

Sweetheart Lake Hydroelectric Project

2013 Aquatic Studies Work Group Meeting Summary and Minutes

Held Thursday, June 20, 2013 9:00 AM

Members Invited

Barb Adams, USFS	bjadams@fs.fed.us
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Sue Walker, NMFS	susan.walker@noaa.gov
Duff Mitchell, JHI	duff.mitchell@juneauhydro.com
Robert Johnson, JHI	rj.ak@starband.net

Members Attending:

Roger Harding
Shawn Johnson
Monte Miller
John Matkowski
Julianne Thompson
Robert Johnson
Duff Mitchell
Cathy Needham
Richard Enriquez

Meeting Objectives and Agenda Items:

1. Presentation of JHI Proposed Aquatic Study Plan by Robert Johnson
2. Substrate surveys
3. Follow up on Salinity measurements/report Gilbert Bay
4. Schedule for Actions

Supporting Documents:

Proposed Aquatic Study Plan outline objectives
BMI study plan
Gilbert Bay Salinity Report
Meeting Minutes

Juneau Hydropower, Inc. P-13563 Sweetheart Lake Hydroelectric Project.

Potential Sweetheart Creek Aquatic Research Objectives for Discussion and Collaboration by the Aquatics Work Group for the 2013 Field Season.

Potential Objective 1: Get agreement from the Aquatics Group that the existing instream flow study in Lower Sweetheart Lake outlet (Sweetheart Creek) is adequate.

Potential Objective 2: Inventory Benthic Macroinvertebrate (BMI) composition and relative density in the main inlet to Sweetheart Lake (Inlet #1). This issue is addressed under the Benthic Macroinvertebrate Inventory portion of the Study Plan and is submitted separately for discussion.

Potential Objective 3: Determine if removal of barriers in Inlet #1 at Sweetheart Lake would provide access to additional spawning habitat. (mitigation)

Potential Objective 3a: Work with ADFG and USFS to develop strategies, if any, for rainbow spawning habitat enhancement/mitigation for lake elevation increase.

Ref: A User Guide for Performing Stream Habitat Surveys in Southeast Alaska, ADFG, Nichols et.al. 2013

Potential Objective 4: Qualitative and quantitative analysis of the substrate in the anadromous reach of Sweetheart Creek.

Ref: A User Guide for Performing Stream Habitat Surveys in Southeast Alaska, ADFG, Nichols et.al. 2013

Potential Objective 5: Evaluate essential fish habitat in the anadromous reach of Sweetheart Creek (Outlet of Lower Sweetheart Creek from barrier to upper extent of tidewater).

Ref: A User Guide for Performing Stream Habitat Surveys in Southeast Alaska, ADFG, Nichols et.al. 2013

Potential Objective 6: Determine the baseline total dissolved gas condition and the effects the turbine could have on total dissolved gas (TDG). (RJ - TDG is generally minimized if hydroelectric dams maximize how much water flows through the powerhouse and turbines rather **than over** a spillway. Water passing through a penstock generally

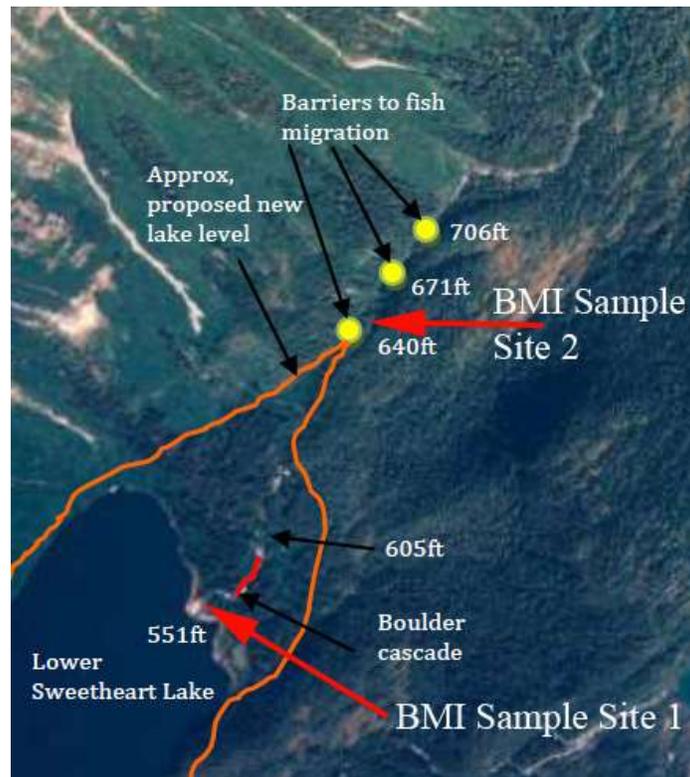
lessens TDG). **Ref:** *Green Hydro Power, Understanding Impacts, Approvals, and Sustainability of Run-of-River Independent Power Projects in British Columbia*, T. Douglas, Watershed Watch Society, 2007.

Potential Objective 7: Determine if previous ADFG and JHI site-specific water quality studies in Sweetheart Lake encompass an acceptable level of scope and resolution to adequately fulfill Alaska Department of Environmental Conservation, Alaska DF&G, NMFS, FWS, and Forest Service requirements. If existing data is not adequate, determine specifically what additional work needs to be accomplished during the 2013 field season.

Potential Objective 8: Evaluate the project effects on temperature in the outlet of Sweetheart Creek and assess the potential impacts of altered stream temperatures on spawning, rearing, and incubating fish in the anadromous reach (data exists from 2012 to address this issue).

Draft Sweetheart Lake Study Plan 2013 BENTHIC MACROINVERTEBRATE INVENTORY

Benthic macroinvertebrates (BMI) are an essential component in the ecological processes of an aquatic ecosystem, due to their position as consumers and intermediate trophic level of lotic food webs (Hynes 1970; Wallace and Webster 1996). BMI are included in many state and federal agency biological monitoring programs because of their significant functional roles coupled with their vulnerability to flow regulations and water quality perturbations (Barbour et. al. 1999). BMI are advantageous for biological monitoring because they are ubiquitous, have a high species diversity offering a spectrum of responses to environmental stress, and their life cycles offer analysis of effects from



stochastic and intermittent disturbances (Rosenberg and Resh 1993).

Figure 1. Approximate Lower Sweetheart Lake Inlet #1 Benthic Macroinvertebrate (BMI) Sample Locations 2013.

1. Study Objectives

The study is designed to document BMI composition in the main inlet to Sweetheart Lake (Inlet #1). The specific objectives of the Benthic Macroinvertebrate Inventory include:

1. BMI community composition
2. Determination of relative BMI density in Sweetheart Lake Inlet #1 in the existing channel elevation and also at the post project channel elevation.

2. Benthic Macroinvertebrate Study Methods

This section describes the methods used to investigate BMI in Sweetheart Lake Inlet #1. BMI will be sampled at two locations on Sweetheart Lake Inlet #1: Site 1) (Figure 1) which is representative of the current inlet elevation; and 2) (Figure 1) which will be representative of the inlet BMI post-inundation by the proposed project. These sample locations will provide a representation of the BMI community in Sweetheart Lake Inlet #1 at its current elevation and an approximation of the inlet BMI community in the proposed inlet elevation at the highest proposed project lake level.

Riffle habitats are the preferred stream habitat for comparative studies of benthic macroinvertebrates. Riffle habitats typically have the highest densities and diversity of benthic macroinvertebrates. Most benthic macroinvertebrate sampling devices are designed for riffle habitats relying on the transport of organisms by the current velocity into a net after disturbance by field staff.

Two replicate BMI samples will be collected in riffle habitat with cobble substrate at respective sample sites using a surber sampler with 500 μm mesh. The surber sampler covers a 20 cm square area of the stream. The substrate will be disturbed to a depth of 10 cm. Individual substrate will be scrubbed clean of attached material and organisms. Two replicate samples will be collected at each site in summer 2013.

The surber sampler is a common device used for sampling benthic macroinvertebrates in stream habitats. The surber sampler is specially designed for sampling riffle habitats. This device requires disturbing the substrate through scrubbing of substrate material. Organisms are carried downstream by the current velocity into the net and then transferred into a sample jar. This technique permits the surber to quantify BMI densities for a defined area. Densities are typically expressed as the number of organisms per square meter. The quantitative nature of the sampler is important because it allows for comparison of BMI densities in riffle habitats at other sites in the same stream as well as other streams. Furthermore, densities can be compared to studies by other researchers to put the data in perspective. Samples will be preserved in 90 percent Isopropyl alcohol. Identification (family level) and enumeration will be performed by an accredited lab. Species densities will be expressed as the number of organisms per square meter in the case of the surber sampler. The final product of the laboratory analyses will be a table of the raw taxonomic data and a list of all macroinvertebrate taxa and the abundance per sample for all samples. The preserved samples will be archived in a state or federal repository for future accessibility by researchers.

REFERENCES

- Barbour, M.T., J. Gerritsen, B.D. Snyder, and J. B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates, and fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. 326 pp.

Gangemi, J., Final Aquatic Resources Study Plan, Cascade Creek Hydroelectric Project FERC No. 12495-002, 2010

Hynes, H.B.N. 1970. The ecology of running waters. University of Toronto Press, Toronto, Ontario. 555pp.

Rosenberg, D. M. and V.H. Resh. 1993. Introduction to freshwater biomonitoring and benthic macroinvertebrates. Pages 1-9 in D.M. Rosenberg and V.H. Resh, editors. Freshwater biomonitoring and benthic macroinvertebrates. Chapman and Hall, New York.

Wallace, J.B. and J.R. Webster. 1996. The role of macroinvertebrates in stream ecology function. Annual Review of Entomology 41:115-139.

Discharge Measurements April 25-28, 2013

	cfs	% of input	cf total Per 6 hour tide	60 seconds 60 minutes 6 hours
Gilbert Bay				
Whiting River	1100	66.88%	23,760,000	
No Name Creek Site 1	19.5	1.19%	421,200	
No Name Creek Site 2	35	2.13%	756,000	
Sweetheart Creek Site 3	259	15.75%	5,594,400	
Gilbert Creek Site 4	65.2	3.96%	1,408,320	
No Name Creek 5	39.4	2.40%	851,040	
No Name Creek Site 6	69.2	4.21%	1,494,720	
No Name Creek Site 7	57.4	3.49%	1,239,840	
Total cfs discharge into Gilbert Bay	1644.7	1	35,525,520	Total Cubic Feet discharge into Gilbert Bay per 6 hour tide

