected.

This is a graphic which is Slide 139. It's not in the handouts. I apologize to those of you on the phone. But I added this this morning, much to the chagrin of the project team.

But I just wanted to demonstrate that from 1950 to 2004 -- this is from a USGS report -- that the mean daily discharges are actually increasing, if you look over the period of record. For our study period, it would appear we have a decreasing trend. But long term there's an increasing trend. That's the only thing I wanted to note on that.

The next set of graphics that we --

LISA RICHARDSON: For those on the phone, Figure 513 in your report.

PAT ENGELBERT: Figure 513 in your report on Page 76. That was the graphic I showed, Figure 513, Page 76.

The next set of graphs that were generated show the channel characteristics based on effective

discharge. So what we did is we looked at our effective discharge, looked at our depth, width and velocity relationships, and evaluated how those characteristics changed over time.

So on the -- and all of these plots are located in the attachments in your report, Attachments A through D, I believe. This is in Attachment D -- it's probably in the CD, I guess.

But we've got depth and velocity on the Y axis, the years on the X axis, and the width on the right Y axis. And you can see each of those points. The red squares are width, and the width varies over time. The blue triangles are mean velocity, and it varies over time, as does the flow depth.

The solid lines are the channel characteristics using the entire period of record to establish the effective discharge as opposed to each year annually.

So what we wanted to note here is that it kind of hovers, goes above and below the long-term trend of each of those hydraulic characteristics. This is the plot at Genoa based on the annual effective discharge.

Similarly at Genoa, this is a plot -- I'm

on Slide 141 now.

The channel characteristics at Genoa based on the dominant discharge, we see essentially the same -- the same trend. It varies above and below the line throughout time over the long-term characteristics.

And the next slide is the seasonal dominant discharge. Again, we didn't do seasonal effective discharge due to subjectivity. But this is how the channel characteristics vary on a seasonal basis.

And I believe that season went from May 1 to August 15. Matt, is that right? May 1 to August 15 is the season that was selected.

So of notice is a greater range of variability associated with the seasonal analysis of the hydraulic characteristics based on dominant discharge.

The next set of graphs are at North Bend for both the annual effective and annual and seasonal dominant, and they will show essentially the same sets of trends, although we do have some variability above and below the long-term characteristics. We would expect that type of cyclical nature due to the braided system or the

braided morphology.

Okay. So this is annual dominant at North Bend; seasonal dominant at North Bend.

STEPHANIE WHITE: The question on the slide number. We're on 145.

NEAL SUESS: Actually, it's 144 because you added the extra slide.

PAT ENGELBERT: Yes. We are on 144 in your handout.

So getting back to our conclusions in evaluating what the literature stated relative to the rivers and what type of morphology it's in and whether it's aggrading or degrading and showing how our hydraulic characteristics varied over the long-term characteristic, that both the literature and analysis show that the rivers are in dynamic equilibrium with no indications of aggrading or degrading or channel geometry changes over time, and that the system is well-seated within the braided regime zone classification.

Okay. Questions or comments on that?

MICHELLE KOCH: Why was 1985 chosen as the starting date?

PAT ENGELBERT: The question from Michelle was why was 1985 chosen as the starting

date.

We wanted to correlate our results with the FERC data that was available, was the main reason.

The secondary reason was the GS has electronic data back to 1984, so that was an awful nice way to start the analysis.

So that's why we started with 1985. We felt it was a good representative era of 25 years.

Any other questions?

GARY LEWIS: You might point out that same series of years had wet, dry and normal years in it.

PAT ENGELBERT: Yeah. And based on the analysis of wet, dry, normal which we followed the same protocol as established by the service and the water users in the Central Platte, it did have areas -- or years of both wet, dry and normal designations. So we felt it was a good representative time frame as well.

Anything? Anybody?

Okay. With that I'm going to turn it over to Matt Pillard, who will get you home.

MATT PILLARD: Thanks, Pat.

We're all glad Pat's through and I'm up --

or maybe not. I don't want to take a vote. Neither one of us would be happy with the answer.

I'm going to go through the same process that Pat used, safety objective, give a conclusion, and talk about some of the methods we used to get to that answer.

So the Objective 3 for the sedimentation study was to determine if a relationship can be detected between sediment transport parameters and interior least tern and piping plover nest counts and productivity measures. So that was the objective.

