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MONDAY, NOVEMBER 8, 1993, 9 A.M.

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MR. DEL PIERO: Ladies and gentlemen, this hearing will come to order. For those of you that may not have been present before, my name is Marc Del Piero, Vice Chairman of the State Water Resources Control Board.

This is the time and the place for the continuation of the hearing regarding the amendment of City of Los Angeles Water Rights Licenses on the tributaries to Mono Lake.

Sitting with me this morning are two of my colleagues and good friends, James Stubchaer on my immediate right, who has frequently been seated with me during the course of water rights hearings over the last month or so, and, to his immediate right is Mr. John Brown, my old and dear friend, who knows everything there is to know about water in the State of California, because I said so.

Nonetheless, ladies and gentlemen, this is the time and place where we will continue the hearings that we ended last, I guess, two weeks ago. We are going to begin today's process with the City of Los Angeles, represented, I believe, either by Mr. Birmingham or Ms. Goldsmith. Ms. Goldsmith, are you taking it today?

MS. GOLDSMITH: I am standing in at the moment for Mr. Birmingham. He is detained et the office, and he may join us later this morning.

MR. DEL PIERO: Is there a problem in terms of a presentation this morning?

MS. GOLDSMITH: No, there is not.

MR. DEL PIERO: And when last we left, we had just finished, I believe, the last panel of Los Angeles Water And Power; is that right, and we have a new witness now.

Before I go any further, a number of the individuals who may wish to present testimony here today may in fact not have been sworn during the course of the last hearing. If you have been, you don't have to stand again. If you have not been sworn -- is there anyone here wishing to present testimony who has not been sworn? Everyone has taken the oath. Good. Then why don't you begin, Ms. Goldsmith.

MS. GOLDSMITH: The first witness that we call today is Dr. Robert Beschta.

ROBERT BESCHTA,

having been sworn, testified as follows:

DIRECT EXAMINATION,

BY MS. GOLDSMITH:

Q Dr. Beschta, would you state your name and spell it for the record?

A My name is Robert Beschta, B-e-s-c-h-t-a.

Q Where are you employed?

A I am employed by the Oregon State University at Corvallis, Oregon.

Q Do you have a copy of LADWP Exhibit No. 10?
A Yes, I do. It is my resume'.
Q And is that a true and correct statement of your qualifications and experience?
A It is a bit abbreviated inasmuch as the publication record only goes to 1985, so it is not totally complete.
Q Are there significant publications that you would like to mention in addition to the ones listed on Exhibit No. 10?
A I would like to include those, and I have a listing of those that I can submit.
Q Do you have extra copies for other counsel?
A No, I don't.
MS. GOLDSMITH: Perhaps we can have additional copies made.
MR. DEL PIERO: Fine, if you want to have those ready after lunch.
MS. GOLDSMITH: Q Would you briefly summarize your qualifications and experience?
A Since 1974 I have been a Professor or at least started as Assistant Professor at Oregon State University at Corvallis. I worked through 1981 as both Assistant and Associate Professor in Hydrology. In 1982 I spent a one-year sabbatical in New Zealand in the mountainous country of South Island.
Since 1982, I have been a full Professor at OSU, again

in hydrology. I also operated as a department head for one year during that period.

My position is one where I do both teaching and research as well as extension end workshop courses.

The courses that I teach are courses in watershed processes, forest land-use, and water quality, a graduate class. My research activities have varied over the years and involved such things as erosion and sedimentation, suspended sediment transport in streams, bedload sediment transport in streams, factors affecting the occurrence in pools.

I have looked at things related to the effects of vegetation on channel morphology. I have done studies looking at the effect of high flows on channel morphology, and effects that they may have.

I have done studies that relate to management impacts to stream temperatures, the role that riparian vegetation plays with regard to stream temperatures and have put together a model on that and am involved in several ongoing studies right now looking at channels and stream temperatures.

I have been involved in doing things related to modeling, hydrologic modeling, of peak flows in forested watersheds, and the estimation of peak flows in mountainous terrain.

And, in recent years, I have been involved and am involved in projects looking at subsurface flows associated

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with riparian systems, of streams and riparian systems.
As far as the other activities other than strict teaching and research that I have been involved in, I have had the opportunity to be Associate Editor for the Water Resources Bulletin, which is a national journal of the American Water Resources Association.
I have been a member of the Board of Registration for the American Institute of Hydrology and am currently their Academic Vice President. I have been involved and a participant in the Bonneville Power Administration reviews of fish habitat and enhancement projects, fish habitation modification projects in Oregon and Idaho.
I am a member of the Marys Peak Watershed Commission, which is a body that is in place by the City of Corvallis where it is a municipal watershed, and am currently a member of the Temperature Committee for the Department of Environmental Quality for the State of Oregon.
I am currently also sitting on a panel of the National Academy of Sciences looking at the question of salmonids in the Pacific Northwest, the causes for decline status of the stocks and opportunities for restoration.
Q LADWP Exhibit 12 is the paper by Mark T. Hill, William S. Platts, and Robert L. Beschta, entitled "Ecological and Geomorphological Concepts for Instream and Out of Channel Flow Requirements". It was published in Rivers, Volume 2, No. 3.