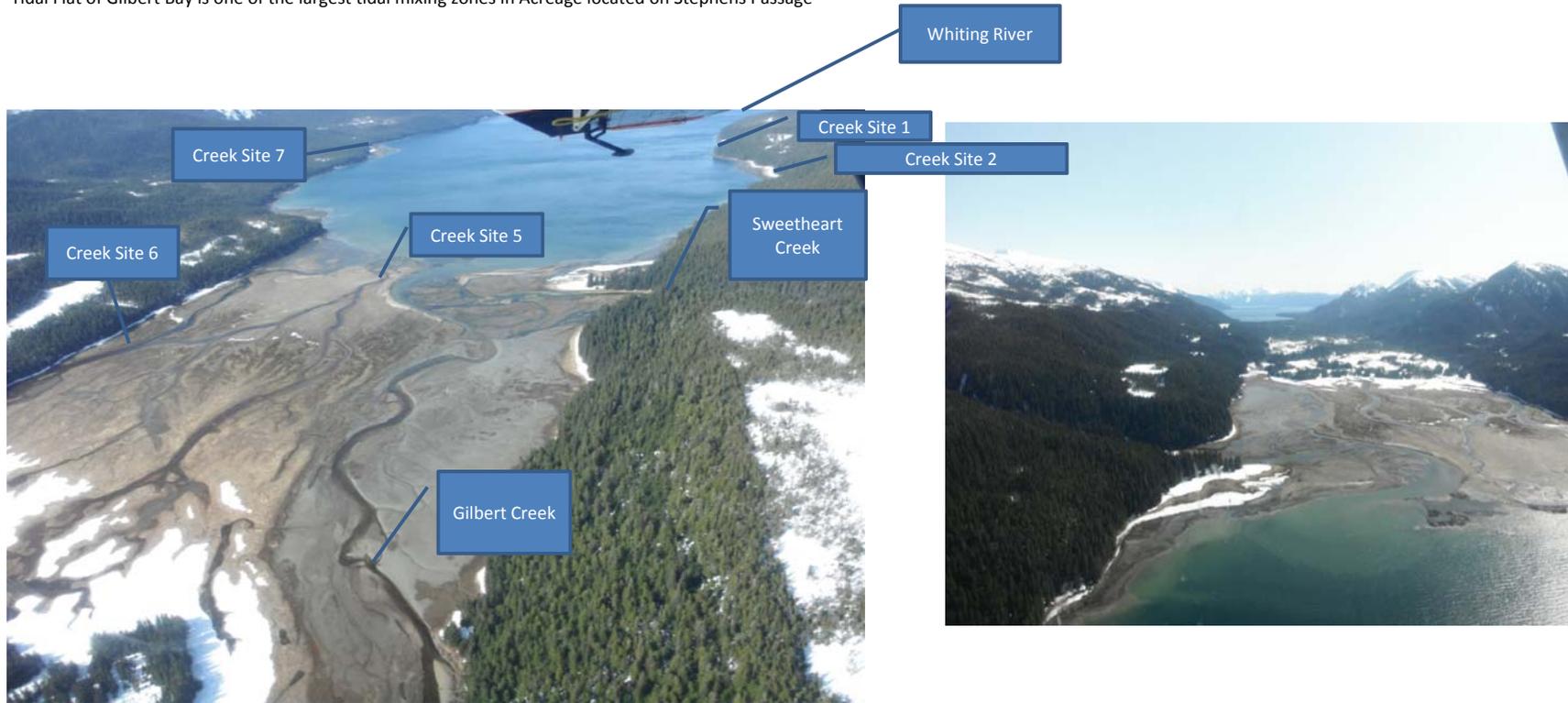
	Cubic Feet	Total freshwater input to Gilbert Bay per day as a % of Gilbert Bay total volume	Total freshwater input of Sweetheart Creek into Gilbert Bay per 6 hour tide as a % of Gilbert Bay total volume
Volume of Gilbert Bay:	12,210,490,908 (south of Whiting River)	0.0029094260	0.0004581634
From JHI Tidewater Report	Cubic Feet of Gilbert Bay per Kai Environmental	0.290942602%	0.0458163398%

Sweetheart Creek	Month	USGS average monthly cfs average		JHI requested discharge	Percent change2	1 Day =	Change in discharge per day entering Gilbert Bay	Change as a percentage of Gilbert Bay Volume	1 Day=
		discharge1	cfs			four 6 hour tides			four 6 hour tides
	January	143 cfs		335	134%		16,588,800	0.13586%	0.03396423642%
	February	71 cfs		335	372%		22,809,600	0.18680%	0.04670082508%
	March	78 cfs		335	329%		22,204,800	0.18185%	0.04546254562%
	April	153 cfs		335	119%		15,724,800	0.12878%	0.03219526577%
	May	415 cfs		335	-19%		-6,912,000	-0.05661%	-0.01415176517%
	June	670 cfs		335	-50%		-28,944,000	-0.23704%	-0.05926051667%
	July	552 cfs		335	-39%		-18,748,800	-0.15355%	-0.03838666304%
	August	492 cfs		335	-32%		-13,564,800	-0.11109%	-0.02777283916%
	September	545 cfs		335	-39%		-18,144,000	-0.14859%	-0.03714838358%
	October	448 cfs		335	-25%		-9,763,200	-0.07996%	-0.01998936831%
	November	290 cfs		335	16%		3,888,000	0.03184%	0.00796036791%
	December	187 cfs		335	79%		12,878,200	0.10547%	0.02636708077%

¹average monthly discharge calculated over a 10-year period (Sloan, et al. 1986)

²calculated as: $((\text{new value} - \text{old value}) / \text{old value}) \times 100$

Tidal Flat of Gilbert Bay is one of the largest tidal mixing zones in Acreage located on Stephens Passage



Low Tide Pictures of Gilbert Bay Mud Flats to demonstrate large area of tidal mixing zone every tide cycle

USFS Satellite photo demonstrating Whiting River influence on Gilbert Bay (silt)



Juneau Hydropower

Aquatic Studies Work Group Meeting

June 20, 2013 at 9:00 a.m.

Mr. Roger Harding: Roger Harding and Scott--Shawn Johnson.

Mr. Shawn Johnson: Scott's my brother. Let's see if I can work on--where's my coffee?

Mr. Roger Harding: Anybody there?

Mr. John Matkowski: Hey, this is John Matkowski from FERC.

Mr. Shawn Johnson: Good morning, John. This is Shawn and Roger.

Mr. John Matkowski: Morning. How are you guys?

Mr. Shawn Johnson: Good.

Mr. Roger Harding: It's a little too warm here in Juneau for my taste, but it's okay, I guess.

Mr. John Matkowski: Is that very abnormal? I saw the-- those temperatures.

Mr. Roger Harding: Yeah, very abnormal, breaking all kinds of records, and I moved here to get away from heat. But--oh, well, other people like it.

Anybody else on the line?

Mr. Shawn Johnson: Nope.

Ms. Julieanne Thompson: Hi. It's Julieanne.

Mr. Monte Miller: Morning. This is Monte Miller.

Ms. Julieanne Thompson: Hi, Monte.

Mr. Shawn Johnson: And Shawn and Roger are here as well.

Ms. Julieanne Thompson: Hi, guys.

Mr. Shawn Johnson: Morning.

Mr. Duff Mitchell: Duff. Good morning.

Mr. Shawn Johnson: Morning.

Mr. Duff Mitchell: It's about--a little bit--I'm dialing in right at 9:00 or 9:01. Is--Robert, are you on? Robert Johnson's not on yet. Who all do we have on board so far? This is Duff.

Mr. Shawn Johnson: You got Shawn Johnson and Roger Harding in Douglas.

Mr. Duff Mitchell: Okay, great. Roger, Shawn.

Mr. Monte Miller: Monte Miller in Anchorage.

Mr. Duff Mitchell: Hi, Monte. Morning.

Mr. Monte Miller: Morning.

Mr. John Matkowski: John Matkowski is here.

Mr. Duff Mitchell: Hey, John. Good morning.

Mr. John Matkowski: Morning.

Mr. Duff Mitchell: Or, I should say afternoon to you.

Mr. John Matkowski: Yeah, that's true.

Ms. Julieanne Thompson: Julieanne Thompson in Petersburg.

Mr. Duff Mitchell: Hi, Julieanne.

Ms. Julieanne Thompson: Hi.

Mr. Robert Johnson: Robert Johnson.

Mr. Duff Mitchell: Hey, Robert. Good morning.

Mr. Robert Johnson: Hey, good morning. Who all's on here,
Duff?

Mr. Duff Mitchell: We have Julieanne Thompson from
Petersburg with the US Forest Service, and we have the ADF&G
crew. We've got Monte, Shawn, Roger, and we have John Matkowski
from the FERC.

Mr. Robert Johnson: Excellent. Morning, everybody.

Mr. Shawn Johnson: Morning.

Mr. Roger Harding: Morning, Bob. How you doing? It's
Roger.

Mr. Robert Johnson: Doing good, Roger.

Mr. Roger Harding: Good.

Mr. Robert Johnson: Hot and dusty down there still?

Mr. Shawn Johnson: Yeah.

Mr. Roger Harding: Yeah.

Mr. Robert Johnson: Yeah, same up here in Anchorage.

Mr. Roger Harding: We can't--.

Mr. Duff Mitchell: --Well, it's about five after, and I
know Julieanne has e-mailed saying that she has to get off
early. So, Robert, why don't we go ahead and start? And as

people dial on, they dial on. Barb Stanley deferred to Julieanne and won't be dialing on. And Sue gave me an e-mail that she was deferring much of this to Shawn Johnson.

Mr. Robert Johnson: Okay. Is Shawn on this morning?

Mr. Duff Mitchell: Yes, he is.

Mr. Robert Johnson: Morning, Shawn.

Mr. Shawn Johnson: [Inaudible], Robert.

Mr. Duff Mitchell: And I haven't got word back [inaudible] Richard Enriquez is dialing on, and I haven't heard from Barb Adams. The only other person that was supposed to dial on was Cathy Needham, and she was basically just dialing on to listen for situation awareness.

So, with no further, let's go ahead and jump into this, keep things moving. I want to follow the agenda, which is Robert's proposed objectives.

Good morning. Someone just dial on? Okay.

So, Robert, I'll turn it over to you. And Julieanne, because you have to get off quickly, or not quickly but quickly--more quickly than others, I want to give you an opportunity before you jump off to ask any questions or any--we'll side the agenda to cover any issues that you may want to cover if that's all right with you.

Ms. Julieanne Thompson: Sure. And it looks to me like you guys are just on track and checking in with the agencies. And

so, that's really all I'm here is--to listen a little bit and look forward to seeing the notes from this meeting. So, I don't have any specific questions at this time, but thanks.

Mr. Duff Mitchell: Okay, you bet.

And I just heard a couple dings. Did someone just dial in?

Ms. Cathy Needham: This is Cathy.

Mr. Duff Mitchell: Hi, Cathy. Good morning.

Ms. Cathy Needham: Morning.

Mr. Duff Mitchell: We're just moving down the agenda.

Ms. Cathy Needham: Okay.

Mr. Duff Mitchell: So, Robert--and we have Fish and Game. Cathy, we have Fish and Game, FERC, and the Forest Service online, and Robert's about--I'm about ready to turn it over to Robert to go over the proposed aquatic study. So, Robert, with no further ado, I'll turn this over to you with your sheet here of potentially eight objectives.

Mr. Robert Johnson: Okay. Good morning, everybody, from sunny Anchorage. I want to not waste any time and--but, we went out on--let's see. Let me get--my notes disappeared, which is great. Let's see.

We went out on April 29th this spring and did a discharge measurement at 259 CFS, which was quite the day of work out there in the rain and snow. And the plans were to plug that into the PHABISM model and then get that information back to the

group. We had an issue or two of getting that done, and that's still not completed.

But, Shawn, I know you're waiting for that. But, can--do you have anything to--after you--you've had a chance to look at what was sent prior to that by Elizabeth Flory [sp]. Do you have anything to say on that?

Mr. Shawn Johnson: No, I just would like to see it. And I'm glad you got it, because it does kind of fill in a little gap between the other two flows. It's a good thing.

And that 259, that's the total discharge, or is that the discharge in the main side channel or where transect one was?

Mr. Robert Johnson: That's the total discharge. That's both of them added together.

Mr. Shawn Johnson: Okay, good.

Mr. Robert Johnson: We saw similar percentages as far as by channel that we've seen before at that flow. So, doesn't look like anything's changed significantly with the channels or the flowage in there.

Mr. Shawn Johnson: Okay.

Mr. Robert Johnson: But, as far as getting a--I never did get a sort of final as far as methodology and all. Was that pretty much appropriate for what you were wanting to see for this?

Mr. Shawn Johnson: Well, given that you've got, let's see, what now, five calibration discharges over a nice range of flows including the flows of interest within--in Liz's fisheries report, actually there's only one flow that was modeled. And that was the flow that now you have an actual dataset for, or close to it.

So, really the--there really wasn't hardly any modeling involved. It was just the--you used the actual measurement straight up, so--which makes it easier, because then you don't have to worry so much about modeling details and how it was modeled. There wasn't any--you weren't predicting velocities. You weren't predicting water surfaces. You were just actually using the ones you measured, which helps alleviate a lot of potential problems with the model. So, that's--.

Mr. Robert Johnson: --Right.

Mr. Shawn Johnson: I'm happy about that.

Mr. Robert Johnson: Okay, good.

And just from a visual observation, I had not been onsite prior to this trip. And I was--of course, the scheduled--or the predicted flows discharge after--during the operation of the project were a little bit higher. I think around in the three, 350 range.

This was--it made me feel a lot better about what was going on as far as the amount of habitat that was going to be

available. And well, when you get onsite there, you'll be able to see, if you get a change to go out there, that flow, that there is certainly no problem with it being drier, intermittent, or jeopardized just because of the shape of the channels there. So, it'll be interesting to see how this all bears out.

But, I was real pleased to see what's going on at that flow around 260. So, it made me feel a lot better. So--.

Mr. Shawn Johnson: --And, of course, you took a lot of pictures.

Mr. Robert Johnson: It was--.

Mr. Shawn Johnson: --That's a--.

Mr. Robert Johnson: --We've got--oh, that's another story. It was the worst day in the field that I've been in 20 years. It was torrential rain at about 36, 38 degrees and snow. And it was blowing and it was really miserable, and everything was completely soaking wet. And no, there are not a lot of photographs.