The early part of the revised study plan and as approved in the study plan determination letter, we would look at the system to see if it was in dynamic equilibrium. And if it were, you know, no further study would be warranted.

As I -- I'm an environmental scientist and learned a lot about sediment transport parameters through this process as well, and realized that pieces -- it's an error process. Pieces were developed piece by piece.

And so we realized that if we waited until we got the final answer, it might be too late for us to actually do the analysis. So we proceeded with

doing the analysis on each of the sediment parameters as they were completed relative to the bird numbers.

So even though, you know, the study plan stated that if this indeed were the case, you know, no further analysis was warranted, we felt we had to do the analysis piece by piece depending on what the outcome might be. So we proceeded with doing the analysis here.

And so again, I already kind of read the objective. And the associated tasks here were to plot those least tern and piping plover nest counts and productivity data against sediment transport parameters. So that was the task associated with the objective.

And here's kind of -- here's the end story. After we plotted all those, we could not find a significant relationship between the interior least tern and piping plover nest counts and the parameters that were looked at.

Not only did with we look at sediment transport parameters but also hydrologic parameters. And we'll go through all those parameters that were looked at and the different -- all the different combinations of how we looked at that data.

Not only did we look at, you know, the statistical analysis, but we also physically looked at the graphs. Visually, what are these things telling us? You know, can trends be gathered just by looking at the curve, looking at the plots.

So kind of going through here on how we did it, here's kind of the methods, is getting that best available data from '83 to 2009.

And through conversations with Game and Parks and with Mary, we looked at, you know, how would we use fledge ratios or productivity measures. And we realized that we really didn't have fledge ratios for any of the years that we -- we had some fledge counts but not fledge ratios.

So based on the scarcity of that data, you know, we used the nest counts. There were also adult counts. We talked about how adult counts are taken, how they're used. And it was determined as a group that the nest counts would be the best source of data to do this comparison.

How we kind of grouped this data is we did use the USGS gages, and we looked at -- divided the river into those segments from Tailrace to North Bend. North Bend to Leshara, Leshara to Ashland, Ashland to Louisville. So we used each of

those as a river segment and did all the analysis for each of those river segments.

Some of the years of which we had data were excluded from the analysis due to the availability of the data for that year. Either there was no data recorded for a particular segment, or in some years, like 1995, that was a high water year. There was simply no records at all.

So some of the records were excluded from the data set to get rid of those outliers that we could explain from a data perspective.

Here's 14 parameters that we looked at. I won't go through all of them. But I think the thing to note here is we looked at both annual and seasonal numbers where they apply in that manner.

So all the things that Pat kind of worked through before, we took all those parameters as well as some hydrologic parameters, such as peak mean daily flows, both seasonally and annually. We plotted all these parameters against the nest counts.

And I think here we'll talk about how we kind of did that. How we broke up the nest count data is -- again I mentioned we used each of the gages. So from a spatial variation standpoint, we

looked upstream from the gage -- looked at the nest counts upstream of the gage and compared those to all those parameters, looked at the nest counts downstream of the gage, compared all the parameters. And we also then looked at both upstream and downstream from the gage and compared all the parameters.

Then we also considered time variations in how we would look at this data. So we also looked at, you know, year to year. What happened in '89 from a nest count perspective, what happened in '89 from a parameter perspective.

And we also looked at what happened in a one-year lag scenario. So for example, we looked at a sediment parameter in Year X, and then we looked at the nest counts in Year X plus one.

And similarly, we took that out to a two-year leg to see if there was any time variation, time scale differences on a lag effect on what might be happening from a parameter perspective to nest count data.

So this is generally what we did end up doing here and the number of plots. We looked at the two species and fourteen parameters. We had the four river segments, the three spatial variations

and the three time series comparisons. It gave us 504 plots for each species, so 1,008 plots we looked at.

LISA RICHARDSON: And those are included in Attachments C and D.

MATT PILLARD: And now that we're on the statistical side of things, in those is also all of the R squareds that were developed for those.

Kind of a parameter for -- more for me than maybe for some of you. Statistics is not my area of strength.

But I wanted to kind of go over that this -- the R squared, you get a linear regression analysis on these. And the strength of that linear -- the R squared is the strength of the linear association between nest counts and particular sediment transport or hydrologic parameter.

So it describes that proportion of the variation of the nest counts so that can be explained by the parameter. And those can range from zero to one. And it's kind of important to remember that if you only have two data points, then that R squared would be a one, Point A to Point B.