Are you familiar with that paper?
A Yes, I am.
Q And did you rely on the information contained in it and the conclusions that are in it in forming your opinions relating to the Mono Basin?
A In part.
Q LADWP Exhibit No. 9 is a copy of the direct testimony of Robert L. Beschta. Is the testimony presented therein your testimony?
A Yes, it is.
Q Are there any additions or corrections that you would want to make to it?
A Well, there are a couple of corrections. One is perhaps a bit trivial.

On pages 23 and 24, I refer to my references to "Chapman (1992)" and "Chapman (1993)", and those should have been "Chapman and Platts (1993)", and I have a corrected reference for that.

Another one is that in the write-up here there is obviously a line that got dropped. They had me graduating from Utah State University with my Ph.D., and that's not the case. I graduated from Utah State University in 1967 with an M.S. Degree in Forest Hydrology. I graduated from the University of Arizona in Tucson in 1974 with a Ph.D. in Watershed Management. So I have a correction page I would

like to submit. Unfortunately, I have only one copy.
MS. GOLDSMITH: We will make copies for counsel and have them available.
Q Are you familiar with the video tape, LADWP No. 11?
A Yes, I am.
Q And have you personally visited the sites which are shown on that video?
A Yes, I have.
Q Would viewing the video help explain or illustrate your testimony today?
A I believe it would, yes.
Q I ask you now to briefly summarize your testimony and invite you to use LADWP No. 11 as you feel appropriate.
A Members of the Board and Mr. Del Piero, I am going to shorten my testimony. I am going to try to keep it as brief as I can. I covered a fair amount of ground in the written testimony, and I am in essence going to skip some of the first sections relating to the history of use and impacts and effects it has had in the Rush and Lee Vining drainages, and I would really like to move on to my commentary, which focuses on a set of questions which I address in more detail also in the written testimony, but which I am going to summarize here orally in front of you.
One of these sets of comments focuses on the restoration activities in Rush and Lee Vining Creeks and, in

this particular commentary here, I will attempt to address the following question, which is taken from the Notice of Public Hearing. The question is: What stream restoration or other measures are needed to reestablish and maintain the conditions that benefitted fisheries in the Mono Basin -- tributary streams -- prior to the diversion of water from the Mono Lake Basin?

A recent publication of the National Academy of Sciences, entitled "Restoration of Aquatic Ecosystems", defines "restoration" as the "reestablishment of pre-disturbance aquatic functions and related physical, chemical, and biological characteristics." Whereas restoration aims to return an ecosystem to a former natural condition, the altering of a landscape to a new or modified use to serve a specific human purpose would instead be termed reclamation, rehabilitation, or in some instances, enhancement.

So terminology is important, at least the way we use it and what we are intending when we say "restoration."

There can be no doubt that the two most important restoration activities that have occurred to date are: (1) the return of continuous flows to these streams and (2) the grazing moratorium implemented by LADWP in 1991. The return of flows was obviously a necessary component of any restoration plan.

This water, in conjunction with the removal of grazing

from streamside areas, has initiated and sustained important establishment and growth responses by the riparian vegetation.

The astounding increase in cover, and I wish to emphasize the word "astounding" -- I've been quite impressed in many ways with the restoration or the reestablishment of vegetation taking place in that system, but the astounding increase in cover and diversity of herbaceous and woody vegetation is already providing important restoration benefits to these streams, and will increasingly do so in the coming years.

Now, from the perspective of developing sustainable aquatic and riparian ecosystems for the benefit of introduced fish as well as other native aquatic organisms, several restoration principles need to be emphasized. As I have previously indicated, the return flows and the removal of grazing pressure has allowed the widespread establishment and rapid growth of riparian vegetation, particularly willows and cottonwoods.