Every--it was one of those days where we were really lucky to get out with our skin. So, we were glad to get the measurements, let's put it that way.

Mr. Shawn Johnson: Okay.

Mr. Robert Johnson: So, that was the plan. However, I think if we would have tried to do that--well, you know my ability with a camera, and either the equipment would have been

damaged or destroyed or the images would have been worthless.
So, you have to take my word for that.

Mr. Shawn Johnson: I do.

Mr. Robert Johnson: It was a horrible, horrible day. I'll just put it that way. So, anyway, yeah, that's the one very big regret that I have about that trip except that we did get the measurement without dying. So, that was good.

So, I guess we're in agreement then. And that part of the objective or the desire there has been completed, and we'll be able to go with what we've got there.

Mr. Shawn Johnson: Yes.

Mr. Robert Johnson: Okay. And hopefully--lord knows what the weather is going to be this year. But, there's a chance, with the way things are going, that we may be able to get back down in the 300 CFS range sometime during the summer the way it's--things are melting and things--the way they're going. I mean, we haven't seen--it's pretty impressive with the way the weather's going this year. So, who knows? If we get a change to do that, we certainly will, okay?

Mr. Shawn Johnson: Yeah, sounds good.

Mr. Robert Johnson: My--the other--the big one for me on our potential objectives is the benthic macroinvertebrate composition study. And have people had a chance to--I know there was--let me back up.

I went through all of the documents and all of the comments and everything, and I pulled out the ones that looked like they needed to be addressed. And please--if anybody has in their notes anything else that needs to be addressed, please, please, please bring that to my attention so that I can address it. But, as far as I could find, the ones that I've included in the document are the ones that needed attention, and so that's why I've done it.

The one that really stuck out was the macroinvertebrate inventory. And what I propose to do, and I'd like to get feedback on it, is to go in and do a basic BMI comp for composition and relative density in the main inlet to the lake to see what exists right now in a representative riffle habitat close to the lake, and then again to go up above the boulder cascade and closer to where the proposed lake level will be and a similar habitat, and do a duplicate type of inventory there to gauge what kind of potential macroinvertebrate population is going to be able to contribute to a food source to the fish there in the lake.

And also, the idea is to get an--to see how much of that habitat above in that representative area would be available for any type of spawning at a higher lake level. Does that methodology kind of make sense to everybody? And that would be basically using the protocol that's been set out in the latest

version of the--why am I not finding it here--the methods used by the Forest Service and Fish and Game that have been standardized for those types of assessments. Is that--can I get some feedback on that from folks?

Mr. Roger Harding: Hey, Bob. This is Roger.

Yeah, I'm not familiar--I'm not a bug man like some of us in the past have been. But, yeah, so I'm not that familiar with this. Is this--if you get like a relative index of abundance or whatever it is, is it strong enough to make in the future to actually document possible changes, or is this just--?

Mr. Robert Johnson: --Yeah, it's--.

Mr. Roger Harding: --Kind of--it's going to naturally shift anyway. I know you can't probably do cause and effect. But, is this something that, if you come back in so many years and it's different, you'll actually be able to detect it?

Mr. Robert Johnson: That's one of the--was one of the objectives of standardizing everything. And that was the desire, one of the objectives for setting this up. And the one I've been looking at lately is the User Guide for Performing Stream Habitat Surveys in Southeast Alaska by Nichols, Schroeder, Frenette, Williams, Cupri, and Smikrud from Fish and Game 2013.

Of course, I guess one of my desires was to look at what is existing in that inlet and then to see what the potential would

be--or the situation would be at a higher lake level, because of course the existing would be nonexistent any more down the lower end because the lake level would be higher--.

Mr. Roger Harding: --Right--.

Mr. Robert Johnson: --And then to see, with that elevation increase further up--I think it's around 60 feet up the channel or of the--of elevation of the inlet, what it would be there and see if it was even similar.

But, yes, these are structured and laid out such that, if you went back in 50 years and did the same thing once again with the same methodology, that you would be able to detect within a fairly gross level of determination whether or not that had been some change. Now, whether it's because of the project or because of climate change, that would be up for argument.

Mr. Roger Harding: Sure.

Mr. Robert Johnson: But, the short answer is yes.

Mr. Roger Harding: Okay.

And is there any plans--I know like the zooplankton, is anyone doing basic primary production kind of zooplankton studies in there, or is that part of DIPAC's sockeye introductions?

Mr. Robert Johnson: Well, the--what we've been using in the past is all of the historical information that was done by Bartow [sp] et al., back some years ago.

Mr. Roger Harding: Yeah.

Mr. Robert Johnson: But, we--I am planning--I hadn't put it in there, but if it's the wishes of the group that we do it, I have the equipment and wherewithal. And it won't be that big of a deal to go ahead and do a sampling of that this season if that's the desires of the group.

I wanted to leave that out there. If it's necessary and required, then I certainly will. If it's not a big deal, then so be it. So, I'm--that's one of the things I was leaving open to the group.

Mr. Roger Harding: I guess my thought on that was that would be up to--I know David and Rich Jonas [sp] did a great job in there and come out with some good estimates for stocking densities of the sockeye in there.

And I think as long as we're in the parameters of that if the zooplankton--and if it doesn't change. I mean, we don't want to hammer the zooplankton back and then put a bunch of sockeye fry in there. You know, that kind of doesn't--wouldn't make sense. I assume some--it's being done by DIPAC or whatever. I don't know, but--.

Mr. Robert Johnson: --I would like to think so, that if-- after the project is completed that they look and see what changes occur.

You know, I've gone back and I've looked at the literature, the sparse literature that's available for these kinds of projects in this latitude. And the few that I've seen suggest that the standing crop of plankton isn't affected all that-- either positively or negatively. There's some information that suggests that it increases, but I haven't seen any that have actually crashed.

There's really good examples where things were introduced in the [unintelligible] nets like in Blue Lake there out of Sitka and created a really robust food source for the fish. So--

Mr. Roger Harding: --Yeah--.

Mr. Robert Johnson: --It's really a crapshoot on that. It's really a crystal ball as far as determining what's going to happen.

So, if I was--like I can't put words in their mouth. But, if I was going to go in there after there'd been a significant change in the physical properties there, then I would definitely look at it again before I continued on with my work. So, I'm kind of with you on that one.

Mr. Roger Harding: Okay.

Mr. Robert Johnson: Like I say, I can't speak for DIPAC.

Mr. Roger Harding: Yeah, it--I think in Bartow's work, it usually--you know, they are way under stocking what the-- probably the system could support is usually what happens.

I mean, I know like Turner Lake, they had--you could put about 20 million fry in there or something like that. So, with the zooplankton levels, I suspect that they're still healthy and no reason to do it. But, I just thought I'd ask. Thanks.

Mr. Robert Johnson: Yeah.

Mr. Duff Mitchell: Hey, Roger, this is Duff. And I don't mean to take time from this meeting, but in my personal discussions with Eric Prestegard, what DIPAC--how they came up with the stocking levels that they did now was--they hate to admit it, but it's pure bracketing.

It wasn't scientific, but it was--this amount seemed to be too much. And so, they had a crash at two million so they dropped it down to one million. That didn't seem to be working, and so they dropped it below to like 200,000 and then they kind of moved it up to 500,000 and said, "Hey, you know what? This seems to be working. And more importantly, this is all the sockeye we really want to put in there, so let's not push it anymore."

And so, they've just kind of settled in that bandwidth of about half a million fry that they put in there. It wasn't

super scientific. It was just based on trial and error and bracketing.

I also don't think that they--according to what they have--what Eric's inferred to me, they're not eager to--even if the lake could hold more as we expand the acreage and we have more, let's say, woody debris that breaks down and more increase in zooplankton, there's not a current effort to want to increase the number of fry that they currently place in the lake even if the lake could withstand--the ecosystem could take more.

Mr. Roger Harding: Okay. No, appreciate that, Duff.
Thank you very much.

Mr. Robert Johnson: Okay.
The one question that I had for the group, I mean, is does--what is the group feeling as far as the need to do this? I mean, is this a yes or a not or a maybe, a requirement? What are folks thinking from different agencies as far as the macroinvertebrates? Fish and Game?

Mr. Shawn Johnson: Okay, Shawn here. Yes, we typically don't request macroinvertebrate studies as far as I am aware of. I don't know that we have any macroinvertebrate specialist on staff. And do--well, who requested the BMI work to begin with, do you know?

Mr. Robert Johnson: It was--I didn't footnote the comment, so I don't know agency it came from. Forest Service, do you have any idea? Is that from your group?

Ms. Julieanne Thompson: It's Julieanne. I don't think it was. I was just going to pull up the summary of agency comments. I know if it was, it wasn't me. But, I will look and see.

Mr. Robert Johnson: And National Marine Fisheries Service, are you there? Do we have anybody from NMFS? How about National Marine Fisheries--I mean Fish and Wildlife Service?

Mr. Shawn Johnson: I don't think they're here either.

Mr. Robert Johnson: Anybody else I'm forgetting?

Mr. Roger Harding: Well, it could very easily be that we're forgetting that we asked. I'm sorry.

Mr. Robert Johnson: Well, it's just--it's out there and I'm just saying we're--we can--.

Mr. Monte Miller: --This is Monte. I'd like to throw--.

Mr. Robert Johnson: --We're all--go ahead--.

Mr. Monte Miller: --Something in here.

Mr. Robert Johnson: Go ahead, Monte.

Mr. Monte Miller: Back when Fish and Wildlife Service was engaged, Steve Brockman [sp] was very concerned with the rainbow trout. And I'm wondering if this was something that he initially brought up.

Mr. Robert Johnson: It's possible. And I don't want to go through another--through this field season and not have this work and then have somebody come back and say, "Hey, why didn't you do that?" And--because I'm ready and willing to perform the work of it's--if that's going to be a potential issue.

So, I guess right now--I don't know, could we get--say set a short measure of time, say a week or so, for each agency to figure out--for us to go back and look through the notes, for me to go back and look through the notes to see where it originated, and then either get a yea or a nay? Because it's expensive work to do, and if it doesn't need to be done then so be it. So, is that something that we could kind of agree on at this point?

Mr. Shawn Johnson: I'd be okay with that.

Mr. Roger Harding: Yeah, I think so.

Mr. Shawn Johnson: Does anybody know, has there been any food studies done with these rainbows? I assume they're eating the sockeye and not the bugs.

Mr. Roger Harding: No, they're eating the bugs--.

Mr. Shawn Johnson: --They're eating the bugs--?

Mr. Roger Harding: --Until they get to be, yeah, bigger.

Mr. Shawn Johnson: Okay.

Mr. Roger Harding: Yeah, I think it's a good idea, Bob, to get a pre-project inventory myself. And I think it's great.

And of course, it is going to tie into the trout up there. I don't have much experience with macro inverts and how it would tie into the trout, however, other than they need them.

Mr. Shawn Johnson: Yeah, but the other question is if we collect the data, how are we going to interpret it?

Mr. Robert Johnson: Yeah. What I was thinking is that there's--if there's a similar degree of production upstream where the--in the inlet where the proposed project will be, if it's similar to what it is now, then that's something that could be a variable that can probably be of low concern as far as making us feel a little bit better about what the effects are going to be on the resident population there outside of spawning habitat, which is what's going to come next. Does that make sense?

Mr. Roger Harding: Yeah, Bob, I'm going to have--I think if--you're probably very--more familiar with the literature and what--the benefits of doing this. I think that point is very good. If we create or the water level--changes in water level actually creates access--allows access to other spawning areas, then, yeah, we'd want to make sure that there is some macro inverts for the juveniles.

Mr. Robert Johnson: Okay. That was my thinking, that it just made sense to do it--.

Mr. Roger Harding: --Yeah--.

Mr. Robert Johnson: --Because--.

Mr. Roger Harding: --That's--so, yeah, I would, I guess--I would encourage it, I guess.

Mr. Robert Johnson: I have a feeling that--I just--in the back of my mind, it just says well, we don't have this and they've done it on other projects. And why didn't we do it on this one? And it just seems to be becoming a standard as far as these kind of development projects.

So, I did not set it at a really high level of measuring it, but I did put it as something that would be meaningful. And so, we will have a record of what's going on there, because they are fairly expensive. The more detailed you get and the more samples that you take, the more expensive it is for the analysis. So, I want at least have some sort of baseline during that period for those areas.

Mr. Roger Harding: All right. No, that sounds good.

