FEDERAL ENERGY REGULATORY COMMISSION

LASSEN LODGE HYDROELECTRIC PROJECT
IN SACRAMENTO, CALIFORNIA
P-12496-002

PUBLIC MEETING

NOAA Fisheries' Office
San Joaquin Conference Room
650 Capitol Mall, 5th Floor
Sacramento, CA
Thursday, March 15, 2018
8:30 a.m.

ATTENDEES

CHARLIE KUFFNER

BILL FOSTER

MARY MARSHALL

STEPHANIE MILLSAP

LAURIE ERLEY

PHIL LEAPLEY

JIM TOMPKINS

JASON TOMPKINS

DOUG PARKINSON

GEORGE GILMOUR

BRIAN MATTAX

KEN HOGAN

JOHN HENDERSON

ALISON WILLY

SUSAN MONHEIT

SAVANNAH DOWNEY

DANIEL WELSH

JANET WHITLOCK

PETER FOOTE (BY PHONE)

TYLER RYCHENER (BY PHONE)

QUINN EMMERING (BY PHONE)

EVAN WILLIAMS (BY PHONE)

P R O C E E D I N G S

MR HOGAN: Alright, I think we're all ready now. Thank you all for your patience and this opportunity to talk about the analysis. My name is Ken Hogan, I'm with the Federal Energy Regulatory Commission and we're here today to discuss Fish and Wildlife Agency recommendations, 10(j) recommendations that the Commission staff does not support in its Draft EIS for the Lassen Lodge Hydroelectric Project.

With that I'd like to go around the room and do some introductions.

MR. GILMOUR: I'm George Gilmour, fish biologist. I have 25 years of experience working in Washington, Oregon and California and I have been associated with hydro project licensing and new licensing work.

MR. MATTAX: Brian Mattax from Louis Berger. 30 years doing air quality science for mostly for hydro projects and I worked on the EIS.

MR. HENDERSON: John Henderson with the U.S. Fish and Wildlife Service. I've been with the Service for 24 years and I'm a biologist working on natural resources, assessment and FERC projects.

MS. WILLY: I'm Alison Willy with the U.S. Fish and Wildlife Service. I've worked with the Fish and Wildlife Service for 5 years and their biologists, I've worked with the Interior for 35 years and I'm the Division

Chief for Watershed filing division in the U.S. Fish and Wildlife Service Office.

MS. MONHEIT: Susan Monheit, State-wide Resource Control Board and this is one of the supervisors of the water quality certification unit in the Division of Water Rights that receives the writing of water quality, new development and writing of water quality certifications for hydroelectric projects.

MS. DOWNEY: Savannah Downey with the State Water Board. I'm the environmental scientist in the water quality certification.

MS. ERLEY: Laurie Erley, with the U.S. Fish and Wildlife Service and I work at the Fish and Wildlife Office and the Battle Creek Restoration Water Dam Program Manager, Battle Creek Water Shed Coordinator.

MS. WHITLOCK: I'm Janet Whitlock, I'm with the Department of the Interior, Office of Environmental Policy and Compliance. I'm the Region One Environmental Officer in this area for California, Nevada, Arizona and the Pacific Islands.

The Office of Environmental Policy and Compliance Coordinates and works under NEPA in environmental review policy. We work with FERC and we deal with cross-cutting issues on the reaffirmation in Fish and Wildlife Service and handling any of these requests and issues for the

Department.

MR. FOSTER: I'm Bill Foster, National Marine Fishery Service. I've been working on their projects since about 2004 and this is one of my main projects.

MR. KUFFNER: Charlie Kuffner with Rugraw for the applicant, Lassen Lodge Hydroelectric.

MS. MARSHALL: I'm Mary Marshall with the U.S. Department of Interior, Bureau of Reclamation and I'm the Battle Creek salmon and steelhead restoration project manager.

MS. MONHEIT: My name is Stephanie Millsap with the U.S. Fish and Wildlife Service. I've been working with the service for 13 years, the last year of which has been working on FERC projects.

MR. WELSH: Hi, I'm Dan Welsh. I'm the Deputy Field Supervisor for the Bay Delta Fish and Wildlife Office of the U.S. Fish and Wildlife Service, here at 650 Capitol Mall. I've been with Fish and Wildlife Service more than 29 years.

MR. LEAPLEY: I'm Phil Leapley, I work for Tetra Tech. I've been working on this project, with the applicant since 2012, a couple of years ago I transferred over to assisting the water coordinator with the DEIR.

MR. HOGAN: Folks on the phone can you hear everybody on the line?

UNIDENTIFIED SPEAKER ON PHONE: Most folks, some are kind of far away.

MR. HOGAN: Okay.

UNIDENTIFIED SPEAKER ON PHONE: Yeah, they're a little faint at times.

MR. HOGAN: Alright, if there's something that you can't hear just don't hesitate to cut in and ask for us to speak up. And let's do introductions on the phone, starting with Peter.

MR. FOOTE: Yeah this is Peter Foote, I'm with Louis Berger for contractor. I'm the Project Manager but I'm a fishery biologist. I've been working on hydro for oh, I don't know 35 plus years.

MR. SEELEY: This is Jim Seeley the Court Reporter and if the people on the conference could please spell your name for our transcriber -- so Peter what is your last name sir?

MR. FOOTE: It's Foote, that's F-o-o-t-e.

MR. SEELEY: Thank you sir.

MR. RYCHENER: There's Tyler Rychener, I'm also with Louis Berger for contractor and I'm with terrestrial and Q&E resources for the Lassen Lodge Project. I've been working on hydro projects for about 10 years and working on through NEPA and biological evaluations for about 18 years and my last name is R-y-c-h-e-n-e-r.

MR. HOGAN: Quinn?

MR. EMMERING: Hi my name is Quinn Emmering and I am a wildlife biologist with birds and yep that's it. I've only been working with hydro projects for about 3 years.

MR. HOGAN: Quinn do you have birds?

MR. EMMERING: No, that is not me.

MR. FOOTE: Sorry, that's my -- this is Peter, that's my bird clock in my office here.

MR. HOGAN: And Quinn could you spell your last name please?

MR. EMMERING: Okay, my last name is E-m-m-e-r-i-n-g.

MR. SEELEY: And is it Quinn with one or two n's?

MR. EMMERING: Two, two n's okay, thank you very much.

MR. HOGAN: Evan?

MR. WILLIAMS: Yes, good morning, Evan Williams, W-i-l-l-i-a-m-s. I'm the Lassen Lodge Project Co-coordinator with Ken. I'm also the outdoor recreation planner and I have been with FERC for a little over a year now so I've been doing hydro for just a short time.

MR. SEELEY: I apologize, I need you to spell your last name one more time.

MR. WILLIAMS: Williams, W-i-l-l-i-a-m-s.

MR. HOGAN: Who also do we have on the phone?

MR. SEELEY: Okay I need to ask, this is the court reporter here again, I need to ask everyone here on the phone if whenever you speak if you just identify yourself by your first name because I have a seating chart here in the physical room but I don't know voice to phone out here to know who's speaking, so the transcript is who says what, our transcriber is going to need to know who's talking on the -- who's participating remotely please.

MR. HOGAN: John you had asked me earlier last week if we can give a presentation before we started the meeting, should we do that now?

MR. SEELEY: No, no, I don't need anyone's name here in the room because I have a seating chart, anyone coming through the speaker there I need to know, sorry.

MR. HENDERSON: We appreciate the opportunity to give a presentation about the Battle Creek salmon and steelhead restoration project. It's a very important project. It's been working on for many years so I think it will help frame our concerns with salmon and the watershed, in restoring the watershed to the licensing of Lassen Lodge.

And this presentation was put together by Mary Marshall herself and some other people here including Laurie and Alison so it is a group effort. And, as I go through these slides I would welcome any other input from -- especially the people that are working on the project for

additional information and insight.

So this is an interesting from Mary where is this --

MS. MARSHALL: Eagle Canyon.

MR. HENDERSON: Eagle Canyon, okay.

MS. MARSHALL: Sorry, so those are springs.

MR. HENDERSON: So you could see springs coming out of the canyon walls at this site. Okay so, first look at the species in Central Valley that this -- species in the Central Valley. These are the four different runs of Chinook and steelhead and three of them are listed on the endangered species list and for fall and late run Chinook are species of concern and the dates or the years (parenthesis) are the years that they were listed.

The winter run salmon was listed in 1994 and this ESU includes all natural origin Chinook salmon in the Sacramento River and tributaries in California as well as winter run and produced in artificial properties and programs.

The winter run Chinook salmon is a priority species for restoration in Battle Creek. Spring run -- Central Valley spring run Chinook salmon was listed as threatened in 1999 -- 1999, and reaffirmed in 2005. This ESU includes all natural origin spring Chinook salmon in the Sacramento River and its tributaries including the Feather

River as well as the Feather River fish hatchery.

And steelhead California Central Valley steelhead DSP or DPS is listed as threatened under ESA and that took place in 2006. And this is also a priority species for restoration in Battle Creek.

Let's take a look at why the species are listed -- so many west coast salmon and steelhead species are -- their stocks have declined substantially from the historic numbers and there are several factors that contribute to these declines including over fishing, loss of freshwater and estuarine habitat, hydropower development or ocean conditions.

And we see here in this diagram -- this map, all of the watersheds in black are areas where steelhead can no longer access that habitat -- it's about 80% of the historical steelhead habitat.

All the -- the facilities that are blocking access are shown there, Cheswick, Oreville, et cetera. So let's take a look -- a closer look at winter run. This is a map that shows the historical distribution of CV winter run Chinook. We see areas up north of Cheswick Dam, this is historical winter run habitat. Also we see historical habitat here in Battle Creek.

Currently the population is limited to this stretch of the Sacramento River between Redding and Red

Bluff and the population is sustained by cold water releases from the Shasta Dam.

So this slide -- so restoring the historical habitat for winter run is very important. The habitat north of Shasta Dam, restoring that area is much more problematic than Battle Creek. So in the '80's -- maybe earlier, the idea of restoring Battle Creek to anadromous fish runs was tossed about and people actually started working on that idea.

So what's unique about Battle Creek? The hydrology is unique, the geology is volcanic in nature. Canyons or the water courses are deeply in size shaded, cool stream corridors. The large portion of the annual rainfall percolates into the volcanic strata and then emerges further down in the watershed as year round cold springs.

Also there are no large reservoirs on Battle Creek so that makes restoration much more plausible and then it also has habitat for supporting anadromous salmonid species.

MR. KUFFNER: So those are some little key points John for sure, because there's no question that there are cold year-round springs and even then the reaches of the Battle Creek entirety which the hydrologic graph shows, you know, historically happens once every ten years. We had it happen a couple of times in the last three.

But because of the hydraulic nature of the volcanic rock right down -- right at and right below Panther Grade, even though all of those streams are dried up and this is shown in our basin flow study that we did in 2014 -- that the water still comes out of the ground at 49 degrees year-round even when it's actually dry, just up above there.

And that's what creates this fantastic habitat for anadromous species and a lot of the studies that we've doen with the project show that really that limit really does stop at Panther Grade and that's one of the things we'll discuss today -- we'll talk about the conditions down below.

These are the key elements that make this such a great stream for restoration, sure.

MR. HENDERSON: So what is the goal of the Battle Creek's Restoration Project? The purposes to restore 32 miles of habitat in Battle Creek North and South Forks and an additional 6 miles of habitat in tributaries while minimizing the loss of hydroelectric generation at facilities.

So there is a diagram of the project and this is the PGE Battle Creek Project pre-restoration. We see the main stem north and south towards the Battle Creek. And we see a series of dams on Philip branches, but the project plus water from the North Fork it sends it to the South Fork

for power generation and that water has been entering the South Fork and that is a problem because that creates a false attraction for salmon.

So the upper project limits are defined by natural fish passage barriers and I guess we'll call it a national fish hatchery and then so the project will remove dams on both forks and add fish passage facilities.

Let's take a closer look at some of the dams on Battle Creek. This is Wildcat Diversion Dam. This is a pre-project photo of the dam on the North Fork of the Battle Creek. The South Diversion Dam on the South Fork and Soap Creek Feeder Diversion Dam on Soap Creek tributary.

So the -- this slide is showing the complex development of the restoration project over the decades and it began with fish game studies in the '80's, picked up a lot of steam after the AFRP program started and a lot of the sessions took place here between the AFRP and between concerted effort was galvanized by participation of both federal and state agencies and private water premieres, PG, Cal-fed coordination played a major part.

So in 1999 you assigned all these restoration project partners and that was a major milestone in the development of the restoration project. Other partners include local stakeholders and there are many founding partners including damage assessment, settlement money from

Iron Mountain Mine, the Packer Foundation, State of California.

So let's take a look at some of the accomplishments of the project so far. So here's Wildcat Dam, we took that earlier. It's located on the North Fork, it's the first dam in the series of dams on the North Fork and that dam was removed. There was a pre-restoration project picture of the dam and note this rock here for reference.

In 2011 this dam was removed -- there's the same rock as a reference point. When this dam was removed it immediately opened up two and a half miles of salmon habitat and immediately the salmon responded to this barrier removal.

MR. HOGAN: So with the dam it looks like a fish ladder.

MR. HENDERSON: There was an end point fish ladder off of the right side and that allowed some, very few salmon, to gain access to the region above the dam.

MS. ERLEY: And it was often blocked.

MR. HENDERSON: Often blocked, right.

MS. ERLEY: And boulders, not maintained -- very well maintained.

MR. HENDERSON: So the dam was removed and immediately the fish responded. The official U.S. Wildlife

Service, Red Bluff Fish and Wildlife Office conducts monitoring in the Battle Creek watershed including sample surveys and as a result of their surveys after the dam was removed in 2011, seen an immediate response in the number of redd's located above the dam which dropped in 2014. It's probably related to general members of salmon since the number of redd's above the dam were going up. Now it's close to 60% it looks like.

MR. GILMOUR: Was escapement during that period any different for the Creek as a whole or was it pretty consistent?

MS. ERLEY: 2009 was probably -- 2010 was the peak years.

MR. GILMOUR: To the whole Battle Creek?

MS. ERLEY: Yeah, since starting monitoring and that was about 800 fish and then since then it's been between 200 and 600.

MR. HENDERSON: Okay, let's look at some other accomplishments, so the Field Changing Dam and the North Battle Creek Feeder Diversion Dam located here had fish ladders added in 2000 and --

MS. MARSHALL: So construction began in 2010 and fish streams and fish ladders were completed in 2012 however after we did some testing we determined we needed to do additional work so we are still doing construction out there

and wanting to complete all the construction this year.

MR. HENDERSON: So here's a photo of the Canyon Diversion Dam and the new fish ladder and fish stream with automatic cleaner and this is how it looked after construction was completed in 2012. Here's a photo of the North Battle Creek Feeder Diversion Dam and the new fish ladders. Here's an old antiquated fish ladder and fish stream. It also has an automatic cleaning system.

MR. MATTAX: And do the diversion systems go over the same, going from North Fork down to the South Fork or after that?

MR. HENDERSON: This diversion here?

MR. MATTAX: Right.

MR. HENDERSON: I believe they do. They're still operating.

MS. MARSHALL: Yes, yes. An important --

MR. KUFFNER: They did -- go ahead Laurie?

MS. ERLEY: An important -- sorry, an important part of the project was -- and John we'll get to you in a second, is that there will be terrace connectors at the South Diversions and so there will be no more, can we see the fish screen?

MR. KUFFNER: Right so the water that was being dumped back into the South Fork is still being generating power but they're stopping it at the tailrace and taking it

in through another diversional without letting it go in to the South Fork.

MS. ERLEY: It basically goes through the path and gets --

(Multiple talking).

MS. MONHEIT: In the next photograph -- what is the screen -- I just don't get the orientation of what's going on with the screen.

MR. HENDERSON: So there's a diversion back there and water is going this way --

MS. MONHEIT: Okay.

MR. HENDERSON: Into the diversion, North is down here and so the water flows through this stream and so this stream is keeping fish out of the diversion of the water.

MS. MONHEIT: Oh, thank you.

MR. HENDERSON: It flows this way.

MS. MONHEIT: Thanks.

MR. HENERSON: Okay so here again this is a diagram pre-project with no ladders and the mile pads still in place and so this is a diagram of what the project is expected to look like after it's completed. So here we have Wildcat Dam removed, the fish ladders on the remaining dams on the North Fork, all the dams removed on the South Fork except for Inskip Bridge and Dam -- there'll be a fish ladder located there.

Diversions from the North Fork are now instead of going back and instead of being discharged into the South Fork, will lead from Powerhouse to conveyance system to powerhouse and on down to Coleman 4 and not be discharged into the South Fork..

Also the dams on the two tributaries -- Soap Creek and Ripley will be removed and so these creeks will also be opened up. So again there's the four --

MR. KUFFNER: John, you mentioned six miles of feeders -- six miles of feeders the Soap, Ripley and Baldwin?

MR. HENDERSON: So these three?

MR. KUFFNER: Yeah.

MR. HENDERSON: I don't know if that's included in the six miles, it may just be these trib's right?

MR. KUFFNER: So those three.

MR. HENDERSON: No those two in the six miles, it's talked about in the restoration project goals, it's just these two trib's.

MS. MARSHALL: I believe that.

MR. HENDERSON: We can check.

MS. MARSHALL: I think that there are.

MS. ERLEY: In addition.

MR. HOGAN: This is phase 2 and when would this be completed?

MR. HENDERSON: There's a timeline later in the presentation.

MR. HOGAN: I'll wait.

MR. HENDERSON: Right now it's --

MS. MARSHALL: And the 2021, I'm sorry one correction and 2022.

MR. HENDERSON: So let's take a look at the funding. We need different funding streams -- federal funding, combined funding, trustee accounts, all that is invested in North Fork fish streams and ladders, state funding and private funding.

And right now the total is something like 145 million to complete all of the phases, with the phase two. I'm not sure if that's what you find after project activities like adaptive management or that's going to be different.

MS. MARSHALL: So I can just clarify with that -- what we're looking at right now is the funding that we have to date. And we do need additional funding to complete the entire project so right now we're estimating we need another 44 million dollars to complete the project.

As far as after construction, there is funding available for adaptive management so after construction ends there will be -- there is funding already obligated for adaptive management for the project and that total is 6

million dollars.

MR. HOGAN: And who's providing the 44 million in funding?

MR. MARSHALL: We are looking for that funding and so at this point we don't know where the funding will come from.

MR. HOGAN: So the passage of end statement is indefinitely.

MS. MARSHALL: Right now we do not have the funding to implement the fishery and ladder at the Inskip Dam.

MR. HENDERSON: This isn't the first time we've had -- this funding gap has been there for a while. We have been given new funding sources.

MS. MARSHALL: Right, right.

MR. HENDERSON: During that period.

MS. MARSHALL: Right, so we -- as you can see, under federal funding we're continuing to get federal funding. The state funding listed started in 2008 and then again in 2014 so we have been continuing to get funding and right now overall we have 10 million dollars available to continue work.

MS. WHITLOCK: You know and I think that you know, we gotten close to 113 million to date and you have done a good job of getting that money through the years.

It's come because of the support for this project on a large scale by a lot of parties.

MS. MARHSALL: Yes, so it's a very important project to a lot of different parties.

MR. HOGAN: The reason I asked the question is one of the things that FERC looks at for reason of foreseeable future actions is it funded so and I'm just filling in my own to know that this is active and I thought it was more reason and we believe it's going on, I just don't know if it's 2021 or 2022 is legitimate, it's going to get, I'd say absolutely.

So help us understand that that date can be met if you don't have a funding stream right now. I'm not passing judgment I just want to gather information so.

MR. FOSTER: You've got 10 million now.

MR. HOGAN: He's got 10 million of the 44 million or does that mean 54 million to finish?

MS. MARSHALL: Right, 54 million to finish.

MR. HOGAN: So it's 44 outstanding.

MS. MARSHALL: Yes.

MR. HOGAN: And what's the -- will the 10 million get the barrier at Inskip removed?

MS. MARSHALL: So Inskip Diversion Dam there will be a fish stream and a fish ladder constructed so that funding will not -- 10 million will not provide enough

funding to do that.

MR. GILMOUR: Do you have a cost estimate for that -- for that passage program?

MS. MARSHALL: Yes, yes, we can't reveal like construction estimates because of just the position process.

MR. GILMOUR: Okay is it more than the 44 million because basically my question is -- is there other things other than Inskip that might not occur that aren't funded full?

MS. MARSHALL: So there's more work to occur than the fish being relied on the South Fork and so -- I don't know John if you want to put that slide back up there that there's a lot of work that's remaining including the remaining of South Dams, South Canal, two dams on the tributaries, Lower Ripley Creek, as well as -- and also Coleman Diversion Dam.

So there's a lot of work that's remaining however Inskip powerhouse there's already been a tailrace connector constructed as well as a bypass system so that -- that's already been constructed.

If we go over to the Asbury Diversion of Baldwin Creek there has been actually a barrier constructed on that tributary and the reason that barrier was constructed because if you look upstream of that there's a state trout hatchery so that's basically protecting the trout from the

diseases that the anadromous fish can carry so that they don't get infected.

However, that's also allowing for the appropriate amount of flow to provide habitat for anadromous fish in that stretch of Baldwin Creek. So basically there's a little bit of the work has been done on South Fork, almost all the work has been done on the North Fork and work on the Baldwin Creek so just what's remaining is several items on the South Fork.

So that estimate is you know, what we'll need to complete that.

MR. HENDERSON: Right there -- you have 20% of that.

MS. MARSHALL: Yeah.

MR. KUFFNER: And Mary what's that flow rate that provides habitat on Ripley Creek?

MS. MARSHALL: On Ripley --

MR. KUFFNER: I mean, excuse me, Baldwin Creek?

MS. MARSHALL: I'd have to look at that. I believe it's five -- five cubic feet for siting.

MR. HENDERSON: Okay so this is a very over-simplified calculation. It gives us that number and cost -- the restoration cost per mile for the restoration project. It includes the tributaries also so 46 miles of restored habitat into the expected total restoration costs.

So it gives a rough figure for -- a very rough figure for the potential value of the bypass to reach.

MR. KUFFNER: So John we have -- we haven't seen this before. This hasn't been presented before but a couple of questions come to mind. One is what is the 46 miles because there is a difference of interpretation.

MR. HENDERSON: Absolutely.

MR. KUFFNER: Where that upper barrier is on the South Fork at 18.5 or 18.9 at Panther Grade or is it you know, up further at Angel Falls? So we don't believe the 46 miles includes that part above Panther Grade so again that number would be off. But also the bypass reach does also go above Inga Falls so 7/10ths of that is also Angel Falls, nobody is disputing is passable.

MR. HENDERSON: Down if you adjust it.

MR. KUFFNER: Yeah but --

MR. HENDERSON: This is just a rough --

MR. KUFFNER: Sure.

MR. HENDERSON: Just take it aside.

MR. KUFFNER: An idea --

MR. HENDERSON: Of what the costs are in restoring or adding to.

MR. KUFFNER: Yeah.

MR. HENDERSON: How did that -- creek --

MR. KUFFNER: I guess that's what I'm trying to

figure out, how are we using those costs?

MR. HENDERSON: As a demonstration.

MR. KUFFNER: But there's no currently -- in the --

MR. HENDERSON: Because there's no barrier.

MR. KUFFNER: Well there's isn't a barrier right I mean other than Panther, no man-made barriers.

MR. HENDERSON: Yeah on South Fork.

MR. KUFFNER: Right.

MR. HENDERSON: If they're still in place, right. We're expecting that those barriers will be removed.

MR. KUFFNER: Physically removed?

MR. HENDERSON: They were man-made barriers, yeah, it's part of the restoration project.

MR. KUFFNER: I'm talking about the bypass reach.

MR. HENDERSON: Are you talking about natural barriers?

MR. KUFFNER: If there's no work being done on the bypass reach why is there a cost --

MS. MARSHALL: That's part of the reach.

MR. HENDERSON: Yeah, that's what it's costing to open up the restored areas designed to be.

MR. KUFFNER: So two kinds of -- involved.

MR. MATTAX: Can I put my interpretation of my understanding? My understanding is the project costs 145

million.

MR. HENDERSON: Right.

MR. MATTAX: You're applying the benefits to 46 miles which not all parties agree on what that 46 miles represents.

MR. HENDERSON: Right.

MR. MATTAX: You're coming up with an average cost per mile and assuming the benefits of this thing for all miles essentially because you have a -- it's ballpark.

MR. HENDERSON: Yeah, right.

MR. MATTAX: And then applying that average number to the length of the bypass.

MR. HENDERSON: So that's the cost to get fish up to the project.

MR. HOGAN: I guess my question is you're not using that money for any other thing other than just demonstrating the costs of what we would use that for.

MR. HENDERSON: I don't know that. It shows the value of the restored --

MR. HOGAN: Well I didn't know if we were looking to get funding from the apple tree for that amount of habitat or what's the goal here?

MR. HENDERSON: I have no idea what it's going to cost. Here's the timeline of the project since it started, when the KYU was signed in 1999 it shows the construction

contract -- three more construction contracts and then project completion in 2022.

MR. KUFFNER: So the three future construction contracts -- Mary help us out here -- that's the Inskip, ladder, it's the South Diversion, what's the third one?

MS. MARSHALL: Okay so the three future construction contracts will be all work on South Fork and so one contract consists of the removal of South Dam and the canal system associated with it as well as Soap Creek Feeder Diversion on the tributaries of South Fork.

Another contract will involve construction of a tunnel tailrace connector so basically from South powerhouse and it is Inskip canal, and an access road over to Inskip Diversion Dam. And the third contract -- the third contract will involve the construction of a fishery and ladder at the Inskip Diversion Dam as well as the removal of the Lower Ripley Creek, Feeder Diversion, just a tributary to the South Fork as well as Coleman Diversion Dam which is the -- basically the last thing that will occur is the removal of the Coleman Diversion Dam on the South Fork.

And so those are the three separate contracts.

MR. HOGAN: Are these sequential or concurred?

MS. MARSHALL: To be determined, you know, I think it does fall back on how much funding we receive when, so.

MR. HENDERSON: So then after -- after the construction is completed we will go into adaptive management into the future. That's a really important part of this project. And here's some of the models that are going to be dealt with under adaptive management -- water temperature, false attraction, ramping grade, fish passage, habitat and instream flows are really an important part of the project.

So before the NYU was signed in 1999 the agreement was struck with PT&E and those are the interim flows, pre-project flows. And those flows were negotiated according to increased instream flows. Those were water flow and to help with temperature issues in the watershed and water temperature issues in the watershed.

So those have been in place since the '90's and after the project was completed, then project flows -- instream flows would be adopted. And so those instream flows are part of this -- or this adaptive management is going to be looking at all of these different aspects of the project and using science to -- to come up with answers to problems that might come up into the future to operate the project -- the restoration project. Instream flow is one of those important elements of the adaptive management.

So is the -- and sort of so the adaptive management program or plan to the Battle Creek PGE project

is actually referred to in the licensing articles that FERC has adopted adaptive management plans.

MR. GILMOUR: So without having that information in front of me, are there specific triggers that would cause the increase in flows? Is it based on fish presence, absence, abundance?

MS. ERLEY: So there's three objectives within the adaptive management plan. There's population objective, habitat objective and a passage objective and under each objective there's goals and I mean they break it down to triggers and metrics and if a certain metric isn't met, who's responsible to deal with it and one of those actions is to meet as a conference group and determine whether or not to achieve that objective do we need reports -- do we need to remove that for barriers -- there's a variety of different.

MR. GILMOUR: I know there are restraints on the magnitude of the instream flow increase? The question is as a hydro operator it's very tough to agree to an open ended adaptive management program that doesn't define certain bounds and I'm assuming this probably has some bounds within it and I'm not sure if that's something you'd know off the top of your head or --

MS. ERLEY: I couldn't tell you the bounds off the top of my head but certainly it's included in there.

MR. GILMOUR: So it's worth looking at if you can dig it up.

MS. ERLEY: If you have knowledge about the adaptive management plan and the objectives of the plan, the plan is definitely in there and it is extremely important to the whole boundary restoration project so I will take a look at that document. It was signed off by all agencies in the MMR and PGE as well so.

MR. HENDERSON: And I would call it -- I would call it a passive adaptive management plan because it doesn't have all the answers.

MS. ERLEY: And then there's studies within it -- there are studies that need to be done.

MR. GILMOUR: Yeah and there are always challenges with adaptive management like you're talking about, demands for water especially in California so it's yes, I will definitely take a hard look at that and see what you guys came up with.

MR. HENDERSON: Okay, so finally I wanted to take a look at expected production numbers after Battle Creek has been historic and these are numbers that were included in -- in the anadromous fish restoration program document in 1995.

These numbers are old -- I think they're still -- they're still fairly accurate as to what's expected in terms of capture.

MS. ERLEY: Yeah and I think it's also important for them that under CEPIA the legislative goals so these are really doubling the goals for that creek and that's ideally are impounded for the restorations to achieve these population numbers.

MR. HOGAN: I have a question about that. So you opened up habitat but I think what you said earlier was that you haven't increased the numbers.

MS. ERLEY: Because we still are -- we've only opened up 2 and miles of habitat.

MR. HOGAN: Oh, okay.

MS. ERLEY: So that's all that --

MR. HOGAN: Got you.

MS. ERLEY: We added flows and actually from increasing flows from 3 CFS in the North Fork Passage to South Fork to 30 CFS. We've actually re-established the salmon population within Battle Creek. Prior to that there was -- no.

MR. HOGAN: I didn't realize this was only --

MR. HENDERSON: I probably failed to mention that the new fish plan or something at the North Fork, Eagle Canyon and North Fork Diversion -- they're not operational yet. And Mary mentioned that there's some -- what did you call it some more construction that's necessary --

MS. MARSHALL: Right, right.

MR. HENDERSON: To bring the fish ladders up to a specification in the passage so there's another contract that was awarded on those facilities, it was a former Wildcat, and that's it further down creek presentation.

MS. MONHEIT: Thank you.

MR. HOGAN: For clarify there is no planned effort to modify Panther Grade?

MR. HENDERSON: Is there a plan in place? I don't think there's a plan in place with Panther Grade right now but modifying the fish barriers, the second part of the adaptive management plan.

MS. ERLEY: Within that passage objectives.

MR. KUFFNER: So related to that -- I know that o the North Fork there's an investment right now going on with passage modifications -- a great presentation of the working group recently on that. One of the things that -- and some of the people here have been there some people have not, but Panther Grade isn't just a pile of boulders. It's really an aeneous batholith that drops off so you might be able to move some of the boulders from the lip edge, but you still have to get up over the lip in a very constrained channel.

And one of the things that hasn't been analyzed with science is how fast the water flows might be through that channel at these very high water flows that we've been looking at that fish -- I'm going to assume, might be able

to get over Panther Grade structure. And so even if they get back over into this sort of ledge as it may be, it then proves up a whole long way on that flat ledge essentially at very high speeds.

So from a scientific standpoint that's one of the things as the applicant that we've studied and were fortunate that some of the folks came in -- Doug Parkinson came in. Doug is the guy that's in the middle of Panther Grade with his staff at 180 or 200 CFS being tethered off and not being washed away so we can ask him about this -- the actual geomorphology and the issue throughout Panther Grade because he has some expertise here.