We also, again, looked at -- we have an

example here, just in case for further clarification -- an R squared of .1 indicates that 10 percent of the variation in a nest count could be explained in that given parameter.

So here we look at the R squared values and what were they telling us. And there's not a golden number for an R squared of what's good and what's bad. You kind of have to look at the range and the numbers.

You know .5 could be considered, you know, at the low end of a positive relationship or a strong correlation. And, you know, for interior least terned, we didn't have any R squareds of any of those plots that were above a .5.

We had one of the piping plover plots that were above a .5, and I can show the range here for interior least terns. They ranged -- of all the 504 plots, ranged from 0 to 0.389.

Six of those, just for point of reference, exceeded .3. And again, because we had so few values of R squared that exceeded a .5, we took a step back and looked at what's a good R squared to look at. If you wanted to look at correlation of the strongest R squareds, where would we draw that line?

And there were a number that were above a .3. More so in the piping plover species. And we'll kind of get to where those were and what those meant.

Specifically on least terns, again, we have six of those that were above a .3 of an R squared. Four of those are associated with a peak mean daily flow. And all are associated with -- you know, downstream and upstream of North Bend, here we have one upstream of North Bend and Leshara.

We did note that -- you'll see in the next slide the piping plovers -- you know, a lot of the variations that we did have were in that Leshara to North Bend river segment. And we can -- I have a slide here later on that kind of describes what we see there.

Two of those six were associated with sediment transport parameters of those that exceeded .3. One was associated with a seasonal dominant discharge in a one-year lag scenario up through Leshara and one was a seasonal cumulative sediment parameter upstream of Leshara in a one-year lag scenario as well.

Here's just an example of a plot. And this one is a -- this one shows interior least tern

nests plotted against peak mean daily flow downstream of North Bend. This is annual peak mean daily flow, and this is in a no-lag scenario.

And just for a point of reference, each dot represents the intersection of a nest count for a given year and its associated peak mean daily flow for that given year.

So this is what the 504 plots represent. And as we looked at these visually, you know, some of the things that stand out to us is we have an R squared here of .374, but we can see for a very similar flow we have kind of a wide range in nest count numbers.

And obviously there's a lot of reasons why that might occur. But specifically looking at peak mean daily flow, that's one of the reasons why our R squareds probably aren't very strong in situations like this and situations where you have an outlier that can skew that R squared.

I think I have another example here. This is interior least tern nests against cumulative sediment. This is upstream of Leshara from a seasonal perspective in a one-year lag.

And again, you can kind of see we have some low ends of the spectrums. We have areas with

very similar flows and a range of data.

You'll also note the whole data set here just isn't large. And that's the other thing we ran into in the Leshara segment, either upstream of Leshara, downstream of North Bend. That seemed to be an area where the numbers were just lower so we had a smaller data set to work with.

Relative to piping plovers, again, looking at -- using .3 as a line just for comparison's sake, 26 of those values were greater than .3. Nine of those were downstream of Leshara. So again, that's kind of an area that seemed to have more comparisons than other -- than the other segments. Five of those twenty-six were upstream of Leshara.

So we -- the thing to point out here is that Leshara is the smallest data set where, you know, in some of the areas we'd had six, seven, eight years where we used it to do the analysis.

And just a few example graphs here of Leshara for a seasonal cumulative sediment under a no-lag scenario. Again, just visually we're looking at a wide range of nest counts. Again, it's only zero to twelve. So we know -- there's not a lot of numbers here we're talking about anyway. But looking at the variable of season cumulative

sediment, you've got a very similar value and a pretty wide range of nest counts across the years.

One more graph, again, simply showing that these are the total data set that we had to work with here, just smaller than we had for some of the other segments.

So I guess again, the conclusions here, we didn't find a significant relationship between tern and plover nest counts and sediment and hydrologic transport parameters.

And then just visually looking at the data, we were having a hard time pulling out, you know, are we seeing a trend here on any particular plot or graph that we could dig into and investigate further.

So I guess with that any questions?

CHRIS PRACHEIL: Chris Pracheil with NDEQ.

I was wondering if transforming some of the discharge parameters might have given you a different correlation? I know a lot of times discharge is log transformed or natural log transformed to kind of account for those 50,000 to 350,000 flow discharge and might take up your R squared a little bit.

I'm just curious, you know, when you've got the orders of magnitude changes in parameters, you might be losing some of the significance just because of that huge variability in your parameters.