Mr. Duff Mitchell: And I just want to add in, one of the expense items is the actual identification rather than--and Robert, maybe you can explain this better than me since I'm not on the scientific side of things.

But, what I understand is that there's the one thing of conducting inventory and just general of the family or of the whatever, and then breaking it further down--the more further

down you go to identification of the invertebrate, the more expensive it gets with all of the analysis of the samples.

And so, I guess from my perspective, it sounds like, from what I'm hearing, we don't need that level of granularity but we need more on the general side. Is that what I understand, or is that--?

Mr. Robert Johnson: --Well, it was my idea to go do the collections and not do it to species, for sure, and go as close as we can without taking a lot of time and effort. But, then those specimens would be preserved in a common library, somewhere that's available to anybody in the future to go in. And should we need to do something that's more--with more resolution, then we certainly could.

That's--I mean, that's what I'm thinking right now. If you've got the samples, you can go back and look at them in the future if there's a need to. But, if you don't, there's no chance to do that.

Mr. Duff Mitchell: Right.

And the other thing--and Jim Holman's not on the line, I believe. But, he's--what he's inferred to me--or not inferred to me, but what he's communicated to me is that, in the studies that they have done pre and then operation and then when the reservoir rises, he says what they have generally found--and although it's not exactly, but it is a high probability that you

have an increase in the macroinvertebrates, but you sometimes decrease the diversity. And anyway--.

Mr. Robert Johnson: --Well, yeah, that's certainly true downstream of these projects, but we're talking about up in the inlet. So, there again, we're speculating.

So, what I'm just proposing is taking the samples to the family level and call it good for now. And then, we will have a--maybe a common library or collection so that they can be looked at in the future. Does that sit well with everybody?

Mr. Monte Miller: Well, this is Monte. I'd like to ask another question related to this.

Have you looked or has there been samples taken from the area identified as the rainbow spawning area which will be inundated to a depth that probably won't have the same diversity that it does now? Has there been any samples taken there, or are there plans to take samples there to actually determine what they have in the lake and what they will lose in the lake?

Mr. Robert Johnson: As far as substrate or--?

Mr. Monte Miller: --Invertebrates--.

Mr. Robert Johnson: --Macroinvertebrates?

Mr. Monte Miller: If you're looking to get a baseline, you can't just look at the stream. I mean, there's more than one habitat there.

Mr. Robert Johnson: Well, that's true. And that's--these are the questions we need to address right here. And so, if that's something that--.

Mr. Monte Miller: --Oh, I--.

Mr. Robert Johnson: --Needs, you know--.

Mr. Monte Miller: --My work on--.

Mr. Robert Johnson: --No, no, I do not believe that it's been done. I've not seen anything to that effect.

Mr. Monte Miller: My work on the Columbia, I used a company in Moscow, Idaho called EcoAnalysts. They helped with the determination of how samples were handled and stored and things like that. They can provide the expertise as to whatever level you want sorting to occur and counting.

They have been involved in many of the relicenses on the Columbia and up into north Idaho and Montana for a lot of projects. They have a vast experience. And they have people that just sit there and all they do is identify chironomids, which is something I would never do. If it's a chironomid, it's a chironomid. That's good enough for me.

Mr. Robert Johnson: Right.

Mr. Monte Miller: So, it just depends on the extent. I mean, you can probably take a college intern and have him sit there and look at bugs for three months and work through your samples. Is that going to be good enough?

Mr. Robert Johnson: Well, it depends on who you talk to. I mean, they get really specific when they start talking IDs on them. That was why initially I was just going to go to the family level.

Mr. Monte Miller: When they're counting the number of hairs on the third leg from the back, you know it's pretty--.

Mr. Robert Johnson: --Oh, yeah, I just went to through a season of doing that for another project. And--.

Mr. Monte Miller: --Yeah.

Mr. Robert Johnson: --I--that's why I say there's really-- at this point nobody generally sees any need to do that unless there's a specific request or desire.

So, I--my thought on the lake and in those spawning areas is that they are going to be changed. We know they're going to be changed. They're not going to be the same 'cause they're going to be some 30 to 60 feet further in depth.

When we are talking about potential for spawning areas and mitigation in the future, that sort of is a good segue into the next objective, to look at the--when we're doing the habitat assessment, the substrate assessment above the border ripple barriers, to determine the likelihood of having spawning substrate for rainbows there.

And so, I think it would be a waste--my personal feeling is it's going to be a waste of time and effort and money to do

anything. We know where the spawning area is right now within the lake. That's not going to be there anymore. We know what the substrate--the sizes are there. And we know what they prefer, but that's not going to be there anymore.

So, it would be better off to, instead of measuring what's going to be--what's there now that isn't going to be there anymore is to see if there's going to be potential for other areas that they're going to be able to direct their spawning energy at. That's the way I'm seeing it. How do you feel about that, Monte?

Mr. Monte Miller: Well, if you're truly looking for baseline information, that's one thing.

One of the concerns I have with rainbow stocks is we have a lake spawning stock here. And is that because that that stock has adapted to be lake spawning? I know in other places we've run into lake spawning stocks and tributary spawning stocks, and they don't interact or they--I mean, they go out in the same area, but some fish will go back to a tributary to spawn. If these are lake spawning stocks, will they adapt to this new area?

Mr. Duff Mitchell: Well, we know from observation that there is rainbows that go up that inlet one. Their preferred spawning area right now is the pinch point between the lowest lobe of the lake and the middle portion of the lake.

Mr. Monte Miller: Right.

Mr. Duff Mitchell: Now, we won't know until future whether those ones that prefer to spawn at the pinch point will either dissipate their spawning energy or they will focus it toward the inlet one, which is a very, very long--if a barrier or two is removed, there is a long spawning reach that could occur.

Now, we don't know where that's going to go. But, I think in our discussions, that was where our focus of effort was so that we can try to use our knowledge and our resources to try to best focus on where that potential would be for the continued propagation of that--of the rainbows. We know the pinch point is going to be no longer be a good spawning place because it's going to be 60 more feet of water over it.

When we raise that lake--if you fly back to the Whiting, that is a--I mean, I just flew it yesterday. It is just a huge--multi miles of stream back there. The only issue we have is potentially temperature and barriers for the rainbows to get back there. And so, I think, because we're looking at trying to preserve those rainbow stocks, that's where we focus the efforts is that one inlet, if that makes any sense.

Mr. Monte Miller: Well, I put my two cents out there, and you guys can take it for what you want. It's--I don't know. I don't have the answers either. So--.

Mr. Robert Johnson: --Okay.

Mr. Duff Mitchell: Yeah. And we're just trying to kind of herd this around. It's--Juneau Hydropower's perspective is that we want to do whatever we can to ensure the longevity and the propagation of those rainbows. We know that if DIPAC keeps feeding them, there's going to be a little bit of feed. We know by raising the lake, there's probably a chance the zooplankton and the macroinvertebrates will increase, though that's a theory. It's not--but, the literature says that it probably will as the reservoir rises.

But, the biggest issue we have is determining if removing barriers in that inlet number one could provide alternative or new spawning habitat which the rainbows are currently going to lose. And I think that's where the investigation was leading. And I'd like to have some buy off that we're at least approaching the equation from the right angle.

Mr. Roger Harding: Yeah, this is Roger. It--yeah, I think Monte is correct. There are some lake spawning and stream spawning. They have some fidelity to where they've spawned, and they're--just like salmon do if you look at the lake as an ocean kind of a deal.

None of that--probably even now even is not the ideal classic textbook spawning preference for rainbow trout, and we probably aren't going to ever get there. What we're trying to define, I guess, is to make sure there is enough spawning

habitat to perpetuate the population to some degree into the future. A lot of our populations, trout populations, are probably spawning or rearing limited in southeast, and I suspect that that is true there in Sweetheart as well.

So, yeah, I guess pursuing all avenues to try and find-- identify spawning areas. The other thing, of course, is successfully spawning, producing young of the year. Just because fish spawn doesn't mean they produce. So, that's, I guess, what I'm concerned about.

And it's hard to pin--it's hard to sit here--hopefully we'll get out there and get a chance to see it, whether that barrier removal or what would make it better. But, anything, I think, that helps identify, locate, and ensures that they have someplace to spawn, even if it's not preferred, is better than nothing.

Mr. Robert Johnson: Okay.

So, I guess to go on doing the habitat assessment in the current areas that they spawn in, and then looking to see if there's similar areas above the existing barrier in inlet number one. Is that right? It's what I'm hearing.

Mr. Shawn Johnson: So, just refresh my memory. There were a couple--there were some rainbow trout observed spawning in inlet one. Isn't that correct?

Mr. Robert Johnson: Yes. Go ahead, Duff. You've been in there.

Mr. Duff Mitchell: Yeah, that's what the crew said, and they found rainbows in their observations.

Mr. Shawn Johnson: Okay.

Mr. Robert Johnson: And I've seen some of that in some of Elizabeth's work, documentation of where those are. So, my plan was to go and look at those, the physical parameters of those sites, and then see if there are similar areas where they would occur above the barriers that exist now.

Mr. Shawn Johnson: Okay, I think that's a good idea.

And Duff, you offered to take a couple of us up there in early July. I think Roger and I would like to take you up on that, go up there in early July, walk the stream up there with Robert, look at the potential spawning habitat at the new reservoir level, look at those barriers.

As far as barrier removal goes, that's a Forest Service issue. So, I don't know if Julieanne wants to weight in on that, if that's even something they would consider doing.

Ms. Julieanne Thompson: I can assure you that I don't want to weigh in on that right now, but I'm taking notes furiously.

I'm kind of at a disadvantage. I'm sorry to say I'm not familiar with the site. I remember this coming up briefly at

the review of earlier information. But, I really need to connect with the district folks on this, so I'll follow up.

Mr. Shawn Johnson: And I don't know if it was a typo, but one of the barriers you're talking about is--the report said it was a one foot barrier.

Mr. Robert Johnson: I didn't--that has to be a typo.

Mr. Duff Mitchell: Yeah, it must be a typo. Might be more of--.

Mr. Robert Johnson: --I didn't catch that one, or if I did I just assumed that it wasn't.

Ms. Julieanne Thompson: How big of a barrier? Does anybody--?

Mr. Duff Mitchell: --Well, I've walked it. I think the barriers that we're looking at are more of a 10 foot level as opposed to a one--they're doable with machine and man to knock out. They're not--what do you want to call--they're not insurmountable. But, I would--I don't know where the typo is. I'd have to look at it, but I'm going to assume there's-- probably needs to be a zero there.

Ms. Julieanne Thompson: So, just to refresh my memory on this, this is a possibility of mitigation. I was thinking earlier you were talking about that barrier actually being inundated by the lake rise. But, no, you're talking about--?

Mr. Robert Johnson: --There is one--Julieanne, sorry to jump in. But, there is one that will be taken care of just by the rise of the lake level. But, then there is another one above that, and that's--I believe that's what we're talking about.

Ms. Julieanne Thompson: I got you.

Mr. Robert Johnson: But, then again, not being onsite, that's what I'm getting from looking at the images and reading the text. So--.

Ms. Julieanne Thompson: --It would be great if--I heard you guys mention a potential field trip in July maybe, and so that might be a good opportunity. I don't know how far or how accessible the barrier is, but might be a good thing to focus on in a field trip maybe.

Mr. Duff Mitchell: No, it's walkable.

Ms. Julieanne Thompson: Great.

Mr. Duff Mitchell: The stream right now, walking up the stream itself is pretty ferocious. But, with bug dope and waders, it's doable.

Ms. Julieanne Thompson: Oh, yeah. Okay.

Mr. Shawn Johnson: Even for old guys with bad knees?

Mr. Robert Johnson: Oh, yeah. I do it all the time.

Mr. Shawn Johnson: Okay. Okay.

Mr. Monte Miller: You mentioned one barrier would be taken care of by the inundation. You are going to have a fluctuating lake level. Will that barrier come and go depending on the lake level, or will it always be under the new bottom lake level?

Mr. Duff Mitchell: Well, there's a permanent inundation. And I believe--and I don't want to be held to it 'cause I'd have to go back and look at it because this is a good question, is we're raising it by that 25 feet. And I believe--and maybe, Robert, do you know if it's permanently inundated or if it's seasonal?

I do know that the lake is rising. It'll be the lowest in April, May--early May, and it rises through the summer and crests like September, October. So, in July when they're spawning, it would be right in the midpoint. So, it's going to be above 25 feet and it may have another 35 feet--or 30 feet above there if it's at the mid of that rise, of that 60 foot rise.