MS. ERLEY: I think it's important to point out and it's great that you brought up the figures because we look forward to make modifications in the North -- one thing we have is a lot of scientific evidence and data from fish monitoring that fish can't pass that and so that was an important component to moving forward and acknowledging that these fish -- these are barriers.

So we went in and took the measurements and then we have the fish data, the background information and then we went and did further studies on those methods on how to modify those barriers -- so I think it's important to note that not truly having the fish within these reaches has really hurt the passage. We can go and collect

measurements but I think it's important to have that backup information so that the fish will end up with usable areas or not.

MR. GILMOUR: Yeah, that's a really good point Laurie because there isn't any historic data that shows they ever have gotten above Panther Grade so that's only a supposition.

MR. HOGAN: So Charlie brings up a good point. We have been joined by I think three more folks. If you could state your name and your affiliation and spell your last name for the court reporter that'd be great.

MR. TOMPKINS: Jim Tompkins, T-o-m-p-k-i-n-s, Rugraw, LLC.

MR. PARKINSON: Doug Parkinson, Doug Parkinson and Associates.

MR. TOMPKINS: I'm Jason Tompkins, T-o-m-p-k-i-n-s, I'm at Rugraw.

MR. HOGAN: Any other questions about the presentation or the special talk about Creek restoration efforts? I want to thank you for that it was very informative that's going to be a fantastic program to work on as a fish biologist.

Well as you know today we're here to discuss the 10(j) recommendations for the Lassen Lodge Project that the Commission staff does not support. I thought the best way

to do that would be to basically just go through them one at a time. This is almost a duplicate of the table that is in the back of the Draft EIS.

We have that in summary comments to the -- that you received on the Draft EIS and just felt that that would be an efficient way to proceed if everybody is okay with that. I'm not hearing any objections so.

So the first recommendation -- well I should ask does anybody want to take a break? No, okay. The first recommendation was from California Fish and Wildlife which is the maintainer of fish passage during construction. We did support that in the Draft EIS so we don't see any problems with that and so we will go on to the second one which is going downstream fish passage.

Again we agreed with that and we don't have any conflicts so the third one is to provide upstream fish passage during operation at the Diversion Dam. We did not support this recommendation based on the cost of the recommendation versus the value of opening up that .7 miles of habitat.

Fish and wildlife or California Fish and Wildlife isn't here today to discuss this, if anybody else wanted to discuss it for them. We get comments that that our costs are unreasonably high. We did want to mention that we are aware that we sourced that cost -- if there is a different

process that we should be using with somebody else we'd like to know that.

MR. GILMOUR: Yeah, that'd be create. I came up with the cost and essentially the costs that I developed was based on my professional experience over the years working with fish engineers and working on hydro projects.

And also based on this plan for steelhead and Chinook in California -- in this there is an Appendix D that actually has cost estimates for different types of restoration measures including fish ladders for screens, coho removals -- that kind of thing. And I did my best to look for -- look at similar sized projects and came up with three, the rough estimate of $300,000.

And to be honest with you I could be wrong. Maybe Rugraw has some better numbers, maybe they have some consultants and some engineers that can come up with a tighter estimate and if you guys have that I'd be happy to hear it and hopefully get a better understanding of the costs versus benefit associated with the passage.

MR. KUFFNER: What was the type of passage that you?

MR. GILMOUR: It was a -- pool and rare type ladder design and I realized that you know, that the facility that Rugraw is proposing is pretty simple so yeah, you know, feel free to enlighten me if you think that I'm

crazy. I've worked on a lot of different passage projects for small systems and sometimes they're $500,000, sometimes they're 2 million, sometimes they're 4 million and it's -- you know, it all depends on constraints of the site, design costs associated with you know, the boutique fish passage firms, permitting and then there's the construction costs.

There's the access to site -- so there are all these different factors that come into play so I just wanted to --

MR. KUFFNER: What is the falls that you have to make that for?

MR. GILMOUR: Yep and whether or not it is a run of the river project or storage project obviously because you know the higher the dam, the more it is going to cost.

MR. HOGAN: So has Rugraw estimated the cost of the gill proposed fish passage?

MR. KUFFNER: Well we have it included in our overall diversion. We haven't necessarily broken it out but it -- based on the data that we have and in fact it's in the same range, it's not significantly different than that.

MR. HOGAN: Than what?

MR. KUFFNER: Than the $300,000.

MR. GILMOUR: But from the biological side of things we are talking about as Ken mentioned, it's a .7 mile long leash between the falls and the proposed Diversion Dam.

If you do have fish in that -- in that person of the bypass reach, you know, rearing in that system you know, as flows decrease and captures come up and they'll be pushed down or if they don't they're going to remain in this reach and exposed to the warmer water temperatures that you see coming into the system when the project is not operating.

So overall it's -- in my mind, the biological benefit is just not there considering a $300,000 cost. And that's, you know, in this role I have to balance those two things and that's the conclusion that we came up with.

MR. HOGAN: Yeah, it's not just George's mind it's our Commission staff.

MR. TOMPKINS: I believe you're correct about the -- initially when we consulted on the side panel it helped us -- the initial thought and this is how we initially designed them including the fact that the reach is so short and those are maybe more excessive to travel within, but they you know, there was really no new necessity for them to regulate that.

What we proposed was basically a simple overflow that you know, a rock cascade.

MR. GILMOURE: Okay.

MR. TOMPKINS: Rather than a you know, 180 foot long through California Department of Fish and Wildlife specifications which we designed it. So I mean it is the

cost is unbelievable compared to the end of all -- nothing else really would change in the diversion structure but that has changed the whole scenario.

Because of the Fall the situation and how many chambers essentially did she need. It's a very good --

MR. HENDERSON: Okay what is the downstream passage?

MR. GILMOUR: The downstream passage we're onboard with. The conventional fish screen bypass I believe so and that would meet criteria. So the other thing that California Fish and Wildlife is relying on to is that they said it's a state law essentially for them to require fish passage facilities, you know upstream and downstream at the proposed project. And, I'm not a lawyer I'm just a biologist and I guess we could leave that to them so you want to pursue that route.

MS. MONHEIT: Excuse me --

MR. HOGAN: Go ahead.

MS. MONHEIT: No, finish this point.

MR. HOGAN: Actually I was going to move on to the next one.

MS. MONHEIT: I was going to -- is this list -- at least 23 items on this list?

MR. HOGAN: Yeah.

MS. MONHEIT: I thought we might focus on the

ones where there are representatives from the agencies in the room.

MR. HOGAN: That's what I was going to do next.

MS. MONHEIT: Okay and if we have time circle back to the others.

MR. HOGAN: And, and some of these with Cali Fish and Wildlife do overlap with other things, that I'm not going to get into right now. We just covered the downstream fish passage which we do include. We're on item 6 -- instream flows. We supported Cali Fish and Wildlife's request for 13 CFS however, with some DOI recommending 35 CFS middle of flow which we did not support.

MR. GILMOUR: I can -- yeah I can add to that that -- and I believe wildlife service are strongly proceeding with 35 CFS to provide -- to maximize the way usable area for, for steelhead and Chinook salmon, so for steelhead fish and salmon.

And all I can say is that, you know, that PSM is a very common way of evaluating flow needs for fish. PSM stands for the physical simulation model. It's a way of assessing flow availability at different -- or half-time availability of different flows.

So at 35 CFS which is recommended by several resource agencies it maximizes the weighted usable area or the amount of habitat for Chinook and steelhead. At 13 CFS

it doesn't necessarily maximize habitats for those species. However, based on Rugraw studies which I believe were done by Kramer 13 CFS was shown to maintain adequate habitat for the existing resident rainbow trout population.

So as a FERC biologist, or a person who's analyzing these projects for FERC, it's our job whether or not it's something you agree with or not, it's to evaluate the effects of a proposed action or a proposed project on baseline conditions. So our hands are kind of tied by that -- by that rule.

And under baseline conditions we've only had resident rainbow trout in that system. I completely understand all the work that you guys have been doing in Battle Creek watershed. It's great, you're helping to bring back salmon but again we don't know if salmon and steelhead are ever going to return to that proposed bypass. We have to make it through Panther Grade and Powerhouse Falls.

MR. HOGAN: So this is going to be a theme that you're going to hear throughout the day is that you know, one of our -- one of our issues to anadromous species aren't there. And that's the conflict that we have with a lot of the recommendations. They're recommendations that are designed to protect species that are present.

We're not saying that they're not bad -- that they're bad recommendations. It's just that when you come

to my agency, we're looking at what are we trying to protect and what can we justify. Now our licenses have the re-opener process or a re-opener article that's specific for this purpose.

If the environment changes, you know if the anadromous fish were to become present we could re-open the license to address it at that time but until then even -- I heard you say we don't know if Panther Grade's a barrier or not. So putting measures in place to protect --

MS. ERLEY: That's not exactly what I said.

MR. HOGAN: Okay, maybe I misunderstood. I heard that you know, we don't -- we don't know if we are going to have a loss in the barrier or if they're passing.

MS. ERLEY: So I think one thing to find out is although the fish are absent and maybe somewhere where it's more of a -- it is critical habitat. And our features two critical habitat that need to be considered and that's you know, conserving and protecting habitat for even if the species are not there. And so it's an important point to consider and to bring up and I don't know --

MS. WILLY: Yes, I'm going to concur with that. As far as the species that's not there, oncorhynchus my kiss, the species is there -- that's called rainbow trout, it's not anadromous, called steelhead if they are anadromous. And we'll give you the spelling on that later.

So we have not gone in and looked at the specific genetics of the o.mykiss upstream at Panther Grade. The emphasis is not, as far as I know, your lab has not looked at those genetics. However, by virtue of the fact that there are o.mykiss upstream at Panther Grade they got there naturally -- that's the assumption.

If you want to go in and --

MR. HOGAN: What is that assumption?

MS. WILLY: I'm going to talk about that -- if you would want to go in and check the specifics of the genetics, you can answer that certainly. But when you look at the Garzan studies of o.mykiss upstream of dams you will find that the ones that are upstream of dams and the barriers are what I call heritage stock. They are free hatchery genetics.

MR. HOGAN: Okay, I've been to the site of both Angel Falls and it was early 2000's.

MS. WILLY: We're talking between Panther Grade and Angel Falls.

MR. HOGAN: Right but fish can move downstream over the falls and what I observed were hatchery fish swimming around in pools above the bridge. So --

MS. WILLY: Okay so there are hatchery fish upstream plus downstream so that would be what I call genetic contamination of it -- but no one has gone in as far

as I know and answered are these pure fish. We do know that hatchery fish tend to have in some -- a much stronger anadromous component depending upon the hatchery.

So the fish in south of Battle Creek, the o.mykiss is down from Battle Creek are going to continue to express out migration because they're o.mykiss, they're going to leave the system. They'll come back as anadromous fish and they are not going to make it past Inskip for now but over time over the next three or four years they will be able to pass.

So to automatically say that's not -- the species is not there is not correct -- in fact the species is there, likely expressing anadromous. Likely another study that has not occurred is we have not done tags on o.mykiss upstream at Angel Falls or upstream at Panther Grade and then check and see if they're coming up to Inskip or coming through any arrays through Sacramento River or Battle Creek River without any detection.

So the expectation is that's what the fish does so they're doing it but there's not been anything saying our fish are coming back. What we know is that this species is there, it expresses anadromous as a species and if you want to go deeper into that, that will take time to do that but that's not off the table. I just wanted to stop -- because we're not there.

MR. HOGAN: So the salmon -- the steelhead species, our analysis indicates that the 13 CFS is protective of the species that's present.

MS. WILLY: So I'm going to talk about that right now.

MR. FOSTER: I'd also like to say -- this is Bill Foster from the National Marine Fishery Service that we're primarily concerned with the critical habitat areas that are areas from Angel Falls down. We realize that (inaudible) is upstream of that barrier to move downstream and will likely do so when the opportunity presents itself.

And again there are other studies here and so forth which show that by and large even though hatchery may have required a lot in the past they tend to be outcompeted by wild and natural stuff and so the genetic usually that we find, they are usually more wild and special stock maintains itself and the hatchery thinks it can't compete with that.

But of course we haven't done that -- looked at any of the fish in that part of Battle Creek. But we are concerned with the quality of the habitat or the critical habitat that's downstream of Angel Falls.

And one of the -- there are several place in the license application where they mention that 30 to 60 - 30 to 50 CFS might be needed to maintain connectivity within parts of the habitat units in that region.

And I'm focusing on the 1.7 miles or so that's below Angel Falls and keeping the quality of that habitat up to par I guess you could say, and some of that is the connectivity, water temperature, the amount of habitat that's there. It -- the average, obviously the average wood and the area for both steelhead salmon and/or steelhead or rainbow trout is, you know, maximized at 35 CFS but the range of the that goes all the way down to perhaps 20 -- 20 to 35 CFS and there are statements like I said based on professional opinions of people that looked it over that maybe the connectivity might be better at 30 to 60.

So that's the type of thing we're concerned with and maintaining that because the quality of the critical habitat is the same important -- what we're talking about and so it is -- one could say that the currently occupy at least by resident rainbow trout.

MR. KUFFNER: So if I can make a comment just about that -- excuse me -- about the critical habitat. And it is true that they have been designated as critical habitat but again that designation was made in 2005 and was not made with any evidence -- scientific evidence that there was ever any anadromous o.mykiss that have been migrating out from below in that project reach at any time.

MR. HOGAN: Charlie, that's where we're going with this.

MR. KUFFNER: I'm just saying as a point that I mean it wasn't -- they didn't use science to define it as a protected resource.

MR. HOGAN: There is clearly an upstream barrier, Angel Falls.

MR. FOSTER: And like I said that's, that's something what we're concerned about in terms of that. But I'm also, you know, I'm also aware that you know, the quality of that critical habitat that we want to try and maintain -- and of course we'd also be willing to -- to discuss the openers and stuff like that for you know, and more.

But there is probably a lot of probably potential at the active management information we might be able to develop those licenses to help determine you know, the quality of the habitat, things like -- if they show up.

Right now like in any other, you know, information we have to be a little bit more conservative.

MR. HOGAN: I think -- I think we'll work on that approach. What I want you to understand one thing we did was we looked at what's the natural system doing now. It's not maintaining 35 CFS continuously.

So these two can give you a really good presentation or discussion about what the flows are doing, how would the project affect those flows in that reach and

so forth. But we are prepared to engage in you know, a discussion that talks about -- and we'll admit we didn't directly address the critical habitat component and we will in the Final and there will be a much more clear review addressing the constituent elements.

You know, that was our oversight and I apologize for that but we had -- hey I think we also have some real legitimacy for why we're recommending our minimal flows. We're not against talking about evaluating those and, and you know, but I want to understand what the hesitation is to using the Commission's reopener to addressing when the species are present.

MS. WILLY: Okay.

MR. HOGAN: Oncorhynchus.

MS. WILLY: Okay so nothing in the 9th Circuit but the Fish and Wildlife Service has not been successful at the openers in court cases and I can get all of that from the attorneys, but the point is is that -- that, that there have been at least three cases that have been explained to me that when we go to do the reopener it does not open the license.

And in other district courts the FERC license reopener for new listings, things like that -- not. So it hasn't been heard in the 9th Circuit. We've tested opening licenses for ESA consultation at least four licenses here

and have been told, "Oh no," and the applicant cites the case law address and the FERC staff go oh, so we're not successful.

We've probably been as successful in my time doing FERC in getting one to just be held over for 30 days to do an ESA consultation. So I understand that there's places in there to do it, it just hasn't proven to be successful.

MR. HOGAN: Even when they listed species?

MS. WILLY: Indeed.

MR. HOGAN: And shows up after --

MS. WILLY: No, ma'am. We've been in consultation for five or six years on a project with a new listed species and flat out refusal. In fact when we consult it's not even working. We're not -- and so we can talk about that more. I also wanted to -- but no, our understanding is using the precautionary principle, make sure that the protected resources are protected on a watershed level through a FERC license or a settlement or some kind of amendment so that later down the line when where there's something that's needed we're not being blocked by a position.

But I also have got something different when we're done talking about this.

MR. HENDERSON: Okay and so that something that

you're talking about is actually language in the license articles.

MS. WILLY: Yes, yes.

MR. HENDERSON: That talk about how to adjust or when you would adjust flows.

MR. MATTAX: And adaptive management.

MS. WILLY: When we have the licenses that I work with don't have adaptive management -- they don't call it that but they do have triggers for change so that you can so some adjusting.

MR. HENDERSON: So maybe you could look at this page so -- this is Article 407 from PGE Battle Creek license it's P-1121 and so here the Article refers to the Adaptive Management Plan that we've talked about earlier through the Battle Creek presentation.

MR. HOGAN: This is a signed settlement.

MR. HENDERSON: Do you know Mary because this has been signed it says phase 1A?

MS. MARSHALL: This is -- I -- I think what you did is you pulled out actually an article from the license amendment.

MR. HOGAN: In the amendment.

MS. MARSHALL: So --

MR. HOGAN: But did you have a settlement agreement with PG&E?

MR. HENDERSON: Them or you?
MS. MARHSALL: Right, right, so --
MR. HOGAN: That's the difference. So the Commissioner has a settlement policy where it was a signed settlement agreement if the licensee -- the original two groups who got those measures that are within that agreement.
We have provisions or expectations I should say that the settlement must meet but -- and if it meets those then it's pretty close to a rubber stamp. Absent a settlement we go through our -- our original approach. But honestly I've tried on this project talking about triggers, you know. They have an "X" number of CFS event over Panther Grade you know, you know triggering -- doing different monitoring and things of that nature and the answer I got was we have a reopener.
So I'm telling you in this room right now my hands are tied on that. Now if we want to talk about and you said offline if we can -- I'll bring back that issue. I would like to know exactly where those cases are and then I can go, "Hey, this is why they don't trust the reopener," but I can't -- you know I can't talk to that today. I'm -- as I was given the approach of the reopener when it came to the anadromous fish, okay so I'm being upfront.
MS. WILLY: I totally get it.

MR. FOSTER: And we have never tried that I know of inside that reopener clause and there's never been a situation where there -- that I'm familiar with, projects where there is critical habitat designated in a certain region but yet it is not occupied due to other things there now.

One of the things that will come out and we feel that certainly over the term of the license, if not much sooner than that, but the -- so the possible -- I don't know if the Water Board ever tried to exercise its authority to reopen the license but if the goal is the possibility of enough people petitioning for something to happen in the license it might -- you know it might actually work this time because short of that there's not much else you can do until you have, you know, protected critical habitat that's there and see if some of its, you know, features are consistent and at the value that you deem but you still have to ascertain what's you know, what -- you have to be monitoring to help understand what's going to happen.

MR. KUFFNER: So may I make a comment? So thanks for all those comments because this is really helpful and I think that you know, from an applicant's standpoint a reopener is not a good situation for us too because it creates a bunch of risk for you know, what might happen and you know, reduce our potential production and these things

are things that I kind of mentioned this before but we've never been in a position where we can negotiate this and I'm opening that this is maybe the forum we can do that.

But it seems to me that we have to have the existing conditions now which represent the resident -- currently resident historic fish that are there and a recommendation from the FERC and accepted by Fish and Wildlife that you know, because the fish cede down from the top that could work.

And we've actually proposed you know, even looking at this system with you know, if anadromous shows up, it may not even show up every year because of the way that the barriers are if it shows up at all.

So maybe there is some -- if anadromous shows up and we need some connectivity specifically how can we assist in that connectivity and have sort of two phases -- like Ken was saying if this and this, and this, and we've made some recommendations to that effect in our response to the FERC Draft EIS and we can bring that up.

Of course that's just something to talk about but it would make a lot of sense to the applicant to be able to have the baseline existing and have it being approved and acceptable for all the parties including of course, the state Water Resource and Control Board and the Water Quality which is a key part of making this all work.

And then if anadromy does show up and we all of a sudden have, you know, and I don't think we said if there's 10 steelhead that show up at the tailrace that want to go upstream then we need to see if we can help with some connectivity.

That may not mean 35 CFS all the time because as was just pointed out we don't even have that in the stream even during the -- you know, likely migration period. You didn't really have any flow years so the actually flow records don't support those kinds of flows even in the key time of the season.

And you can even see that on the recent flows that we just were able to distribute here in the last week from the last three years that those flows just don't exist in the system.

MR. HOGAN: So Bill you are the next one to comment about the Water Board and the license and I think typically what you do is you put in the reopener to your 401 and we just adopt the 401's the way they are so if you were to open a 401 and just a 401 -- I have seen that where the 401 changes the conditions of the license.

MS. MONHEIT: So in response to Bill's question we do put reopeners in our certifications for reintroduction of anadromous fish or recolonization, historic habit. To my knowledge we have not tested that in court yet. We are

cautious to pick our --

MR. HOGAN: Battles.

MS. MONHEIT: Opportunity and so it's unproven.

MR. HOGAN: I will say when it comes to the 401's the Commission is probably more cautious just because we've lost every 401 opportunity in court.

MS. MONHEIT: You mean if you conflict or --

MR. HOGAN: Every time that we've challenged the authority of the 401 it has not gone our way.

MS. MONHEIT: Oh.

MR. HOGAN: So we stopped challenging.

MS. MONHEIT: So now you just sort of adopt it.

MR. HOGAN: Because we continually lose ground so it might as well -- you know.

Which led to the Water Board's ability to sign an MOU with us because in the history we would challenge things and it took -- I want to say decades of photocopying and stapling the 401's to our orders before the -- there was a comfort level there between our agencies to sign an MOU. Make sense?

MS. WILLY: Yeah it's true there's history.

MR. HOGAN: I'm curious Alison in the cases that the reopener article was attempted to be used and failed, was there any discussion in those license orders in the body of the order that talked about the potential need to reopen

an order for a specific --

MS. WILLY: Yes, absolutely, in the ones I know of. The ones in the Midwest it went through -- I don't know but I'm going to give you an example from California where there was an expectation -- that this resource that things would happen.

And it, it just hasn't happened yet and we have met monthly with one of the applicants for -- for years trying to -- so it's been difficult.

MR. HOGAN: Are you engaging the FERC?

MS. WILLY: Yes and no. Again, offering conversation.

MR. HOGAN: Okay --

MS. WILLY: But yes we have made some phone calls and site visits with FERC's staff on those projects, specific to the question.

MR. HOGAN: And the listing of whatever species was known at the time of licensing and there was a discussion that pointed to the reopener in the license, okay. Do you know a project number?

MS. WILLY: I don't. The person that works on it is not here so I --

MR. HOGAN: Okay, that's fine.

MS. WILLY: You are, for American River Council.

MS. DOWNEY: 2101 --

MR. HOGAN: It helps when you could go back and make a case for why there is some discomfort relying on the --

MS. WILLY: Yes, and I'm going to go back to our solicitors who of course give us guidance as well. I'm not going to go back to the applicant's attorneys, I don't want to do that again, but I will go back to our solicitors.

MR. FOSTER: Look, and I don't know that we necessarily going to solve the minimum instream flow issue here today because we want to get through some of these other things and we don't want to disagree with each other. We have to kind of figure out you know, you have to have some sort of a -- decide what is an adaptive thing that can be done through monitoring in the future, something from that standpoint.

MS. WILLY: Yes, yes, but --

MR. FOSTER: Short of taking all the water out of the bypass reach below on the inflow into the falls which is where I believe there would certainly be not particularly where the critical habitat is, you know, but on the other hand having 13, 15, 25, 30 -- some amount of water in there that keeps the habitat viable is -- and if we don't know exactly what that number is completely and so -- I'd rather try and move on to some of these other things.

MS. WILLY: Well I still have clarification on

that.

MR. FOSTER: Is there anything else you'd like to say?

MS. WILLY: I do. Thanks -- something that we noticed looking at the DEIS is there seems to be a slightly different interpretation on what is a flood plain. And so typically people talk about flood plain as being the flatter areas that become inundated during high rainfall events.

But we know about both Chinook salmon and o.mykiss that when their juveniles feed on submerged aquatic vegetation -- so you can have a minimum flow or an average low flow during the summer where there is no riparian vegetation in the water.

It's the fluctuations from that lower flow into that wetted area provides the habitat for juvenile salmon for it. So this slide here is just a simple statement inundated riparian vegetation provides food cover and velocity shelter for juvenile salmon.

And we put references in our letters to you so I didn't load this up with references. The number of days during inundation and the amount of riparian are significantly correlated with juvenile Chinook salmon survival.

Now we haven't looked at that specifically for o.mykiss but the juvenile's forage in the same manner. And

so I put two examples up here, one from the Stanislaus River and the other from the (inaudible) River where the number of acre days of inundation of riparian habitat had a significant effect on juvenile survival in the region of the river, so closer to the dam to the mouth.

And so those two paths there have slightly different scales but the point is that riparian inundation over a certain amount provides abundant food and cover and then when those salmon return the numbers are much, much higher so that's where the --

MR. KUFFNER: What kind of flows are in those river systems where those --

MS. WILLY: Very high flows, but still we're looking at flows that would support 20 to 60,000 salmon.

MR. KUFFNER: Right I mean are these thousands of CFS or are these --

MS. WILLY: Oh yes, high flows in the thousands and at the lows they're I think what -- 600, 250 different. The rivers they have such low flows that the riparian flood plain is not engaged. Recoupment gets so low that it's like for example the Yuba River .0004% return instead of the 2% that will allow the population to persist.

MR. KUFFNER: So the riparian is so much further back then it's just the wetted --

MS. WILLY: Or the river doesn't fluctuate. It

stays at the level and it's not engaging with the riparian area.

MR. KUFFNER: Right.

MR. MATTAX: I'm actually curious though of the channel types of these compared to the project area because my gut is these are much more than not --

MS. WILLY: Oh the ones we're talking about yes.

MR. MATTAX: Yes from the stance on --

MS. WILLY: Absolutely that's true, the larger openers are lower in the place that we call "the flood plain", most people say the flat land but the point is there is a higher recoupment and higher survival is where the riparian vegetation gets engaged with the river during high flows.

So that's what we call juvenile rearing habitat and at the higher elevations with a steep bank you can have a relatively small change in flow but quite a bit of riparian picked up as the river moves up so that's what the juvenile habitat need to forge a cover to essentially survive and persist in the stream.

MR. HOGAN: Yeah I think if you look at our analysis on the Draft EIS and it will be in the Final EIS is that back into the flows that come down -- so for Battle Creek the influence of the project of the capability of the project is not minimal, okay.

MS. WILLY: Okay so here is an example of a natural hydrograph and this is hypothetical but it has components in it that I'll talk about momentarily and then a functional flow that many licenses or downstream conditions are trying to match.

So there's portions in the natural hydrograph that are needed for salmon. So this first thing is called winter precious typically -- they call it wet season inundation flow. That's the first flow that mobilizes sediment, you know, organic matter, engages the stream and starts the ecological process for invertebrates to feed and then to be available food.

So there's the fall precious. Then there's the winter storm flows which in this type of event there's some storms here and then there's the spring high flows, snow melt flows and snow melt recession which is this line here. So what these mobilize gravel, mobilize bio-mass, get the individuals into the stream. Typically that's when you see the runs coming up through.

The peek high flow is where you get the cleaning of the gravel so that this fine gravel is usable and doesn't have algae and stuff in it. And then -- then they're spawning and then the juveniles are, are in their gravel and this period here and then the bigger the juvenile salmon gets the more food it needs.

So eventually juvenile salmon need to get into this wetted riparian area in order to forage or they're not going to be able to leave the system at a size to survive. So, so licenses will put in fresh -- some mobilization flows to clean the gravel and move it around quickly so that the spawning period, there's no de-watering and then later on something to match the migration for foraging and then there's a few here -- there's still not recession does two things.

It cues the fish to move out so there's less stranding and also is what the riparian vegetation needs in order to germinate and survive the system. So that's a natural flow and a functional flow that is typically seen in managed rivers just as an example of something.

MR. GILMOUR: That's okay I was just going to look -- considering that the bypass goes -- to the high gradient, better rock dominated, I think has a capacity of 125 CFS I believe.

MS. WILLY: Yes.

MR. GILMOUR: I'm not sure I see a complete elimination of this natural hydrograph in the bypass reach.

MS. WILLY: You're not seeing an elimination -- what you're going to see --

(Simultaneous speaking).

MS. WILLY: Okay so this is the juvenile rearing

period that I just put a hypothetical one on -- that's a typical period coverage and then I took that juvenile rearing period and I put it on top of a piece of a hydrograph from South Battle Creek and I put the 13 CFS line in here so that what would be the foraging habitat for the larger juvenile system is right in there.

And so this green line is your mock-up flows and that's the actual flows so this whole area under the red line will not be a loss of habitat but some amount in there between the 13 and this here, that's --

MR. HOGAN: What are the other delineation -- what is the maximum of a hydrograph?

MR. GILMOUR: Is the green line the actual flows less the divergent flows?

MS. WILLY: Yeah I don't know the slide that goes there --

MR. GILMOUR: You still have the volume of flow that's underneath the green line, just not underneath the red line so the difference is between the green and the red.

MS. WILLY: Not sure, not quantified yet because this is an example from -- just as an example to show.

MR. GILMOUR: It looks like it's right out of our report. I mean the CFS on the left --

MS. WILLY: So you can see the natural hydrograph has a freshet here so it would be matching for a freshet,

winter storm, imagine if there was a winter storm -- there's some amount of habitat loss in here, not quantified yet. So that's what we're looking at.

So there's a look at Spring Run which has a longer range of juvenile habitat needs. There's this period here and then you've got the larger fish and they're really heavily dependent on that but they may be moving downstream.

So the point is to try and get them fed up as much as you can to grow so that when they run out of food then they move down to the next system.

MR. HOGAN: What does the green line represent?

MS. WILLY: That's their model -- that's a model flow line.

MR. HOGAN: Meaning that's what would be left in the channel?

MS. WILLY: I don't know, no, --

MR. HENDERSON: This is just comparing the historical data from South Fork, the flow data from South Fork to synthesize.

MR. KUFFNER: Is that from our NHC report?

MR. HENDESON: Yeah.

MS. WILLY: So that's your synthesized flows are the green and the aquatics are red.

MR. MATTAX: Well something's on this because the green is actually above the red.

MR. GILMOUR: I'm trying to figure out where that came from.

MS. WILLY: The example of what we're looking at so --

MR. HOGAN: And I guess what my question was is where is the maximum capacity of the turbine?

MR. KUFFNER: Correct, exactly, so that's 13 at the bottom, is that 100 at the first line and 200 --

MS. WILLY: 50, the bottom line is 50.

MR. KUFFNER: So 50, 100, 150, 200.

MS. WILLY: So you're pretty much getting close to capacity when you're up there in your model flows.

MR. KUFFNER: So the turbine is you know, approximately 100 it's 95 to 105 so any flow over 118 is going to be in the system still --

MS. WILLY: So what would be left in the river for salmon foraging during this period with our project has not been calculated but that's what we call habitat lost for juvenile salmon, that area.

MS. MONHEIT: It's below the 100 line?

MS. WILLY: It's below the 100 line.

MR. FOSTER: The other thing is some of that is if you had to do your analysis and your study with what data you were able to get and as we mentioned before and several comments I've heard. You know you do the best you can but

sometimes it's just not great data to go on. I mean estimation of your bank flow might be if it's too high it's going to over-estimate what your flow levels are going to be to have it -- it's just there was a lot of studies to try and understand or develop you're hydraulic geometry might have been a bit too crude to begin with in the situation.