MATT PILLARD: Yeah, thanks, Chris. Our study plan showed that we do a linear regression. That's where we started from to see where we'd land, you know, obviously open to your comments as part of the process on ways that we can improve on the data.

CHRIS PRACHEIL: I would also ask Mary or anyone with Game and Parks, did you ever think that an R squared of .3 is pretty good for a (inaudible). It's not quite the same as the correlation between, like, a precipitation event and discharge. .3 is pretty significant in biological settings.

MARY BOMBERGER BROWN: If you could explain this -- how nearly 40 percent of the variation in exploratory data is high (inaudible).

MATT PILLARD: Considering that, visually looking at the graphs, you know, we have to compare what the R squared of .34 is telling us compared to the data set.

So you're right. Being able to attribute

30 percent of something to a variable, that is telling us something. Visually looking at the graph is telling us things as well. But point taken.

Joel?

JOEL JORGENSEN: I have a number of comments. Rather than sort of going around and asking specific questions, maybe I'll run down the list of comments I have.

Mary and I reviewed the document individually, but then we saw there was a great deal of overlap in some of our comments. So -- and just for the sake of efficiency, this includes comments from both me and Mary.

I think overall we think we identified a number of different problems with the analysis that really make the analysis the conclusions and the results somewhat invalid, or just invalid in general.

A couple of the comments that I have is -- or the comments that I have are, you know, I think the first step is -- in any analysis is summarizing the data properly and matching the data that's available with the appropriate analysis. I think that, potentially, step was overlooked here.

One of the problems here is that it's

pretty apparent that the data aren't normally distributed, you know, and that's one of the basic assumptions in doing linear regression is that the data is distributed normally.

That's one point, and a lot of these comments are interconnected.

I think also another point with sort of this whole data preparation commentary -- and really this is key to the rest of what you presented here -- is that I think it's pretty clear that you have some issues with pseudoreplication with the analysis.

The units aren't combined and pseudoreplication is merely treating individual observations here as independent, when in fact they're interrelated. And so you have different points that may put a lot more pull on what's being fitted on the model, so I think that's another important issue that needs to be resolved before proceeding with the analysis.

And going back to this whole thing of the normality of the data, parametric tests were used when probably nonparametric tests should have been used just, again, because the data aren't normally distributed.

But then you have issues with the small data sets, which is another problem. It's just an error problem with the data sets. Specific statistical tests weren't named in the write-up, which is -- makes it challenging to interpret.

Going back to this whole issue of some of the basic assumptions of regression analysis, potentially looking at or stating in the document that you reviewed perhaps the residual plots and some of those things -- and that would probably help to sort of understand how the data -- how the data are distributed in relation to the regression lines and some of those issues with normality and also violations with (inaudible).

And again, I think some of those issues with the data preparation are very important. And I think once those are addressed, we identified some specific examples that could really improve the overall analysis.

Just a few other points about what's been presented. We both identified that most of the analysis do appear to be influenced heavily by outliers, and that's potentially related to the pseudoreplication issue. But potentially also, even if those outliers exist, maybe looking at why --

potentially examining why some those outliers of exist.

We know there's inconsistencies with the data. Maybe that's an artifact of some of that inconsistency and maybe that necessarily shouldn't be included as it is.

With some of the graphs, no significant tests or key values were provided for some of the tests. That's sort of a minimal expectation. Also, within 95 percent confidence intervals with regression plots, that's kind of a basic expectation.

Now to some of the suggestions.

I think linear regression is really not appropriate for this data. You were talking about how the data or the lines fit with the data, and I think that's a valid point as the data are presented here. Maybe if some of these other data issues were addressed, that might change it a little bit.

But this graph here is another good example of why linear regression may not be the best choice. If you look at values above 2 million on your X axis, if you extended your regression line, the fitted values would be negative. And we know in nature we don't have negative -- we can't report

negative nest counts.

As a suggestion what I think I would put forward is potentially looking at using a generalized linear model, either -- potentially for some regression because for ecological data, especially for count data, that's what's now recommended for use for count data because it fits the distribution of the data being collected. So that's pretty important.

Another possible choice is logistic regression. And we know this is kind of noisy data and so using -- success or failure may also be affected just dealing with some of that noise.

Each approach has drawbacks, limitations and advantages, and I think it's maybe the issue of really sort of thinking hard about the analysis and also the data in which you have. But again, I don't think linear regression is appropriate for some of the reasons I just stated.