So, you're looking at 50 to 55 feet above the current lake level. I'm going to speculate, and I hate to do that on the phone here, but I think that that first barrier is--the rainbows or--.

Mr. Robert Johnson: --Yeah, the first--the existing lake level is at 551. And the boulder cascade, the first one, is

only about--well, it's about--I think the top of it is 605. So, it's--that's the very top of it, so--.

Mr. Monte Miller: --That's 54 feet.

Mr. Robert Johnson: That's 54 to the top of it. And the bottom of--it looks like it's in the midrange there. It's hard to tell from the scale of the map that I'm looking at.

But, it looks like it's--there again, that's something we need to measure this summer. Like I say, I can't determine it from looking at this map.

Mr. Monte Miller: Yeah, we're speculating here and going nowhere. So, the question's out there, and I think you guys can identify that this summer.

To me, it's an important consideration. If--you're talking about taking out one barrier, but what good is that if the lake level does not go over the more barriers?

Mr. Robert Johnson: Yeah, absolutely. Absolutely. There's one at--there's that one, and then there's one at 640 feet. There's one at 671 feet, one at 706 feet. So, I want to go up there and look at that. And then, above all those it looks like it flattens out.

So, that's the plan is this summer to determine all of--the physical nature of those barriers and at what elevation. So--.

Mr. Monte Miller: --And the reservoir elevation will vary. And it's going to be a function of your operating plan and timings and things. So--.

Mr. Robert Johnson: --Right--.

Mr. Monte Miller: --That would be excellent, to get that tied down a little bit tighter.

Mr. Robert Johnson: So, that's why it's in as an objective. And I guess we're good to go on that objective then. Okay. Let me get my--.

Mr. Monte Miller: --But, Roger, did you have anything more, any other questions about that?

Mr. Roger Harding: Yeah. Thanks, Monte.

I was just going to say, I--not necessarily. I admit I haven't read all this in detail. Did you guys see any successful spawning, in other words, signs of it? Did you see any young of the year fry during your surveys anywhere?

Mr. Duff Mitchell: I know those guys took a bunch of pictures, underwater camera pictures. I don't know, Roger, if they had documented proof of young of the year fry in there. I would have to go back and look at it. I know they took still cameras up into the stream and they filmed. But, you know, to me a fish is a fish, and they could have very well been Dollies.

But, there was some small fish in that inlet. I also know that they took minnow traps and hoop nets into that inlet, and

they found both Dollies and rainbows in there. That in itself doesn't show proof. But, there was different sizes of the smaller size fish.

Mr. Roger Harding: Okay. Liz's report said they caught--I don't know the number, how many offhand, but that they did catch juvenile rainbows in inlet one.

Mr. Monte Miller: Okay.

Mr. Robert Johnson: Yeah.

Mr. Monte Miller: I would assume also that you guys filed--
-.

Mr. Robert Johnson: --Dollies also--.

Mr. Monte Miller: --The--I would assume you filed the Fish Resource Permit Report at the end of last year.

Mr. Duff Mitchell: Yeah.

Mr. Monte Miller: You should have those numbers listed and things.

Mr. Duff Mitchell: Yeah. No, we filed those, and I just don't know them off the top of my head right now. I just--they did see that. But, when Roger says young of the year, that may be a specific size. And I can't go down to that level of detail in my mind.

Mr. Roger Harding: Yeah, that would be like you walk in a Coho stream about late May and you see all the little fry, yeah, or coming up--yeah, just buttoned up.

Okay. I guess, yeah, I think we're talking about--our assumption is that once the--once this project goes through, if and when, then the spawning will be the limiting factor in the lake. And probably not food, probably not--rearing is closely associated with spawning.

So, yeah, I think you're on the right track as far as that goes. If we can identify suitable spawning, knowing that the area that they're using now is--it won't be there is probably the best thing--the best approach.

Mr. Robert Johnson: Yeah. Okay. So, we will take care of that, and that's going to--yeah, I think that's--I think we've got agreement on what we need to do there and we will do it.

There's another objective. Let's see. I think we're looking down below now, or switching from the inlet to go down the outlet end of the lake. There's--from what I saw when I was there, there is a really minimal--minimum quantity of spawning habitat for salmon in the anadromous reach below the first barrier falls down in lower Sweetheart Creek.

There is just a few passes. And it's got to be one of those situations that either, number one, those fish are--have an incredibly high survival rate down there, or number two, that there is a significant amount of straying from other systems in the area. And I don't know which one it's going to be.

So, objective--potential objective number four would be qualitative and quantitative analysis of substrate in the anadromous reach of Sweetheart Creek. There's only maybe three or four different patches that are optimal there that are--that, in my mind and observation, are conducive to the requirements for pink salmon to spawn successfully. Outside of those areas, the cobble size increases significantly--greatly to where there is--it's marginal.

So, I think it's just necessary--it will probably be necessary to just go in and measure those areas to see what we've got there. I know it's very small. But, like I say, either they are incredibly--have a high survival rate or there's straying going on there. So, if there's straying going on there, it isn't going to--that's neither here nor there. But, whatever's going on there is working really well.

So, I don't think it would be too big of a bit of work--piece of work to look a little bit closer at the--in the substrate just above--in that intertidal area there. And that ties in with essential fish habitat, and we don't have anybody from National Marine Fisheries Service to talk to us about that.

So, Roger, what are you thinking about taking a look at the substrate below the barrier falls and above tidewater there?

Mr. Roger Harding: I guess--I mean, I know towards-- they'll start at the mouth of the stream and work up. The fish just don't get above there too much.

And I think you're right. Most of that pink spawning I've seen is certainly intertidal. And I think any gravel that was in there could get flushed out easily in natural occurring high flow events anyway.

And I have no feel for the creek itself throughout the canyon and the whole fast area. Is that what you're--below the outlet, I think, right?

Mr. Robert Johnson: Yeah. And the outlet'd be--well, you know how far they go up there. I don't--I imagine just a few of them make it up to where the gauge is. Are you familiar where the gauge is, the water gauge is?

Mr. Roger Harding: No, I think I've fished up to the third pool, which is probably a barrier to salmon.

Mr. Robert Johnson: That's right where the--.

Mr. Roger Harding: --Gauge is--?

Mr. Robert Johnson: --Gauge is, yeah.

Mr. Roger Harding: Okay.

Mr. Robert Johnson: And I can see what you're talking about in that one little shelf. There's a little wraparound channel. There's just a little horseshoe there that's probably

only about, oh, less than 50 meters in length. It goes kind of around a rock island or a rock--an elevated point.

Mr. Roger Harding: Yeah.

Mr. Robert Johnson: Do you know what I'm talking about there, one of those first little gullies?

Mr. Roger Harding: Okay.

Mr. Robert Johnson: And that pool there, it looks like there's--that's as far up as they're going to have any successful spawning, or access to any successful spawning. And I understand what you're meaning about the hardiness of the fish that can get up there and spawn. They've got to be pretty tough fish.

At the elevation of flow that I saw when I was there at 260 CFS, they could definitely still get there and they could definitely still spawn successfully there, so--and probably a little bit easier than they could with flows that were 350 to 600 CFS.

So, I just--do you agree that that's something we need to look at, or should we just call it good because it works or what? And I'll add Shawn, Monte, everybody.

Mr. Roger Harding: Well, I thought Liz collected substrate information throughout this anadromous reach already.

Mr. Robert Johnson: There is. I mean, I didn't know if you wanted that expanded upon, or if there's anything else that needs to be done there.

Mr. Roger Harding: I think it's--well, did Liz--I think most of the spawning that was observed was below--I think there's a barrier at 17 feet--or not a barrier, I mean a--the first little waterfall like at 17 feet or whatever.

And from what I understand, most of the--most, if not all, the pink are spawning below that, more in the intertidal reach. So, I think we all agree that there's no much spawning going on up on those series of pools.

Mr. Robert Johnson: Okay.

I guess the way I was--it's frustrating to not be able to address this with National Marine Fisheries Service, because all this is tying into what their needs were for essential fish habitat in there.

Mr. Shawn Johnson: Yeah, that's their--.

Mr. Roger Harding: --Yeah--.

Mr. Shawn Johnson: --Ballgame.

Mr. Robert Johnson: So, I just wanted to address it and put it out there and get it on the record that we were--we're looking for direction and input of whether or not that's been adequately covered or not. And that's something we'll have to

address directly with them. So, I don't want to waste--I don't to--.

Mr. Roger Harding: --Yeah, because we have a lot of--.

Mr. Robert Johnson: --Spend any more time.

Mr. Roger Harding: Yeah, we got a lot of substrate information where they were spawning where Liz collected. I guess the only concern--.

Mr. Robert Johnson: --Yeah--.

Mr. Roger Harding: --Would be is if--after the project's in place, whether or not there's going to be continual gravel recruitment to keep that habitat in place.

Mr. Monte Miller: Yeah, that's what I was going to throw in there as well, was the cleansing of those spawning areas by the heavier flows, which we won't have after the project is there probably, at least during the time that'll be used for refill of the reservoir. Just--it's that flushing flow would be a concern.

Mr. Robert Johnson: Yeah. Well, my observation, this is an incredible--incredibly complicated water regime down there. And it's set up such that there are buffers between those--it looks to me like there's really good buffering between those pools and the falls, and the pools and the falls and the ripple and down below that--it's set up really well for not having much recruitment, and it doesn't generate the energy for scouring.

You don't any large woody debris coming down through there and dredging things out.

Where the velocity increases, it's set up so that they--so that it flattens out and spreads out instead of getting to a scouring flow, except for there's one rock outcrop in current. There again, it's rock and it redirects the flow out against that big ripple that comes out on top of the tide flats. So--.

Mr. Monte Miller: --We also don't have a good handle on the delta itself. Is it the result of Sweetheart Creek, or is it the result of the other rivers coming in around the corner and it just happens to collect there at Sweetheart?

Mr. Robert Johnson: Yeah. Well, it's really something to get on the ground there and see how this thing is laid out. I don't--.

Mr. Monte Miller: --It's quite a complex--.

Mr. Robert Johnson: --I tell you what, I've seen a lot of streams in my life, but I've never seen one quite as complicated as this one.

Mr. Monte Miller: Yeah, it's quite a complex corner right there.

Mr. Robert Johnson: Yeah.

So, I'll try to address this with National Marine Fisheries Service and see what they have to say about it. But, it was in

there as a comment and a request for more information, so that's why I've got it in here.

Mr. Roger Harding: So, Bob, I think it's just--the comment was to get at we don't want to do away with any natural selection process and allow the pinks that do get up there. So, there's a--maintain whatever diversity of genetics they have.

Mr. Robert Johnson: I think that's just--without being able to specifically qualify my observations except for the experience that I have, I think that that's going to be a nonissue. But, we can--maybe there's something more that needs to be looked at.

But, being there--like I say, I was very fortunate except the conditions were so absolutely miserable. It was really something, seeing it at about 260 and realizing it was going to be higher than that. So, I know you can't just go on my word, but those are my observations.

Mr. Monte Miller: Yeah, it's also not in the interest, I believe, to improve that habitat to create more pink salmon. That would not be the optimal solution.

Mr. Robert Johnson: No.

Mr. Monte Miller: I don't think anybody wants that.

Mr. Shawn Johnson: No, I--.

Mr. Robert Johnson: --I'm going to go out on a limb and say I think it'd be absolutely fine the way it's set up now at

around 300 or 350 CFS. I think it's absolutely perfect at 260, but then that's just me. Not seeing it higher, I can't even imagine--I can hardly imagine how they can do what they do up there at higher flows, but obviously they do.

Mr. Shawn Johnson: Well, speaking strictly as a personal use fisherman who's used that area, you kind of want to use those barrier falls as a selection process. You're willing to go with less fresh sockeye salmon in the upper pool and have fewer pinks and sorting through all the pinks to get one or two brighter sockeye. So, yeah, it's used that way for sure.

Mr. Robert Johnson: Got you.

Mr. Monte Miller: Right.

Mr. Robert Johnson: Total dissolved gas, there's a--there is a comment about the effects of total dissolved gases. And what I sent the literature searches that I've done on these types of turbines, the--unless they're being run really slow or near shutdown or maintenance, they generally minimize total dissolve gases. And this kind of a regime is it flows to the powerhouse and turbines rather than over a spillway, which there won't be. And maybe there will be some that happens during flooding events or whatever.

But, I--that's another one of those things that's going to have to be measures. There's no--like in Scotland, they have quite a few of these, and they've not had any problems with them

except for, like I say, when they run them at very low efficiency when they're working on something or during doing maintenance. So, generally they don't have any issue with the dissolved gases.