The development of bank flow monitors might have been a bit too crude but it is what it is and that's the information that we have. When we took some of the information that you actually had and ran it through we have a the SIM model which might have been a better way to go to begin with.

You know hind sight. We are where we are now and mainly because we don't have a tremendous confidence in the temperature model or the flow model. So many questions may have to be resolved in the you know, licensing issue you know, to understand better, you know, what's really going on over the course of the year.

Because you know, we didn't really get a lot of good information until hiring you, we got it from -- we got 9 years of a flow record trying to develop peak flows which is way, way short of it. Usually you need 20 years of it for that to happen, it just doesn't always happen.

So I understand that there are limitations on that but that's one of the reasons we have some problems

with some of the things that we've come up with it's because of the way we thought we had left that collection and -- so it means that we have to kind of clean that up or replace it.

MR. HENDERSON: So I just wanted to add for the record that hydrograph that Alison was referring to is on page 19 of the baseline hydrologic analysis for South Fork Battle Creek.

MR. KUFFNER: And who is -- what before is that?

MR. HENDERSON: NAC.

MR. KUFFNER: NAC.

MR. HENDERSON: Baseline hydrologic analysis 2014.

MS. WILLY: I just have a couple of more slides.

MR. KUFFNER: Go ahead I'm just going to say in that report, you know, took the data that Bill's just talking about -- the 9 years of measured data that we had and then also do some regression analysis on deer and mill to come up with synthetic flows for the other durations that we didn't have measured flows.

And we had 9 years continuous and then we had a little group here, a little group here, a little group here. But what we just provided earlier this week was three full calendar years of flows that we had continuous from essentially all of calendar year '15, '16 and '17 so most of

water year '14, '15, and '16 and those things -- I don't know Bill if you had a chance to look at those at all but they actually confirmed the water temperature reports very well. They actually show that the water temperature model that we had is reflected very well in the system and maybe we'll have some time to go over that data because it's in -- the most current data and it's complete data over three seasons.

MR. FOSTER: And I appreciate that even though some of the flows are capped at 75 CFS.

MR. KUFFNER: That's only because we -- we don't have a staff gauge like -- we could estimate what those are.

MR. FOSTER: Some of the things we can clean up in the future with you know, things --

MR. KUFFNER: Well we have those things with those settings but we haven't measured those flows so I can't tell you where on our hydrograph -- I'd have to be really extrapolating. We can do that but what we limit to is what we had actually measured and gauged at that actual opening and confirmed that that gauge was still valid after those years because those things move around too, you know, so --

MS. WILLY: Okay should I finish up?

MR. MATTAX: Can you clarify what colors are, maybe --

(Simultaneous speaking).

MS. WILLY: So the red is the actual and the green is the model.

MR. HOGAN: But the synthetic WD3, I'm not sure what --

MS. WILLY: That's the model, that's the green. The green is -- and so when you see that --

MR. HOGAN: That's with diversion, that's with the diversion that's what that is.

(Simultaneous speaking).

MS. WILLY: What this tells you with the synthetic data that Deer Creek had a really strong freshet but that did not go over Battle Creek so there's residual that's strong but the majority did not hit on Deer Creek.

MR. HOGAN: But synthetic with diversion in the case of the green is the flow going down Battle Creek?

MR. MATTAX: That's correct.

MS. WILLY: The green is the flow going down Deer Creek, the red is the Battle Creek, so it's modeled.

(Simultaneous speaking).

MR. KUFFNER: The synthetic from Battle Creek is the blue. The green as pointed out is with the diversion so it's the synthetic left, so this is still the flow in the system even after the diversion is still going on in this area if you're looking at it from sort of --

MS. WILLY: Based on Deer Creek data.

MR. KUFFNER: Well again, we have actual data for 15 different years of 5 years and we have more than just --

MR. HOGAN: Which would indicate that the Spring Run rearing habitat that you indicate is a lot of --

MR. KUFFNER: Well it's somewhat less, it's not lost.

MS. WILLY: I think it was taken from an adjoining watershed. So this is 50 and this is 100, this is 50 and the capacity of the -- this is the one that I have -- the capacity of the diversion is 100 correct?

MR. KUFFNER: So when this observed is up here that you know 230 --

MS. WILLY: Right.

MR. KUFFNER: And you divert 95 or 100 then down here is what's actually in the system.

MS. WILLY: So --

MR. KUFFNER: So all this water still is in the system even with the diversion full operation.

MS. WILLY: So based on actual flows why is it when you're operating is it not showing that 100 is diverted?

MR. KUFFNER: It is. The difference between the red line and the green line is 100.

(Simultaneous speaking).

MR. KUFFNER: That's correct, it's showing what's left in the river.

MS. WILLY: So if this is 50 and that's 100 I can see -- I don't understand why --

MR. KUFFNER: This is the measured flow which is over 200 so the difference the 100 so this is what this whole amount is still left in the creek, you want it being diverted at 100.

MS. WILLY: Why is it here the flow is the same as the actual not 100 less?

MR. KUFFNER: It's at the slope of the line so.

MS. WILLY: So it looked -- I just am not seeing.

MR. KUFFNER: Again, I mean you have a whole month's worth of data right in this line.

MS. WILLY: Right.

MR. KUFFNER: I mean that's part of the issue.

MS. WILLY: So that is another excellent point. It's typically when you analyze this data -- when we do the acre day analysis we look at how much habitat is lost per day because increments of 3 days, 7 days --

MR. KUFFNER: Right, so the data that we just -- and Bill did point out a good point is that we capped it at 75 just because I didn't try to extrapolate what the flows are but we could do that and we could look at relatively what the flows are because they are, you know, over the

system diversion so there's still substantial flows in the stream during a typical season even when the project is in full operation during a full diversion.

MS. WILLY: Yeah, I just think we might want to look at that.

MR. HENDERSON: Are you sure that the D means diversion or does it mean let's try here?

MR. KUFFNER: I've got to pull this out so I could get the -- because we have a graph that shows something similar to this.

MR. HENDERSON: Yeah I don't think what you're referring to is a different graph.

MR. GILMOUR: But you're not at C13 CFS this time of year.

MS. WILLY: No I just put the baseline in there so you could see what we're talking about but I do want to let you know -- we're going to talk a little bit about the document -- when you don't engage the riparian area you end up with cohort barriers and if you do that 2, 3, 4 years in a row it can actually remove the population from the stream.

So that is a concern that a non-engaged riparian area means that you don't have enough forage and cover for the juvenile.

MR. HOGAN: And the period concern is January to June?

MS. WILLY: Yes, or to May 15th, I think this was the Battle Creek. Battle Creek had a really long steelhead run -- it didn't separate the o.mykiss from the steelhead.

MS. ERLEY: May 31st was the --

MS. WILLY: Oh so you did May 31st with steelhead, okay, thanks, to May 31st, so I went to May 15th.

MR. GILMOUR: So it's my understanding so if the project's operating, even at full capacity there are times between January and May 1st and whatever date in May you want to pick where you still see a -- a, not the same magnitude of water in the channel but the same type of fluctuations.

You also see peak flows in excess of 100 CFS that are being diverted that may hue out migration and you know, if you're looking at the steelhead in the Central Valley you know, they typically out migrate -- most of them do in the spring during that before May period.

And, again, during that period the project would be pulling 100 CFS off but you're still going to see flows from 150 to 500 periodically.

MS. WILLY: So they migrate in this period here in the recession area.

MR. GILMOUR: Okay.

MS. WILLY: And this is 100 CFS right here so the capacity of the facility if it's operating then would be

removing most of that water during that time.

MR. GILMOUR: These are some pretty long Chinook, not steelhead.

MS. WILLY: I'm just looking at the hydrograph.

MR. GILMOUR: Okay.

MS. WILLY: You know we're talking about that.

MR. GILMOUR: These are 100 -- these are where the lines are getting a little --

MS. WILLY: 50, 100, 150, 200. So what, it's just that I wanted to bring up that that's how we look at losses, the loss of an acre, the number of days and the number of acres of habitat to estimate it. So you can measure what the acre day inundation would be with the project and without and then you would actually know how much habitat is lost.

And so I put the big graph and apologize for the smaller summary but just to show the various shapes of the hydrograph you're seeing all the components in there and I open with the 13 which in some years might be close to failure -- we don't know, but if there is some kind of adaptive management or you know, measuring like when are they leaving the system -- okay they're out, we can drop the flows -- you know some kind of way to use the project to mimic the natural hydrograph to protect the individuals that are leaving would be very useful.

And then I also put the 35 in there to show that you get a long -- you get a large number of days of inundation which would be for a current condition it would be lacking under the 13. We also had talked about the connectivity but that hasn't been measured -- how much habitat is lost, what will be left at 13, what will be left at 35, what would get you the 2% returns.

MR. KUFFNER: Yeah if there's any -- a couple of things the stream is about 5% gradient in this reach.

MS. WILLY: Not, you know, --

MR. KUFFNER: Yeah and this is when to get up to where the you know, this flood plane where the riparian is -- is you know, in the flood stage because almost all the other measurements are just days within that have rock channels. I mean the --

MS. WILLY: Yeah, so the other --

MR. KUFFNER: It's only a big flashy -- big flashy surface -- we'll get into our operational rules, you know, later, but our plan is that when we have big storm events like these big peak events here that are showing you know, 400, 450 -- that we actually drop essentially our pneumatic radial gates and the stream flows through its natural flow.

So the biggest highs of storm floods where we're going to have the biggest sediment movement and the flooding

of all of these channels, is going to be at the natural flow. We will not be diverting at those large storm flood flows.

MS. WILLY: Right so I do hear and see attraction flows and mobilization flows but what I still am not hearing or seeing is the engaged riparian vegetation component of the juvenile habitat and it doesn't have to be trees, it can be -- and you know all these river systems --

MR. KUFFNER: Yeah I don't understand why you did that below 300 CFS in this system because of the way that it is.

MS. WILLY: Good to know.

MR. KUFFNER: I mean I just don't -- if you look at where the bank full is and Bill you've been down there, if you look at their bank fully with the estimates, that's just sometimes still in the channel not even up into the vegetation in some areas.

MR. TOMPKINS: Hey, I believe all of that has been analyzed in the NAC and studies.

MR. KUFFNER: Yeah, I'm not sure that they went into the depth of where the riparian -- the riparian acres that were flooded. I don't think it's to that level of detail but --

MR. FOSTER: Well on one hand you've got a little bit of a difference between what you figure the frequency of

400 or 450 is and then your bank flow that you came up with in the 600's and so what your bank flow of 600 -- I mean I wondered wouldn't your peaks be close to that?

As I just said it's somewhere between 400 and 600.

MR. KUFFNER: Right. I mean the return interval --

MR. FOSTER: And on a small stream like that that can adjust the --

MR. KUFFNER: The return interval is 600 in five years, 800 at ten years and 100 year flood is at 1550. The two year return interval is right at just under 400.

MS. MONHEIT: I have a question about this graph. Because -- and I'm trying to figure this out. If the project is going to divert roughly 100 CFS shouldn't we be looking, putting the 13 CFS line above the 100 so you can see like okay, so the first 100 CFS are being ripped out and if we move the line then to here --

MR. KUFFNER: You're right.

MS. MONHEIT: Only that little bit above the line that is any fluctuation -- I mean I'm concerned about flat-lining the hydrograph in the bypass reach and so the only flow different than flat-lining it that we're going to see is going to be at least this little bit here -- just that much and then there and then --

MR. KUFFNER: So you're going to get the 100 is going to be right at this line here so you're going to get all of this peakieness evened up to another 100 and another 75 over and above what's being diverted.

MR. FOSTER: And I think where you're going to have your problems is that when you get towards the like -- or you know the shoulders of it are like the new, period around to maybe October and some of the hydrology work done shows that you still have some flows there that could be cut in half by you know, 13% but again, not necessarily for very long.

It's kind of adjusting as to whether you still have enough to pull in you know, 5-6 CFS's worth of generation or you know, 13 CFS, you know, in the stream.

MR. KUFFNER: So, yeah.

MR. FOSTER: And that's, that's the only kind of row that there is a -- obviously if you shut down and the fish would try and move out as it warmed up and the flow started to drop but allowing them enough water to get out might be more than 13 but I don't know what that would be, exactly yet.

So that's where most of the time because you can only think about 100 CFS most of the time during the year you're going to still capture a lot of that variability is still probably going to occur because 100 CFS will only be,

you know, not necessarily a large proportion of that.

But where you have that trouble is at the tail end of migration or at the, you know, beginning of immigration I guess you could say. Now, right now that's only going to affect whatever you might consider there.

MR. KUFFNER: So the actual data, measured data from the biggest wettest year we've ever seen in Battle Creek according to all of the hydrologists which is 2016 so it would be the Spring of 2017 -- the flow has dropped below 18 CFS on July 20th. And so we would be offline in July 20th.

MR. FOSTER: Right.

MR. KUFFNER: Even in the wettest year that we've ever had and stay offline until it would come up in November or December or something like that.

MR. MATTAX: I evaluate it based on the historical record and I recall very often that basically it was September or October it generally shut down almost entirely but during July and August it actually would be half the flows to operating.

While I was looking at the historical record so I will pull that table up.

MR. KUFFNER: There may be some years that happens but --

MR. MATTAX: 20%.

MR. KUFFNER: Yeah I just --

MR. MATTAX: Frequency a little --

MR. KUFFNER: Just in the wettest year that we have with again the snow cap -- one of the things that's interesting about this reach it only goes up to about 6600 feet so at the highest reach. So we don't get a late snow melt, the snow melt is relatively earlier in the season as it may be and --

MR. HENDERSON: So the license application is for the -- some of the data to operate any time of the year for the flows at present. For instance there are no restrictions to when they could operate and so the time.

MR. HOGAN: Correct, so as long as there's 18 CFS inflow to the project they will be able to operate up to its hydraulic capacity of 105 CFS, but the natural hydrograph drives a lot of when that is either operating or not -- well it drives all of the projects operating and typically we did our analysis in July/August.

MR. MATTAX: Well it's actually September/October is when it's really going on which isn't surprising because that's typical.

And July and August have a higher percent but it's not solely offline, but it's solely on 18 CFS.

MR. HOGAN: But I was hearing two issues. One is the recommendation in the feeding period and the second one

was allowing throughout migration when the temperature maybe looking for feeds here --

MR. FOSTER: Well right because some of the median flow data that you had was for April, May or June you know 107 - 129, 69 CFS. You go to 13 CFS and that cuts down what's there like 70 - 80%.

You can run it sometime when the crew starts to get a little warm out there and that's one of the things you're concerned with is that your volume of water becomes so much less and actually will heat more than the current volume that's in there. I mean you'll still be operating but --

MR. KUFFNER: And this is important to make this comment because this is not the way most streams work but actually by -- and just stay with me on this -- by reducing the flows we'll actually cool the stream more within the project reach because there'll be less warm flows coming out of mineral that will need to be cooled down within the reach.

If you look at the data that we just issued you'll see days where there's 10 degrees C difference where it's cooler at the powerhouse site than it is at the diversion and that's because that diversion's going through that Mineral Meadow and warming up.

And the very steep canyon that has the almost --

it runs almost due east to west there so it's almost all south facing so there's very little sun that gets even in the middle of June -- there's not a lot of sun down on the bottom of the canyon. So the canyon rocks in the ground is the same as the underwater flow of 49 degrees Fahrenheit. So the water actually cools in the reach.

MR. HENDERSON: Do you have the launch area above the meadow?

MR. KUFFNER: Yes, not above the meadow.

MR. HENDERSON: You don't have one above the meadow?

MR. KUFFNER: No we don't have one.

MR. HENDERSON: Then that warms. We've taken a look at the consummate on DEIS based on this analysis there, we look at the new data, right?

MS. WILLY: Are you moving on to temperature?

MR. HOGAN: Well they're interrelated and I think we have an approach that we want to kind of put out there but we have to come and provide the base for that so.

MR. MATTAX: So a few days ago we provided data for essentially three years of data, 2015, '16 and '17 -- we provided data for the old Highway 36 Bridge which is above Angel Falls and a site at the powerhouse location --

MR. KUFFNER: Just below Powerhouse Falls it's actually in a pond just below the powerhouse.

MR. MATTAX: And I didn't look up exactly where the --

MR. KUFFNER: It's actually just above the tailrace so it's interesting the difference between those two temperatures is probably just the pond warming up a little bit. It's maybe like100 yards upstream just right above the tailrace.

MR. MATTAX: But it's below Spring Fork.

MR. KUFFNER: Below Spring Fork.

MR. MATTAX: So we looked at that and generally the temperature does cool in the summer and other seasons it doesn't always cool and it depends what you're looking it.

MR. KUFFNER: It's not just the water that comes in over 65, 60.

MR. MATTAX: I didn't look at that level. I did monthly because I have very little time to do this. I looked at monthly just generally what the pattern was and the daily means cooled in 2015 and '16 and '17 they warmed a little as a daily means.

And that's Tenant Spring and in the 7 died down, cooled in 2015 and was basically neutral say more or less the same in 2016 and '17 and that's down by the powerhouse versus up at Highway -- Old Highway 36 switch.

So that you know in the DEIS we had said that we believe warming occurred in the reach and hence the minimum

flow would -- actually a higher minimum flow will it cause warmer conditions because you would have less impact of cooling effect of the canyon and the spring.

Given the absence of data between spring number 4 and the Old Highway Bridge we can't really get at what goes on there other than with the 2015 data that was provided earlier. And so that data which was very low flow showed that it did warm in that reach but we don't have any data to confirm that that happens in non-dry -- super dry years I think is too hard to remember, right 2015 stream actually totally went dry.

MR. HOGAN: So what we were looking at is to do some post-license monitoring, temperature monitoring, pool monitoring in particular to get a temperature upstream of spring 4 which we don't have. We know that spring 4 then had a cooling effect and we're concerning about what is the project effect.

The other concerns we have are is we don't want to monitor in perpetuity through the term of the license, so we're trying to think of a way that we can do this temperature monitoring that could then be used to operate the project proactively through a predictive model.

And monitoring for a period of three years to try and capture three different watering types, wet, dry and normal and if that doesn't happen maybe additional

monitoring may be needed. Monitor the water temperature, flows in the reach, ambient deer temperature and form a predictive model that could then be used to describe the project operations, be proactive instead of reactive. I wanted to get your thoughts on that.

MR. FOSTER: Well I think you did need a better water temperature model and I'm personally okay with you know, a gauge like you suggested, a gauge above the impoundment and one above spring number 4 and also one below the diversion dam.

And I guess obviously you'll be monitoring water that goes through the powerhouse.

MR. HOGAN: We can do that through --

MR. FOSTER: Locating some gauges in those areas for flow and for temperature and then if you can take that more recent data or data that you finally collect and update the temperature model, then you could look at and base it on the information that spans the whole year rather than four or five months which would probably be better and then you could see what's going on with that.

MR. HOGAN: So the thought is and we do have a typo in the Draft EIS that said engage upstream of the impoundment -- that gauge is actually located within the impoundment and basically to maintain the impoundment level. It's for run of river operations. There is a gauge almost

immediately downstream of the diversion dam, that is for monitoring the ramping rates and we have recommended for a full gauge upstream of spring number 4 and that would be used for monitoring compliance with the minimum instream flow that might be -- there's some debate as to what the flow should be.

There will be a monitoring at the compliance location and the purpose of that is we understand the reach may be a losing reach so we want the protective reach that's most influence by the project which would be upstream of spring 4.

MR. FOSTER: Correct.

MR. HOGAN: And having the compliance point there would do that. Again, I'm not debating what that flow should be but as far as where it's monitored at.

MR. FOSTER: Right.

MR. HOGAN: That location would also have temperature monitoring to inform the proactive model and it could be used to operate the project. And I know you are proposing operations modeling -- we didn't really have any details about what that operations model was.

You left the room but I don't know how much you heard before you left the room. The thought was if we can do three years of water temperature and flow monitoring, if ambient air temperature monitoring can ideally capture a

threat model in dry year and if we don't need additional monitoring needed, we could inform our operations model that could actually be used to proactively operate the project and what is protective of the bypass flow and temperature.

MR. KUFFNER: Yeah, it's a little harder to get ambient just because trying to find a good place to protect an ambient monitor but the water temperature shouldn't be any problem generally speaking.

MR. TOMPKINS: What we've had for a number of years we had ambient and water right at the Mineral Bridge, right below that we've had above the diversion site both of those. We've had ambient air all over the place and something like 15 gauges in the affected reach but we pulled those out back down to 4 simply because everything dried up and all the fish died for two years.

So but I mean there's a lot of data that we already had. You mentioned temperatures -- differential between what comes out of minerals in the summer. We've had that data for at least probably two seasons of the differential.

MR. HOGAN: So three years of monitoring post license with the temperature operating --

MR. TOMPKINS: Not a problem.

MR. KUFFNER: Yeah we could do that. You're saying the ambient -- it's a little harder to make the

ambient protected everywhere --

MR. HOGAN: Well I think as long as you're monitoring the ambient in the same location and that would have to be --

MR. KUFFNER: We'd have to find a place we could keep it in the shade.

MR. HOGAN: But it would have to be -- that would be for the kind of license because that would be an input to the model that tells you then to open the project to operations.

MR. KUFFNER: Yeah we can do that on the upper end of it and so forth.

MR. TOMPKINS: The only concern is the one above spring 4 or immediately adjacent to that is access. And that would probably have to be manually taken care of but there's not a problem with ambient air. We had it -- we can do that.

MR. HOGAN: So again, taking this approach, developing a model -- an operations model to do this -- the idea would be that you probably wouldn't need real time monitoring because you could take the three year of operations and data and in the interim you would have real time monitoring in certain locations.

MR. KUFFNER: We do at some places, but we don't do that kind of test. It's difficult to access that

particularly in the west.

MR. HOGAN: After three years or so of monitoring in the bypass region you develop a model and then you actually use that model to say hey, the ambient air temperature is 97 degrees out, we need to either restrict operations or shut them off or whatever it might be -- be proactive with what the model says.

MR. HENDERSON: So the model would operate off of just one temperature and that would be ambient air temperature. We wouldn't have any thin water --

MR. HOGAN: So when is the model is calibrated and validated?

MR. MATTAX: I personally -- if I was adopting it I'd use ambient air and water temperature. Water temperature to develop it.

MR. HENDERSON: What would you use?

MR. MATTAX: It would depend on exactly how the model was developed -- well your alternate would be down upstream of spring 4 and that's where you go through consultation to figure out what works best but one approach would be to base everything on temperatures at the down because you know you can get those real time and you could be more proactive.

If you wanted to do that approach there are different approaches to seasons. I mean there's all kinds

of different approaches.

MR. HENDERSON: So what is the issue with real time monitoring?

MR. MATTAX: Well that's part of it especially when you're talking some agencies recommend 7 different locations and that costs -- we have comments received on the costs.

MR. HENDERSON: Real time monitoring with fewer locations would cost less.

MR. MATTAX: Well it depends where they are.

MR. HENDERSON: Right, of course, and that's something you might consider.

MR. HOGAN: Yeah, the idea would be using all the proactive and the idea would be to cut down the amount of monitoring so if you can -- whatever inputs the model needs, whether it be just flow and ambient air temperature we can calibrate it to that -- we're already getting monitoring flows.

If it needs to have a water temperature point -- Brian?

MR. FOSTER: Your saying be -- be proactive because you're here thinking there wouldn't be any monitors in the water. You would proactively just based on the model --

MR. HOGAN: That's what I was thinking yes.

MR. FOSTER: But you don't have to do that. You could operate in real time without a model. You don't need a model for that because you would be measuring the water temperature direction you could adjust project operations based on that.

MR. HOGAN: Well that's not the 10(j) recommendations we have. 10(j) recommendations we currently have are for 7 day average max and --

(Simultaneous speaking).

MR. HOGAN: So and that's why I just put out there as an idea, I wanted your feedback. One of our hesitations is monitoring in perpetuity. If we get to a point where Rubraw is right and the cooling reaches if they shut down the project it's actually going to create warming then why are we continuing to monitor it, you know?

If our analysis in the DEIS is right. Developing a model to generate project operations would just impair that.

MR. FOSTER: I think in the operational sense of developing the model you want to have the ambient air, you want to have several locations that you're monitoring in the water to help get inundated you need to build a model and validate it.

Once a model is actually running I think it's still important to have that -- they could use that ratio

between say the one spot above spring 4 and the ambient air to see if there's a difference there or something gets out of range in that ratio, then I think you could do something because sometimes the variation in, in ambient air can be different in terms of what's better in the water.

Now some of that noise you try and filter out as you build data to develop the water model but I think in that period of operation you still need something at one point in the water to correspond with some other point.

MR. HOGAN: And I don't know that I think once the model is calibrated and validated where that location is is not as important because it would be calibrated to that location, you know. So if you're going to monitor water temperature at a location that is in real time, then it makes sense to have it at a site that's accessible.

You know and above spring 4 isn't. Now I'm not saying that we shouldn't be monitoring spring 4 while building the model, I'm saying that the long-term operations.

MR. FOSTER: There's so many advances in the telemetry it can't be real time in accessible spots?

MR. KUFFNER: There's no signal down there unfortunately -- why we can't get a GPS signal in the canyon, we can't get a cell signal down there unfortunately, I mean it's really steep and deep.

MR. FOSTER: So in the point above spring 4 would be somewhere above spring 4 -- it may not be necessarily that close to spring number 4 because of issues like this and getting the signal and stuff like that.

MR. KUFFNER: It doesn't get better unfortunately.

MR. HOGAN: And again what I'm saying is I'm not saying that we shouldn't monitor that site to build the model upon, that site may not be needed to fully -- for the model to be run on.

MR. KUFFNER: Correct. But one thing to keep in mind when we measured spring 4 it was flowing at .4 CFS so at that small of a flow rate it's not going to have a huge impact because it doesn't have enough volume of water at that temperature to make a big impact.

MR. HOGAN: Are we still on -- actually before we move directly on temperature we took tests on gauging for close and we kind of went minimum flow so. So we're at three gauging locations and the agency has recommended 7 and we're just wondering, you know, why 7? Why is that needed to understand the project's influence on flows.

MR. FOSTER: And like I said you need at least three.

MR. MATTAX: I guess my biggest question is why are there so many downstream and why the importance

considerably downstream of the project.

MR. HENDERSON: So if the project is warming the water then downstream monitors can see how far downstream that temperature goes.

MR. FOSTER: One reason of having temperature monitors downstream.

MR. HOGAN: So you're saying if the project -- you're predicting that the project would or could -- potentially --

MR. HENDERSON: We're trying to address that eventuality.

MR. HOGAN: So if the project is warming water in the bypass reach, you are saying you want to monitor downstream of the tailrace because there -- that influence could be perpetuated below the project?

MS. WILLY: Yes.

MR. FOSTER: It depends on how the water in the reach affects, changes or not changes -- as it runs into the springs, influences and the influence from the tailrace as well. That would be the only reason because it's too warm in the bypass region, that might overwhelm the cooling effect that you might get from the -- from the spring or from the other springs that are downstream -- assuming that you'd have water coming through the powerhouse near to the same temperature as upstream where it's cooler.

That coolness coming from down if it does actually cool may -- could cancel out what's in there or it may not be enough to change that until you get farther down. That's going to fluctuate potentially.

MR. HENDERSON: It could cancel out those benefits that those springs supply to the South Fork below Panther Grade so.

MR. FOSTER: Which is why having a temperature that works better.

MR. HENDERSON: Right, so Laurie has some data.

MR. HOGAN: Why don't we just come back at 12:30.

(Break 11:17 - 12:20)

MR. HOGAN: Okay we're back on the record.

MR. FOSTER: Bill Foster from NMF's, the National Marine Fishery Service. I'm okay with three gauging points. We might want another one -- if we could adaptively manage that fourth one somewhere to capture something below where the mixture of the bypass and the tailrace there and it might come together.

What happens -- just to get a feeling for what happens when all of those kind of three things kind of come together at the end of the tailrace, but like I said the three other ones could be co-located with each other like the temperature and the flow going to those other three points.

MR. HOGAN: Okay so you're not just talking co-locate, you're talking temperature.

MR. FOSTER: Yeah temperature -- but I figured you'd want a temperature reading at the same spot, at the same region that'd you'd want because eventually post-licensing you might need to pop in a couple more temperature monitors than those three spots so you get a good spread of what happens dynamically to the water, you know, to get a little bit more finite than just three points.

MR. HOGAN: Okay.

MR. FOSTER: In terms of --

MR. HOGAN: Okay, so and just for clarification our current recommendation is to monitor flow at three locations but those locations are already used for different things. One is a reservoir elevation monitor, a monitor run of river operations, to keep the reservoir from fluctuating. The other one would be a gauge immediately downstream of the diversion dam to be monitored with a rate requirement and then the third one would be just upstream of the spring 4 monitor in compliance with the full recommendation -- whatever.

MR. FOSTER: And you'll know what's coming out of the powerhouse.

MR. HOGAN: Right through generation.

MR. FOSTER: And the reason why I like those things is I was looking to get a few more to see what happens when they mix. Now the other thing you could do to is if some other party or USGS or somebody like has some gauges there that are not project gauges, you could still tap into those because obviously everything gets more immense as you get down below Panther Grade you know.

I don't know what you guys think about that. I know when they come down a little bit on a number of the gauges because it just depends on -- because I feel better about them putting in gauges temporarily to develop a model to be a better model, do you know what I mean?

MS. WILLY: Yeah, now you're talking about flows and temperatures?

MR. FOSTER: Well flows and temperatures. I mean the flows are going to be what they are in terms of everything like that once it gets below the powerhouse. I was concerned about flow below the powerhouse because everything below that isn't even on the project.

MS. WILLY: Yeah, exactly.

MR. FOSTER: But that's -- since I'm hoping that they'll put in more than the three temperature monitors in the system there so that you get a better idea of how you use that information for a model to develop.

MR. HOGAN: How about if -- let me ask if this

works for you. Monitor, hypothetically, a recommendation to monitor temperature within the project's effect reach for up to three years or three water year types, okay?

Develop a monitoring program in consultation with the agencies, you know, monitor three locations -- can I put parameters on it without saying this is where it needs to be? I mean what, what makes -- I mean we don't -- it sounds like you guys would like to have some input as to where it's monitored but we need to have some bounds on it.

I guess that's where, you know, the FERC and -- I don't want to dictate to you this is where all your monitoring needs to be but we need a thought-wise process as to what makes sense you know, and Brian can tee in here if he wants but what makes us -- what would be new to monitor or where would monitoring need to be to inform a model?

You know because you don't want to go -- and I appreciate what you're saying below the project that's outside the affected project, that's where we were too so.

MS. WILLY: For flow or the temperature?

MR. FOSTER: I think we're trying to talk about flows, temperature and reach.

MS. WILLY: Okay.

MR FOSTER: I think it makes sense to have a temperature gauge where you have a flow gate. It's just a matter of what other information you guys need as far as --

because I'm still kind of --

MS. WILLY: Well as far as flow is fine and reasonable but for temperatures we really do want to see what the temperature affect is further downstream. What really the reach of the river could be affected by it -- now that wouldn't be forever but we might discover in the first three years that we might talk to people and say, "You know, you know, in case of like a problem you want some kind of alert system." Some projects that when it gets to a certain temperature you get an email or you know, a signal saying there's a problem.