Taking a step back, I think using a model-based approach rather than doing 1,008 individual analyses would be a better approach. And a model-based approach, specifically looking -- especially if you're using information in a theoretic approach where you can build competing

models and then compare the relative strength of the models against each other rather than the individual analyses, that would also allow you to have interactions between the X variables.

I think that would be much more appropriate here and perhaps be much more appropriate for the goal of trying to determine whether these relationships exist or not.

If you decide to do that -- if you decide to use a model-based approach, using something like AIC is not the only model-based approach. There's a number out there that you can use.

But perhaps one thing that might be important if you do choose to go down that road is to address the issue that many of your dependent variables used in these analyses and are probably highly correlated. So addressing that issue of multculinarity before you build those models will be important.

It may also help, even if you choose to do individual analyses because it could just simplify things for people. Maybe, you know, doing some sort of principal component analysis and reducing a number of variables used can be very helpful.

We already talked about R squared values.

Again, we thought those were incorrect conclusions that R squared values of .3 or whatever are not meaningful. Again, that's an important point to talk about and acknowledge.

Also some of the information presented in the report, you know, Section -- on Page 41, it said, you know, literature was reviewed or something was relevant. Rather than saying that, it might be much more helpful to use that literature or citations to understand why certain decisions are made in the analysis or the methods.

And also too it would have been helpful to know what kind of software package you used for the analyses. Again, there's different opinions about different statistical software.

And then I guess I have one final comment about -- excuse me for taking so long -- one final comment about some of the text that was included in the report.

For instance, on Page 41, the second sentence, Section 4.5 you specifically refer -- you included a quotation in there regarding the data use agreement. And I guess I'm not clear why that was included. I don't know how that affected your analysis. Did that affect your analysis,

acknowledging that information?

MATT PILLARD: No, the data use information did not.

JOEL JORGENSEN: I guess why was that included in the document then?

MATT PILLARD: I'd have to refer to the section and read it.

JOEL JORGENSEN: Well, I mean, the data are what the data are, and we know it's somewhat noisy data. The data use agreement was just sort of a standard document that's usually done when data are being exchanged between workers, and especially in our case when we're working with threatened and endangered species.

It's fine to acknowledge the limitation of the data, but if it doesn't affect the end interpretation, it doesn't affect the analysis. It's somewhat superfluous. So perhaps those comments should be left out of the report.

Sorry for taking so long, everybody. I hope the comments are helpful, and we will be providing the comments in written form. And I hope they're helpful and can improve the end analysis.

MATT PILLARD: Thanks, Joel.

Yes?

MIKE GEORGE: Mike George, Fish and Wildlife. I just want to piggyback that I don't see it as linear either. And I think what that illustrates is when you consider that in a linear relationship, high flows you'd expect few birds and low flows, you'd expect a lot of birds. At either end of that we won't have nesting. Because with low flows the birds won't use the habitat, so I think that alone tells you it's not a linear relationship.

I also see the multculinarity issues being pretty big. I mean, a parameter of annual effective discharge and annual dominant discharge, those have a lot of overlap. And so right away your R squared values are going to change.

So that alone -- I don't have much comment on the R squared values because I don't think they tell us anything due to the multculinarity issues.

Those are my comments.

MATT PILLARD: And I guess I'll say, you know, the linear regression is what we talked about last fall when we talked about what we would do and that's what was in the study plan.

What I'm hearing is it's a place for us to start. And if it wasn't valid when we did the study plan, you know, somehow that's what was agreed to

when we agreed to the study plan. No changes were made in the study plan determination. So that's why we did what we did, is because that's what was discussed as a group.

MIKE GEORGE: The only thing I'd add to that, though, just from my own experience. I mean, there's a value in doing the linear regression to show you that it's not a linear regression.

MATT PILLARD: Sure.

MIKE GEORGE: Until you see the data applied, you don't know that.

JOEL JORGENSEN: And also too, I mean, I read the document. Sorry I wasn't at the previous meetings. But I agree, it did say regression analysis would be more (inaudible). Some of the data issues are separate from what analysis technique was used.

JEFF RUNGE: Yeah, that was my comment, is that it said a regression analysis was going to be performed, not a linear or other type of regression.

MATT PILLARD: I guess to conclude, I have one more slide here.

We did look to see what else in this area had been done before. I know Jeff is very familiar

with this study, on the USGS study that was done in 2009 on the lower Platte.