Yeah, that was one of the--I don't know. Somebody else may have a comment on that. Monte or anybody?

Mr. Monte Miller: Yeah, this is Monte. I'm kind of the one that threw this out there initially. My concern was more from the potential for pulling water from beneath ice where we had problems--I've seen problems with hatcheries where, in the mid to late spring before the ice goes out and you do have concern with fish in the downstream reaches, that we wound up with high nitrogen levels and actually gave fish in the hatchery the bends. That occurred at the Fire Lake hatchery when I worked there years ago.

So, it was just a concern I threw out there to--hey, your operational scenario's going to play a lot on whether you have these issues, and it may be something to watch.

Mr. Robert Johnson: Absolutely. And fortunately there have been some advances in technology in the way these blades and such have been developed so that it helps to minimize that also.

And then, they--well, I tell you--.

Mr. Monte Miller: --I also--.

Mr. Robert Johnson: --If you do run into that, they have allowances for injection of oxygen at the turbine head to minimize that--.

Mr. Monte Miller: --Right--.

Mr. Robert Johnson: --If it turns into a problem.

Mr. Monte Miller: Well, I agree with the statement too that usually water through a pen stock doesn't cause too much problem. I've seen that on Grand Coulee on the Columbia where everything was fine, but if they spilled water over the dam it gassed up the river.

The only time that I've seen those issues, and I've seen 120 percent coming in off of the Spokane River into the Columbia, and it's been water taken from under ice conditions.

Mr. Robert Johnson: Okay.

Mr. Monte Miller: So, it--how much it will dissipate I can't really say. I do know that at Fire Lake hatchery we had a--we had to put in a gas dissipation tower and run everything over limestone to break up the gas before it went into a cistern type collection--a holding area and then was pumped to our raceways and troughs and things like that.

Mr. Duff Mitchell: Well, isn't the--?

Mr. Monte Miller: --It can--.

Mr. Duff Mitchell: --Monte, isn't the--?

Mr. Monte Miller: --It usually hasn't been a problem in Alaska hydropower. But, I threw it out there.

Mr. Robert Johnson: And it's always good to have those out so we can take a look at them if we start to run into any issues with that in the future.

Mr. Duff Mitchell: Yeah, I'm going to meet with--this is Duff here. I'm going to meet with Eric Prestegard here this afternoon actually on another--on our fish collection barge, a follow up meeting, but I'll ask him about that.

I believe that the DIPAC hatchery is pulling water from the Salmon Creek reservoir, which is [unintelligible] ice for a chunk of the year. And I'll ask him what are the parameters or if it's had some issues related to this. I don't know what size turbines and if they're getting that water after it comes through the turbine or before. I would assume it's after.

Mr. Shawn Johnson: Yeah, it is after.

Mr. Monte Miller: It's after. It's after the turbines and after the city water is taken off.

Mr. Duff Mitchell: Okay.

Well, I'll ask him if they've had to deal with some of these issues, because I think it's a little smaller elevation but it's--it may be similar in some regard. So, I'll ask some questions with Eric on that as well.

Mr. Monte Miller: Yeah.

And I'm not sure what the depth of the intake is there either. That may have a factor in this, if they're taking from closer to the bottom of the reservoir or if they're taking water from 15 feet down.

Mr. Robert Johnson: Got you. Okay.

And like I say, there are some--there is some information from similar projects in Scotland that address this. So, that's another--.

Mr. Monte Miller: --Yeah, so you--.

Mr. Robert Johnson: --Input--.

Mr. Monte Miller: --And we'll get stratification within the reservoir as well with the gas level.

Mr. Robert Johnson: Yeah.

Mr. Monte Miller: So--.

Mr. Robert Johnson: --Okay.

Another one--let's see. Let's go on to water quality. You're all aware of the work that's been done to date on existing water quality in Sweetheart Lake. And the question is, is it--does it provide an acceptable level of scope and resolution to fulfill the ADEC and Fish and Game notes and Forest Service--Fish and Wildlife Service requirements? And if it isn't, I mean, what do we need to do during this field season?

That's out there. I mean, yeah, I'd just like a discussion about if it's--is it good enough? Is it good to go? What else do we need? Do we need it to be ongoing? And I'm going to keep temperature separate from water quality in this discussion if possible. Shawn?

Mr. Shawn Johnson: Well, I can't speak for DEC or the other agencies. And refresh my memory. I know Bartow and those guys did a whole lot of water quality work. Did you guys--did you do more water quality work in the lake?

Mr. Robert Johnson: Yeah. We just had a hydro lab there and did--and looked at different parameters on it also. So, I don't know if there's something specific, if there's a--what I'm looking for is a specific protocol that exists as far as these monitoring efforts, because it seems like somewhere there should be a protocol for what's necessary for these permits. Is anybody familiar with that?

Mr. Shawn Johnson: I'm not.

Mr. Robert Johnson: Monte?

Mr. Monte Miller: The only thing that I would say would be you can of write your study plan and develop what you need to look at. DEC does have standards that, when a license is written, typically one of the license conditions requires a monitoring system to look for instances where you may have erosion which affects water quality. There are certain

standards that DEC has that usually are--become part of a license condition when you're--for construction.

Mr. Robert Johnson: Right, I'm familiar with those. I'm talking about pre-project.

Mr. Monte Miller: Yeah.

Mr. Robert Johnson: FERC? Is John there? John, do you know?

Mr. John Matkowski: Yeah, I'm here. I guess our concern initially was the fact that there was no comparison of your existing water quality data with standards for the state, and it was more of an analysis issue. But, I know we--during some of the study meetings you had discussed water quality in much greater detail than was provided in your preliminary draft.

So, specific, I mean, it's what we scoped out as we are looking for and not necessarily--we didn't really have the information from what Alaska would like as far as their water quality certificate. Is that waived in Alaska? I can't remember.

Mr. Duff Mitchell: This is Duff weighing in. I'm not an-- I'm certainly not an expert, but my limited dealings with DEC is that this is not a water--municipal water supply, and so it has a lot less standard. Our concern is that we--and this goes back to the woody debris up there at the lake.

We're not wanting to haul out the woody debris because we don't want to disturb and create high sedimentation or whatnot. Because our concern is--from Juneau Hydropower's point of view is that we don't want to muddy the water up for fish when it's pretty much of a crystal clear water reservoir. But, that's that factor of quality.

So, we may be self imposing a higher standard than what DEC requires just because it's municipal versus non-municipal. But, they have not been very active in the scoping process. When I--there's something to do with the Army Corps with--I forgot what the--it's not--.

Mr. Monte Miller: --I can address that.

Mr. Duff Mitchell: Yeah, go ahead.

Mr. Monte Miller: Not to interrupt, but, yeah, DEC typically on hydropower has issued a standard waiver letter on 401 certification under the NEPA criteria. That causes the water quality issues to fall, other than the state standards, I mean. But, the main NEPA documentation then comes from the Corps of Engineers 404 permit and 404 findings, which usually are--I don't want to say a rubber stamp, but less stringent.

Mr. Duff Mitchell: I--that's been my discussion. They haven't given me a waiver, but that's kind of where they've kind of led me to believe where this is going to go, Monte.

Mr. Monte Miller: There's actually a DEC waiver letter out there that they--when asked for their input on 401 certification, they typically send the waiver letter to the applicant. They waive 401 certification.

That does not waive Alaska standards, if they so want to get into, which are typically more related to, like you said, water systems for municipal use and construction activities.

Mr. Robert Johnson: Okay. So, we're--I see us a little bit broader in scope than just dealing with fisheries here. So, I think--I guess we're going to need to touch base with DEC and get a little bit of clarity there and see what we can do. Okay. That's gives you enough to kind of--.

Mr. Duff Mitchell: --Well, let me jump back here just so I understand. John over at FERC, John Matkowski, underneath the scoping there--we address some issues or we said we were going to do some issues with water quality.

We have the baseline, what I'm going to call the Bartow stuff, which was earlier. We had a little bit on the temperature and the issues--or not issues, the things that Liz had taken, I think dissolve oxygen and a few other things. Going back to Robert's original question, what more is typically found or required for a hydropower project of this size?

Mr. John Matkowski: I mean, typically you're dealing with other things. Like dissolve oxygen and temperature are your biggest ones, generally speaking.

But, the real question, I guess, is--and also generally you would--like two seasons of data can usually help you a lot better than one, of course. But, if everyone agrees that your studies are enough to analyze potential effects of the project being this--a lake way out in the middle of nowhere, if I can say that for that, then it's fine.

But, I know--I mean, there were some questions about rock leachate. I don't know if you addressed those. There was the dissolved gas levels. The reason--I know Monte had discussed that in his concerns. But, our concern going through it was--is that it was mentioned also during the scoping, but it wasn't analyzed. So, we had--there was no mention of it really.

So, I don't know if anybody can interject as far as anything else they--you think they would need. But, if it's sufficient--like I said, from what I've reviewed in the draft--or the preliminary draft, there wasn't enough analysis. So, it kind of calls for more--we need more information.

Now that you--I've seen some of the--I guess there was a presentation. I saw figures and more of the data that wasn't necessarily included. It seemed sufficient for an environment that has a very short season and there's not a lot of changes to

the water quality parameters. So, I guess we'll see when you submit.

Mr. Robert Johnson: Okay.

Let's see. Where did my screen go here? I know that we've got--what was that one that was on the bottom end of this? Hang on. Oh, there were comments about--again, I think it's before-- we have it. We have the information. We're still gathering information about effects on temperature in the outlet of Sweetheart Creek and assess the potential impacts of altered stream temps on spawning, rearing, and incubating fish.

We've got--we do have that data and we are continuing to collect that data. It just needs to be analyzed and plotted. And so, my response to that is I wholeheartedly agree. And it's being collected and it will be presented. So, is that--?

Mr. John Matkowski: --No, that's temperature. That's like profile?

Mr. Robert Johnson: Right, at depth.

Mr. Monte Miller: This is Monte. I'd like to throw a clarification out there. I misspoke. The 401 compliance is with the Clean Water Act, not NEPA.

Mr. Robert Johnson: Okay, makes sense.

Mr. Duff Mitchell: Thank you.

Mr. Robert Johnson: So--and was it Shawn? Was it Shawn that was talking?

Mr. Shawn Johnson: Pardon?

Mr. Robert Johnson: Did--were you saying something about the temperature?

Mr. Shawn Johnson: No, I wasn't, but I will.

Mr. Robert Johnson: Oh, please do. I didn't know who I was speaking with.

Mr. Shawn Johnson: So, you're continuing to collect a water temperature profile in the--well, on the lake, I guess, not the reservoir yet, but the lake right now?

Mr. Robert Johnson: In the--yes.

Mr. Shawn Johnson: Okay. So, then you'll be able to address the temperature that you're taking in at the intake, and it will be released back into the anadromous reach--.

Mr. Robert Johnson: --Absolutely--.

Mr. Shawn Johnson: --By season. Okay, that's what we need.

Mr. Roger Harding: Well--.

Mr. Robert Johnson: --Yep, we can do that--.

Mr. Roger Harding: --Hey, Robert. This is Roger.

Mr. Robert Johnson: Um-hmm.

Mr. Roger Harding: Obviously I guess it's the thermal units the fish need to complete their incubation and their-- actually emerge. So, I guess that's what you're looking for is that we don't change that. And I guess that would include all

the pinks in the estuary if that's influenced at all by the outlet temperatures.

Mr. Robert Johnson: Correct.

Mr. Roger Harding: Okay. And so, even down in the estuary, do you--well, I guess, yeah, you're going to find out if there'd be an effect or if it would be changed at all.

Mr. Robert Johnson: We have a temperature gauge on the--we have a temperature monitor on the string gauge down below.

Mr. Roger Harding: Okay.

Mr. Robert Johnson: So, we're able to profile what those temperature are over the year or the season.

Mr. Duff Mitchell: Yeah, I think it's pretty--it's down to like every 15 or 30 seconds it's taking a reading. And that's been plugging away since we started--when we started the stream gauge. And we have another one at the lake that does exactly the same thing at the stream gauge, and then we have two lake arrays. Unfortunately, at some of the depths HOB0 meters have been yanked off by ice or fallen off. But, we still have those out there in the exact same places, and then we integrate those HOB0s into there.

One of the things that we've been talking about is not having the intake at the bottom of the lake, but maybe putting it somewhere in the middle. And that is designed for two

things. One, to--for the temperature, like what you were saying, Roger, for the incubation and the emerging.