I know that we can't do that because we don't have the system thing. How would we be protective of -- in the chance that there could be warmer temperatures affecting the larger --

MR FOSTER: You can tell what's happening in the reach at the one that's above.

MS. WILLY: Yeah, yeah, with the three.

MR. FOSTER: So if we were to put one more I would probably put it just downstream of the tailrace a little bit because that's where things are going to be mixing. And if you get farther down to Panther you've already got the inputs at that point -- you've got inputs at Battle Creek and then by the spring, that's why I'm not concerned with one down there because you're not going to be

able to tell the inflow from down there may not, you know -- you need to kind of know what's happening and see if that's you know, as it leaves the -- as it moves out of the tailrace.

MS. WILLY: So during the modeling I was supposed to be a longer -- be more of them to find out if there's any affects further downstream so we can determine --

MR. FOSTER : I was thinking for the monitoring part you'd have more because you'd need that for establishing the --

MR. MATTAX: Can I ask you a question -- what leads you to believe that you would want it downstream of the powerhouse with the powerhouse there.

MS. WILLY: Do you want to show those slides -- do you want to do those now or later?

MR. FOSTER: Especially with the model and the questions we have with the model. So in the future model document it talks about using several different models I believe in concert.

MR. MATTAX: Temperature modeling?

MR. FOSTER: Yeah, and stream flow models to model and then to model for the pipeline or --

MR. KUFFNER: So as a physical ability it's a lot easier to track temperature with a hobo (ph) than it is to track flows, and even though we can get stage measurements

with the hobo it's hard to maintain because the ponds don't always stay the same, the -- doesn't stay the same, you have to kind of constantly keep measuring it to see if your stage to flow relationship is still appropriate and that is physical and takes time.

But putting in some more temperature monitors is not that complicated and yet we do want to be careful. We only have access to so much of the reach. We don't have control of the site around Panther Grade -- it's on different private property.

We do have access to our reach for a little bit of distance below our powerhouse tailrace before it goes into another person's property so we could put them -- a temperature gauge in there. We are -- we do have a temperature gauge in down -- it's on private property but it's down below the actual Rosa Way Bridge, so it's below where Panther Grade comes in, Panther Creek comes in -- all the springs at Panther Creek and we do -- it's not legal there and we can't guarantee that we can always do that but we have that and we're happy to share that data.

MR. HENDERSON: So the 3 W3 can be used for that?

MR. KUFFNER: Right, W3 is correct.

MR. HENDERSON: And in the DEIS model it was used to protect the down creek would actually cool as it goes downstream?

MR. KUFFNER: So here's what we have --

MR. HENDERSON: We have some data.

MR. KUFFNER: Right, so let's look at that. So essentially what we're talking about --

MR.: Maybe we can explain what this is?

MR. KUFFNER: Yeah.

MR. HENDERSON: First?

MR. KUFFNER: Yeah go ahead.

MS. ERLEY: In 2011 we have -- the watershed, (inaudible) into the falls and while they were fine in the weather we actually collected something off (inaudible), we collected in August of 2011 and so pretty much our at base flows in 2011 and so these axioms came in.

Basically we are starting upstream and going downstream so -- my computer is -- okay, going downstream and the median temperature at the time of the survey. Right here is an unnamed tributary coming in and I believe it should be -- right here, so one of these springs is spring 4.

MR. KUFFNER: It's the one on the right because of where it's located. The river mile 21 plus spring 4 would be right around here. It would be right there, this would be spring 4, yeah. And then this is actually right where Panther Grade is -- 19.

So I don't know why there's two distinct ones

there but it's right where Panther Grade comes in and there's a positive -- on 18 -- on 19. So this would be spring 4. I don't -- an unnamed tributary? I don't know what that would be.

MS. ERLEY: I'm not sure either.

MR. KUFFNER: But yes the actual diversion's at 23 and this is almost where Panther Grade is so about 22.3 or something like that -- there's about 7/10th between the powerhouse -- excuse me the diversion, Panther Grade and the powerhouse is down at 20.6 right here and in between is where spring 4 is.

So I don't know exactly where this is but this is what -- and this data is also what we confirmed in the data we provided and again it depends on exactly when you do this. This is in August so it's warming and John you asked the question if we had temperatures coming into the creek above -- again we don't have control of the land up there, we've never really tried to measure that, but it's not -- anyone that's looked at this system is in agreement that because that big open meadow that's basically been cattle grazed and knocked down and stuff, but the water definitely warms up in that meadow. And you can see it in the --

MR. HENDERSON: I would agree with that, that generally the water warms as it moves down.

MR. KUFFNER: Generally it does and so what

happens in this unique situation here is this water comes in here and it's going to be really cold for this time of year from what we've documented. If you look at our stuff we have it coming in at a much higher temperature.

MS. ERLEY: And this is 2011 was a high water so --

MR. KUFFNER: It was a high water year so it had higher flows. So there's a flow relationship here to any of these temperatures so that's the other thing that we've found the relationship. But you can see as it goes through this canyon and goes down it does indeed cool and in fact that is what our data shows and we can see some days like in June or July where it cooled 10 almost 15 degrees Fahrenheit in that reach.

So what's happening -- you referred to the right thing with the WD3 model and what the water reverse engineering folks found is that because this is deeply shaded and dark those rocks are mostly cold -- they're not hot and of course the ground temperature is about 49 degrees.

So you'll see that when the water temperatures are 55 or higher they actually cool going down that reach. The other way around if they actually start below 49 or down in the 40's they tend to go slightly up. As you look you'll see in the winter time it's not within their reach but as it

gets later and it gets warmer, particularly because of those warmed waters and particularly when the flows go down -- so that's why I was arguing earlier that actually by doing a diversion actually putting less water into the project reach, that water will actually get cooler if you have more of the warm water in there because there's less water to cool.

MR. HENDERSON : It's not cooling downstream from that point, it's warming. It's warming too.

MR. KUFFNER: To where Panther Grade comes in?

MR. HOGAN: No, no, Panther Grade --

MR. KUFFNER: Are you talking about here this here?

MR. HENDERSON: Yeah, that's warming through there.

MR. KUFFNER: And that may be. Because right now we're measuring it at about here and about here and we're not measuring it three places in there.

MR. HENDERSON: So anyway --

MS. ERLEY: I think to determine you have to understand the dynamics of that, that's how we monitor.

MR. KUFFNER: Probably, you know exactly what's happening all the way through that reach, that's probably right Laurie.

MS. ERLEY: And then just to point out too this

is 14 when you see it.

MR. KUFFNER: Right.

MS. ERLEY: And it's well below 14 -- and 15 then until you get down to the diversion.

MR. KUFFNER: Right so again that's a cooler temperature. I think when you look at the actual data that we just took for 2016-17 you'll see that it's higher and it actually drops more because it's trying to reach that equilibrium of somewhere -- I don't know -- help me out guys. What's 49 degree Fahrenheit -- 9?

MR. HENDERSON: 9 and half.

MR. KUFFNER: 49 to almost 10? So right around here is about where the earth temperature is so if you come in much above this it's going to cool it. If you come in much below this it's actually going to warm it is what our data shows.

MR. HOGAN: So let me ask you a question. If the Commission had a requirement in the license to develop a flow and temperature monitoring plan that would be used to develop an operations model that would be intended to operate the project to protect water temperatures within the bypass reach and left the details of the plan for how to accomplish that post-licensing? Is that something that would work for you all?

MR. HENDERSON: Isn't that kind of what we asked

for?

MS. ERLEY: Yeah.

MR. HOGAN: Well the problem that we had with what was asked for was a couple of things. One, you know 7 locations weren't all justified okay and we have to tie it to project effects and two -- there was no understanding of how that would be used.

So it was just monitoring for monitoring sake. Here I'm saying a tenth of the monitoring is to develop an operations plan and monitoring basically will be fairly short-term, we can determine the length that it needs to be in order to populate a model. But the goal of that monitoring is to inform a model. And then that model is then used to control operations so that monitoring is very similar to what you asked for but it has a purpose at FERC and that's the important thing.

MR. HENDERSON: So you're saying that this would be developed after the license is issued?

MR. HOGAN: Yes.

MR. MATTAX: After the project was operational.

MR. HOGAN: Well the plan could come in before, but I think you need to monitor what the project will replace right but understand the helix of the system.

MR. FOSTER: You can collect baseline information up until it can be used towards modeling of the system

without the actual project there and once it's built obviously you need to collect information with it operating in order to inform an operation's temperature type model.

MR. HOGAN: And you can make that argument but you have to tell me why the information has been collected thus far isn't sufficient with the additional information that could be collected post operation. I'm not saying one way or the other just you know, help me understand that so I can pitch that.

MR. MATTAX: Let me chime in here and let's -- a model wouldn't necessarily really have to be a physical process model. It could be a multiple regression model, it could be lots of different attributes, and especially at the project -- if you had data for the project in place and acknowledged that you had some risk during those years when you're really on -- when you're monitoring and you're not operating necessarily -- informed as much. You gain a knowledge base that you can then use to develop a model -- let's say a multiple regression model and then you can use that to -- to guide -- proactively guide how you operate the project in the future and you maybe identify a key target or I guess possibly targets as far as where you're trying to -- where the most critical place is and then you just determine whether you're complying with your goal.

If you're meeting your goal then great, if not

then you need a new timely model.

MR. HOGAN: Meaning --

MR. MATTAX: Well because --

MR. HOGAN: The temperature threshold?

MR. MATTAX: The temperature threshold at any given site.

MR. HOGAN: Okay.

MR. MATTAX: During all times or partial times, you know, there's all kinds of qualifiers that can be on there.

MR. HOGAN: We're just not talking about specific temperature threshold but the concept.

MR. MATTAX: Yeah the concept, yeah.

MR. FOSTER: Yeah well I think the original concern was that there was not a long record of temperature information and it was not for an entire you know, year. But if you have more of that you can set up -- use that to theoretically set up a model to see how the actual you know, reach operates on a seasonal basis and then that will inform you when you develop more of an operations model to help validate what you've been able to ascertain with you know, real kinds of information or information that you've already collected.

MR. HOGAN: Yeah, and we would envision that going with the temperature monitoring at various locations

that that would be a hobo approach not real time reporting so it would be continuous recording in 15 minute intervals or whatever is decided to be appropriate in the development, but it wouldn't be real time and the use of the model in the operations would eliminate any future need for real time monitoring and triggering because you just rely on the model to protect the reach.

MR. FOSTER: Well right and to develop a flow operation temperature type model with the information you collect, you can -- you can theoretically pretend that it's operating by say dropping out a certain amount of flow or something to represent it going online and that's all theoretical modeling when you're monitoring the project as it actually operates to see if you come close at what your model says.

MR. HENDERSON: That's the type of operational model you've been using?

MR. HOGAN: Yeah.

MR. MATTAX: But we're open -- when we provided the operational model in the proposal there really wasn't -- we couldn't come to an understanding on what was meant by that, you know, so. How would be used you know, how it would be -- what it would do, how it would be used, what data would be needed to -- to develop it, you know.

MR. HOGAN: And then why would it be needed

because we were basing our analysis on the Draft EIS but it is the cooling effects -- so what is the concern. And then in the comments that we got well wait a minute -- the way you're looking at that you're looking at too short a period of a window and we ultimately agreed that there wasn't enough data to support the analysis the way that we were using it, okay?

So that's why we've kind of come full circle to where we are and we still don't see 7 gauges needed to do this.

MR. MATTAX: Well maybe at least 4 maybe, the most 5, but 4 would pass through you know, what comes together from the reach and any spring in the tailrace to give you that final thing because like I said if it's like not significantly cooler at that point based on the bypass reach then you know that you know, that's not necessarily good because you know, that means the bypass reach operations affected something downstream.

Now because, you know, if you have temperature information where below half a grade you're certainly going to know -- like I said, some of the information you have with this being pretty cool all the way past Panther Grade most of the time and that's probably due to a lot more springs.

MR. KUFFNER: That's exactly what's going on.

MR. FOSTER: And so -- like I said, you're doing this -- you're getting that extra data point because it's easy to throw in the water. It's a hard thing to throw in a rowboat -- and you want to have a good amount of either testing data or new data to help develop your model and it would be an operational flow type model that you could put into a temperature model.

It can give you an idea of what happens theoretically, okay, before the project is even built. If you didn't get enough of that data to this date to be able to ascertain or at least feel good about the current model but it seems to me and I can't think of a case where it wouldn't be true.

The largest temperature in fact, -- on a run of river project would be shortly downstream by the powerhouse as far as the downstream effect. And you know the further you go down the stream to the more you can't really determine where the causes of the effects are -- especially once you get down in the spring area, maybe it's different spring flows, maybe it's some other funky thing.

So I think once you get beyond, you know, a short distance downstream of the powerhouse I question adding -- I question how FERC could support that because I don't see how that data would guide an operation project.

What guided the operation was actually how the

temperatures in the bypass peaked and if there's a significant -- if it's better or if it's the same or worse below the tailrace then you know those effects aren't necessarily doing it upstream. Because we expect it to get better once it goes past the tailrace.

Because what we know about Panther Grade and the spring down there -- that's quite a distance so.

MR. KUFFNER: 1.7 miles.

MR. HENDERSON: Right, so there's quite a big distance between the tail race and --

MR. KUFFNER: And not a lot of accretion in that 1.7 miles.

MR. HOGAN: I think what's important to consider though is that the effect of the warming of the project is in the bypass reach. What's coming out of the tailrace, because it's set up penstock, underground -- shouldn't. So it's -- it may cool.

MR. HENDERSON: Let's talk about that -- so I'm looking at your temperature model development report -- it's the final report on page 35. It talks about using the tunnel model. It gives an idea of how water -- as it goes through this table 6 -- table 10 has some eco parameters and for example it's 7 -- 14 degrees and considering that's set as a constant because it wasn't varied. So I looked at some information about how the ground warms through the year --

so here's a graph and I'll have to get a source for you.

This shows ground temperature and it shows how the ground temperature at various depths varies through the year.

MR. KUFFNER: Well it also depends on where this is taken from.

It makes you wonder what's going on actually with depth, so what's going on?

MR. HENDERSON: And so the next -- this is a NOAA station up by Whiskeytown and it has many different sources of physical data and one set of sensors they have are buried in the ground up to 100 centimeters. So the date for this particular query of the census is August 16th at 7 a.m. and we see even at 100 centimeters which is about 3 feet, the temperature is 27.2.

MR. MATTAX: What's the mean annual temperature during that period?

MR. HENDERSON: I don't know.

MR. MATTAX: Could you now clarify for the record is this Centigrade or Fahrenheit?

MR. HENDERSON: Essentially this is Centigrade.

MR. MATTAX: Thank you.

MR. KUFFNER: That's really warm, I mean so I can't --

MR. HENDERSON: I know it's really warm so --

MR. KUFFNER: Yeah but again that's a different location.

MR. HENDERSON: It's a different location, about 1100 feet so.

MR. KUFFNER: So right, we're a much higher elevation and in a different location.

MR. HENDERSON: But the point is the ground temperature varies throughout the year, so how much does it vary? In the model a constant was used.

MR. KUFFNER: Well, again we're at least 100 centimeters down and then some because that's over the top of the -- if you look hard, at the top and so at the bottom that means we're six feet deep.

MR. MATTAX: I mean look at the variation here.

MR. KUFFNER: Again, the underground temperature of the springs that come out year-round that's in the same ground is 49 degrees.

MR. FOSTER: Yeah, I don't think he's contesting the fact that these temperatures should be the same as the ones you had. He's talking about it's just -- your -- the land and area where your project is, how does the ground temperature vary there? Does it vary a lot, does it vary a little? You do put it as 49 -- it's not going to stay there at 49 forever does it? Doesn't it go up and down?

MR. HENDERSON: So the question is using this

model you're saying that the temperatures of the water to the penstock is not going to vary much.

MR. KUFFNER: Let me address it a little bit John, because again this site data is not relative to our site. I don't have the data there.

MR. HENDERSON: Well I don't know that 14 is relevant to your site. Let's take a pause. One -- I think the issue here is we'll be at varying depths of soil at varying temperatures alright? Once you get to a certain depth the soil temperature remains fairly steady year-round.

MR. FOSTER: Well how deep is that?

MR. HENDERSON: It's below the frost line because that's where the penstock is going to be buried right?

MR. KUFFNER: We don't run the frost line here.

MR. HOGAN: Well, yes, your point was taken. My question to you is absent that -- absent what these models are predicting if we design a monitoring program to establish an operations model that is designed to protect the bypass reach, why are we debating this?

MR. FOSTER: Because it's being brought up, that's why.

MS. MONHEIT: And John are you saying that in the model there should be a place for the soil temperature to vary. Is that your point? That soil temperatures do vary and --

(Simultaneous speaking).

MR. MATTAX: Isn't it easier to mark as discharge of the tailrace -- does it form the model?

MR. HOGAN: Okay and what I said earlier was I'll let you guys design the monitoring program, okay? I just need to have bounds on it so that it's looking at project effects and not going, you know, down Panther Grade and beyond the confluences -- okay that's what I need from you guys to be able to pitch it to FERC.

We're going to do a model for operations. It's going to be a model -- that models the project's effects and addresses the project effect through the bypass region and immediately downstream to the tailrace, okay. But I can't support going beyond and then really what I'm saying is the modeling data that we're basing the DEIS on -- we're basically saying, "Hey, there are concerns with it, it needs to be replaced."

So I don't want to debate this stuff anymore. Because if the approach works for you guys let's agree here that in concept the approach works so let's move on to another issue. If it doesn't work let's work it out.

MS. ERLEY: So then Ken's question to me what analysis would you use in the Final EIS to show what the project effects would be? The same analysis that you use in the --

MR. HOGAN: No, I think our analysis would be what we do is identify the concerns that we've heard based on the counts on the Draft EIS and then we have an approach to address those concerns which is what we're talking about right now -- to this monitoring to develop an operations model.

MS. ERLEY: So that going forward as far as the potential project advancing we're just going to say this is our approach and then --

MR. MATTAX: Well is there -- I find it extremely really hard to believe that the ground temperature at the depth where the pipeline would be buried would be warmer than the water temperature at the -- extremely hard. So okay, --

MR. HOGAN: Are we still debating this?

MR. MATTAX: Just let me finish -- and then for -- therefore warming would not occur at those temperatures if that's the case and I -- feel free to disagree with that.

MR. HOGAN: And if it does it's not -- I would be really surprised if warming to an effect that would be catastrophic to aquatic species.

MR. HENDERSON: Well I don't know the temperatures are kind of critical in there -- if it's warming.

MR. KUFFNER: So here's an example of what we

were just talking about. July 20th of this last summer -- you guys have this data, this is what was published, you know, earlier this week when we got the three years of data.

And in those three years of data I think we'd argue that we had a couple of dry years and a really wet year. So I think that relative to the data that's been provided with this new data, we actually have more data at the ABS site, they go back many years.

The challenge with we have is we don't always have paired data but it's exactly at the same timeframe so we can compare temperatures at one space to another space and that's why we have a little limited -- more limited subset here.

And then on this day the temperatures in the middle of the day and later in the day are 65 degrees or 18 degrees Celsius -- 65 degrees. By the time it gets down where the powerhouse tailrace is it drops to about 3 degree Fahrenheit -- about a degree and a half Celsius in that reach.

What we're saying and I think what Ken was just saying is that -- and he was just saying is that 65 degrees -- there's no way that that ground is going to be 65 degrees. The number 14 was about 59 degrees. The actual springs that we know are 49 degrees -- so there is some temperature gradient as you go down into the earth but it's

not going to be as you just played it out.

The 65 degree water coming in -- that water in the penstock is going to be somewhere in the 40's and 50's -- it's not going to be at 60 and more under that -- where that is and that's because of the average daily --

(Simultaneous speaking.)

MR. HENDERSON: Thank you for clarifying when you said it's perfect when you say 3 degrees Fahrenheit, 1 degree Centigrade that's perfect. When someone just throws out a time like she's going to call me up -- are we Fahrenheit or are we Centigrade -- can we clarify that?

MR. KUFFNER: So we didn't argue that there's going to be a lot of cooling because cooling was related to the wetted perimeter which is where the air faces, between the water inside and the casing and the soil and how fast it's flowing through there -- so all those things impact the amount of cooling that would happen in that penstock.

MR. HENDERSON: And all of that adds to the uncertainty which I hope this new approach to addressing the temperature.

MR. HOGAN: Okay so --

MS. ERLEY: I'm just looking at the data Charlie that you're talking about.

MR. KUFFNER: It's just one day -- the day that you turn off you go to 18 CFS, site base 720.

MS. ERLEY: Are you talking Fahrenheit?

MR. KUFFNER: Yes.

MS. ERLEY: That's why.

MR. HOGAN: If you think the approach would work what I'd like to do is get a verbalized response from each agency and I'll attempt -- but if you don't think it'll work I'm open to hearing other suggestions.

MR. WELSH: Ken maybe should talk to us about that.

MR. HOGAN: Alright we'll leave the room and put the phone on mute, we're going off the record at 12:59.

(Off record.)

MR. HOGAN: Alright back on the record and back from the agency requested caucus. Do you have anything to report?

MR. FOSTER: Yeah we -- this is Bill Foster, National Marine Fishery Service. We've come to a consensus that we feel you know, we might be able to live with the 13 CFS as an minimum instream flow but in order to help protect critical habitat that's there we would suggest that that -- we seem to be okay with the four to five monitoring stations that would monitor or flow in for temperature.

But we would want that temperature monitoring to be tied directly to how the project operates in terms of temperature criteria through several seasons of the year --

a slightly different criteria for the spawning period, the rearing period, for an over summering period.

Most of the time which you'd probably be able to meet since the system tends to be more cooler than warmer because of springs and stuff like that. But that's sort of what we're coming at. The concept of -- we're concerned about the time it takes to develop a model. It cuts into, you know, how do you deal with that as you're collecting information and it takes a number of -- it could take, you know, 10 years to get three different -- two to three different water year types you know, because of the nature of where we are. We don't get a lot of variability. It comes all at once or it's all dry or it's all wet or -- and so we were thinking that based on what you said before okay temperature monitoring for temperature monitoring sake -- the purpose of the temperature monitoring to follow criteria throughout the year is to help the project operate.

So they don't go below 13 CFS -- they may actually fluctuate up or down from that minimum based on how well they're meeting the temperature criteria. And having the criteria point being above spring number 4 and tie that to the -- that temperature at that point and tie that to the diversion rate.

You can then, you know, if it is gets out of -- out of temperature, compliance and they'd have to discuss

that with some experts to decide how much plus or minus degree you'd have to be to be out or in.

Obviously if you're responding from November through March -- yeah from pardon me, yeah, I'm sorry. Yeah, from November 1st to March 1st the 13 degrees Centigrade you may -- that might not be terribly difficult for your project to meet but what it does is the protection of that habitat if it gets too warm, you add more water down the reach -- it comes back down.

And that can be cycled. Your diversion therefore can be cycling up and down slightly in order to, you know, keep the things within those temperature criteria.

MR. HOGAN: Just for clarification are you saying, you know, use the 13 CFS as a guide but it's not really a requirement and what would be the requirement is the temperature?

MR. FOSTER: Well you wouldn't want to go -- you wouldn't want -- the minimum instream flow in the bypass reach should be 13 CFS, that would be the minimum.

MR. HOGAN: Alright.

MR. FOSTER: But you will go above that and back down to that based on staying within the temperature criteria. And then like I said the 13 degrees from November 1st to March 1st and 16 pardon me -- my glasses, 16 degrees from March 2nd to May 31st -- yeah 15.5 --

MS. WILLY: 15.5.

MR. FOSTER: Alright 15.5 and then the rest of the time the theoretical over the summer period would be 18.

MR. HENDERSON: It was 16C I believe in all your recommendations the NMFS recommendations.

MR. MATTAX: I'm not trying to say what it should be I'm just trying to say what's on the record.

MS. ERLEY: Laurie Erley, 15.5C is the equivalent to 16 degrees Fahrenheit which is the highest that you can monitor.

MR. HENDERSON: No I'm fine with that I just want to make sure you know what's on there.

MR. HOGAN: EPA Standards?

MR. FOSTER: I think we're trying to get at the US EPA Standards.

MS. ERLEY: And if it's not EPA Standards it's Central Valley -- same answer.

UNIDENTIFIED SPEAKER: And that would also be the way from adverse effects on critical habitat.

UNIDENTIFIED SPEAKER: Right, yeah, and for the record you're talking 7 die downs correct?

UNIDENTIFIED SPEAKER: Yeah, the average of the highs.

MR. RYCHENER: This is Tyler on the phone. I just want to make sure I'm following. So November 1st

through I'm sorry -- what March -- what date?

MR. FOSTER: November 1st to March 1st is kind of a 13C and then --

MR. RYCHENER: And that's for maximum temperature right?

MR. HOGAN: No it's 7 DATAM.

MR. FOSTER: Yeah 7 DATAM, 13 would be the criteria to be at or below.

MR. RYCHENER: Okay and then the rest are near the criteria would be the 15.5?

MR. FOSTER: 15.5 would be like March. This is where we had a slight disagreement. The EPA 2003 criteria has it that 16 from March 2nd to May 31st, but we wanted to be able to accommodate any potential winter run that might enter the system too and that's why we in our comments had said 18 degrees which basically covers the -- where am I at -- the May, well June 1st to end of October.

And so that's why some of the -- that's basically what the criteria are. The time periods through our kind of an adaptive management approach we may be able to either shrink or expand some of those time periods depending on, you know, what works for this -- this stream.

Right now we're just picking those because we feel that it more or less is in the ballpark responding and for you know, re-raining for over summer. You realize the

nature of this system is such that unless it's a very wet year or above normal type of wet year you may or may not get a lot of flow in the summer okay, which is understandable and probably shut down and you may or may not get fish in some of those areas because of that.

Because at the same time we have to have a criteria that covers things in the event there is enough water and there is fish there over the summer which again, would be you know, o.mykiss.

MR. HOGAN: Are these temperature thresholds in the interim measure while the monitoring and the development of the operation's model is going on or is this real time monitoring?

MR. FOSTER: We're thinking real time monitoring to enable the project to function and be able to maintain those criteria within the limits of those criteria.

MR. HOGAN: So no model?

MR. FOSTER: So we probably weren't thinking so much about a model mainly because of the time it takes to develop one and what do you do in the meantime.

MR. HOGAN: So really coming into this now we're at a more strict 10(j) recommendation than we started at this morning with no negotiations -- is that what I'm getting at?

MR. FOSTER: Well I mean it was -- by doing my

10(j)'s --

MR. HOGAN: Well in other words 15 and a half instead of 16 so that's more strict.

MR. FOSTER: And I'd have to talk to your people and talk to my people about, you know, what that means. Because I know in the EPA criteria we've got it at 16 but that's mostly for -- for rearing and not necessarily holding so --

MR. HOGAN: Okay.

MR. GILMOUR: Could that be, I have a question -- could that be tied to the presence of Chinook in the reach?

MS. ERLEY: Well the problem is -- is the upstream temperatures right are going to influence the downstream temperatures and so our (inaudible) and habitat flows in that facility holding you know, and are you saying that middle section --

(Simultaneous speaking.)

MS. ERLEY: So we're already above holding temperatures as it goes downstream.

MR. MATTAX: Are you talking about above or downstream -- upstream, downstream or Panther Grade?

MS. ERLEY: So downstream of Panther Grade ideally. Grade A habitat remains in --

MR. MATTAX: Okay.

MS. ERLEY: As soon as the restoration project is

in effect, so if you can tell me that 13 and above is going to continue down and not affect those in there --

MR. HOGAN: If all the water is going back into the system upstream of Panther Grade the water temperature should not be affected downstream of Panther Grade.

MS. ERLEY: I do not see that in the analysis.

MR. HOGAN: Say that again?

MR. MATTAX: I don't see a reason that it would be anything more than negligible and I haven't -- I don't recall seeing any rationale that anyone has provided on the record to why it would be warmer than that. I've seen criticism of the model and I think I understand some of that.

MR. HOGAN: I think we're going to be at an impasse considering a lot of people agree to disagree. I can't, you know, we will look at the temperature analysis that we did and the new data that we've got but I can't say, "Yeah, we're going to go along with your temperature, there's no medium," and like I said you went the other way -- you backtracked.

MR. FOSTER: Well we're trying to use real time temperature monitoring to operate the project, that would be the purpose of the monitoring.

MR. HOGAN: But the original 10(j) still.

MS. ERLEY: And so maybe there is some give and

take there in that you could have stressed that higher temperatures down here is not going to affect temperatures downstream. And then once anadromous fish are observed then we have -- then we have a different type of criteria there, it's different, and that's one potential option.

So I wouldn't say it's completely out the door it's just back at some negotiation that needs to happen.

MR. KUFFNER: So Laurie if I can ask for a clarification. This is Charlie Kuffner. Temperature -- your obviously -- even though it impacts negatively at Panther Grade which is what I hear you saying and that we'd be analyzed --

MS. ERLEY: And potentially upstream of Panther Grade.

MR. KUFFNER: Okay and so one of the issues that we have as an operator is we just look at the temperature that's entering into the reach and even again we go back to this wettest year we had -- 2016. We go to June of 2017 and we have temperatures coming in in the afternoon at 16 , 17 , 18 -- 18 all Celsius by the middle of June. The flows then are in the mid 30's or something and it's cooling in the project reach.

So there's all kinds of times in this timeframe that the water is coming in to the site doesn't meet this temperature criteria -- existing condition without project.

So I don't know how we can make the system cooler than it already exists without the project in those timeframes.

And then that's gotten into the question that was asked here about, you know, if it depends on if there's some types of fish that you mentioned -- I think you mentioned winter run?

MS. ERLEY: Yeah.

MR. KUFFNER: And I know there's a winter run re-introduction program but it's a long way from having winter run not just up to Panther Grade but then up above Panther Grade and into the project reach, so --

MS. ERLEY: I guess the thing is that you need right -- you said you needed something like funding to show that these actions are inevitable right?

MR. KUFFNER: Yeah, the reason is that --

MS. ERLEY: So this thing -- this actually would move right into these today and yesterday into Battle Creek as (inaudible).

MR. HOGAN: Into Battle Creek above Panther Grade?

MS. ERLEY: Not currently, but above Panther Grade but they're going to re-introduce into Battle Creek at the North Fork -- at the North Fork. But the Reintroduction Project is under --

MR. HOGAN: I think we're going to --

(Multiple simultaneous speaking.)

MS. ERLEY: There is certainly -- returning to Battle Creek in two to three years.

MR. HOGAN: So I think we were talking about two different things. Planting fish into Battle Creek is different than anadromous fish returning and having access to.

MS. ERLEY: Right the accesses are different then that's with the restoration project.

MR. HOGAN: Uh-huh, so --

MS. ERLEY: But I think that there just needs to be acknowledgement of the winter run, potentially gets to the reach, once access is available.

MR. HOGAN: I don't think we -- I think that Draft EIS acknowledges that. We have said, you know, it's unclear whether Panther Grade is a barrier or not. It may be passable at 400 CFS, we don't know. I'm not sure -- what more acknowledgement do you want?

MS. ERLEY: Well I was just acknowledging Charlie's point is that he mentioned what happened so I just wanted to acknowledge that fish have been re-introduced, the project is going, the reintroduction jumpstart project is under way. So we don't need to have any -- there's nothing to discuss or go back and forth on it, I just had to make that point.