You know, there's some good information there, thinking about -- thinking ahead and thinking of how we could piggyback on that work or use that work as part of our analysis.

Primarily what that did is looked at nesting information, clustered those relative to looking at components like valley width, channel width, and simultaneously. So we did look to see what else was out there from the literature standpoint. This is the one area that we did find that looked at things how to kind of classify nesting information relative to other parameters.

STEPHANIE WHITE: Do you mind if we give our court reporter a break?

(Short break taken.)

SCOTT STUEWE: Objective 4 is to determine if sediment transport is a limiting factor for pallid sturgeon habitat in the lower Platte River.

Well, as the sedimentation study basically documented, there is not a change or effect on morphology and so I guess you could infer that the project does not affect pallid sturgeon habitat

parameters related to sediment transport.

In conversation or direct personal communications with University of Nebraska Lincoln, USGS, and U.S. Fish and Wildlife Service, and looking at literature review, the lower Platte River is appropriate for pallid sturgeon habitat.

And with the recent sturgeon captures, it shows that the species are occupying this area, using it for basically a refuge area. So there is not any documented spawning at this point in time.

With that, no further analysis is needed based on the revised study plan methodology.

However, we did do a literature review again, just to document. Peters and Parham, 2008 -- these are direct quotes -- The fact that we caught pallid sturgeon during the spring, summer and fall months of the year indicates to us that the lower Platte River is an important part of the Recovery Priority Management Area. And that's Area 4.

The capture of six pallid sturgeon in the lower Platte River that were stocked into the Missouri River suggests that conditions in the Platte River are attractive to stocked pallids.

And with further study that has occurred with the University of Nebraska, with the 69 fish

that were caught in '09 and the 20 to 25 that have been caught recently this last year, it shows that the area is being used.

Also the Platte River Recovery Implementation Program states, Consistent with the April 28, 2004, finding of the National Academy of Sciences, it is now agreed the current habitat conditions on the lower Platte River do not adversely affect the likelihood of survival and recovery of the pallid sturgeon because it appears to retain several habitat characteristics apparently preferred by the species. And if we are in dynamic equilibrium, then this should not change.

This is the five-year study that the University of Nebraska is conducting now. There's information that's going to continue to come in over who knows how many decades as we pursue the sturgeon research.

But with the information we have, the study is going from the Platte River 30 miles west of Columbus to the confluence with the Missouri River.

The gear used, of course, are trotlines and drifting trammel nets. Some of these have just been really used in the last -- oh, probably the

last decade. That was why a lot of sturgeon were not caught originally because these are -- basically we had to (inaudible) from the commercial fishermen.

The results for 2009, that 69 pallid sturgeon were captures. Of those, three he feels were documented wild fish. The rest are hatchery reared and spawned.

2010, due to the water situation that was experienced this year, they couldn't get out and get the numbers of capture days in that they'd like, but they still captured 20 to 25 pallid sturgeon through midsummer.

At this point no sturgeon have been collected upstream of Columbus. Several shovelnose sturgeon and one pallid sturgeon collected a half mile below the Tailrace canal. No gravid females of spawning age were collected or have been collected.

Rick?

RICHARD HOLLAND: Thirty miles west of Columbus, that was a one-time sampling event?

SCOTT STUEWE: Yes, that's correct.

RICHARD HOLLAND: That was not part of the original objectives of that study. So to characterize the five-year shovelnose sturgeon

study, it would start at Columbus. They did an exercise in the spring of -- the late spring to look at that area by Clarks to see if with the water year we were having, whether or not they would have presence of shovelnose and pallids.

SCOTT STUEWE: Okay. So noted.

Again, with this, just restating the conclusions, being that it was determined to be in dynamic equilibrium. The habitat should not be a limiting factor.

Again, with the literature review and with personal communication, it supports that the Platte River is a good and stable environment at this point in time for sturgeon, and recent sturgeon captures show that the species are occupying this regime.

And with that, as more information becomes available in the future -- and this goes for the whole Missouri and Mississippi river basin -- we'll be continuing as we go along. But we are finding tributaries such as the Platte are important for the establishment and recruitment of sturgeon.

And with that I'll take any questions.

Okay. Thank you.

LISA RICHARDSON: That was quick. My

watch says it's 3:15, and we're supposed to be done at 5. So I'm going to have to find a way to keep you here for another hour and 45 minutes.