It looks like, no matter what we do though, with the way the temperature level is going to be, we may be having--you'll still get the temperature of water that you need, but it may shift some things later in the season. In other words, it may not get as hot as quick or as normal, but it may move it back a little. We're not sure yet. We're still looking at that data of where we put the intake in that spectrum of feet.

Mr. Roger Harding: Okay.

Mr. Robert Johnson: Yeah.

Mr. Roger Harding: Is there--I know--so, thinking ahead then, I'm sure you probably have HOBOS up in that upper stream that may be able to the barrier that you're talking about in the--where there might be new spawning just so see if that gets warm enough and it's--is it upwelling? Is it just snow melt? Did temperatures get warm enough there for successful spawning up there?

Mr. Robert Johnson: I agree it needs to be there, but I'm not sure that there is one there.

Mr. Roger Harding: Okay.

Mr. Duff Mitchell: I know it was originally placed on there. All of those things get a lot of ice buildup and sometimes they don't last as long as what you would like. But,

I know one was placed not above where--I don't necessarily believe one was placed above where the barrier in inlet one was or where it would be. But, I think there was one placed below but above the current lake level.

Mr. Robert Johnson: I'll carry one up there when we go this summer.

Mr. Roger Harding: All right. Yeah, we lose about half our HOBOS too.

Mr. Robert Johnson: They all end up on trains. Oh, sorry, I couldn't resist, couldn't resist.

Mr. Roger Harding: Yeah.

Mr. Robert Johnson: Okay, and I will put it in a bombproof place. Okay, just a second. I'm jotting a note.

Mr. Roger Harding: And I don't know if I know about sockeyes smolting to tell--I know that they do come out pretty segregated like at Ott [sp] Creek here in Juneau. You get the big ones, the two checks first, and then the one check followed by that--follow them. I'm sure there's a temperature regime there.

I assume that that would be something that you would naturally try and--because that's going to be lake surface temperature probably, right, that--you're going to be sucking those off and they're going to be migrating downstream?

Mr. Robert Johnson: That tends to be correct, yeah. It's--I think it's the surface temperature that they're dealing with.

Mr. Roger Harding: Okay. I just noticed that--worked out at Ott Creek this past spring. And boy, they're real sensitive to any kind of temperature change and flows. Not one--nothing one day and then 1,700 the next day, and they're all two checks. And then, three days later, the temperature changes and you just all get the smaller one checks. One--yeah, so--.

Mr. Duff Mitchell: --Yeah. And unfortunately, from what we've talked to DIPAC, it's not--it is temperature dependent. So, some years they're a week earlier, then a week later or two weeks later. It just depends on the winter, the amount of ice, how fast that lake heats up.

Mr. Roger Harding: Yeah.

Mr. Duff Mitchell: And what we're kind of planning on, just being proactive, is that we just have to be ready to go when it occurs, because it's not going to be consistent as far as the lake outmigration system. We just have to be prepared from season to season rather than date specific. It's--those lakes warm up differently every year.

Mr. Roger Harding: Oh, yeah, yeah, yeah. No, it definitely varies, yeah, quite a bit.

Mr. Robert Johnson: And I have a question just based on what you were saying, Roger. Is like--and I've always just sort

of assumed that I knew, but I'm going to ask the stupid question. There's no successful sockeye spawning there, is there?

Mr. Roger Harding: I would doubt it. I don't know. That's one of the question we had, is did they find any what you'd consider Kokanee in there?

Mr. Robert Johnson: Well, the answer to that is, to my knowledge right now, no. So, I was just wondering, when you were asking--talking about emergence, if I had missed something.

Mr. Roger Harding: No, that would be the pinks--.

Mr. Robert Johnson: --And you were talking about--.

Mr. Roger Harding: --Probably down in the outlet, below the barrier down--.

Mr. Robert Johnson: --Yeah, absolutely. Absolutely. But, when we were talking about sockeye, I was like, "What? Did I miss something here?" So, I just want to make sure I--I just wanted to make sure I address it. I can ask the dumb questions without any problem whatsoever.

Mr. Roger Harding: I think--I looked in our files, regional files here and did not see any mention of Kokanee. And they would be pretty obvious. They're going to look like herring if you saw them in there. You'd see like the three year old Kokanee dimpling the water out in the middle of the lake where there shouldn't be any fish.

Mr. Robert Johnson: Yeah.

Mr. Roger Harding: That kind of thing.

Mr. Shawn Johnson: Robert, were you asking whether the sockeye were spawning in the lake, or down in the anadromous reach?

Mr. Robert Johnson: I want to know if they're spawning anywhere at all.

Mr. Shawn Johnson: Yeah, exactly.

Mr. Robert Johnson: Because I hadn't heard anything at all about it, and just--the way Roger was talking led me to believe that maybe I was missing something. I just wanted--.

Mr. Roger Harding: --No--.

Mr. Robert Johnson: --To nail that down. Okay.

Mr. Roger Harding: No, I'm sorry. I was talking about the salmon, yeah, pinks below the barrier there.

Mr. Robert Johnson: Got you. Got you. Got you. Yeah, and that's something--yeah, that's absolutely the reason we'll be looking at that. So, all right. Yeah, that's the whole rationale behind that.

Okay. Well, it looks to me like we've gone through these. And then, I really want to--this is a real important one, is did I miss anything here? Did anything come up in any--with any of the agencies that are represented today that I overlooked or something that's really standing out with anybody? Because I

spent a good bit of time looking through and trying to consolidate the comments and put them into potential objectives, and then those are listed here.

And I just--it wouldn't be something that I haven't done before is overlook something, and I want to make sure that--and even if it doesn't come to mind right now, if in the next day or two somebody thinks about something, please, please, please, I implore you to please get a hold of me and run it by me to make sure it's something that we aren't overlooking so that we can make the best of our field season. Is that okay with everybody?

Mr. Roger Harding: Yeah. Bob, this is Roger again. I think it sounds good to me. I appreciate all your work on this.

And I guess looking down--to follow up on an earlier idea that we're assuming, and probably rightfully so, that spawning could be the limiting factor in there, and successful--or spawning area.

And it's always hard to get a handle on has there been successful spawning, because the young of the year, the ones and the two year olds, really aren't recruited to the gear that you use. They don't necessarily get caught by minnow traps, for example. And so, how to--any work that you can do now to set a baseline for--to measure or evaluate successful spawning would certainly help after the project is completed.

Mr. Robert Johnson: Yeah, something that I've started doing out west--thank God for GoPros. I just came back from the Bristol Bay area and was able to document a lot of emergent sockeye fry that otherwise would have not been documented using underwater GoPros. And that's been very helpful.

The other thing--the other tool that I've been using to document some of the either successful to unsuccessful marginal spawning is to use a sewer sampler and to do excavation upstream and then see if dead eggs are--when I saw excavation, I'm just talking about using a tool like a hoe or a shovel to just sample a very small area to see whether they're live or dead eggs, or dislodged from being frozen out or unsuccessful.

And you can come up with, say, a dozen or two eggs at times like that. And so, that's a minimally invasive technique for doing it. I think if you got into something that was a fairly egg dense place that you would know it right away and could stop. So, I'm just talking about marginally invasive, not something that's--not like in the old days when we used to go out with those suction pumps and dig up--good lord, a heck of a lot of eggs--.

Mr. Roger Harding: --Yeah--.

Mr. Robert Johnson: --And [unintelligible] them.

So, anyway, there's tools that I've been trying to pioneer and to use to start looking at some of those and to document

some of those very, very heretofore difficult situations like you're talking about, as far as if you're not there on the day that they're spawning or if you're not there on the day that they're coming out of the gravel, that there's places to look in some of the back eddies where you can actually document what's going on.

So, anyway, I've been--I'm aware of the need for that and I'll certainly be looking at that when we're out there--.

Mr. Roger Harding: --Yeah--.

Mr. Robert Johnson: --This year.

Mr. Roger Harding: It might just be hit and miss observation. So, yeah, just keep an eye on it. Thank you.

Mr. Robert Johnson: Yeah, absolutely.

So, I guess that's it. But, please, please--I'll implore you one more time, because I'm not--I've never been afraid to be obnoxious. Just if you think of something, please, please run it by us here in the next short amount of time as I'm getting things together to go in the field on this one. So, let me--.

Mr. Monte Miller: --Can I point something out real quick?

Mr. Robert Johnson: Absolutely. Absolutely.

Mr. Monte Miller: In review of the recent wildlife minutes--meeting minutes that were just sent out recently and in discussions with Dianne Rodman, I--after our meetings in Juneau that we had, sit down meetings and things, the beaver showed up

in the inundation report but not in the wildlife report. And I thought that was going to be a topic of discussion, but apparently it didn't make the agenda.

Our wildlife people down there assured me that they would make contact, but they forgot. They were tied on bigger issues with bigger animals. Did you guys intend to include the beaver stuff in the wildlife stuff down the road, and how is that going to be addressed?

Mr. Duff Mitchell: Well, Monte, let me--I want to stay on aquatics. But, Cathy's online. Let's discuss it after. There's obviously beaver there and there's beaver than are going to be inundated and/or they're going to--being the tenacious critters they are, some of them are going to move. But, we can address that underneath the wildlife more than the aquatics if that's all right.

Mr. Monte Miller: I was just bringing it up because it didn't seem to get addressed in the last wildlife meeting.

Mr. Duff Mitchell: Yeah, no problem. And I was out in the field with Stephanie Sell and Ryan Scott yesterday on bear snares and stuff. And frankly, we saw beaver homes but we didn't see any beaver and the issue didn't come up. So, we'll recalibrate and address.

Mr. Monte Miller: All right. Well, I'll talk more to Ryan too.

Mr. Duff Mitchell: Okay.

The one thing that--before we move off of this proposed aquatic action plan, and I don't need to know it now, but we need to start scheduling so that Roger and--just kind of looking at calendars for a field trip with Roger and Shawn and likely to include with you, Robert. We don't need to lock that down right now, but maybe as we're going through the rest of this agenda, we can be looking at those dates and where that is.

My history or my experience with talking to Liz and the crew that was out there last year is the first week of July was when the rainbows were spawning. Now, again, this year is going to be different. I don't know if it's going to be earlier or later, but that's when they hit--when they were spawning last season.

Mr. Shawn Johnson: Yeah, Roger and I were talking about dates the other day. And the week of July 8th kind of worked out for both of our schedules.

Mr. Duff Mitchell: Okay. Is that going to work for you, Robert?

Mr. Robert Johnson: Probably. I can--I think it will. I want to look specifically at the dates, but I'm pretty sure it'll work right now.

Mr. Duff Mitchell: Okay. All right.

When we were discussing earlier, Robert was thinking the first two weeks of July was when he was looking at being up at the lake and we'll have things. And again, we'll address that, so thanks.

The second thing on the agenda is the substrate surveys. We kind of covered some of this in the first section. And I guess, Robert, you kind of explained what you did out there in April. What else further do we need to do to pin that down, or are we good, Robert?

Mr. Robert Johnson: Well, what I need to do is get some feedback from National Marine Fisheries Service as far as what they're going to need for fish habitat, essential fish habitat up there. And that's what needs to be done. It may not--that there's not anything that needs to be done. But, that's their--it's their responsibility, and so that's what needs to be done.

Mr. Duff Mitchell: Okay.

Well, let me quickly follow up then on our--on the salinity measurements and report we did out there at Gilbert Bay. It didn't come up that we needed to address the salinity issues with regards to--I'm just trying to find my report while I'm talking.

The salinity issues at Gilbert Bay and the input with regards to how Sweetheart Creek--the changes of the water flows from its natural cycle to more of a spring flow, which would be

at that 350. And I think our request is 350 usually, up to 428 or so. I don't know the exact specifics, but let's just say around 350. So, we were going to moderate the flow so it was year-round consistent, more so than from 100 to 700 range, which is on the average. Obviously it goes up to over 1,000 on some days.

But, we went out there in--April 25th through 28th. We sent a team out that was separate from what Robert and Mark did on the stream work, although we used one of their discharges. And we used Don Thomas [sp]. We took a vessel out there and we took discharge measurements from all known brush water inputs into Gilbert Bay. And we tried to do that simultaneously--well, within a quick region so there wasn't going to be much changes between days or additional rainfall and whatnot so that we could get a good picture.