MR. HOGAN: Well and regarding the comments on the DEIS informing us about the jumpstart effort we actually agreed that that was good for us to know. We will be bringing that into our discussion on the EIS, but it doesn't change the presence of Inskip as a barrier, it doesn't change the potential barrier at Panther Grade, so I mean.

MS. MONHEIT: This is Susan Monheit, State Water Board. I just wanted to comment on the idea of temperature in forming the development of a model that might take 6 to 10 years after the project starts operating for the purposes of SEQUA which I'm trying to sort out right now.

For SEQUA we need to identify potential impacts and their significance and actions to mitigate those impacts to less than significant levels. And the development of a model would not address or mitigate potential impacts just as monitoring doesn't mitigate impacts developed in the model.

MR. HOGAN: The model would be used to control project operations which would ideally prevent.

MS. MONHEIT: But the project's going to be operating for 6 to 10 years.

MR. MATTAX: We would never extend for that amount of time I believe and that's definitely not my intent.

MR. HOGAN: No and --

MR. MATTAX: There's no reason why they'd have to wait for 6 years for a development of the model. I mean 2 - 3 years at max to develop a model based on that data and to refine the model in future years if you needed to, but there's no reason in my mind that I see any reason whatsoever to prolong it 6 years after operation starts.

MS. MONHEIT: So until -- until a model would be in place and in use to guide operations, any potential impacts -- I have to find a way to mitigate for anything that's significant -- to mitigate it down to less than significant.

And real time monitoring to guide operations would be a more direct route I think.

MR. MATTAX: So it would work -- it would be a way to address in the meantime. There's other ways that you could do it. I mean Rugraw could choose to bump up the minimum flow if they wanted to. I'm guessing they don't want to but that would be another approach.

But, but until it's resolved when and how reliant warming does or doesn't happen between -- or cooling happens before springing forward some of that is -- is who knows if you're making it better or worse than it could be.

But that's the risk. I mean you always have a risk.

MR. HOGAN: So hold on. Susan, would -- would

real time monitoring for the data collection to inform the model during that initial period and then using the model satisfy these? And using in the interim temperature thresholds that, you know --

MR. FOSTER: You would have to have a temperature threshold even once you had a model because the model -- operation there's some criteria.

MR. HOGAN: I completely understand that there has to be a temperature threshold. I'm not talking about what that threshold should be right now. I'm just talking about how do we operate the project to not exceed "X" threshold.

MR. FOSTER: Right.

MR. HOGAN: And what tools are in place to do that.

MR. FOSTER: Okay.

MS. ERLEY: And I guess I would just -- I'll just state other, you know, systems within Central Valley operate off temperature criteria as opposed to a flow criteria because temperatures are such a concern to Central Valley. And so I think it's something that everyone here who works in California is very used to it going up and up and diversions working on temperature criteria.

MR. HOGAN: But what we also heard is that you can't go less than 13 so you're using both so --

MR. FOSTER: It depends on the time of year to begin with and it could also potentially depend on whether, you know, you could have different criteria for anadromous fish as opposed to resident ones because we realize there's going to be some time period there between when they get the license, when they get you know, the thing built and stuff like that.

You could use real time temperature collection data to help run the model -- run the operation. You could still build a model. I'm not totally against building a model because you're gathering all this data and you might as well use it for something else as well.

But it just seemed like if you can effectively adapt how the thing is working by using the real time temperature data, do you in fact need a model -- because you can adaptively manage a real time temperature and time periods and flow levels and stuff like that using that real time criteria almost indefinitely.

MR. HOGAN: I -- I think you're right. And there's a couple of things I wanted you to look at, you know, I'm not debating. We actually could use real time temperature data to then control project operations.

Our thought process was if we can develop a model or determine a license valued more cost effective than real time monitoring for a 30 to 50 year license. With that

said, we also thought that the model could be proactive instead of reactive. So we could actually be preventing an exceedance of water temperatures in this reach that is so critical, you know.

Rather than waiting for those water temperatures to be exceeded and saying okay, we've hit a 7 day average max -- time to react -- well you just lost your 7 day average -- you know the previous -- so we were just bringing it up there, you don't like it that's fine.

MR. FOSTER: I mean the predictability of a model that helps you act proactively is an attractive feature to that. It's just where we're kind of coming to grips not only the criteria that would help guide the operations but also what do you do while you're developing the model?

MR. HOGAN: Well and that's why I asked. If we're looking at this as an interim measure that someone wanted to talk about well we can talk about it all but you know, I just wanted clarification -- was it an interim measure or are you talking about just doing the real time monitoring for the term of the license?

MS. MONHEIT: I would add that we will have some compliance monitoring too for the project. We're not going to base compliance off of a theoretical model, so there will be some temperature monitoring that we will have done.

MR. HOGAN: Through the model -- spot-checking

the model to make sure it's still there?

MS. MONHEIT: Spot-checking the project operation.

MR. MATTAX: And possibly one station?

MS. MONHEIT: I haven't thought about it.

MR. MATTAX: To just understand more is better but I was just curious if one station is even in the realm of thoughts.

MS. KUFFNER: So let's just talk about the technical issues with the real time monitoring as opposed to, you know, going there to pick up a hobo once a quarter, twice a year or something like that.

So it's one thing to go -- and again we talked about above the powerhouse spring 4, you can get to it in the fall but you really can't get to it when it's flowing because you'd have to go through the river to get to it and there's no -- it's straight up and down and there's really no access to it.

MR. HOGAN: Fiber optic cable.

MR. KUFFNER: Yeah, that's a long way from anywhere so what I'm saying is that the intact where we have, you know, some power and a signal line because we have BD&E Power there. We also have power down at the powerhouse that's line station power that, you know, that's brought in from BD&E so it's -- we run a phone and get stuff.

So we could do some real time monitoring relatively close to the tailrace, either above it or below it. So in the effective reach or below it and we could also do that either just up above the pond or in the pond that is you know --

MS. MONHEIT: At the diversion?

MR. KUFFNER: At the diversion yes because we have facilities there that we could tie into. In between and below we won't have any facilities however we could put manual temperature monitoring stations in some of these other locations and have a period of, you know, go pick them up every so often and if it's a critical time period we could, you know, pick them up more often if we need to -- put them in places that we can physically get to year-round.

We should be able to get to the powerhouse tailrace essentially year-round except for the big storms. So that is something that we can offer up because at those locations we could do some real time monitoring -- stuff coming in and stuff going out maybe, is what they were -- and some manual monitoring in between.

Because we just did -- we just published three years of data here that there are two dry years and one wet year found. This isn't 7 stations, this is 2 stations. We have a couple of more stations but they're you know, down

below Panther Grade and they're mixed in with the cold water so I don't know that that's going to inform this model.

It won't inform exactly what's happening right in here per se because we've measured it here and here. So we want to inform more of what happens in here we'd have to do some work that we haven't plan on yet, but we could do that.

MR. HOGAN: So regarding temperature monitoring what I'll tell you is that we'll take back the recommendation. I'm assuming you'll want to modify the 10(j) recommendation being at 15 C instead of --

MR. KUFFNER: So where does that come from?

MR. FOSTER: Yeah I still have to talk to some people about that.

MR. KUFFNER: Yeah where does that come from?

MS. MONHEIT: It's Central Valley requirements -- well it's temperature criteria requirements for holding.

MR. KUFFNER: When you say holding is that through the whole summer?

MS. MONHEIT: So for spring run yes because that's a --

MR. KUFFNER: Yeah, so I mean that's the thing in this system. We're offline --

MR. HOGAN: Charlie --

MR. KUFFNER: Okay, alright.

MR. HOGAN: We're going to do our analysis.

MR. KUFFNER: I'm just trying to figure out how --

MR. HOGAN: Okay, just for clarification where is that criteria published so that we can have it or get to it.

MS. MOHEIT: As far as actual criteria I believe it's CFW but I could get you a publication.

MR. HOGAN: So we will evaluate the new 10(j) in the Final EIS. We will evaluate the existing temperature data including the new data that we have from Rugraw and we're going to make -- we'll make a decision on what is needed to protect the resources there but I can't come to an agreement here on the table.

I could tell you what we will analyze and look at -- we just don't have -- we haven't done that analysis to say this is what's needed so.

MR. KUFFNER: Could I ask a question please? This is Charlie Kuffner again, Rugraw. Bill you had said something that you might consider and again this is -- obviously -- having different criteria for the resident if the anadromous shows up and there is a difference -- if there's a different temperature here for the winter run than for a sealand you know, we'd like to have a discussion about that because if the winter run never show up and we're trying to get a temperature for a winter run when maybe a steelhead shows up -- maybe neither of them show up.

So for the applicant it would be a better situation for us to have more flexibility if there is no anadromy if some type of anadromy shows up then another condition comes in -- if another type of anadromy shows up then another condition goes in.

So just this cause and effect type of thing -- that would be the most ideal considering that we don't know all the data and we have suppositions and we don't know what might or might not happen but that could be something that also gives you the protection you guys are looking for but it also doesn't give us a big exposure for a reopening that then could you know, put us out of business later, so it's less risk for us to negotiate all those issues now.

MR. HOGAN: And if you want to a signed settlement agreement to whatever you want your --

MR. FOSTER: And that's been our agency's policy to follow the 2003 criteria which has 18 degrees. It's basically over summering -- summer holding, stuff like that. 16 is kind of a rearing temperature and 13 is spawning and so the -- although I would have to check on it most of the time we're dealing with anadromous perch and those are what we consider for anadromous criteria.

I personally don't see anything wrong using 18 or less for say resident because you at least have that criteria that you don't want it to go over 18 at any time

during the year. And that criteria could work for resident, you know, resident o.mykiss.

But again I have to talk to my other people about -- at the same time we're trying to protect the critical habitat and what I'm not -- what I have to find out is does 18 protect the critical habitats and potentially that part -- you know it could be a holding temperature for fish or something like that.

Or does it have to be the exact, you know, criteria from each one of those criteria -- so that's one of the things I -- I want to try and work out and, and get it more reset in writing because right now our third 10(j) has those criteria -- they're not based on anadromous fish.

We normally don't set temperatures for non-anadromous species so.

MR. HOGAN: So clarification it's just Fish and Wildlife Services modifying the 10(j) right now with 15.5 not yours?

MR. FOSTER: I don't -- yeah, I can't quite go there completely.

MR. HOGAN: Okay.

MS. ERLEY: They're onboard with that. Fish and Wildlife -- they're in.

MR. HOGAN: Okay.

MS. WILLY: So do we have to do that in writing

for you or is that --

MR. HOGAN: On the record.

MS. WILLY: On the record, okay, thank you.

MR. HOGAN: And we'll capture that.

MR. RYCHENER: This is Tyler again, just one thing I want to point out if we're talking about year-round temperatures around 13.5 in the event that there some monitoring there, you're basically then writing off the foothill yellow rating -- because there are metamorphoses happening between 15.5 and 20 with very little survival below 16.5.

So I think some is going to be lost to the fisheries discussion.

MS. WILLY: Yeah Tyler, this is Alison. We are very keyed into that. This particular stretch of area is about 13 so do you know of any (inaudible) being in this cold water stretch?

MR. KUFFNER: We need Matt Myers for that question.

MS. ERLEY: I'm certain we've observed throughout the South Fork but at least that's in the area below the bridge.

MS. WILLY: Okay.

MR. MATTAX: That criteria too I think with 15.5 was holding temperature which wouldn't be all year, it would

be you know, during a holding period most likely in the summer.

MS. WILLY: Yeah, it's an overlap with the juvenile metamorphoses.

MR. MATTAX: I was just going to say could Fish and Wildlife give us the dates that that would apply since this sounds like what record they're going to have on this?

MS. WILLY: I'll check on that.

MR. HOGAN: Okay --

(Multiple off-mic conversations.)

(Off record at 2:17)

MR. HOGAN: Alright back on the record. Just for clarification are folks okay with the three gauging locations? Okay, so our recommended gauging locations -- the first one is within the reservoir to monitor compliance with the run of river operations.

The second one is downstream of the project diversion dam to monitor compliance with ramping rates and the third one would be just upstream of spring 4 in the bypass reach to monitor compliance with whatever number of flows.

MR. FOSTER: And your -- your fourth point would be as water goes through or comes out of the powerhouse?

MR. HOGAN: Flows through the powerhouse can be calculated based on generation if you're interested in that.

MR. FOSTER: But in terms of flow or temperature as we experienced with the way to measure flow or temperature at the powerhouse itself because that's the end of the pipe per se.

MR. HOGAN: Yeah, well the flow would be -- I mean you could calculate based off us just the pure generation.

MR. FOSTER: Right.

MR. HOGAN: The run of river operations where inflow basically equals outflow below the tailrace will be monitored in the reservoir.

MR. FOSTER: Okay.

MR. HOGAN: So they're not impounding at the reservoir and then dumping, you know, and peaking does that make sense?

MR. FOSTER: Yeah, I mean I think it does. I just didn't know if -- how that was monitored at most powerhouses or at tailraces. Did they have stuff right -- a temperature recorded in the tailrace that goes into the powerhouse?

MR. HOGAN: So when you're talking temperature I'm just talking flow. So I mean as far as what's coming into the system because it's a run of river operation it should be below the tailrace should be what's leaving the system. It should be pretty in sync.

MR. FOSTER: So I'm personally okay with the three so.

MR. HOGAN: Okay, I was hoping to make some progress. Is everybody okay with the three flow gauges with those intended purposes?

MR. FOSTER: Yes.

MR. HOGAN: I hear a yes from NMFS, Bill. Fish and Wildlife Services?

MS. WILLY: Fish and Wildlife Service is okay.

MR. HOGAN: Progress, thank you, alright. Alright it sounds like we're not going to get to a resolution on temperature monitoring but we will take a look at an in depth look at our analysis of the FEIS of the latest data that's come in. I think we have a better understanding of your desires for monitoring and how that would be used to maintain compliance with protecting the reach.

And if we feel that the data that we now have is inadequate to determine what it is there will probably be some kind of monitoring component but not doing that analysis I can't say what that is, okay.

So we'll leave that as unresolved. The item number 10 is ramping rate. Now the agencies asked for a one inch ramping rate. Commission staff said a tenth of a foot -- we'll give you the one inch -- two items resolved. We're

going to get to that.

But the findings for fish -- not with our frogs, we'll concede the tenth of a foot and go with one inch.

MR. GILMOUR: For fish stranding.

MR. HOGAN: Okay, so --

MR. GILMOUR: My feeling biologically those two are very indistinguishable.

MS. WILLY: They're very close.

MR. GILMOUR: Very close.

MR. HOGAN: Fish stranding?

MR. GILMOUR: Fish stranding.

MR. HOGAN: S-t-r-a-n-d-i-n-g.

MR. GILMOUR: The river dropped so fast they started a pond up here and they can't get out now.

MR. HOGAN: Okay so with that said we had a question about a comment in the Interiors letter regarding -- it was identified as a 10(j) but it's for a "No more than one foot -- one-third of a foot, one-third," --

MR. MATTAX: Actually we'd like to hear -- I'd like to hear what this one I believe it was said because I found --

MS. WILLY: I don't remember what was said, but what was establishing since Congress so I do want to --

(Multiple conversations simultaneously.)

MR. HOGAN: Tyler, why don't you reiterate what

was the comment?

MR. RYCHENER: So the comment was one foot per three week with the -- sort of based on some frogs laying eggs below one foot in depth and egg development taking up to three weeks so they didn't want to have a recession rate greater than one foot for three weeks.

MR. HOGAN: So our first question is -- is this a new 10(j)?

MS. WILLY: I have never experienced a new 10(j) in a 10(j) meeting before so I didn't know --

MR. HOGAN: Well the things is -- well in your comment letter it's under comments, not under the 10(j) so it's official Fish and Wildlife population, so we're wondering what you classified it as?

MS. WILLY: Well you know, at that time I would not have called it a 10(j) but now I would --

MR. HOGAN: Okay.

MS. WILLY: Because they're a promising candidate species for California Department of Fish and Wildlife and for Fish and Wildlife Service.

MR. HOGAN: Okay.

MS. WILLY: There's a change in status so the species which would make us change where we put it in our code book so yeah, it's pretty straight 10(j).

MR. HOGAN: Alright.

MR. MATTAX: No, Tyler just summed it up and they didn't disagree I don't think with what he summed up so that's --

MR. HOGAN: So we have taken the opportunity to review that recommendation. We did reveal the 10(j) and Tyler has a -- I'll let you take it away and if we can see the presentation -- Tyler you're going to have to indicate when to change slides.

MR. RYCHENER: Sure.

MR. HOGAN: By the way it is -- it's also this handout. Unfortunately our color printer was down but this is the presentation so but some of the graphs will be easy to follow along in color.

MR. RYCHENER: Okay?

MR. HOGAN: Yeah.

MR. RYCHENER: Okay so I'm here looking at the comments and we considered sort of what the ramping rates would have to be to meet that where criteria -- and so we came up with three key questions of those presentations to look at.

The first is what are the effects of the project operations on bypass flows and I'll kind of walk through from UL up to 450 for what happens in terms of what waters in the bypass reach and how those ramping rates in terms of (inaudible) over time are occurring, where the project with

insolence those rates in the bypass.

Then look at how those would affect stage and look at what the existing rates of stage are during a development period serving the, you know, early to late May until June timeframe, looking at how the existing ramping rates compare to the ones that put per three week recommended rate and how often does a stage drop of at least one foot over a three week period occur in the historic record.

And then there was a comment by California Department of Fish and Wildlife suggesting that we failed to consider what happens when the project goes offline and suggesting that there could be a big pulse flow as the project shuts down and water is diverted back into the bypass reach and so also we'll be taking a look at that, next slide.

So this is a cable on the far left we have the hydro rim whether it's climbing or falling. Essentially the top half of the table is the same as the bottom half just in reverse. Then we have inflow above the project diversion -- what the project is doing at that inflow, whether it's operating or not operating, how much flow is going into the bypass and what the change of flow is in the bypass and then some typical timeframes during the season.

We expect those to -- as you can see I've

highlighted the 18 CFS and the 4.50 CFS transitions. These are the only places where the project will modify changes in water flow into the bypass. From fewer than 17 CFS the bypass will be in run of river. From 19 CFS -- well from zero to 17 will be run of river, we'll get to 18 CFS the project will start operating and then the bypass would flow into opted 13 CFS at 1 foot per hour or one inch per hour under this new agreement.

Then from 19 CFS to 118 CFS the project would increase operating potential out. The bypass flow would stay at 13 CSI -- most of that we expect to happen in the August to June timeframes -- sort of late summer through the winter.

Then as the project goes above 118 the project operations are maxed out at around the 100 to 105 CFS level and so the project -- the water then increases to about 119 the changes in flow are again run of river within the bypass reach.

When we get up to 450 CFS for the project would stop operating and the hydraulic gauge -- that pneumatic gate would be lowered and all flows would go -- at that 105 CFS flow would go back to the bypass at a one foot per hour increase.

And then higher to that flow the project would stop operating and flows in the bypass would be run of river

-- everything above 450. I think I can skip going through the following -- it's essentially the same.

So the key point here is that for the majority of the flow levels -- the project having little influence over the range of flow change within the pipelines, go to the next slide.

So we wanted to take a closer look at what the stage change would actually be at those 450 and 18 CFS thresholds. This is based on the state's discharge per Highway 36 Bridge. We estimated after 450 CFS thresholds the project tops off and starts operating and flows in the bypass reach would drop from 450 to 345. There would be a stage change of about 0.3 feet and that would occur over a four hour period.

At the lower end of the operation's special range flows are at 18, the project starts operating, flows drop to 13 -- this would be a stage change of 0.17 feet and it would occur over a two year period.

MR. HOGAN: Two hour?

MR. RYCHENER: So, both of these aren't going to result in you know, one foot drops, it could potentially dewater any masses, next slide.

We also then look at over the calendar year where these flows greater than 450 CFS typically occur. We know that the frogs are keyed into this slow pulse and the draw

down in the spring when the flows start switching over from snow melt to ground water -- that's when they're starting to lay their eggs.

So really there's not a whole lot of concern about this 450 period because that's not going to occur in the period from this May to July timeframe. You can see on the left -- on the right during that May to July window from the pipe or the historic record of the 1929 to 2016 there was only five years where the total was 7 days where flows over 450 CFS during that period likely associated with early in May when you either had maybe a slightly later snow melt but based on this we're not thinking that the project shift of flows during the high 450 CFS flows are going to have an effect of the yellow-legged frog breeding, next slide.

MR. HOGAN: Hold up, Tyler, hold up.

MR. KUFFNER: So this is Charlie Kuffner. Thanks for this Tyler. I just wanted to make a comment here. As it relates to these larger flows and potential passage downstream the big flows tend to be big rain events and like the ones we had in early December 2014.

We aren't necessarily coinciding with the spring flow runoff -- in fact they very seldom happen that late in the year. They usually happen earlier in the year with the real quick splashy couple day thing.

So as it relates to the time that the spawning is

happening and the potential crossing over Panther Grade and the other barriers, it is impacted by potentially the time of year when those flows occur -- I just wanted to point that out that this illustrates right next to it.

MR. RYCHENER: Thank you. So next we wanted to try and see how we could quantify what the existing ramping rates look like in terms of stage within the stream. So one of the key issues we ran into was, you know, trying to sort through this long historic you know, synthesized record and trying to select what years we thought would be representative enough for a more detailed analysis.

We looked at a variety of different water year's heights for example, it is all the wet water years from the 1929 to 2016 period. If we go to the left slide these are the last 30 years-worth of wet water years and more or less subjectively we felt that we could get rid of a lot of noise by just looking at the last 30 years of record.

Most of the fluctuations between the 100 and 300 foot level with a few peaks above that but like they said it's a very flashy system -- lots of very sharp peaks. So what does that mean in terms of stage changes, go to the next slide.

These are those same water years from the last slide but now we're looking at stage instead of discharge. The red line flow here represents a one foot drop over a

three week period and as you can see a lot of these points there's declining rate and the increasing rate of flows from these peaks are a lot faster than the ones for three week flows.

If we needed to maintain one foot for three week ramping rate we would be dramatically altering existing conditions and reducing the rate of drop of some of these storm events, -- the next slide -- go to the next slide.

I just moved the same slopes line so it was up against some of these peaks and you can see that in many cases we're dropping a lot faster than that, next -- go ahead?

MS. WILLY: This is Alison. Can we go back one slide for just a moment?

MR. RYCHENER: Sure.

MS. WILLY: When we look at recessions for the yellow-legged frog we typically take off the last day of the storm recession. So from the peak -- we don't measure usually from the top of the peak -- we measure from where the line starts to curve at the bottom part of that.

MR. RYCHENER: Okay so how does that then play into a one foot over three week -- how do you interpret that?

MS. WILLY: Now just go to the next slide. It looks like if it's -- it looks like the river's not -- these

are just natural flows right?

MR. RYCHENER: Right.

MS. WILLY: The river doesn't ever go that fast -- it doesn't -- there aren't any recessions that are as fast as what our maximum accept list, you know what I mean? The line isn't from the top of that curve it's from the bottom of -- it's from the last day of the storm recession. So here I'm going to --

(Multiple conversations simultaneously).

MR. KUFFNER: We'd have to blow up this really big scale to get to the closer dates.

MS. WILLY: So instead of going from here --

MR. KUFFNER: You're saying do it from the bottom there.

MS. WILLY: From here and so we look at where it drops and where it starts to -- that little U shaped spot in there at the beginning of that, that's where we put it from. So you can see that that's all in this river, obviously it's always much deeper than what the river provides and out here it's a little too late, this is past that rearing period.

But in this egg-laying period it's like it's just exactly what the yellow-legged frogs need so -- what I don't know is how the project is going to affect that.

MR. HOGAN: I think we're going to get to that.

MS. WILLY: Next slide. Okay, thanks. Do you

have my statue because I have a --

MR. RYCHENER: Yeah absolutely, I guess my question is just if the requirement in the license is one foot over three week drop and the applicant is trying to base operations -- like when we get to one of these peaks and it starts dropping and they're not going to know when that drops and stops.

I'm just not sure how that implementation would work. How would they know how to change operations to manage for that?

MS. WILLY: Well if you're managing -- this project is different, but when you're looking at what's happening with the flows daily you see that when the storm is over the river drops down and so one or two days after the storm is over you get down to your -- whatever the base loads were.

So we -- that's why we go from like the last day -- the last of the, the day after the last day of the storm is what we start measuring.

MR. MATTAX: So do you judge the storm by rainfall or -- it's all easy to do after you have the full record.

MS. WILLY: But of course, that's why we work it out.

MR. MATTAX: No, and that's why I'm trying to

figure out how do you know you're at the bottom until you're past the bottom of the curve unless you base it on weather.

MS. WILLY: So you know when it stopped raining.

MR. MATTAX: Right -- no that's why I said --

MS. WILLY: And you know your flows are receding.

MR. MATTAX: Right.

MS. WILLY: And then you go out like to the day after or two days after the last day of the storm and that should be very close based on that. Each river is different, sometimes the day after -- because there's lot of absorption of water but it's that you're trying to pick up the -- this area here. You're trying to pick up that, the end of the storm -- the end of the storm surge flows.

You don't want to -- because the frogs are not going to lay eggs during a storm event because they are geared to not have their eggs go dry. So when it gets down to -- when it normalizes out that's when they'll lay the eggs again. So it looks like the river provides -- so it looks like the river provides really well here but what I don't know is how the project affects that.

MR. MATTAX: Yeah and well, you have some more graphs.

MS. WILLY: Yeah, and I'm going to go on to that yeah.

MR. MATTAX: That show less well I think in other

examples.

MS. WILLY: Okay.

MR. HOGAN: This is a wet year.

MR. MATTAX: But personally you're pointing out what you call recession and how you implement recession because --

MS. WILLY: And I'm not talking snow recession I'm talking recession from --

MR. KUFFNER: So the one place where that would be a challenge would be like back in early 2014 where we had a huge storm on December 4th and then another huge storm on December 10th and the peak came down and then real peaky again -- I mean fluctuation but that's not -- that's seldom.

MS. WILLY: What the fall freshets you know they can be like one on top of the other but they're not breeding. I really liked Tyler's point about when they start to breed --

MR. KUFFNER: Yeah.

MS. WILLY: Is when the snow melt recession ends and the groundwater -- I haven't heard it described that way but that is a good description. Because we look at you know, when the water temperature reaches -- but of course, when it's no longer melted snow -- it's going to be warmer water and that's when they start to spawn. So that's just

really cool, it's a good graphic I like it.

MR. HOGAN: Do you hear that Tyler you got kudos.

MR. RYCHENER: Thank you. And that was something I was just reading -- I think there's something that just came out regarding melt for fairly recently -- they were looking at sort of molecular chilling that the frogs need to be seeing and aren't. We're associated that with snow melt to attend it versus ground water for certain flows so that's where that came from.

I think that's a really good plan and it's not something that I was -- I mean I think sort of intuitively I thought that might be the issue but the way that the -- with the looking at the bottom part of the storm peaks, but the way the recommendation was worked it didn't sort of bring back into the context and so my main point over these next several slides is just -- we're still on right?

MR. HOGAN: Yeah, you're still here.

MR. RYCHENER: Was just that, you know, if we're talking about maintaining that flow on a short timeframe -- that recession rate on a short timeframe that it didn't seem realistic and wasn't consistent with what we see happening in this system.

However, extending that period over a longer period I think makes more sense but from that standpoint we can pretty much skip the next series of grouse --

MR. HOGAN: Well actually --

MR. RYCHENER: You can look through them slowly if you want to get a feel for what we're seeing but in general we're not really seeing --

MR. MATTAX: I'd like you to go a little slower and I think the next one I think shows one that's a little closer like the previous one -- maybe it's peak there, you know, on the recession --

MS. WILLY: That one looks like it would be hard to measure.

MR. MATTAX: Right.

MS. WILLY: You start to get the U and then you have another steep decline but even if you match the line in there you find that they match pretty closely.

MR. MATTAX: Yeah, you're pretty close.

(Multiple simultaneous speaking.)

MR. HOGAN: Figure 6.

MR. RYCHENER: Figure 6.

MR. HOGAN: Yeah.

MS. WILLY: That's the one with that storm peak that has like a quick recession and then it like drags out in and bustles and it's like where do you pick that up? I would again pick it up when it starts to lessen in the time in what we call like the top part of the U and just -- and like he said each river is designed to as you measure it you

start to go oh, after day 3 you start to see the switch, that's when we would go.

So I appreciate they reworded it in a confusing way and how do we modify that to make sense. I need to actually know the actual dates of things. We usually go through the hydrograph, you know, every year -- hydrograph and check what that changes and once we've identified it all then we come up with a thing that matches that and that drainage. And we don't really have that ability to do that right now but --

MR. MATTAX: We could on the historical date -- the synthetic historical.

MS. WILLY: You would do it on the synthetic?

MR. MATTAX: Well that's what all this is.

MS. WILLY: Oh this is all synthetic.

MR. KUFFNER: It's a mix.

MR. MATTAX: Yeah it's a mix over what, like almost 90 years or something like that -- it's 98 years or something like that.

MS. WILLY: So I'd be curious to figure out if you've got the data to show is what -- there is a place numerically that you can see it visually but you could say once the flows come out -- the storm flow, are proceeding at this rate or less that's when that rate kicks in, does that make sense?

Like, I just think there's a way to model. I think that when you're looking around you figure out where that is, but you numerically say once the recession rate is -- is at -- once the storm recession is at this rate that's when that rate kicks in.

MR. MATTAX: Well and that's probably the biggest challenge with storm analyses is -- is where does recession start.

MS. WILLY: Right.

MR. MATTAX: And that's assuming you have the entire storm going out so any suggestions I think you could give us on how to put that in a way that we can put it in a license article.

MR. HOGAN: Yeah, it has to be enforceable and trackable.

MR. MATTAX: Because, you know, we want to remove subjectivity and i.e. disagreement down the road.

MS. WILLY: Yeah.

MR. MATTAX: As much as we can.

MS. WILLY: It's hard to do it with this kind of graphic. I think it's doable -- I'm more comfortable with a control number so I could say this is a recession on this day and this is what it looked like and then we come up with an algorithm after looking at a bunch of these.

MR. HOGAN: So what's the process for doing that?

MS. WILLY: Well I'm used to an ILP process so we have a lot of meetings when the engineers and the biologists and -- they just go through each, you know we discuss stacks of hydrographs looking for that point, matching it up with the breeding period. It's time consuming but that's the way we've done it in the past.

MR. HOGAN: So that was the license requirement?

MS. WILLY: Well the license requirement --

MR. HOGAN: To develop?

MS. WILLY: It could be developed it -- yeah that's be great. It's not hard to do it just takes a few days to work through with it with the experts. And once you come up with one that's a match for your river that's -- that's what's expected.

MR. GILMOUR: These events are pretty, pretty rare based on that first slide I think.

MR. KUFFNER: Yeah because it's typically the late spring run -- it's pretty typical, we haven't had gotten a lot of experience with a big storm but it's tailing off -- so I guess the question I have so we understand a little better is -- is it all this time period that you know, back from the beginning of May -- the day May start?

MS. WILLY: Yeah.

MR. KUFFNER: Because it starts warming up then so there could be a drop-off in May and yet maybe another

peak and then another drop-off so it would be another egg laying period for another group of amphibians?

MS. WILLY: Well, what -- I'm just going to go with the drainages that I know.

MR. KUFFNER: Yeah.