RICHARD HOLLAND: Good luck to you.

LISA RICHARDSON: I guess before I go into the next steps piece, is there anything else anybody had a question on? I'll talk about the next steps here as far as submitting any official comments.

Gary?

GARY LEWIS: I'm going to ask a question a little bit out of my field.

But I've done a lot of statistical analysis of hydrologic data. In order to do some of the things that were asked earlier -- I'm sorry, we jumped right in here before I had a chance to break and ask this question, but to do that you have to have a model of some kind.

For example, in hydrology we know that rainfall and runoff and other parameters are related in a log linear fashion, as has been suggested here. And for multivariant statistical analysis with some of the techniques that were described here, including principal component analysis -- I've done a lot of that -- you need to have some kind of

understanding of the model you're going to fit.

With hydrology, for example, the discharge from a watershed is a function of coefficients times parameters to a power. So it's a power relationship, but that's a physical process based model.

I'm just curious if I'm going to be at least talking to the folks that are going to try to respond to the comments that were given, whether you bird species folks have a model that you're trying to fit. How are nesting counting related to these factors?

If you're going to use a multivariant statistical analysis, you can't search for that model. You have to have some preconception of how those variables interrelate to each other in order to do the work. It's all part of it.

So it's a technical question. I don't need an answer during this discussion. It's not really relevant to our presentation. But if one of you might be able to fill me in a little bit after the break, I'm interested in at least advising our staff on if they're going to do any principal component work, multivariant statistics, what model you would propose we use for that.

So that's certainly something I have no expertise in understanding, how nesting counts are related to these physical parameters of river sediment and hydrology parameters. Maybe there is some literature or some knowledge on the part of folks here that could give us some guidance on that.

That's a form of a question or a comment. Thanks for the minute to --

JOEL JORGENSEN: I'd like to take a minute. I'll just respond real quickly. I guess if there's good justification not to do any sort of additional analysis as it relates to doing PCA, that's fantastic. And maybe providing some information in the methods section would be helpful, just saying, We looked at this, we shouldn't do it.

I guess specifically what I was referring to if you were going to use a model-based approach, it would probably be -- it's generally not appropriate to have to fill the model full of highly correlated variables. And just maybe -- I don't know anything about -- too much about the parameters, but if it doesn't make sense, then great. Put it in the methods, defend it, and we can move on.

LISA RICHARDSON: Other questions or

comments?

I'll just kind of walk through the next steps as we talked about them at the beginning of the day.

For the completed studies that we presented today, we'll be submitting a meeting summary, as I indicated, meeting notes from today by the 24th of September. And then agencies and here as well as others can have an opportunity to comment on that meeting summary as well as to submit requests for modifications to the studies.

And I heard today that Joel is going to submit some comments, as well as Jeff. I didn't hear anybody else with any particular suggestions, but you certainly may have additional ones.

And then by November 24 the district will have an opportunity to have reviewed your comments and prepare some responses to those that we would file with FERC. And then by the end of the year, FERC would make a determination as to whether study modifications are needed and what form those modifications might take.

RANDY THORESON: I have a question. This is Randy.

When do we have the opportunity to see the

meeting summary that you're going to be submitting to FERC? Is that going to be sent out to us? Will we have an opportunity to see that?

LISA RICHARDSON: We'll do that the same way we've done pretty much all of our other submittals, Randy. First of all we'll file it with FERC, and that becomes automatically posted with the e-notice. I don't know if you're on that list or not for this project.

We will also send an e-mail out when we file it with an attachment -- I'm sorry, with a link to the project website where we'll post it. So if you got notice of this meeting, you should get notice of the meeting summary being posted to the project website. It would be on FERC's e-file at the same time.

RANDY THORESON: Okay.

LISA RICHARDSON: Jeff?

JEFF RUNGE: Yes. I've got a question in FERC in regards to the process here. We're going to provide comments. We're going to provide recommendations for modifications. But we're going to reserve a lot of recommendations because a lot of these studies aren't discreet individual components, but they're integrated

components and integrated with other studies.

And for us you need to see that big picture. You need to see all the studies so that you can conduct a lot of cross-validation of results to see if they are -- logically make sense.

And with that too, I guess we can provide some insight prior to -- within our comment letter, I guess, we can provide some insight as to what we would be looking for from the future studies that would help to cross-validate that would be beneficial to FERC. But if not, if all you want is recommendations for modifications too, we can just focus our comments on those.