Now, the reason we did that is we researched and talked to several key people in this field. We contacted an Oregon--I'm looking through my notes here. Well, I don't have my--I don't have what I sent to Sue. But, we contacted an Oregon outfit that--and a professor who's written quite a bit on salinity modeling. They've done the Columbia River work. And I sent him our data, sent him what we were doing, asked him if there was a grad student or somebody who could work on this.

He did not have a model for southeast Alaska. He said they did do some models for the Oregon coast, but they could not extrapolate those models to southeast Alaska. He referred me to the outfit up there in Seward. Again, my notes aren't right here. I thought I had it printed out and I don't.

But, the Seward--they operate, I think, out of Seward SeaLife Center, the Ocean--OLRC. And I talked to them, and they do modeling up in the Cook Inlet. And there had been some previous--some work that they thought had been done in Glacier Bay during--when they were doing those studies back some years ago. But, there was no modeling--there was no template and there was no protocol where you can just take from what exists to what we have in Gilbert Bay.

I even had them research and see if there was any foreign models anywhere in the world that could be used as a base to build from. And that was unsuccessful, and I--we volunteered to hire a grad student or anybody, or a contact that they may have. Bottom line is that the gentlemen in Oregon said, "Look, if you go out and you get the discharge measurements of all the freshwater inputs in and around the same time, at least you have a basis for a model to be able to decide and determine if you have impact."

And so, we did that, and I sent that Excel spreadsheet out with some pictures of what we took. Obviously--and we knew this

going in too. The Whiting River is the predominant input into Gilbert Bay. And we took the measurements, and during that period the total cubic foot discharge into Gilbert Bay was 1,644.7 cubic feet per second. And on that particular day, it's like what Robert's saying, Sweetheart Creek was putting 259 cubic feet per second, or 15.75 percent of the freshwater input.

Now, we also looked at what would occur in gallons per--or cubic feet per a six hour tidal cycle. As we all know, Gilbert Bay is a huge number of acres that is inundated every tide cycle. And it's in transition, going in tide and then out tide.

So, you have undisputably one--a very large mixing zone so that any freshwater changes would not be--what would you call--any freshwater--there wouldn't be any standing freshwater. It's going to be moving. And then, we took those numbers and then we put down per tide change as a percentage of Gilbert Bay. And you guys can look at that. It's a very, very small percentage impact.

And so, we've compiled this data. We've sent it to Sue-- Susan Walker, who primarily was the person requesting this, although, Monte, you had some input as well. And she sent me an e-mail. She's not on the line, but I can just read from her e-mail. It says, "As per your earlier request to review your salinity effects assessment, we do concur that you have enough

information on the changes of salinity that the proposed project operations may have on Gilbert Bay."

And so, I kind of have her concurrence of what we have done. And in my previous discussions, I think, Shawn, you feel that we've also done what we need to do in this particular area.

Mr. Shawn Johnson: Yeah, I think it's pretty clear that, given the Whiting River and the big tide flats and all that stuff, that the change in water flow in Sweetheart Creek isn't going to really do much to the salinity in the bay.

Mr. Duff Mitchell: Okay.

Mr. Monte Miller: And I--and this is Monte. I concur with that. Shawn and I have talked about it, because the question has arisen would it even be measurable.

Mr. Duff Mitchell: Yeah, it's going to be small. But, we want to make sure that we're addressing the issue. And unfortunately, there wasn't a textbook model for me just to pull out. So, we kind of had to take from the experts and kind of do what we did.

The only other thing here is the schedule of actions on our agenda. We have all of the issues that Robert is addressing with the proposed objectives in his study plans. We encourage agencies to make a field trip out there. Seeing is believing, but also to help us calibrate and make sure that we're on the right track as well as any input, because when you're on the

ground there may be additional considerations or a more thorough understanding of what we're dealing with.

The only other thing underneath the aquatics that--doesn't really fall under Robert's. It kind of fell underneath Cathy's, and I'm going to be taking the lead on it, is any further work with the EMF issues. It sounds like, with our AC and with combining cables, that we will be able to address EMF to a pretty low level so that it doesn't impact any species.

This is my theory. I'm not saying carte blanche that that's what's going to occur, but it looks like that's where it's headed. I've enlisted ABB, who is a potential cable supplier. I've asked them to internally try to help us address some of this issues.

I haven't got a--they're a big organization. I haven't got a big green light that they are going to help us, but I've made that overture to still attract or gather additional data than what we have at this point. So, I just kind of wanted to give a status up on that.

I think we've come pretty close that we're going to be okay with the cables and everything that we're running. The Teslas are pretty low. They're going to be pretty deep so they're not going to affect the salmonoids unless they're bottom fishing. And we're feeling comfortable at this point that we're not going to have major issues with EMF, but we haven't ruled that out.

I'm still data gathering. Monte, you have any more input for me on that?

Mr. Monte Miller: No. I also looked at the stuff talking about the cable suppliers and the type of cabling you were looking at. It looked it was pretty much going to, as you stated, take care of the problems.

Mr. Duff Mitchell: Right. That's our intent, or at least that's where it's leaning. But, I'm going to try to get something in writing from the cable manufacturer to such, if they will give it to me.

Mr. Monte Miller: Well, they should have specifications for the cable which--I would think the engineering specifications would direct--or at least provide some information, because it is not just a small issue. Worldwide it's a consideration a lot of places they would sell their cable.

Mr. Duff Mitchell: No, I agree. The issue that's been explained to me is that everything is tailor made. They don't just like say, "Oh, this is your underwater sea cable." If you're going in a sandier area, they build it X. If--they can-- I guess from what I understand, they can vary the amount of copper, aluminum, and armor to each cable. And each one of those factors impacts EMF.

So, if you do a study on this cable, it's 138 kV, say, submarine cable. But, it's 80 percent copper and 20 percent aluminum, and then we get the opposite in copper and aluminum. Does that have much of an impact? Those are the kind of variables, that granularity, that we may not--those studies haven't occurred.

Mr. Monte Miller: Yeah, they may be able to provide an anticipated range, or something to that effect, that at least would help you pin down somewhat.

Mr. Duff Mitchell: Right, right. That's what I'm gaining--I'm trying to get them to give me what they can give me, exactly.

Mr. Monte Miller: Yeah.

Mr. Duff Mitchell: Yeah. Yeah. So, anyways, that just an update on that.

I don't have anything further. But, like I really--Robert really wants to measure twice and cut once, so to say. It looks like we still need some work from--or some input from National Marine Fisheries. Is there anything else that we've addressed that has come up to anybody that we need to go further on or add on, or any comments from the group?

Well, not hearing any, Robert, if you can kind of produce maybe a calendar of days that you would like to be up at the lake and doing what tasks, because you have multiple tasks and

you don't necessarily need people in your hair on the day that you're doing maybe certain things. And--but, if you could look at that week of July 8th for maybe inlet number one work, we'll get Roger and Shawn up there.

Mr. Robert Johnson: Oh, I could probably put them to work. We'll see. I can always use advice from those two.

All right. I will do that and I'll get back to you pretty quick. I'll try to do it today or tomorrow.

Mr. Monte Miller: Yeah, this is Monte. Don't forget that--was it Julieanne? The Forest Service person indicated an interest, so please check with them--.

Mr. Robert Johnson: --Yeah--.

Mr. Monte Miller: --Again.

Mr. Robert Johnson: Yeah. Yeah.

Mr. Duff Mitchell: Yeah, I will extend the invitation. That's a good point, Monte. I thought about that earlier when she mentioned that. I'll extend an invitation for her as well and her--and if she has another person or crew.

Mr. Robert Johnson: Monte, you need to get out in the field, don't you?

Mr. Monte Miller: Yeah. Well, we have these things called budget cuts, so our travel is taking a hit again this next budget year.

Mr. Robert Johnson: Oh, that's crazy.

Mr. Monte Miller: We'll have to see what we can do.

Mr. Robert Johnson: That's just crazy. That is crazy.

Mr. Monte Miller: Yeah, more work, less money. I guess that's the realities of the modern budgeting.

Mr. Robert Johnson: Absolutely, which is too bad.

Mr. Duff Mitchell: Well, we're going to be sending Ryan or one of his folks up every 10 days to do bear samples. You can just say, "Hey, I want you to walk up that creek and give me a good video of that entire stretch there for bears."

Mr. Monte Miller: Yeah. Yeah.

Mr. Duff Mitchell: I'm just--I don't want--.

Mr. Monte Miller: --But, it's funny you mention that, because I had talked to Shawn and he proposed initially--or spoke with the other people. And they're doing some research work with putting cameras on bears, and then they get the downloaded information of the bear interaction with everything. And I thought, "What an opportunity down at the salmon fishery, to put a camera on a bear and see how he reacts--interacts with the people."

But, it's an expensive proposition. And unless you have the time and the resources to do all the other work, it--they didn't feel that they had the right opportunity. So--.

Mr. Robert Johnson: --Yeah, that'd be great to see, though.

Mr. Monte Miller: I thought it would have been some great, great information.

Mr. Duff Mitchell: You'd probably have a million hits on YouTube if it was published.

Mr. Monte Miller: Oh, absolutely.

Mr. Robert Johnson: Absolutely.

Okay. Well, I appreciate everybody's input and assistance. And there again, just please feel free to let me know if you come up with something that's going to be helpful here in the short while here. So--.

Mr. Monte Miller: --Thanks--.

Mr. Robert Johnson: --I'll let Duff--.

Mr. Monte Miller: --By the way, I do get to the field occasionally. We just had a trip down to Swan Lake and looked at one of the intake streams there for their proposed inundation raise. So, I do get out in the field occasionally.

Mr. Robert Johnson: I know, and you're welcome anytime.

Mr. Monte Miller: But, it's coming into July and I got to put some salmon in my freezer and get ready for another winter. So--.

Mr. Robert Johnson: --Got you.

Mr. Duff Mitchell: You can go down to Sweetheart Creek at the end of July, maybe first week of August, and do some cast

fishing. And then, you could do some beat observation and help your freezer out.

Mr. Monte Miller: Yeah, up close and personal, huh?

Mr. Duff Mitchell: Yeah, up close and personal.

Mr. Monte Miller: I could do like our partygoer up at Eklutna Lake this last weekend and carry a little barbecue with me.

Mr. Robert Johnson: Yeah, that works really good to get you in the headlines.

Mr. Duff Mitchell: Yeah, and I'd also like to extend this to you, John. I know that you're going to be--and for those of you that don't know, John is going to be taking--not only is he on the fisheries side of FERC, but he's also going to be taking the lead of this project. Is that still on tap, John?

Mr. John Matkowski: As far as I know, yep.

Mr. Duff Mitchell: Yeah. And so, John's going to be-- where you guys were used to working with Jennifer Harper, she's leaving the FERC temporarily, or for a while, and John's going to be taking over lead from FERC for the project.

So, John, I know you haven't had a site visit up there. But, since we're running a camp, if you can finagle a way from your budget to get to Juneau or passing through, we'll get you up to the site from our end from Juneau.

Mr. John Matkowski: Actually, yeah, we're on limited travel, that's for sure. But, actually my sister lives in Anchorage and I'm going out there in September. I know that's still far away, but, hey, close--a lot closer than from where I am now. So--.

Mr. Duff Mitchell: --There you go. All right.

Mr. Monte Miller: John, when you get up to Anchorage, if you have the time you're more than welcome it stop by and meet and greet here at Fish and Game. We'll do what we can to show you what we're dealing with up here.

Mr. John Matkowski: Okay. Yeah, I think I'm going to be up there for 10 days or so. So, and--.

Mr. Monte Miller: --Moose season, though.

Mr. John Matkowski: Well, yeah. Yeah, I have a one year old, so our--what I had in mind going out there was all this fun adventure. But, then reality set in after I remembered I had a baby at home.

Mr. Monte Miller: Yeah.

Mr. John Matkowski: But, yeah, I might be up for some meeting or seeing the area like that. So--.

Mr. Monte Miller: --Yeah. Well, I think you probably have my contact information. And if not, it's readily available.

Mr. John Matkowski: All right, great. Appreciate it.

Mr. Monte Miller: No problem.

Mr. Duff Mitchell: All right, guys. Well, if there is no further, we can adjourn the meeting. I appreciate everyone's time and input. Thank you very much.

Mr. John Matkowski: All right.

Mr. Robert Johnson: Likewise.

Mr. John Matkowski: Thanks.

Mr. Robert Johnson: Thanks.

Mr. Monte Miller: Bye.

Mr. Robert Johnson: Take care, everybody.

Mr. John Matkowski: Bye.

Mr. Roger Harding: Bye.

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