MS. WILLY: What -- sometimes somebody's monitoring and other people are not and so there is -- to place someone monitoring in that drainage that time and when the beginning of egg laying starts in a drainage then the whole drainage is now in egg laying.

And so you monitor the temperatures, send the biologist out and make -- see I don't know who it would be because we haven't been asking you to monitor so.

MR. MATTAX: Has anybody else been monitoring in the basin?

MS. WILLY: In this basin?

MR. MATTAX: In South Fork.

MS. WILLY: For Foot Hill.

MS. ERLEY: In South Fork there was a -- the Lassen National Forest does not -- they have had surveys but have not -- their parcel of land is so small and it's above their range so.

MS. WILLY: Yeah, so Tyler have you got a series of spawn dates for -- for Battle Creek or similar advantages up there?

MR. RYCHENER: No we don't. I haven't seen that.
MS. ERLEY: Actually you know what I have information for Antelope Creek.
MS. WILLY: Aha, there we go!
MR. HOGAN: What was the name of that creek?
MS. ERLEY: Antelope, which is the next stream, well next anadromous.
MS. WILLY: Yeah and so when I look at that to me it looks like an anadromous years -- that 2005 and just seeing it surprised me but that little bump along the end also looks like some snow was melted so you have got a little snow melt recession drop down on top of a storm.
MR. KUFFNER: Yeah, it's still -- I mean at those high flows it's still melting snow for sure. So there was probably a storm on snow back there on May 17th or so.
MS. WILLY: And sometimes you get ice or snow slipping and you get those little bumps in the middle.
MR. KUFFNER: Yeah.
MS. WILLY: And then it turns up in the water.
MR. KUFFNER: So that's the challenge right there. It goes down and it goes back up and then when does it start going down again. It's right at that rate that we're looking at there.
MS. WILLY: Back up -- see if there's no storm, it's right at that rate.

MR. KUFFNER: Yeah.
MS. WILLY: You're not in a danger zone.
MR. KUFFNER: Yeah.
MS. WILLY: Following that rate.
MR. KUFFNER: So the thing is that these high flows based on this -- we're not going to have much really to do about changing. I mean we can put a little more water in but we're not going to be able to keep more out because it's going to be running by itself over the top of our diversion.
MS. WILLY: Well I'm wondering why we're looking at above normal years because it's the below normal years where the maximum spawning --
MR. MATTAX: We're looking at all years.
MS. WILLY: We're getting to that, okay, yeah, that's when you see the maximum spawning is in the warmer years.
MR. KUFFNER: When there's less flow and the flows are down and there are more gravels.
MS. WILLY: And the survival of the larvae are --
MR. KUFFNER: The temperatures are warmer sooner because of that.
MS. WILLY: Yeah.
MR. MATTAX: We're going to jump to the slide -- figure 7 below normal -- there's the tail of those

recessions.

MR. KUFFNER: That was steeper in there -- in the middle there.

MS. WILLY: And these are some really odd years.

MR. HOGAN: How did you look at your years Tyler?

MR. RYCHENER: These are -- I believe all the below normal years in the last 30.

MR. MATTAX: Yeah, I believe that's true.

MS. WILLY: So again, really not more to it to meet that --

MR. HOGAN: Can we go ahead now?

MR. MATTAX: We're going to jump to the next slide I think.

MR. RYCHENER: Sure.

MR. MATTAX: Which is dry year and fairly close to what 2009 was, yeah.

MR. HOGAN: We're on figure 9 Tyler?

MR. RYCHENER: 10.

MS. WILLY: And so there's one year there now that's the one year of all I've seen that would look tricky to measure and that's 1954 -- what's the green year?

MR. HOGAN: '94.

MS. WILLY: Was it '94?

MR. MATTAX: PQ.

MR. RYCHENER: So the target range is 90, the

ramping is 94.

MS. WILLY: Okay, so that's '94 it looks weird.

MR. HOGAN: The double peak is '90.

MS. WILLY: And what caused that?

MR. KUFFNER: It had to be a storm and then another storm.

MR. HOGAN: You're talking about the double peak?

MR. KUFFNER: Yeah.

MS. WILLY: Yeah, right.

MR. KUFFNER: Yeah a storm followed by another storm.

MR. MATTAX: Yeah it cleared up for a day.

MR. KUFFNER: Yeah.

MR. MATTAX: And then it rained again.

MS. WILLY: So that one will be problematic in that you would probably pick up -- like if you were talking -- if you figured out for the average for the whole drainage what the number of days it was before the storm recession kicked in, my -- that is you'd come out about there.

MR. KUFFNER: Yeah Alison those are such high flows for that kind of a year that it's hard to say what we would do I think because we'd probably still -- when there's a lot of turbidity and a lot of stuff in the water after we dropped our regular gate it's going to take us a little bit of time to get back up to operation. We have to let that

stream calm down.

MS. WILLY: So you probably would stop on that.

MR. KUFFNER: Yeah we probably wouldn't start back up to go in there somewhere. But what it does is it actually will -- by going back in operation after a big event like that it will actually modify and control the flows so they won't be as flashy and they'll be less scouring for the frogs. So there's actually an advantage to that, but it's how the timing --

MS. WILLY: This is the actual flow so I don't know how the project operation is related to this.

MR. HOGAN: Tyler?

MS. WILLY: Oh we're getting to that -- I'm not going to keep mentioning that.

MR. RYCHENER: Well I'm not sure we have a slide for that necessarily. The next slide shows -- this is again looking at the stage changes and looking for drops greater than one foot over a three week period. And looking at how frequently that has occurred in the past in these different time periods -- the tricky part would be evaluating this of course is that for each of those events we can't really say whether the frogs had laid eggs at that point or were waiting to lay eggs at that point.

But just in terms of trying to implement this one foot over three week criteria -- under the existing

conditions that happened between like April 16th and June 15th at about 50% of the last 80 years or whether that range is 1929 to 2016.

MR. HOGAN: But that is off the peak of the event right Tyler? So this slide is no longer relevant.

MR. MATTAX: He overstates.

MR. RYCHENER: Well it can --looking at the top of that peak but it's still a one foot drop in three weeks.

MR. MATTAX: So it would be less than this?

MR. HOGAN: Alison's point that they would not lay their eggs at the top of the peak so --

MR. MATTAX: Right.

MR. HOGAN: That initial drop is not of concern -- it's once that peak hits the bottom.

MS. WILLY: Unless it starts to -- once it starts to recede, not the bottom of the U but it just starts to taper off.

MR. KEFFNER: Help me out with it because I mean it's receding, receding, receding -- where it takes out the bottom it actually stops receding. So the frogs wait until it stops receding and then they lay their eggs because the hydrograph was going down when it turns and goes back up it means there's more flow. That means that it's already done receding.

MS. WILLY: There's a few days where it's not

like crash receding it's just dripping off and that --

MR. KUFFNER: So kind of more stabilized -- it's where stabilized flow essentially -- I mean that's what's happening in this.

MS. WILLY: It's not at the bottom yet. It's just not dropping because the fluctuations.

MR. KUFFNER: The rate slows down there. So the rate would drop.

MR. MATTAX: This is basically what you see going on in storms is you're at a base slope and that base slope depends on what time of year at such a -- you're at here. Snow melt obviously the base slope is higher and it's being contributive to snow melt and rainfall and just an elevated groundwater table.

And then you get your storm or some let's say a rain on storm, snow event or some hot weather that comes through and melts snow, it brings up your flow then it starts dropping. It drops -- depending what caused the event, let's say it's a rainstorm, then it's going to drop really fast when the rainstorm is over.

If the rainstorm prolongs then it's going to take a while to drop faster and it's going to come down at varying rates depending on that and the bottom line is it's trying to approach this base slope but it's got all this havoc water and groundwater and you know, up high in the

water table that it's trying to put in the -- so that's what's the big picture of what all is going on.

And that's part of what makes it so hard to pick where this recession starts because in the summer storm it's easy -- much easier because you have something much closer to this. But when you're in spring you're up here and you get -- say this, and you know, this isn't necessarily dropping at the rate -- you know it can be dropping on its own whereas when you're in the summer it's pretty much dropped to the bottom of the base flow or dropping very little -- the groundwater.

MR. HOGAN: Now John with project operation. We've all been waiting for that.

MR. MATTAX: Is this storm over 450 or is it -- if it's over 450 here we go. Basically if -- let's say this is under 450 then you're taking 105 CFS off of it assuming you have 105 to take off before you get to the minimum flow.

Let's say this line here -- just for simplicity it's 118. So what your riding at minimum flow you get over here to this -- you're going to start paralleling this without any wrapping right restrictions.

You're going to parallel at that down until you get to this 118 again and then you're going to flat line it through. That's in the picture -- the one's you're talking about with the project with whatever minimum flow it is, you

know, and that's assuming the project -- max generation for the project.

MS. WILLY: So Ken, was your resolution that we would come up with a plan?

MR. HOGAN: Well, no. I guess there's a couple of things going through my mind. One is we still need a clear -- now that we have a better understanding of you know what you're looking at is -- or where do you start you know, the bottom of it or on the receding limb versus at the peak.

MS. WILLY: Two or three days after whatever number of days that turns out to be.

MR. HOGAN: We're going to need to look at it and go is this even an issue for the project. You know, and that's the analysis we're going to take it back and look at and go okay. Does this condition represent itself you know, as a potential problem but we'll take this.

MS. WILLY: Okay, so will we see that in the Final EIS, the analysis of the project efforts on that?

MR. HOGAN: That's what I'm talking about now, yeah.

MS. WILLY: Okay.

MR. HOGAN: So let's -- and let's say that our analysis does demonstrate that oh wow, look at that the project would result in -- or project operations would potentially result in a recession rate greater than one foot

or four inches a week then a potential solution would be to develop your algorithms to identify trigger points for that rain thing.

MS. WILLY: Okay.

MR. HOGAN: It is that "meet your needs under the 10(j)," assuming that we see an issue. Of course if we -- if we do our analysis and it demonstrates that this really shouldn't be a problem, then you either agree or disagree --

MS. WILLY: Yeah.

MR. HOGAN: And we'll work it out there.

MS. WILLY: Yeah and so I would say algorithms or decision points because this one looks pretty simple so you might be able to by looking at all of the hydrographs, pick a number of days where you typically are at that point just to be monitoring recession and that doesn't have to be like -- run through a computer to figure it out. Sometimes you could do it just by working it through with the flow modelers or the engineers and the biologists.

MR. HOGAN: So what would you call it if we wanted to name it something as a recommendation, what would you call it?

MS. WILLY: A recommendation -- I would say that for where we are the frog flow recession rates.

MR. HOGAN: Ramping plan?

MS. WILLY: Excuse me, ramping plan.

MR. HOGAN: Okay.

MS. WILLY: And you think I used your terminology, after spring storm events so our decision just to come up with what the ramp -- we're going to use this ramping rate but the decision is where after a summer storm or spring storm events will that --

MR. HOGAN: Ramping protocols.

MS. WILLY: Ramping protocols.

MR. HOGAN: Alright.

MS. WILLY: Ah, it's good to be a government employee.

MR. HOGAN: If we do our analysis and it demonstrates this is a concern which we will look at the economics of it, but I think this is just an approach that we could use.

MS. WILLY: That sounds good.

MR. KUFFNER: Do we have a specific and I know this is probably in the record but I am not familiar with it that we are looking at for that?

MS. WILLY: Well that's what we were looking at.

MR. FOSTER: Before we got in the period you know, we either adopt your period or we pick our own period for the EIS because --

MS. WILLY: Well you identified -- I really liked Tyler's definition. Can you identify when the floods go

from snow to recession the down water flows through your water modeling?

MR. KUFFNER: You can kind of look at it. It changes year after year.

MS. WILLY: Yeah, yeah.

MR. KUFFNER: Obviously we'd like for example this last year which is the wettest year we had -- the spring melt runoff was all down to you know, base loads almost by the middle of July. It's usually earlier. It's usually by the middle of June.

MS. WILLY: Yes, that's typically why they don't --

MR. KUFFNER: It's more like the middle of June.

MR. HOGAN: Couldn't we use a real time water temperature monitor to trigger the ramping protocols?

MR. KUFFNER: It's actually warm enough.

MR. HOGAN: But also not -- so I mean we could use if you're looking at a trigger point, we could use water temperatures.

MR. KUFFNER: We can start looking for the frogs. Matt Myers isn't here from Fish and Wildlife, he's very interested in the foothill yellow legged frogs. We haven't been able to identify -- we haven't seen them in the targeted reach and Laurie mentioned that she had seen some down below Ponderosa and there are somewhere around but we

haven't found any and he's actually talking about doing some kind of a survey and asked if we've allowed him to do that with his little research.

We said absolutely -- of course we would let you do that, so --

MS. WILLY: And we would love to join in with that.

MR. KUFFNER: So I don't know if he has that scheduled or planned or anything but he wants to kind of use this because it's obviously now this change of status is an issue as well. So it's probably just worth having Matt's input on that because the one thing we did agree is we did agree we would do pre-construction surveys in the stream to see if we could identify any egg masses or frogs -- that's something we agreed to do.

MR. HOGAN: And that runs us into another issue is if they're not there why would we have to venture to protect --

MS. WILLY: So that is absolutely something to think about. When the project goes on line the conditions will spread significantly towards it being better habitat for them. So they typically agreed in the prior years when it's warmer and slower and the project reach may not be optimal right now and they may only breed in the really dry and critically dry years you know because they move up and

down the drainage to find the right spot.

So they have to look for the frozen temperature and so there may be more of them after this -- I don't know. I'd be more concerned about this idea when it goes offline and they're all established if there's a change in flows, how that affects them -- I don't know.

MR. KUFFNER: So typically at the end of the season when we go offline it's already ramped with the weigh down --

MS. WILLY: It's already ramped so there's no -- right.

MR. KUFFNER: So if we go offline we're probably talking about putting in maybe 10 CFS into the stream that isn't in the stream now which is going to be a fraction of a --

MS. WILLY: Okay.

MR. KUFFNER: I mean for a short period of time but then we'll ramp at our ramp rate -- that last little bit that we shut off and then essentially we drop the radial gate in the summer time when we're off and the creek runs like it always has.

MS. WILLY: Okay.

MR. KUFFNER: Until we come back in in the fall and move it back up.

MR. FOSTER: And if you run it your powerhouse

will have some sort of trip off bypass?

MR. KUFFNER: Yeah, we didn't talk about that but exactly.

MR. FOSTER: When it gets that 100 CFS pull --

MR. KUFFNER: It won't.

MR. FOSTER: It'll just --

MR. KUFFNER: Exactly.

MR. FOSTER: Get left out --

MR. HOGAN: Next slide.

MR. KUFFNER: If there's a problem in the system the fins of the wheel will divert -- the diverter comes in and diverts the water basically.

MR. HOGAN: So in this case the project is operational and in the next slide the project has been tripped offline.

MR. KUFFNER: Right.

MR. HOGAN: And you can see that there's a backflow against the walls that will slowly turbine down but the water's being diverted right into the tailrace so it's not going up over the diversion -- the flow continues to exit the powerhouse where it would have the --

MR. GILMOUR: Instantaneous.

MR. HOGAN: So there is no change in the flow in that bypass reach until at some point in time --

MR. KUFFNER: We start ramping again.

MR. HOGAN: You decide to use the --

MR. KUFFNER: Tune this down, ramp it down whatever yeah.

MR. HOGAN: And transfer the flow up that you'd be doing under a ramped --

MR. KUFFNER: Exactly and that's --

MR. HOGAN: Controlled circumstance.

MR. KUFFNER: Yeah and that's so you can avoid the use of a (inaudible) structure so you'd be bypassing the unit.

MR. HOGAN: Yeah.

MR. KUFFNER: And this is designed in our system. We actually have a 2 or something.

MR. HOGAN: You just didn't have it off of YouTube I think.

MR. KUFFNER: It can easily go through.

MR. HOGAN: I'm sure they do. So, does that address that concern in the emergency tripping situation?

MS. WILLY: I think so. I don't have a concern right now.

MR. HOGAN: Alright so for the frog ramping we'll look at -- we'll do an analysis, we'll evaluate whether this is a concern that does need to be addressed or not. Of course we'll still have -- if it does, we'll still have to do our economic analysis. We'll have to figure out does it

trigger or want us to be there or not. Alison you said that they may move into the area? I know we have monitoring for frogs prior to construction -- Tyler, was there a recommendation for the monitoring throughout the term --

MR. RYCHENER: Yeah there was recommendation for monitoring post-construction during operations but we were having trouble tying that to any sort of license requirement and not just having it be monitoring for the sake of monitoring.

MR. HOGAN: Alright so one way to maybe do it -- and I'm just putting it out there, I might have to take it back but the monitoring would be used to trigger the ramping rate protocol. Otherwise it wouldn't apply. Flows would have to be identified first. Is that palatable?

MS. WILLY: Oh, so the thing about bred frogs is you never really know where they're going to show up because they're highly mobile and move up and down rivers. There are ways to like with EDNA I'm sure you can do it with dog sniffing, you can go out -- they really are stinky so you can tell when they're there.

MR. HOGAN: I've been told that too.

MS. WILLY: Yeah. Oh you're a frog, you just had no idea, I see.

MR. HOGAN: I -- I guess I don't mean that they would, you know, have to find them each year but once

they're found they'll only be present in the area then we can have a trigger to implement the ramping but if they're --

MS. WILLY: Yeah, I'm going to speculate here but your analysis will tell you -- I don't really see much -- I mean I haven't looked at the project but the river itself doesn't look like there are any problems -- mapping for the yellow legged frog. So it's great -- the natural hydrograph is really good.

MR. HOGAN: Okay.

MS. WILLY: Based on these slide. What the project is -- I don't know but what I do know is they can get into areas -- the populations during wet years you can't even find them -- like zero, zero, zero detections and then you'll have a normal or drier year and suddenly all these frogs show up.

So they are breeding when the conditions are appropriate and with 13 CFS I can darn guarantee you and you could put that in -- that you know, when you have conditions that are often like that there is a high likelihood of them showing up and you may not suspend they'll be there.

But if they're in the drainage and the conditions are right they'll move up. Particularly if the conditions worsen downstream and suddenly are improved in the project reach -- so I wouldn't want to wait until someone figures it

out. I want to just not -- they're pretty easy to remotely monitor because they stay and so there might be ways with EDNA or a person who knows that they smell like or dogs that are going to become more available in the future I'm sure because we've talked about this at other rounds because they're so detectable, so.

MR. KUFFNER: So the only issues I guess that we have with this potentially is that if they are never there why are we doing some mitigation if they're never identified.

MS. MILLSAP: I don't know that you are doing mitigation. We have no idea what the project effect is. I'm indicating to you I think the project might --

MR. KUFFNER: We're not saying we're not willing to it's just --

MS. WILLY: I don't see this as a burden at this point, it's just nice to know if they're there.

MR. KUFFNER: Yeah, no obviously we need to know if they're there.

MS. WILLY: Yeah.

MR. KUFFNER: And I'm trying to think about how to do that over a long period of time because if they're not there then we do a pre-construction survey and we're not doing anything particular which may impact -- may or may not impact our ramping.

And it sounds like based on this tailing issue we don't really know all the answers to that.

MS. WILLY: Yeah. You and 100 other projects -- exactly the same issue and sometimes it's Fish and Wildlife, sometimes we'll go out, sometimes there'll be once every 10 years, I've seen that and at least when the project isn't working once every 10 years for gills.

MS. MILLSAP: I don't know because the only ones I'm familiar with is recently there's pit 4 and 5 and pit 4 monitoring every year.

MS. WILLY: Every year, yeah.

MR. GILMOUR: So someone mentioned earlier a temperature trigger for incubation success or something like that as well maybe being considered?

MS. WILLY: That would be really useful but I can't think of that off the top of my head.

MR. RYCHENER: At 16.5 to 20 is where they have the most success with metamorphosis after egg development.

MR. HOGAN: These are billable hours.

MS. WILLY: So --

MR. KUFFNER: So that's an interesting --

MR. RYCHENER: 16.5 to about 20 -- this is coming from the Interior letter to make it satisfactory again. Yeah 16.5 to 20 in June through August resulted in the highest survival rate with very low survival below 16.5.

MS. WILLY: Yeah so that's a match.

MR. HOGAN: That brings us kind of full circle to the temperature criteria for salmonids you know.

MS. WILLY: Yeah.

MR. HOGAN: Is there a happy medium where both are protected or do you pick one over the other or -- because we're not a management agency so.

MS. WILLY: So in this stretch not a happy medium? Do we pick one or the other -- yes we put the salmonids first because this is the best of the best for salmon habitat and it's gee they might come in if the project changes conditions for the foot hill yellow-leg frog. So I would definitely say this is the best of the best for salmon habitat. Fish and Wildlife Service, the Fish and Wildlife -- you know we just poured everything into this for the salmon and I wouldn't want that to get in the way.

I just don't expect it to be in the way and I also don't see a problem if you're making better conditions for the frog -- I don't see that as a problem for the frog, I see that as a problem for the salmon so.

Put winter run first because endangered is a big deal and then spring run and steelhead.

MR. HOGAN: So use the legal listings.

MS. WILLY: Use the legal listings so we have

endangered, threatened, threatened and candidate. I think the --

MR. HOGAN: The approach --

MS. WILLY: We have to make a decision by 2020 on the foot hill yellow legged -- I don't know it depends on staffing if we're up to the judgment but that would be coming up some time in this process.

MR. KUFFNER: So if I could ask a question on that Alison and then the rest could do so. As it relates to project operations and these anadromous species who we were just talking about maybe or maybe not showing up and maybe showing up on some years and maybe not on other years, we don't know -- nobody knows which, if and if which ones might get that.

MS. WILLY: I don't want to be so -- I don't want to say we don't know about steelhead because we know so much about where they can get in. They're there -- I would say --

MR. KUFFNER: Yeah but have you been on Panther Grade?

MS. WILLY: No, but I have to tell you I work with fish barriers to keep them out.

MR. KUFFNER: Yeah trying to keep them out is hard. So we don't disagree with you. We would agree that if -- it's more likely the steelhead would get there than

any other species because of their mobility and the timeframe and the size and all these things. You know we're not going to sit here and nobody is going to figure out if Panther Grade, you know, is passable or not, but would be desirable for us and would like to be considered of sort of a tiered approach where it says if we only have you know, resident species and we go with 13 CFS and this temperature regime.

If we have these other species and we've identified them and they show up, we need to do something for that species and you mentioned winter run would be the first one and then we would have the Chinook salmon which would be probably the spring run and then there would be, you know, the steelhead or you would flip it the other way around, the steelhead on top and just say -- we have these different things, what are the conditions that would be ideal and then we have to talk about you know, flow regimes and communication and those kinds of things.

MS. WILLY: So I personally, I'm not NMFS but I'm going to say there is another listed entity in this region that's critical habitat and it has primary condition elements that must be met. And so -- and that's for spring run and for steelhead so if we're talking about fish I can give you a hierarchy but as far as critical habitat -- the whole point of critical habitat is to hold on to it so that

they can get to it, so it's just a different standard.

MR. HOGAN: And we will address the PCE's.

MS. WILLY: Of course you will.

MR. GILMOUR: And it's important to note too that there is some wiggle room in those PCE's too for interpretation. It's not black and white and I think, you know, we could all keep that in mind and again we'll do our best to analyze it in a fair way.

MS. WILLY: Yeah, wiggle room. And the temperature part -- that's a water quality criteria?

MR. GILMOUR: Yeah.

MS. WILLY: And that's pretty solid.

MR. GILMOUR: Yeah I was thinking more about the flow regime and the barrier touched off which is a little bit more challenging sometimes.

MR. KUFFNER: So if we can I have a couple of comments. We've been talking a lot about temperature and we threw around some numbers on temperature that were a little different than we had before.

But there's also -- excuse me, the way that temperatures are measured and in working with the California Fish and Game you know, they were using the average daily temperature. In fact they were recommending a 20 degree Celsius average daily temperature as the temperature.

MS. WILLY: For o.mykiss?

MR. KUFFNER: For the --

MS. WILLY: Resident o.mykiss.

MR. KUFFNER: Yeah.

MS. WILLY: Okay.

MR. KUFFNER: And so then when we were talking about some of the salmonids the issue for us and related to the system is because of this heating in the stream sometimes the maximum temperature that's there is 10 degrees more than it was at night and it's for -- just for a peaking hour because of the hydrograph the natural temperature graph that goes through there.

So it's a big penalty these -- those are Celsius numbers. So using that maximum number particularly at the intact is really problematic because it peaks up there because of the sun and it's actually cooler down in the stream so I think we need to both agree on what methods we're going to use for the temperature but also where it's going to be because it could depend and it's -- like you said we were really penalized because -- and you can look through the data that we provided for the actuals of how hot it gets in the summer months -- June, July, August you know, in the middle of the day, late in the afternoon it will be 70 some or 23 degrees Celsius out there.

MS. WILLY: Yeah so we use the 7 datum which is a different criteria.

MR. KUFFNER: Right.

MS. WILLY: And the reason for the daily maximum from my perspective is to prevent those daily events that would go above lethal and so I understand that the Department uses a different metric and why. But where we measure is where we -- it's -- the salmon's said to be holding so in that optimal holding content that's where we want to make sure that the 7 datum is met and then we have a -- there is a place in there where you know it can get warm during the day but because it's an average we expect thermal effusion at night and certain cover and some springs.

And so I'm more thinking of your question as where would you put the monitor other than.

MR. KUFFNER: You just answered the question though. It's really in the reach down that is above the tailrace but in the project race where the salmon would potentially get into -- the effective reach below Angel Falls and above the tailrace.

MS. WILLY: And we had hobos moved out by beavers and suddenly there were really weird different temperatures. So we know that you have got to have the right location.

MR. KUFFNER: You have to have it backed up with other stuff, yeah, yeah. And in this data we've had those same hobos in for four or five years and we have got all that data from them, so and although they do get bumped

sometimes and the stages do get effected sometimes.

MS. WILLY: Yeah.

MR. KUFFNER: And it has to be tuned up. Okay so we're in agreement then that the measurement is down in the project reach -- are you onboard with that Bill?

MR. FOSTER: For the most part or you can get the measurements below Angel Falls. They're a pretty good core right there that you could throw one down to the bottom but I guarantee you it's probably cooler at the bottom than it is at the top.

And also whatever you know, whatever habitat if there are three different at spring 4.

MS. WILLY: The bottom of Angel Falls?

MR. KUFFNER: Above spring 4 and the bottom of Angel Falls, that would make sense.

MR. GILMOUR: I don't think that's far a distance it's only 1.7 miles from Eagle Falls to the powerhouse.

MR. KUFFNER: I think they found several pools that are close to two feet deep plus in that reach, someone will look closer, yeah so we could find one of those pools and get down in there. There's one actually not very far north of or right above spring 4 but you can't get at it, okay.

MR. HOGAN: I was hoping it was a quarter of three.

MR. KUFFNER: It depends upon what time zone you're in.

MR. HOGAN: Alright can we move on to item 12 which is the salmon monitoring plan?

So as discussed in the -- during the meeting of the DEIS we really don't see this as our licensee's responsibility to monitor wind, fish or accessing the bypass reach. We haven't changed that position on that position. We see that as a manager issue and as indicated in the earlier presentation that monitoring seems to be ongoing under the Battle Creek Restoration.

In the event that you know, the agencies identify salmonids or address salmonids being present in the reach we would expect that licensee would be notified and the Commission would be notified and the division of protection would need to concur that salmonids are there.

MR. GILMOUR: And that would be in the licensee's best interest I would think to immediately address the issue.

MS. WILLY: That's not the only monitoring they asked for. Didn't we ask for other monitoring that just went they show up in the reach or is that just one item --

MR. GILMOUR: There was hatch monitoring and fish monitoring.

MS. WILLY: Okay.

MR. HOGAN: This is theoretical surveys and so forth.

MR. GILMOUR: We've separated the two in the matrix I believe, I'm not sure, maybe I'm wrong. Yeah I think that something that advocating for is our feelings that Panther Grade is well outside the project area and that seems to be the primary point of uncertainty as far as migration go and I think it's challenging for FERC to recommend monitoring portions of a system that are not within the boundary and will not be effective necessarily by operation of the project, am I correct on this issue?

MR. HOGAN: Well it's that and you know monitoring the success of a program is the agency or the program agency's responsibility. Once they're there and they know that they're there it's our licensee's responsibility to make sure that they're operations don't affect those fish.

MS. WILLY: Okay so that's where I was confused. So I don't know if they agree so I'm speaking without caucus but --

MR. HOGAN: We can go into caucus. If we're caucusing we'll go off the record and we'll leave the room if we can try to keep it short.

MS. WILLY: We will.

MR. HOGAN: Okay so we are off the record.

(Off the record at 3:46.)

MR. HOGAN: Alright we're back from the caucus. Okay Alison do you want to report?

MS. WILLY: Yes this is Alison Willy reporting out on the agency caucus. So we talked about potential project effects -- potential project effects of pre-spawn mortality, changes in habitat and connectivity and stranding.

And so we think related to the project that at some level and I'll explain that later, there should be respond mortality monitoring, snorkeling of the habitat, surveys of the holding pools, connectivity, mapping and stranding.

So the -- I have the habitat -- holding pools, connectivity, mapping and stranding should be mapped every year because the project would be affecting that but there are ways to do that that we could talk about that. We didn't talk about that in this group, we talked about it here in the larger group.

And that those would be related to the existing monitoring for the flows and temperatures because the flows and temperatures relate to the project effects. We also think it should be monitored how long it takes to recall an ISO if there is habitat loss, loss of connectivity, stranding -- die-off events -- we think it should be noted

and then monitoring after that to find out how long it takes to recolonize but we did not talk about the specifics about that -- just that that was a project effect that needed to be monitored.

As far as the frequency of monitoring we all agreed that the first three years after the license the -- should be monitored and then every five years and typically the agencies pick up the four years in between so it would be either Fish and Wildlife Service or the Department of Fish and Wildlife would be doing the monitoring in the off years. We also --

MR. HOGAN: Hold on -- sorry, what was the timing?

MS. WILLY: So the first three years after the license issuance.

MR. FOSTER: And it was for the construct of operation or just issuance? License issuing monitoring --

MS. WILLY: We said issuance but do you want to change that as a group? We said issuance.

MR. FOSTER: Well the thing is from license issuance you get kind of a letter pre-project kind of information there and we're talking about assessing the general health of the species that we find there and doing that on a seasonal basis hence the quarterly type of (inaudible) relief for the first three years.

Because you're going to identify what the size class is, their general health -- that sort of thing. And then once the project starts operating I guess you would continue to do that -- say after the first three years. The thing is between license issuance the building of the project -- I don't know how long that's supposed to take necessarily.

MR. HOGAN: By statute we're supposed to start construction within two years of license issues but they can get I think one extension and then any additional extensions need to be approved by Congress. They might be able to get two extensions -- I'm not --

MR. LEAPLEY: Just one.

MR. FOSTER: I would, I would take what you do for the license issuances because you want to capture something before and during construction and basically carry that through so you could see if there's anything project effect-wise going on by this.

There are certain aspects of the monitoring that there are more anadromous fish related types of you know, methods and things you're looking for and those wouldn't necessarily have to be part of the quarterly sampling until there is some presence of them getting pasts Inskip downstream and they're potentially be able to be in the area.