NICK JAYJACK: This is Nick Jayjack from FERC.

Jeff, I've been mulling over the same thing for the last couple of days as to how we might want to do this. I'm not sure yet how we would structure this.

I mean, one option would be to basically have two processes like this. We go through the one, as mentioned here so we make a determination on December 27. And then once the additional study report came in on January 6, we'd go through a second process like this. So one would have two

chances to request for modifications to the study plan.

The other thing we might do is -- and this is something -- again, I've just been mulling over this. Maybe we hold off on our December 27 determination and wait and make one determination. And it would be April or something like that after the studies are -- the initial round of studies are completed, a report is sent in on January 6.

And that might be a way -- so that way you have the big picture in order to make the recommendations, and then we would have a bigger picture with which to make a determination.

None of this has been decided internally. It's just something that we're going to have to think about over the next few months, how we might approach this. Does that make sense?

JEFF RUNGE: Yeah, that does. I guess we'll wait on your word as to how to proceed.

NICK JAYJACK: And I'm thinking off the top of my head as well that your comments on this regard at some point -- and maybe on the October 24 -- in this regard, written comments would be helpful too as far as if you can make a recommendation as to how -- you know, for us to

consider how to proceed with this.

Until we actually sit down and we look at the study results and try to think through our minds where are there information gaps remaining, it's really -- I don't know the best course of action at this point.

So maybe in mid October or sometime in November we'll have a little more clarity on the best approach to take.

LISA RICHARDSON: So Jeff, I guess I would interpret what -- Nick, what you're saying is it would be helpful if you provide not just comments on the studies that are complete, but also how those might be interwoven with the studies that are still pending and that will help FERC make a determination on whether they think they ought to wait on their resolution of comments until after those sets of studies are completed.

JEFF RUNGE: Yes, we can do that. But keep in mind they may not be all-inclusive because there could be a lot of surprises with results that come about that doesn't necessitate changing the methods, it's just something that you need to reflect on before you make a decision.

ISIS JOHNSON: And one other thing --

this is Isis from FERC.

One other thing I also wanted to say is you should give recommendations for how you would like us to handle your comments. So if you would prefer that we wait until the January 6 filing to make a determination or to resolve any conflicts, then I think those comments should also be included in your responses to the studies. I think that's also what I heard.

LISA RICHARDSON: That takes me to my last slide, which was just a reminder of the January 6 date for the -- what we're calling the updated initial study report. We'll have completed the studies that were not completed this time. We'll have a full report on those.

And then we would also have a companion meeting to go with that report in January scheduled for January 20, location to be determined. We may have it here or we may be at another location.

So that concludes us for the day unless anybody else has more to say.

Neal, do you have anything or anybody else?

RANDY THORESON: Let me just understand this. January 6 (inaudible).

LISA RICHARDSON: Randy, I couldn't quite hear that.

(Inaudible conversation between Randy Thoreson and Janet Hutzel.)

STEPHANIE WHITE: So I'm going to repeat your question, both Randy and I think Janet as well. They just want to confirm that the January 6 submittal of the updated initial study report to FERC will include the final results from the recreation study.

LISA RICHARDSON: They will, assuming that FERC doesn't request or require an extension of the data collection. If the data collection gets extended --

JANET HUTZEL: Yeah, Randy if you have comments about whether they should do the extension for this November through February (inaudible).

STEPHANIE WHITE: So Janet was just explaining to Randy that if he would like to request an extension, he should get that in by October 24.

RANDY THORESON: Yeah. I understand that.

LISA RICHARDSON: But as the study is

currently scoped with the data collection to end October 31, we will have the final recreation results on the January 6 updated report. We won't have the recreation management completed at that time, but we will have the study completed.

RANDY THORESON: Yeah, I understand that.

LISA RICHARDSON: Anybody else?

RANDY THORESON: I'm just looking at the final results for the overall recreation study.

LISA RICHARDSON: And Randy, one other piece that may play into that is we also owe FERC -- I believe it's next week -- an interim report on the recreation survey that we've been doing.

JANET HUTZEL: Right.

LISA RICHARDSON: And we're almost there with it. We wanted to get the August data incorporated into it, which we weren't able to incorporate into that initial study report that we submitted on August 26. So that should be coming next week, the interim recreation use study update.

Well, thank you all for coming.

(Adjournment - 3:25 p.m.)