MS. WILLY: Yes, so we asked for the first three years after license issuance and that's the quarterly snorkeling. Then every five years -- but I hadn't gotten to my last one and that's also the same sampling -- the quarterly snorkeling, three years after the ladder goes in and we will contact you and let you know the ladder is in and its operational and then that's when you'd be picking up salmon in your stretch. We'd be monitoring the rest of the river.

MR. FOSTER: But I mean that's pretty much in the general timeframe we were looking at and having talked with Matt Myers about that he and I both felt that either the quarterly sampling -- basic routine stuff isn't necessarily costing as much as we had thought. He didn't provide me with that -- that cost.

MR. HOGAN: This one wasn't much of a cost issue for us as it was an applicant's responsibility issue for us.

MR. FOSTER: Well the thing is you want to know if there's any potential effects from the project itself on you know, the species that are there. And you won't be able to know that first off if you never looked to see if they're there -- if they're having problems with connectivity or stranding or you're missing some size classes or something weird that doesn't look like a normal healthy for instance, resident trout population.

You'd want to know that information. If something the project's doing in terms of you know, not meeting the temperature requirement or not meeting a, you know, flow level or something like that -- that could potentially affect it and again the presence of some fish there is going to give you some sort of indication of the health of the system that's there because you also are trying to protect essential fish habitat and potential, you know, critical habitat.

MR. HOGAN: Yeah you know I don't disagree with what you're saying. Look, one thing I struggle with is okay if we're monitoring the resident fish there and the population changes, how are you correlating that with whatever the effect is and change that population to a project effect? How do --

MS. WILLY: We monitor the rest of the river so we'd be able to compare Fish and Wildlife, Department of Fish and Wildlife Service data or other parts in the park shed so if the rest of the water shed is doing okay and there's a change here -- that's a big deal.

MR. HOGAN: A change in the bypass.

MS. WILLY: In the bypass region, yeah.

MR. GILMOUR: But for example in 2014 the bypass reach -- what would potentially be the bypass reach when completely dry so you ended up losing the whole population

at that point.

MS. WILLY: And it's such a blessing when it's dry because then you don't have to snorkel there.

MR. GILMOUR: Sure, I guess.

MR. FOSTER: You know if you hadn't actually gone out and looked you could always surmise that oh, maybe it's dry, which is -- valuable information to know and certainly because it goes dry naturally it's not a -- not a fault of the project, okay -- but at the same time you know, we're more -- you go out and you get this information because you're more interested in seeing how the species is, you know, going -- how it's you know, functioning, when there's actually, you know, enough water there and stuff like that.

And so there's probably times that you may be able to catch some information prior to something going dry you know, or knowing when it recolonizes you know.

MR. HOGAN: There's also all these recommendations for water temperature thresholds, new flow criteria, things that are intended to protect the resources.

MR. FOSTER: But if they aren't we can surmise that those are going to protect the resource but if we don't actually look at the resource to see that they're actually, you know, that's all happening and they're there or that's all happening and they're not there -- that's something we need to know.

We can't assume that just because you're putting the "x" amount of flow to a certain time of year, you're meeting an actual amount of temperature that that, you know, going to be completely resulting in an ideal situation.

If something isn't ideal come to that and that's how you trace that or how you validate, you know, the purpose of the monitoring is to validate the -- the mitigations you put in place are working to keep a you know, healthy population there.

MR. HOGAN: Again I still don't understand how you -- how monitoring these populations will then correlate necessarily to a project effect, you know. If natural flows go dry and your populations are eradicated in the bypass reach, who's fault is that?

You said it's not the project that's at fault but what does that monitoring tell you? It doesn't tell you anything.

MS. WILLY: Well if we have some -- I like the idea of a little bit before the project and a little bit after, but if we just set up right after license issuance, monitors so we know what's happening in the reach -- when the future monitoring happens every five years and there's a change, but there isn't a change in the rest of the watershed -- that's an indication that we're not doing something right in that reach -- we need to go back and look

at that better.

MR. MATTAX: That's actually an indication that something's not happening right in that reach -- not necessarily that the project is causing it. For instance if you had -- let's say it didn't go dry but you had low flow and you had below project operation for half the summer and the beginning of the summer you don't then you have a collapse in the fishery.

Who's to say whether that was caused by cutting the flows early in the year versus the low flows late in the year. That's where it's challenging.

MR. GILMOUR: Yeah, another example on the other side on the other extreme is that let's say you have a one in 25 year or 30 year flow event in the spring that may 8 or 900 CFS and that high gradient reach you may see a significant amount of scour and actual flushing downstream of juvenile adult salmonids.

Well is that due then -- if you then go back and monitor it and say, "What the heck happened to all of these fish?" -- well it's got to be that these guys, you know, are not following their license conditions or you know, the operation of the project is severely altering the habitat. You know, and that may be the case but it's just so hard to tee that out without this incredibly complex, ecological effort, I don't even know what you would do.

It's something that biologists have struggled with for decades.

MS. WILLY: Yeah, so snorkeling -- what Bill had mentioned that it's relatively easy and not that expensive and it's a short duration -- so that's one thing that pre-spawn mortality is really strongly related and other anadromous project effects so that's one where we want to know if there are conditions in there that are increasing the pre-spawn mortality in that stretch because that's just not magic. That happens because of conditions from -- typically from dams.

MR. GILMOUR: So temperature is one right. Would you say that flow conditions are another.

MS. WILLY: Yes.

MR. GILMOUR: Would you say predation is probably another major source?

MS. WILLY: Not for spawning adults. I mean -- I mean, I don't know, you don't have a lot of barriers through there do you?

MR. GILMOUR: No but you have a lot of, you know, other mammal species that may be in that system whether they're -- I'm not very familiar with wildlife species in this neck of the woods but whether there are river routers or weasels or -- you know I'm not -- there's --

MS. WILLY: Yeah, I'd say to respond certainly

there are predators within the system and we, you know, definitely see predation from otters in the lower portions of the system but based on my adult mortalities, one direction that I think both IDO and ODO and temperature and flow.

MS. ERLEY: I would not say predation is.

MS. WILLY: Yeah, I just haven't had an experience with predation being a problem. It's more like the fish did so bad and it died and then the wildlife took it off, you don't even see it as part of your dataset.

MR. HOGAN: I guess I'm so -- if we are putting in place measures to protect water temperature and flow connectivity.

MS. WILLY: Right.

MR. HOGAN: Then what does pre-spawn mortality tell you?

MS. ERLEY: Well what the temperature --

MS. WILLY: It's our safety net -- should we blow it on this, you know?

MS. ERLEY: And what's the temperature at --

MR. HOGAN: Well we haven't established that. So what does the monitoring tell you? If let's say we hypothetically we recommended your flows and your water temperature -- what does the monitoring tell you -- the salmonid monitoring?

MR. WILLY: Do you want to caucus again?

MR. FOSTER: I don't know it's -- you're not going to know how good or bad things are regardless of what you try to set out you know, unless you actually look.

MR. HOGAN: And if you notice -- if you're requiring that the applicant monitor the conditions that they can control and we have mitigation measures and targets that they must meet -- monitoring the fish that those conditions are intended to protect you know, doesn't tell you anything because there are umpteen million other things that could be affecting those fish that's not related to a project and it is beyond the control of the project.

That's the issue we have. I can tell you I can't sell this at the office. I cannot sell to someone monitoring the plan.

MS. WILLY: And we heard that. We also heard Susan say you know, the Water Board will ask for some level of monitoring.

MR. HOGAN: And we're okay with that.

MS. WILLY: So that's a great place to let that rest. I wanted to make sure that I covered what we talked about.

MR. HOGAN: So I think we -- we will -- regarding the temperature threshold which is items 13, 14 and 15 -- 13 and 14.

MR. FOSTER: Probably up to 16 above I mean.

MR. HOGAN: Well just 13 and 14 with temperature thresholds early and yeah -- and 15 so those three. We'll look at those thresholds. I don't know that -- again we still have this rub of you know, protecting species that aren't there -- we will definitely take a look at it with consideration of the critical habitat but I don't think we're going to --

MR. FOSTER: Those criteria are protective of resident rainbow trout too.

MR. HOGAN: And we found that our recommended measures were protective in resident rainbow trout also. So I'm just saying that we now have more temperature data we're going to look at the project's effects but I don't know -- this is one of those things that we're in a chicken and the egg issue but definitely critical habitat has been raised and will be addressed in the NEPA document so I don't know where they'll end up on it is what I'm getting at.

That includes the Water Board's new recommendation for the 20 degree, you know, 7 DIM which was not considered on the Draft EIS.

The monitoring plan -- it sounds like we've covered this one already if you have any relative data we'll look at what makes sense -- what are holds are and the need for additional monitoring.

BMI monitoring we have not touched at all. This is one that we're struggling with and it's not just us -- it's going to be other projects -- I think you'll start seeing it. It's similar to the salmonid monitoring but it's how is this data used, how is it correlating specifically to identify a project effect?

MR. FOSTER: Well I know that the Water Board will use that as part of their water quality monitoring you know, things to do. You know it's -- it's again it's kind of related to the particular either -- I guess the temperature or flow or that sort of thing could create certain types of you know, (inaudible) development depending on, you know, that sort of thing.

It's a little bit -- it's information that goes into the realm of well how if something is out of alignment what's the possibility and then we start seeing well you see something to identify a potential problem and then you try and figure out well what would cause the problem and the investigation goes forward to solve the problem, you never look -- you don't know there's a problem if you never look at it. It kind of relates to it.

The fish monitoring as well I mean it's sort of --

MR. HOGAN: Yeah --

MR. FOSTER: But the item itself is a little bit

more apparent you know, in some of the you know, probably larger rivers with bigger impoundments and stuff like that where they tend to have so much cold water at the base of the dam and that has a different population of invertebrates that develop there because of these different conditions and that tends to change as it goes downstream.

It may tend to change a little bit as you go downstream here to but the problem is it's not nearly the same scale -- it's a smaller type of project. But like I said it is one of those things that the Water Board does use as a part of their suite of, you know -- their suite of action and things they want people to do so.

MS. WILLY: Yeah and so the project effect from my perspective to BMI is the maximum foraging period for BMI in the spring is dependent on the amount of area -- wetted area and so when that is less than there's that percentage of less food available. Something that we typically ask for but we didn't in this but you may see it come up again is terrestrial in all of the extraterrestrial studies is 50 to 80% of the annual biomass foraged for o.mykiss and that happens in like May, June, July period.

So if that's not being monitored also we don't really know what the change in the majority of the biomass is -- we're only looking at what the change is in the biomass from project flows to a wetted area.

So it's -- so the one that is maybe more expensive isn't in here. The one that is just as fair at what you got, get an idea of what it is, look at your conversation, ask someone that's in here and that's what the Water Board typically asks for.

So we -- we go with their guidance particular on this, and then like I said for larger rivers we would want to be looking at the whole suite. I think that because the project design and when it's diverted and stuff that this seems to get at biomass -- particularly biomass for fish.

MR. HOGAN: Okay, just a note and this is during the first four years of the operation and then every four years thereafter for the term of the license.

MS. WILLY: Yeah, most of them are every five years so I don't know why it says every four years.

MR. HOGAN: Why does it?

MS. DOWNEY: I'm sorry I will jump in. I want to say the frequency is, you know, it's not that we didn't think about it, it's just we needed to come up with something -- especially after you told us at the, you know, public meetings that needed much more specific direction so --

MS. WILLY: Usually that kind of thing we can dictate or say or as amended during -- something like that. So that's where it came from for us is just we were trying

to find a specific direction to give FERC.

MR. HOGAN: And I wasn't trying to put you on the spot -- this is actually Interior and NMF's recommendation.

MS. DOWNEY: We recommended -- I don't know why we're not on there -- we said that.

MR. HOGAN: Because it's NJ comment 401.

MR. GILMOUR: I understand that you know some of these larger projects there may be some desire to try to figure out you know if you have hypolimnetic withdrawals and other issues and PH issues or DO, whatever you have but I'm trying to thing -- do you know of any examples of run of river projects that have had BMI data used to modify or suggest modifications to the operations?

MS. WILLY: I know that we have adaptive management in some of them but I don't know how it's been implemented.

MR. GILMOUR: It's just that I mean, monitoring is great but I just -- I struggle with it too because you know, there's these -- I've been doing this for 25 years and BMI has conducted projects during most of my career. I just don't often see, you know, it's done you talk about, you know, percent, tolerate tax and present -- whether or not your sampling is done at the same time or conditions are similar if you have streaming effects.

You get a mixed bag of data and then it's kind of

hard for anyone to figure out what it all means and what -- how are you going to use that to manage the system or to modify operations? You know I think of that and in a like, you know, ideal world there'd be an unlimited supply of money and we could all do this monitoring and everybody would be happy and it would be great but that's just kind of not what we're living in right now and --

MR. HOGAN: You know the other thing for us is how do you discern it's a project effect? You know for example when we went out for the meeting on the DEIS we learned that there was a forest fire in the watershed and that that completely changed the stream down -- or the habitat of the stream downstream of where that fire line was.

Clearly that affected the BMI composition as well so does that become the licensee's responsibility? Now that's an extreme example but there could be a fire upstream started putting cows up instead of growing corn and then you're going to have an increase in nutrients which is going to change the BMI composition in the stream.

So how do you correlate your BMI monitoring to a project effect and then -- and Savannah when I said, you know, we need some bounds on what it is you're right. But we also need to understand how it's used. If we can't say how it's going to be used like -- temperature monitoring we

can tie that to -- if, if it's appropriate to establish a temperature threshold, temperature monitoring is tied to compliance of that threshold and I can make that sink, so --

MR. FOSTER: I think it's just to try to get at, you know, a general check on the health of it.

MR. HOGAN: But that becomes a management issue for us. That's not our licensee's responsibility.

MR. FOSTER: If you don't know -- if you do something like that and it looks good okay, you can't necessarily tell if it's, you know, from the project or not. And the problem or the purpose of that type of kind of a health check state sort of thing is when things and you check them and they don't go right.

And so it may, you know, we both know that there's a problem there or if you're even able to fix the problem once you are aware of it.

MR. HOGAN: Yeah well I don't disagree with you that BMI are indicators of the water quality -- absolutely. The question is how do you take what's going on with the BMI population and then say it's your fault -- fix it. I don't know how to do that and that's the problem we have is how do I use that to understand that it -- this effect, if we monitor BMI whatever we observe for a result in the BMI changes or no changes, are the responsibility of the hydro's.

You know how I know that it's the hydro that's causing this condition? And then how was it used?

MR. FOSTER: And I was going to say especially on this project where you're talking run of river operations with a small dam in which basically you're flushing the sediment through. So it's not like you're backing up the sediment -- like some impoundment.

Even with a run of river project, other rock projects might not be flushing the sediments and in this one you're flushing the sediments too.

MR. HOGAN: So I think we all know the value of BMI monitoring -- it's just when does it become the licensee's responsibility versus the management agency? If you're interested in understanding the system, you know, and knowing the health of the system that's -- because the management -- the resource agency's responsibility for a -- excuse me a second. Mr. Gilmour used a word hypo - something --

MR. GILMOUR: Hypolimnetic.

MR. HOGAN: Whoa.

(Multiple simultaneous speaking.)

MR. GILMOUR: H-y-p-o-l-i-m-n-e-t-i-c.

MR. HOGAN: I'd have to write it out. H-y-p-o-l-i-m-n-e-t-i-c.

MR. GILMOUR: Lim -- l-i-m netic --

MR. FOSTER: Oh limnetic okay.

MR. KUFFNER: As it relates to the BMI issue I didn't know it also -- Savannah and the state Water Board's letter there's also a comment about the water treatment facility up in Mineral Meadow that may have some chlorophorus, you know stuff that gets into the stream -- and again that would be coming from upstream of our site, that means we can't control that. So I'm not sure how that comment relates to the project impacts but.

MS. DOWNEY: We know -- we know that you can't control that and someone's monitoring for whatever you monitor for below sanitation tolerance sediment. No one could attribute it to you. I can't remember that comment exactly right now I don't want to repeat anything that's not right.

MR. MATTAX: In some respects I saw it as a looking for if we had information that you might not have and just more in a general because I don't know if that's where it was meant.

MR. HOGAN: Because I think --

MR. HENDERSON: I have a comment so if you're monitoring BMI and you're doing it properly upstream of the potential impact area -- impacted area downstream of that and you're seeing a change in that impacted area then you know it's like an adaptive thing.

What can you do with the project operation to maybe improve the BMI? I've been at the bypass reach -- you know, ramping rates aren't right or something like that and you could try to find the solution for that issue.

MR. HOGAN: I suppose if the habitat was similar throughout that may work but here upstream of the diversion location it's a low gradient meadow area -- so your BMI composition is not going to be the same or should not be the same as downstream through the canyon reach so you don't have that comparison you know.

I can see if it was a continuous light impact system that could work. You have basically your control and --

MR. HENDERSON: You could control at a nearby stream or something like that. I mean the point of the monitoring is not so much to worry about --

MR. HOGAN: You can't do that because you don't know if this changes in the watershed itself.

MR. HENDERSON: And you don't know if your control is actually the one that's being --

MR. MATTAX: Yeah but if you're doing pre-project monitoring you have that information too. So I mean if there's something wrong upstream in the project you're going to see an effect in the BMI right?

MS. WILLY: Well if it continues your base

monitoring will not change.

MR. FOSTER: Yeah and so then if you have that pre-project information you can see a change in the project area.

MR. HENDERSON: The frequency if something is going wrong upstream, you have something in the bypass reach and you can see if it maybe recovers downstream.

MR. HOGAN: Okay.

MR. FOSTER: It's also not a singular isolated type of process. You're gathering this kind of information from the fish, the state of the habitat, the state of the BMI and chances are if something's wrong with one of them, something is going to be wrong with all of them but it actually depends on the nature of the severity and you won't know that -- you won't know to look or question or see if you could even do anything without, without that.

And there are, you know, I kind of thing that yes there's a good possibility that maybe they're projects and you don't do anything about some of these things. But we're doing this to see if in fact, there could be something about it that may be helpful to improve it or you know, again the whole thing is if you wouldn't know any of that to be worried about any of that if you never actually go out and look at it -- even if it's not necessarily on an annual basis you still need some idea how's it doing you know?

Doing good -- great, fine everybody's happy you know. Something catastrophically goes wrong you can ascertain how to fix it but not necessarily focusing on blame you know, we're focusing on how to fix it, how to make it better, you know, bring it back up to speed.

And to the extent the project can help with that is all the better. But again --

MS. WILLY: So after hearing all that can I ask a question?

MR. FOSTER: I don't know what else to say.

MR. HENDERSON: Here's the table that shows projects where flows were increased let's say, before and after and shows the response to that management or that operational adjustment. And sometimes you know it does change -- increases the trout abundance in one study but changes or increases it in another and if you see the bottom one and there's restoration of invertebrate populations if you increase the flow.

So you don't know until we do the science.

MR. HOGAN: If you had target population levels that you want to meet that's something that we can analyze and recommend monitoring for -- didn't we say 50% in our condition?

MR. GILMOUR: I believe, yeah I believe we had 50% of -- 50% decrease in some intolerant attacks or

something like that.

MR. HOGAN: So I mean we're heading in that direction so -- 50% increase in tolerant attacks and then what?

MS. WILLY: Okay so before you get to them I'm just going to make sure we are in the same place. So after the license say just like hypothetically we have three years of snorkeling data so we have an idea of composition and age spots in different areas.

And we also have three years of BMI in the same way so we would know what the composition of the fish is and the numbers and the same BMI composition and findings. And we monitor after the project is in place or after they're salmon -- whenever that next moment comes in time, and we find that there's a decrease in maybe an H class of salmon or something like that and commensurate date increase in BMI and we notice that oh this BMI decreases -- matches with the stage class and so if you found decreases in BMI and some part of the demographics of the o.mykiss population, do you know would that not be a project effect or how would you tease it out to show that that's in fact not a project effect?

MR. HOGAN: Well so that's kind of our issue. How do you tease it out to show that it is a project effect? How do we know that those first three years weren't normal

water years and then we have the dry year and that's the reason for the decrease in the BMI in the fish population?

Or we had a flood year and everything was just flushed out and scoured?

MS. WILLY: Because we have wet whale, we have other populations that we sample so for -- I can't speak specifically to BMI because I don't sample BMI but for salmon we can have -- we have a sampling protocol for juvenile salmon and we can show how different rivers are doing in the same year and if they're all looking the same and one's really low, that says something happened in that one river.

And I'll flip that like Clear Creek there was one year we had really, really low returns for salmonids because of poor rain conditions and some drought conditions. But Clear Creek had the same -- they had a small decrease in returns but not anywhere near like in the west of the state.

So went whoa -- why is it Clear Creek has all the salmonid back and hardly any other place does and then we looked and it had to do with the stream conditions. It had to do with the material, PMR, that kind of thing. So it works both ways. It helps us know when we need to get in and remediate.

There are ways to increase BMI through monitoring the material placement and habitat enhancement. My

experience is more with the terrestrial subsidies component because I see that as a huge part of supporting a population, particularly for steelhead.

But with the instream with which the Water Board uses it's more that juvenile rearing period, you know, that you're looking at. So there are ways to enhance if you see oh, oh, this one is not doing so well, other ones are -- what do we need to do?

Now would that enhancement be that project? You know, we didn't talk about -- we didn't talk about any.

MR. HOGAN: We didn't --

MS. WILLY: Yeah but those are things you do to significantly increase BMI bio-availability to someone.

MR. HOGAN: And I think that goes along with what we're saying. We have -- we're recommending mitigation measures for flow, debris, sediment so based on what we interpret the project can affect BMI we are addressing those things. So could we go off the record for a minute?

(Off the record 4:44 p.m.)

MR. HOGAN: Back on the record, so we do recommend we could bring some of the management plan. The proposal and the working system to the Interior there -- where we are inconsistent is with Interior administered recommendation for monitoring sediment retention of stream with the sluice gates -- reach-wide parameters -- this is I

believe NMFS, maybe it's also the reach-wide parameters for length gradient, width depth, basically just the habitat monitoring that's in the bypass reach, substrate composition, substrate consolidation percentage embeddedness, camping cover and so forth.

Our thought process here was we're supposed to -- the sediment -- we're going to be moving it based on our analysis it should be moved -- and we would agree that it should be moved at least every two years. I think it's 400 CFS -- is when the sediment -- the system events would occur.

It could it occur more frequently in consultation -- that was our recommendation. One thing we did pick out in -- from the comments on the Draft EIS is that NMF's had a request which I think was overlooked in the Draft and this request to monitor sediment build-up in the reservoir and the Water Board had a request to monitor turbidity during system events.

We are onboard with monitoring the turbidity during the system events and we think that could then inform the sediment monitoring plan and the flow that occurs. So basically if doing it at 400 CFS exceeds a certain threshold of turbidity maybe 450 is the more appropriate or it could go vice-versa. It could be done at 400 or whatever it might be.

So there's monitoring sediment in the reservoir -- that's something where we could see -- hey, is what we're doing to move that sediment downstream effective? Is it on -- on a frequency and a magnitude -- is it being productive?

So we can agree with both of those components. Monitoring the habitat response in the bypass reach we're of the opinion that these large peak flows that we've seen in the passage channel changing flows will continue to occur with or without the project and we don't have a reason to monitor the results.

If we're putting that product down into the bypass reach that's -- we're removing the project's influence there.

MR. GILMOUR: That ties directly the PCE's to maintain or that is exactly where you're maintaining natural sediment and larger debris processes in the system and I think that it can be argued that by doing this it will maintain that.

MR. FOSTER: I mean I do think that if you can keep the sediment moving periodically and keep the wood moving -- moving past that's probably the best you could do in terms of you know, providing that -- that substrate.

MS. WILLY: That's the project but I think even like if it gets low or fractures the only fix is to move it. Engineers on log jams and it's kind of the right shape

through this -- inside channel, shut it down in there and that will increase (inaudible) for salmonids in a big way and also change a little bit of the sediment composition near that will change the spawning, usually increase the spawning in those areas. So I like the idea of passing it through and making sure that the system continues that ecological function but the mitigation part of placed wood isn't really a part. It could be if we looked at BMI and said whoa, it's too low it's changed, let's get some wood in there and do that.

MR. FOSTER: Well I hear what you're saying though that you're passing the wood that comes to you and you probably would have to try and pass most of it if not all of it.

MS. WILLY: Yeah.

MR. FOSTER: And you're periodically allowing the sediment to just sluice out that that would sort of sort itself out downstream as the conveyor belt of substrate would keep going.

MS. WILLY: Yeah.

MR. FOSTER: And maintain the -- the thing is it's not going to move -- it only has to move during some of the high peaks and some of the high peak flows they're -- I'm thinking anyway, that they are 100 CFS and the material would change the effect of them being able to move material.

MS. WILLY: Yeah, yeah all that's true. I agree with that except one little change that I've noticed about in the past five years is that I used to just like -- oh it's going to move through and be part of the system but I noticed that the piece they come in really big and would have the most effect on salmon habitat and stream dynamics -- actually in a (inaudible) sometime between the project and where it is in the river so you end up with smaller pieces that actually float away, smaller pieces yeah, so that's really a hassle for some of the projects to handle a piece of wood that's say 45 feet long and they're like oh my God it's too big, let's put it in six foot lengths and put it over there.

And so we never really got into the specifics of that on this. So I really like the idea and I totally agree with the concept, I just want to note that in the past years I've noticed a lot of chainsaw activity on some of that.

MR. HOGAN: But we can prevent that. If that's a concern then I mean we can just say it won't move it shorter than 30 feet in length, you know.

MS. WILLY: Yeah and I don't know the measurements but there's a specific ratio to string bed of what sticks and what doesn't. So you want to push things through that actually stick.

MR. FOSTER: One thing I would note though is if

you've got a piece that's managed to get down to your dam or your impoundment and the farther upstream you goo the smaller it is downstream tends to get --

MS. WILLY: There, yeah.

MR. FOSTER: I'm hoping that piece that's gotten down that far would just keep going but the only thing and again assuming once you get it over that hurdle and then let nature kind of takes its course -- that's what I don't know whether you'd even need to -- you may not necessarily have to monitor for that because like I said you're trying to -- if you're putting over what comes down you're kind of doing its work for you.

MS. WILLY: So I'm taking this out of that context of putting things down adding that it needs to be what came into the reservoir needs to go out not some modification of that, but this BMI component that I know is off the table right now -- the large sticking pieces are the things that can bump up the BMI. So if there's a way to mitigate the loss of BMI with the wet side spaces.

And if they're with all this those big pieces show up every time there's a wind event make it show up -- we recommend typically again, we didn't -- but we do per se -- hey any pieces, should we get it in, (inaudible) pull it out and then hang on to it and get it into the river.

You don't have to like carry it down that day but

find a way to move it down and get it into the river.

(Multiple simultaneous speaking.)

MR. FOSTER: Historical projects that maybe want storage reservoirs and things like that.

MS. WILLY: Yeah.

MR. FOSTER: Or you know get rid of it.

MS. WILLY: Yeah, well they will have widths on this they just won't be so --

MR. HOGAN: We're going to have Charlie -- just a little short spiel about Rugraw is proposing for sediment and large weighted debris sluicing and a design of the dam to accommodate that.

MR. KUFFNER: So the diversion structure has a couple of elements in it. One of the elements is a pneumatic radial gate essentially in the middle that allows when a big storm event comes through to go down that operation and let the entire river be the way it was before through the opening of the radial gates and I don't have the dimensions right here but it's around 20 feet wide -- maybe 24 between two of the --

So the concept is that any large weighted debris that comes down and through and gets into our -- actually we've got one in there a diversion that we wanted to get over the dam and down into the structure itself. The way they designed the intact to the conduit is it actually has,

you know, concrete down over the top of it so the water goes up -- so the wooded debris won't go into the, you know, screen area it will go over to where the dam is.

Now on flows to a certain level our plan is we have a couple of sluices -- bottom sluices at either side of the diversion structure. So our plan is to let a lot of the over minimum flow if we have -- you know, 200 CFS coming down and we're using 100 I'd say so we have 100 CFS going over, we'll have 13 going through this, you know, at least this fish way tube that's in the screen but then, you know, make sure the fish have safe passage downstream and make sure that we have the minimum flows.

But any other wooded debris that comes up against our structure of the plan is to get over the top of the structure and to get it down. We don't have a plan to pull it out and we don't have a plan to cut it up. We have a plan to just leave it at the river.

MR. HOGAN: So would you be against a requirement that it remain intact full-length as it came in?

MR. KUFFNER: There may be a limit to what we can pass through which would be the width or the two sides of our gate so that would be going in but that's like 24 feet or something like that. The door to the structure is about 9 feet tall but the radial gates drop all the way down. The radial gates are going to drop all the way down.

UNIDENTIFIED SPEAKER: They have a brace on top -- the radial gate comes up to and will still be opened.

MR. KUFFNER: Oh really, yeah, it's pneumatic so it just comes up to a stop and you just reduce it and it flows over. We'll have to be careful with that because we'll have to do ramping rates and you know, we know.

And that's why we talked about doing the large sediment sluicing through a large flow of that where we drop the radial gates and have the whole rearing -- the thought then would be that any debris that has been built up that did not already go through the two bottom site sluice is that, you know, I imagine there will be a little crown on that, you know, sediment as it builds up because it's going out here and it may not be in the middle.

So we dropped inside the big flow -- we expect all that stuff to minimalize and get picked up and moved down.

MR. HOGAN: I can foresee, you know, instances where a chainsaw needs to come out in order to get it past and you know, I could support, you know, as long as it's not a dam safety issue -- consulting with Fish and Wildlife Service and the California Department official why you are doing that so if there are appropriate links to cut it up and facilitate getting it past that would work for us if it works for you.

MR. GILMOUR: Is there going to be a crane or any other structure that's going to be near that?

MR. KUFFNER: Not permanently but we do have a pad that we will be able to bring in a mobile if we had to.

MR. GILMOUR: Okay.

MR. FOSTER: Well I for one kind of feel like I'm perfectly happy with them sluicing the gravel and moving the wood over and I think if you do that I don't think there's -- there's really in my view, there's really not much more you need to do for that. The only thing I would caution is do you want to look at your dam and your sediment build-up on a somewhat regular basis so that you know when it would be a good time to you know, release it -- maybe that can be part built into the actual plan.

MR. GILMOUR: I think that may be to act as best interest too to make sure that the small impoundment doesn't get load on the sediment from the operational perspective.

MR. FOSTER: Right.

MR. HOGAN: So as we recognize based on coming from the Draft EIS, NMF's has a recommendation to monitor sediment deposition within the reservoir. We thought -- you can tell me if this works for you. In my mind when I interpret what you wanted I was thinking okay, if there's a sluicing event you have modular -- or actually fill the dams, go and get a transits or double trans-sets in the area

where the reservoir would be, the impoundment would be.

And after the first sluicing event you go out and you measure those transits again and see if there's still sediment or if those transits now represent what was there before the dam was built.

You do that periodically over a couple of decades or I'm sorry, a couple of sluicing events -- it should be about a decade and you have an idea of whether it's affective or not.

MR. FOSTER: Right because you have some of the symmetry of your pool and you're actually sluicing stuff out or sustain the build-up.

MR. HOGAN: Or as it's starting to build-up.

MR. FOSTER: Exactly.

MR. KUFFNER: And that's as easy as a rubber raft in the GPS -- and/or GPS basically.

MR. HOGAN: And then if your finding there is build-up that could trigger a modification to the sediment sluicing plan which okay -- maybe sluicing's not working but either the flow that we're doing it at isn't working or -- we need to you know put a dredge in and actually move some of this material periodically in every decade or whatever.

The idea is to make sure that the program is effective.

MR. FOSTER: Right, I mean that does make sense

to me.

MR. KUFFNER: We have a couple of transit rates through there from our base sediment study. And what we would do is we would put some, you know, monuments up that would be, you know, out of either bank so that --

MR. HOGAN: Yeah we would have to develop possible --

(Two people talking over each other).

MR. KUFFNER: We would have controls and we would then relay those transits out again.

MR. FOSTER: If you need to get a good idea of your impoundment and just upstream of your impoundment because what should happen is your good gravel stops when you drop out first.

MR. GILMOUR: But then when the big flood flows through you've got to know that that stuff getting picked up and carried as well as capacity because you don't want your good stuff sticking behind just because it didn't --

MR. HOGAN: Right, so --

(Multiple people speaking at the same time).

MR. HOGAN: So this monitoring with the reservoir sediments would require the plan redeveloped in trust with the agencies but if you can identify, you know, the appropriate number and location of the transits that would be monitored basically to evaluate the sluicing plan,

effectiveness and make any recommended modifications to the plan.

MR. FOSTER: I mean you're going to need to know yourself what the basic average size of the small impoundment is. It's going to be -- you know at times it will be bigger than not, depending on how much is -- you know, there's going to be some sort of average size to it maybe on a CD basis.

MR. KUFFNER: It's almost always the same size.

MR. FOSTER: I would imagine so.

MR. HOGAN: Yeah it's run of river so the impoundments --

(Several people speaking over each other).

MR. KUFFNER: Because I mean it's going to adjust very little over the top because we're going to let more of the water out from the bottom so your top level isn't going to change much.

MR. FOSTER: The surface area that may change as it becomes -- just a positive yes or no.

MR. KUFFNER: It could -- yeah, it could change the topography. It could change --

MR. HOGAN: That's why I was saying you know, you would do the monitoring prior to construction or establish your transit prior to construction and then monitor the resulting sediment post sediment sluicing. If you found

that your transits are the same before you build the project, hey things are functioning the way they're intended. And if they're not then we need to look at the sluicing program and what changes need to be done there.

MR. KUFFNER: I looked up at the ridge and there are actually three pneumatic gates that are 8 feet apiece. We have a 24 foot wide opening that we can accomplish stuff -- 24 feet.

MS. WILLY: 24 feet.

MR. HOGAN: So was that in mind -- is everybody okay if we're not going to have that monitoring downstream of the dam based on these recommendations? I think we're --

MS. WILLY: You said happy. I think you're not going to -- you just asked if we're happy with it?

MR. HOGAN: Can you -- can you live with it? Just curiosity does that also carry recommendation over -- all that stuff? I think it was just --

MS. WILLY: Yeah a lot of stuff.

MR. HOGAN: It's a joke now.

MS. WILLY: For me the canopy pillar height and diameter -- this is really important because if that changes that's when you see a big, big change in asked for settlements -- that's what you want to know. You want to know if the project is reducing them right there in the

canopy.

MR. HOGAN: How are we going to do that?

MS. WILLY: In the drainage.

MR. HOGAN: How do you know there's a project on there -- if you're moving --

MS. WILLY: Every dam does that.

MR. HOGAN: If you're moving all the sediment downstream the way that it's supposed to go.

MS. WILLY: But this is not attack moment right now.

MR. HOGAN: But it's tied to our sediment sluicing process.

MS. WILLY: I see, got you, oops.

MR. HOGAN: I mean we've got large weighted debris, all the wood is going to go over the dam -- ideally all the sediment that's coming into the impoundment is going to move down through and be put into the system. We have channel changing flows that are going to be regularly put through the reach.

We're not -- given the size of the project we're not seeing a lot of effect on the functionality of this channel, the project we have.

MS. WILLY: So I get it that it's not in the right place so it's hard for me when you say there's not going to be an effect when I know that the snow melt

recession is what causes riparian regeneration and without the trees you don't have the bugs and then you don't have the fish.

So I think we put it in the wrong place, that's our mistake, but there are ways to measure changing canopy really infrequently and people do it with drones. They just go over and so there are ways to do it like every 10 years, and that's like the regeneration cycle for the trees is about every 10 years. Alright I'm just not fond of it -- I don't like giving it up because that's what happens. You know downstream of the dams you lose riparian when the water table isn't engaged the way it was, it's just not.

MR. HOGAN: The dam is you know 7/10ths of a mile upstream.

MS. WILLY: I know.

MR. HOGAN: Of Angel Falls.

MS. WILLY: It's a small little thing but I'm just -- I think well what if we had a change in your insect biomass because there's less water in the bypass reach during the time when riparian trees should be established in the valley.

So this would be like a loss effecting regeneration for years but like I said I see that it's not in the appropriate place.

MR. HOGAN: Well you know --

MS. WILLY: And then that goes --

MR. RYCHENER: I just think you're still going to have the sediment transport, you're going to have the high flows, you know, to wash away sediment to create the bare mineral soil determination. You're not going to do anything that's going to -- in the spring you're still going to have the water going through the project. I don't see where you're going to interrupt the germination system.

MR. GILMOUR: Well you also have a fairly defined bedrock dominated canyon which is not your typical broad flood plain where you'd see some of these --

MS. WILLY: Right, well I mean I don't know. If we lose the canopy there that's a loss of habitat into the future for quite a long time. So I'd like to know if there's going to be a canopy. There are ways to fix that with flows.

MR. HOGAN: What flows?

MS. WILLY: With recession flows in June, there isn't one but like I said this is like way, way at the end and so I'm like it's such an easy thing to do but I guess you're question to me would be because I'm pretty good at occasionally stepping on issues. It's okay well what would be the mitigation route? Well in other years it's some riparian plantings. We go out and stick some -- eggs wherever there is sand or dirt and say let's put some trees

in here, get that canopy -- edge canopy back in place. So that's what I would like to see but it is -- like you said it's not specific to sediment.

MR. KUFFNER: We have to spend some more time on that project reach I think.

MS. WILLY: I do.

MR. HOGAN: What's the minimum flow tomorrow?

MS. WILLY: So if I'm the lone person on this I can -- I can let it go if I'm the only one.

MR. FOSTER: They are despite the harder GFS that they can take out that might reduce the flow in the bypass region by 80%. The time of year -- the other times of the year when they're probably going to be flow much higher than that, than what they can take and it's that flow that's going to provide some of that, you know, wetted perimeter.

MS. WILLY: Do you think there will still be recession in it?

MR. FOSTER: I think you're going to get the natural recession that happens.

MR. KUFFNER: They will.

MR. FOSTER: The amount that they take out isn't going to affect it as much if it's a small amount relative to a larger amount that's coming down.

MR. KUFFNER: It will actually recede.

MR. FOSTER: It's going to come down and stay

aloft.

MS. WILLY: It will taper.

MR. KUFFNER: Yeah it looks the same but it just stops in there.

MS. WILLY: I'm almost going to say --

MR. KUFFNER: It will come down the backside the exact same way as it would before.

MR. FOSTER: All the way down to 118.

MS. WILLY: All the way down.

MR. KUFFNER: All the way down to the amount that's being diverted. So the height looks identical.

MR. HOGAN: So just a curiously so we can show what -- or so we can analyze the issue. You're looking for natural hydrograph-type events from when to when?

MS. WILLY: Oh May, June, July in the wet years. So it sounds like that's a very high likely event and --

MR. KUFFNER: We have really good data from 2017.

MS. WILLY: And actually it might be above normal in some the wet years have too much water during the regeneration period and the water is too cold and they don't so it could be a -- depending on.

MR. KUFFNER: We don't have that issue. Our flows were down to -- natural flows were down below 18 CFS by the middle of July.

MS. WILLY: Yeah, so you have that yeah.

MR. KUFFNER: And we would be off -- we would be off and that's on the wettest year on record, we'd be off.

MS. WILLY: Yeah so see some rivers it's above normal and there's a --

MR. HOGAN: So we'll do the analysis that hopefully gives you the warm and fuzzy feeling that the canopy won't be an issue.

MR. WILLY: Warm and fuzzier. There is a lot of modified snow melt recession in the reach in the wet years so I don't have to worry about canopy going away or if it does they're still be trees regenerated in that area between the low water and where it would have been.

MR. KUFFNER: It's almost all rocks in this place.

MR. HOGAN: My point is that you've raised an issue and we need to evaluate.

MS. WILLY: Yeah, thank you. That was quick.

MR. HOGAN: It doesn't mean that we're going to agree to the terms.

MS. WILLY: I didn't know you would need a diagram. Nobody what?

MR. KUFFNER: Has that policy.

MS. WILLY: So we're on 20?

MR. HOGAN: Yes we're on 20.

MS. WILLY: I see that and I also see that when

you do a bald eagle management plan you implement all of the measures so they don't get killed so to me -- I mean I would hope that they aren't constructing transmission lines that are going to kill bald eagles. That would be no.

MR. EMMERING: So this kind of the quirky one, this is Quinn. We don't adopt the guidance and that's basically saying we don't adopt it as a whole because it contains dozens of potential measures.

MS. WILLY: Oh, okay.

MR. EMMERING: We do recommend that it is considered in the development of the bald eagle plan.

MS. WILLY: Yeah.

MR. EMMERING: And it will be filed, they'll prepare their plan they'll just describe how they are going to construct the lines that they think that they need to have, you know, diverters or -- reduction measures or that sort of thing. They'll put it back in there based on what's in the output guidance.

And then you guys will be able to review that plan and comment on whether you think that's appropriate, whether you think more is needed and then it will go to FERC for approval. So we're just saying that we're just not adopting it right. There is so much variability on what -- how that gets implemented from one project to the next.

MR. MATTAX: There's something in aiding a

protection plan where some of those concepts could be integrated into that.

MS. WILLY: Right and I get that. And so there just this idea when you're putting in a transmission line, designing and constructing it prior to the plan and then if the plan says oh, you need to have these markers on that so the birds don't fly into it and get killed, well too late it's a retrofit. That's one of those.

MR. HOGAN: Do we --

MR. EMMERING: No, their plan will be adopted and approved before construction of a transition line restarting.

MR. HOGAN: Okay so we got that resolved but we have to make sure we specify that comment.

MR. EMMERGING: Okay.

MR. HOGAN: The other ESD that resulted.

MS. WILLY: Yes, yes.

MR. HOGAN: Right -- develop a bald eagle management plan which we agreed to -- we have a lot of text here and I don't have my glasses on.

MR. EMMERING: I'm having trouble hearing you Ken so I don't know if you're --

MR. HOGAN: 21.

MR. EMMERING: You're really low on this end.

MS. WILLY: So it's 21 and it was a yes and yes

so I don't know if we need to talk more about it.

MR. EMMERING: I guess the only question was that the is it clear that I think you stated in there that there were components that are not fully included or something?

MR. HOGAN: That was a DOI comment?

MS. WILLY: All the elements stated in our 10(j) conditions so.

MR. FOSTER: I'm trying to remember I think maybe the DEIS didn't bring up consultation with resource agencies that might be an issue there.

MR. HOGAN: Okay so.

MR. EMMERING: We do recommend consultation.

MR. HOGAN: Yeah so in some of the --

MR. HENDERSON: Which agencies?

MS. WILLY: Usually we go together. We work together on all eco plans.

MR. HOGAN: So I think.

MR. MATTAX: So should the resource agencies not just one or the other agency?

MR. HOGAN: Oh well I think okay so in the executive summary we got comments on the executive summary where we did not specify cost in Section 5 where we have more in detail depth. We actually list each of the agencies we consulted and Fish and Wildlife Services and Cali Fish and Wildlife.

If Cali Fish and Wildlife was not identified -- that was an oversight and we'll make sure that that's corrected.

MR. EMMERING: I think that's an applied complication with California VFW and not the --

(Simultaneous speaking)

MR. HOGAN: Okay, that was Quinn -- that was Quinn. Yeah where are comment or where our question was, was in general Interior's comment just said this measure should include all the 10(j) recommendations -- almost as a criticism that we didn't and we weren't clear what didn't we include and if we didn't include something what are they so that we know we should be addressing them.

MS. WILLY: Can I say conditions because I have that open here -- or he's got it.

MR. MATTAX: You may have hit on the problem. Some sections talk about consultation.

MR. HOGAN: And I think that's different than our question. Sorry.

MS. WILLY: Okay so okay the main thing that I see is we wanted this review period.

MR. MATTAX: I think I saw that and realized that there was one missing from the requirement -- consultation and so that meant I just put that comment in there. We have to follow all of these conditions including consultation.

MR. HOGAN: Okay.

MR. HENDERSON: I didn't go down the list of the entire document to make sure every condition for the bald eagle --

MR. HOGAN: Okay so this consultation is --

MR. HENDERSON: In the DEIS.

MR. HOGAN: Okay.

MR. HENDERSON: But as far as I recommended to FERC the verbatim into the document so then you could see that what you're talking about in your comments, do you see what I'm saying? So if you put it in the plan or in the EIS then you're going to follow everything that's in there.

MS. WILLY: And there's only two conditions so it's just like --

MR. HOGAN: Well it's more than that.

MS. WILLY: Is there? Condition 7 only has two.

MR. HENDERSON: I recommended all of our recommendations are conditions in the EIS, all of the conditions in the REA.

MR. HOGAN: In the REA, okay.

(Multiple simultaneous speaking.)

MR. HOGAN: So what you're saying is that they're not.

MR. MATTAX: No I think what he's saying is towards the work but what their recommendations and we're

adopting everything that's in our -- within quotes.

MR. HOGAN: Okay.

MR. HENDERSON: Which I can see benefits and (inaudible) for that. The time in that is if we misunderstand something it's going to be a lot harder for the readers of the EIS to pick up on anything that we misunderstand in the recommendation.

MR. RYCHENER: I think there's also -- this is Tyler, there's also periods of times where the recommendation isn't written with enough clarity to know exactly what the bookends or the measures are for what exactly is implied by the way the recommendation is written and so we have to make sure that it's -- that we're putting it in a way that it can be interpreted into the future replacements, preparation and that sort of thing.

MR. HOGAN: Yeah, it's just an addendum to the DEIS right?

(Multiple conversations.)

MR. HENDERSON: But see the recommendation and conditions verbatim that you're referring to --

MR. HOGAN: But that's what our record is.

MS. WILLY: That's for what's for?

MR. HOGAN: Our record and we referenced the letter in the filing. We're the government we're supposed to be doing paper reduction.

MS. WILLY: I actually only see two conditions that stand really clear and I don't know why it's an issue for that condition so because that's the -- that's what we asked is to put everything I think there's 7 now right -- where it just says, "Include all stated departments in 10(j) conditions 7, so.

MR. HOGAN: And so our question was so what did we miss?

MS. WILLY: I don't know.

MR. HOGAN: Because as far as --

MS. WILLY: Well actually because you already put these additions in here and now we're saying put your conditions there?

MR. HOGAN: Yeah, so we were thinking we did what you wanted and we have saying put all of our conditions in -- it's like what did we miss?

MR. HENDERSON: We talked about why we made that comment because and one place in the DEIS you couldn't -- you didn't agree to consultation therefore you didn't include it.

MR. HOGAN: So our executive summaries are supposed to be summaries even though they're usually this long but Section 5 was where the need of what we're recommendation should be as a requirement in a license and that's where the detail is. So if you think you know, the

licensee should be consulting with purple people-eaters than that's what we say. We don't necessary say it and list it on the executive summary -- we try to keep that to developing a plan.

We don't have to specify every agency that they are with regarding while that plan was in the executive summary. In Section 5 it will specify who they need to consult with and what that plan needs to do.

MR. FOSTER: Are you going to make draft license articles?

MR. HOGAN: We weren't planning on it.

MR. FOSTER: Just curious.

MS. WILLY: Okay so in the interest of time you said yes and yes. We stated something which sounds like there's a clarification that's already in there so oops, didn't mean to offend you.

MR. HOGAN: We just want to make sure if we were omitting something, we knew what it was and we could adjust it -- that's all.

MS. WILLY: Okay thanks, so now we only have really one left even though it's -- number 23, the legged frog protection plan and protect their breeding habitat during construction. You said yes and included a recommended special status and clearly you had monitoring in the protection plan.

So then that sounds great and the conditions should probably read -- develop a -- do you want to say special status amphibian monitoring plan and that would include California yellow-legged frog and any frogs or salamanders that show up along the way? So, because the next one where it says develop for a monitoring plan I see no and no and I understand that but in the protection plan usually you figure out where they are, put in a buffer, have some conditions on the area.

So I'm hoping to see similar protection for both of those species under your special status amphibian and monitoring and protection plan.

MR. RYCHENER: I think part of the issue is that we don't know what -- say it was regulated frogs -- this is Tyler I apologize. The plan or the recommendation just says to provide for and allow California red-legged frogs to become re-established and to protect from manageable threats. That's really wide open and we don't know what manageable threats are you referring to? It's difficult for us to just put that in verbatim because that could be very broadly interpreted.

We are including monitoring and control measures for both frogs which we think is the primary risk to red-legged frog habitat in the project area. Right now there's none. We're talking about a very small impoundment

area and just -- the only potential habitat in the region -- in the project area that was identified is maybe being red-legged frogs habitat where two man-made ponds along the transmission line -- that it was only moved so the riparian area from the stream and so we're skeptical to say if that area is going to become colonized naturally.

We weren't sure whether you were saying USHS deemed that the applicant developed some sort of plan to reintroduce California red-legged frogs and then pay for you know, monitoring, reintroduced populations or it was just very hard to interpret.

MS. WILLY: Okay, so we'll get to the power line frogs but what we have found in every comment that I've ever worked for the past 35 years and that is bullfrogs do become established in impoundments, so --

MR. RYCHENER: And that's probably will control them.

MS. WILLY: The best and so the risk that happens of course with the influence on control is there's also a risk for future distraction of the stream which effects amphibians downstream so it's awesome that you're doing bullfrog control and it's awesome that you're not saying eradication which gets everybody worked up, control and then proper protocols to make sure that your equipment isn't contaminated so that you're not adversely affecting the

native frogs while your removing the mainland species.

So that's the kind of protection we're looking for and as far as re-introduction goes we'd just like to have an opportunity if there is creature free habitat that if there's a reintroduction program that the licensees don't say, "Oh no, you're not doing it right."

So our understanding that whatever it is we work up with bullfrogs are going to support native frogs and so there wouldn't be any additional burden on the applicant -- the licensee. We want to make sure that the process is thought out.

So for the project it sounds like you're right on track and that's the kind of thing we want to make sure we're all on the same page on and put that in some kind of explanatory document. So --

MR. KUFFNER: So if I could make a comment -- I didn't mean to interrupt you there but the transmission line in an alternative transmission route that was requested by the city -- the residents of the city of the Manton.

MS. WILLY: Okay.

MR. KUFFNER: And we had articulated that before the Draft EIS was done and it didn't quite get picked up. But because of the rerouting those problems are both off of School House Road and we're not going up School House Road anymore, we're going across Basin Road and then up South

Powerhouse Road.

MS. WILLY: Right.

; MR. KUFFNER: So we're actually not going next to those two ponds anymore.

MS. WILLY: That's what I thought. I thought so that was our major concern coming in as --

MR. KUFFNER: Right.

MS. WILLY: But that and the other one is when you have ponds that you won't be going by impacting but if bullfrogs do get established they just disperse out of impoundments and swamp up to a mile all the red-legged frogs.

MR. KUFFNER: Yeah, these ponds are about five miles from the creek, they're 11 miles up the --

MS. WILLY: The thing about bullfrogs is they go -- a male bullfrog can go about 10 miles out of habitat and disburse.

MR. KUFFNER: Wow, that's huge.

MS. WILLY: Yeah because once they're hopping, they just -- they will hop until they die or find a pond.

MR. KUFFNER: Just like the Calaveras frog jumping.

MS. WILLY: Yeah they just keep going. They look really sad hopping. With the smaller ones I only know of distance of like maybe 3 or 4 miles so the smaller they are

they just don't have the energy and the body fluid to go the great distances, but --

MR. HOGAN: I don't have the energy.

MS. WILLY: Yeah so it's just we try to make sure there are simple inexpensive ways to remove bullfrogs, either the eggs or the males and just limit the dispersal -- it's pretty straight-forward. So I'm just delighted that you're doing it -- way out front with that.

And so when we work on the plan we just like to make sure we've walked through the de-contamination protocol and we talked about methods and you know if you were going to use guns to do it we're like, eh, eh, eh, we really don't want to -- permit you to use guns but we're going to have to write an opinion that could allow accidentally killing the red-legged frog.

The ISO person is not going to be in there. No, no, no -- but that's what we would actually write a biological opinion, you know, we could do that. And it would actually make the project -- we would call that action a benefit and then the biological opinion would exempt the take -- it could happen from the -- so it's actually a positive process.

MR. HOGAN: Just a clarification -- we don't need a biological opinion here right?

MS. WILLY: No, we'd like to give you one if

you're managing appropriately. So we had asked -- didn't we ask you formally to consult on the red-legged frog in our --

MR. KUFFNER: We did a red-legged frog study and we consulted with the California Fish and Game. I don't know if we kind of --

MS. WILLY: Yeah we want --

MR. KUFFNER: U.S. Fish and Wildlife Service -- I don't know the answer to that but we're happy to do that with you and we have the study that we can look at.

MS. WILLY: But this is not like a regulatory burden -- this is us making sure that they are covered and protected and are doing everything.

MR. HOGAN: So it is or it isn't formal session 7 consultation?

MS. WILLY: I would make it formal just because if the eradication involved recurrence -- because people do make mistakes, you know. I know it's unbelievable. So for example --

(Multiple simultaneous speaking.)

MS. WILLY: So if you were on (inaudible) -- we've both done this, you go out in your deep hole skiff and you work the edge and it's very easy to spot bullfrogs at night if you got the right light. So we would talk to you about, you know, what the right light is and how you can tell the difference between the species and then it moves

along the shore -- ping, ping, ping, and if that was your choice of methodology.

MR. KUFFNER: It's a little rocky --

MS. WILLY: I know but they are very different looking at night, but say the person in the boat, in the evening, but they maybe don't have really good red/green vision so it's hard to tell the difference between a sort of red-legged frog and a green bullfrog in that they stick their -- you know --

MR. KUFFNER: You get the wrong one by accident. You're saying that the take related to the earlier eradication is understandable.

MS. WILLY: And it would be -- the incident alone it would be incidental it would be non-intentional. And then if you did have the red-legged frog there's a little collection protocol and you put it in a container and it goes through an exam, and you know, that's the cost of shipping and a little bit of.

MR. KUFFNER: We're happy to consult with you on that to make sure that we know all the rules that you want us to follow if there's an issue.

MS. WILLY: Excellent, see these are easy and fun because you're doing something that's really cool and we can -- and now okay I am offering this biological opinion out of the goodness of my heart because it's not my office's

expertise but we have expertise and a willingness to help you through the process so we'll do that.

MR. HOGAN: Help me through it.

MS. WILLY: Yeah.

MR. HOGAN: What's the timing on this? Is this -- do you want us to consult FERC --

MS. WILLY: We'll be commenting don't worry. No, what we want to do is sit down and work our plan and go through all the things and it's so great what you're doing.

MR. HOGAN: So this is post-licensing?

MS. WILLY: Yeah, post-licensing.

MR. HOGAN: Okay hold on a second.

MS. WILLY: But see okay, but you -- it sounds like you are open to a biological opinion post-licensing where that is unusual in my world.

MR. HOGAN: I didn't say that. I'm just saying it doesn't affect me in licensing.

MS. WILLY: Well it would require someone from FERC once we've worked it all out to --

MR. HOGAN: I think if -- I'd have to look into -- one second.

MS. WILLY: Just think about that?

MR. HOGAN: Well yeah, I'm trying to figure out what the federal action is -- is the federal action requiring the plan or is it approval of the plan? When does

it --

MS. WILLY: Yeah.

MR. HOGAN: You know --

MS. WILLY: So ESA consultation is when there is federal funding authorization or -- in whole or in part.

MR. HOGAN: Issuance of the license.

MS. WILLY: So you're issuing a license -- that's a federal action.

MR. HOGAN: Right so --

MS. WILLY: This plan is under that action and so you are the lead federal agency for that on our support. I'm kidding.

MR. HOGAN: I was just wondering if it was the Division of Hydropower Licensing and the Division of Hydropower Administration clients who approve the plan.

MS. WILLY: I don't know the answer to that.

MR. HOGAN: Neither do I but I'm trying to because we did not already request formal consultation because we found a no effect -- right Tyler?

MR. RYCHENER: Right.

MR. HOGAN: So meaning if we wanted to issue formal consultation we would have done it when we issued the Draft. I'm not saying we're not going to, I'm saying we may have overlooked this and we have to bring this back because --

MS. TYLER: And I wasn't really thinking about it. I was more concerned about the school house ponds but there is this section in ESA that allows the applicant if they think they might be taking the wrong protective coverage to request you in a consultation so they can get the balanced opinion to exempt so. I think that's 780 -- three or 7 yeah, so anyway up in there.

MR. HOGAN: So is that an approach that you'd want to follow through with in the development of the plan?

MS. WILLY: I would because we want to work with them positively, you know, make sure they're covered, click assessment, click biological opinion, they have protective coverage just on the record.

MR. HOGAN: Because you need the most advantage, you need to devise a plan to that.

MS. WILLY: Yeah.

MR. GILMOUR: Could that be done under section 10?

MS. WILLY: No.

MR. GILMOUR: The applicant?

MS. WILLY: There is a section in the ESA where the applicant can ask for exception to Section 7 because Section 10 is expensive and lengthy.

MR. GILMOUR: Okay.

MS. WILLY: Where Section 7 is 125 days and so I

mean I just think that's -- it is called -- Section 7 is called inter-agency cooperation and this is one of the cool cooperative things that like I said I can offer staff to work on that.

MR. HOGAN: Yeah, at least I'm not -- I'm just trying to put in my mind where do we stick it you know?

MS. WILLY: I'd like to get it before the license but you'll be getting a balanced opinion from NMF's on critical habitat and spring run and steelhead.

MR. HOGAN: Yeah but if we don't have the plan on frog control before the license how do we do the consultation on it?

MS. WILLY: Well we can talk about what would be in the plan and do a preliminary -- those are a little hard, early consultation are a little hard where we do a draft biological opinion. My manager gets a little nervous about that but I am -- I can entertain that. I can say hey there's an issue, what do you think?

They may ask us to offer a draft -- there's ways to go through.

MR. HOGAN: Let's table it.

MS. WILLY: Okay.

MR. HOGAN: And we'll be in touch.

MS. WILLY: Excellent.

MR. HOGAN: Because Alan Mitchick -- he is an

expert on -- (inaudible) is going no way or oh yeah we need to do this.

MS. WILLY: And I would certainly rather have something that is just not a regulatory burden it's just a way to exempt the person so when we get through this process positively and they come around saying you lose control, I need to give you -- I don't want -- this isn't my preferred process but it's also unusual to go from it positively into ESA consultation, inter-agency cooperation, I'm happy to do that.

MR. HOGAN: So did we cover both yellow and red-legged frogs?

MS. WILLY: Yeah, so my hope was is that plan would convert yellow-legged plans into it. They're not listed but it would be nice if yellow-legged frogs were also part of that plan. The bullfrog control is kind of ethical species.

MR. HOGAN: Okay.

MS. WILLY: For kind of monitoring.

MR. KUFFNER: It's called the amphibian program.

MS. WILLY: The amphibian program and I kind of was joking about salamanders but every now and then some anadromous salamanders but if it's not listed.

MR. EMMERING: And so we're not talking about post-construction monitoring right? We're talking about

monitoring for bullfrogs?

MS. WILLY: Yes.

MR. EMMERING: Controlling bullfrogs and as we control the bullfrogs we'll take precautions to not introduce --

MS. WILLY: Correct and to not escalate kill red-legged frogs.

MR. EMMERING: Correct.

MS. WILLY: And so, but with the bullfrog monitoring you know, you can occasionally find red-legged frogs so we like incidental reporting on all of that.

MR. EMMERING: Sure.

MR. HOGAN: We can do that. Alright I think we're at other issues.

MR. EMMERING: One other thing Ken this is Quinn.

MR. HOGAN: Quinn?

MR. EMMERING: We don't have -- I know we don't have PDFW there in regards to their concern about relocating the yellow-legged frogs. We wanted to be notified -- I don't know if anybody there can speak about that.

MR. RYCHENER: Our hope was that we might be able to develop some sort of pre-construction plan that would detail what would occur if relocation was necessary such that construction activities could continue without having to stop and then develop a plan at that point.

MS. WILLY: I'm going to take a stab at that. It's not PSA listed yet but we do have -- when projects move forward I don't know. If it's state or federal risk normally there will need to be some kind of formal process for the relocation because that kind of take is prevented in both.

MR. HOGAN: So it's similar to what we are recommending for the red-legged frog now. I think we have comments not to touch them and notify the Fish and Wildlife Service.

MS. WILLY: Yeah, but it sounds like with the relocation plan it's -- we'll want to have some kind of quick description or you know, work term with the state saying as long as they're not listed you can relocate them. Here are the conditions you need to follow to relocate them, so, the wetland technique, transport information.

MR. HOGAN: That's what we were wondering if there's protocols existing that we could say implement these protocols which could include notification and rather than saying okay stop work and wait for someone to come out.

MS. WILLY: Unless it's listed you might be in a stop-work initiative and it will take a while to get that person so -- but there are ways I would want to agree with this stand at first but there are simple guidance's on transporting frogs that we could talk about an agree on and

as long as it's not listed -- our perspective you could install that, from theirs I can't speak because that's they're opinions.

MR. KUFFNER: So just one thing -- we're only in the stream at the diversion, we're not in the stream anywhere else so we are just talking about we go down where we're doing the diversion work with the construction?

MS. WILLY: Yes and it sounds --

MR. KUFFNER: Because everything else downstream we're not going to have control so obviously we're not going to be able to control the stream.

MS. WILLY: Well as far as I know that is what we're talking about but like I said they're not here so.

MR. KUFFNER: Yeah, okay.

MR. HOGAN: Okay Quinn, anything else on thresholds?

MR. EMMERING: No I think we've covered everything.

MR. HOGAN: Alright that brings us to the other issues of the agenda. Does anybody have any? No --

MS. WILLY: It's ten of 6.

MR. HOGAN: Other issues?

MR. EMMERING: Other than statement 9.

MS. WILLY: Oh man.

MR. HOGAN: Alright, folks on the phone thank you

very much, have a good night and you can go in an hour late tomorrow too.

(Multiple conversation.)

We're off the record.

(Adjourned 5:48 p.m.)

CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceeding before the FEDERAL ENERGY REGULATORY COMMISSION in the Matter of:

Name of Proceeding:

LASSEN LODGE HYDROELECTRIC PROJECT

Docket No.: P-12496-002

Place: SACRAMENTO, CALIFORNIA

Date: Thursday, March 15, 2018

were held as herein appears, and that this is the original transcript thereof for the file of the Federal Energy Regulatory Commission, and is a full correct transcription of the proceedings.

James Seeley

Official Reporter