Both willows and cottonwoods were important riparian species of the gallery forests that dominated these streams before human intervention. Their prolific return provides important evidence that these stream systems are indeed recovering. At this point, I would like to illustrate some of this recovery with a video tape showing sections of Rush and Lee Vining Creeks. So, if I could at this point, we would

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like to view --
(At this point the video tape was started.)
MR. DODGE: Mr. Chairman, I have --
MR. DEL PIERO: Hold it. Mr. Dodge.
MR. DODGE: I don't think that's Dr. Beschta who is speaking in the audio portion. I request, if they want to show a video, that's fine, but there shouldn't be an audio from someone who is not subject to cross-examination.
MR. DEL PIERO: Ms. Goldsmith, do you have a comment?
MS. GOLDSMITH: The narrator on the video tape is Brian Tillemans, who is an LADWP employee, and he will be testifying later in the hearing, and we will ask to introduce the video tape after his testimony to authenticate the exhibit.
However, I believe that I could obviate the problems with questions to Dr. Beschta.
MR. DODGE: Well, I don't think she can obviate the problem with questions to Dr. Beschta. The point at issue is whether we are going to be allowed to cross-examine Mr. Tillemans.
MR. DEL PIERO: Mr. Tillemans is on the witness list.
MS. GOLDSMITH: Yes, he is.
MR. DEL PIERO: Is that satisfactory?
MR. DODGE: So we are going to be allowed to cross-examine Mr. Tillemans with the video later?
MR. DEL PIERO: Is that correct?

MS. GOLDSMITH: That is correct. However, I think we have a problem with the volume.

MR. DEL PIERO: Mr. Dodge.

MR. DODGE: One more point of order. Is there some way where we can know exactly where a point comes up so we can replay it in the cross-examination of Mr. Tillemans?

MR. DEL PIERO: There is no time indicator on the video tape that I am aware of.

If you would be kind enough, in the event there is an objection, since you have the control, if you would be good enough to stop it in the event someone raises an objection so we can at least identify the site on the tape in terms of cross-examination.

MR. STUBCHAER: Isn't there a tape counter so that you could set it at zero at the beginning of the tape and record that number?

MS. CAHILL: Would it be possible to put Mr. Tillemans on a panel with Dr. Beschta for a portion of the testimony so that we might have cross-examination in a contemporaneous fashion?

MR. DEL PIERO: Ms. Goldsmith, when did you anticipate Mr. Tillemans being presented?

MS. GOLDSMITH: Next week.

MR. DEL PIERO: Dr. Beschta is going to be gone by then.

MS. GOLDSMITH: Yes.
MR. DEL PIERO: Is there a chance of having him up here tomorrow?
MS. GOLDSMITH: Let me ask.
MR. HERRERA: We do have a counter.
MR. DEL PIERO: Thanks. We are making progress here.
MS. GOLDSMITH: Mr. Tillemans is available to answer questions about the tape. He is not prepared with his full testimony today. The only complication is he needs to be sworn.
MR. DEL PIERO: Mr. Dodge.
MR. DODGE: We were not told by LADWP that Mr. Tillemans was going to come on this week. I have no objection to his being on the panel. I don't want to waive my right to fully cross-examine about everything.
MR. DEL PIERO: I don't think he is available for cross-examination about everything. He did indicate he would be prepared to comment about what's on the tape.
MR. DODGE: I simply want to reserve my right to cross-examine him on the tape when he comes on next week.
MR. DEL PIERO: Ms. Cahill.
MS. CAHILL: I think it would be best if we were able to examine him now.
MR. DEL PIERO: Well, let's do this --
MR. DODGE: I have no objection to Ms. Cahill's

suggestion.
MR. DEL PIERO: I understand. Let's do this: After the tape has been played, assuming that we ever get through this, I am going to ask Mr. Tillemans to be sworn and that he be made available for questions regarding information that is on the tape. That does two things. One, it allows the individual who wishes to ask questions in regard to his representation on the tape to cross-examine him at the same time Dr. Beschta is being cross-examined, and, second, inasmuch as I recognize he was not prepared to come in here and testify, I will be very cautious as to ensuring that the cross-examination today does not go too far afield, so that he is afforded ample opportunity to prepare as a witness for the panel next week.
MS. GOLDSMITH: That's certainly acceptable to us.
MR. DEL PIERO: Good. Now, if we could begin the tape -- I am most interested in seeing what's on it.
(Thereupon the tape was played.)
MR. DEL PIERO: Is that it?
MS. GOLDSMITH: Yes.
DR. BESCHTA: In early October of this year I personally visited each of the sites shown on the video. Although I saw them in October of this year, obviously I didn't see them in September of 1987 when the original footage was taken, but I can attest to the fact that these are indeed

representative of a lot of what's going on in regard to Rush end Lee Vining Creeks. In some areas, it's a lot better. In other areas, it is not quite as good as shown here, but they do indicate that the vegetation is indeed coming back.

In addition to the video tape, my original testimony has some figures, and I would at least like to get those up in front of the group here, which are large-scale reproductions of photographs taken on several occasions of Rush and Lee Vining Creeks, so I have got Figures 3 and 4. Figure 3 is July of 1986 from an area which is known as the "hatchery site", and it is looking upstream, and you can see the relative scarcity of vegetation along that channel.

The photograph in August of 1993 is from a similar location, looking into this channel area, and you can see that the revegetation has been fairly remarkable across this bottom land, and it is difficult, in fact, to see the stream channel out there.

If I could look at the next two figures also, Figures 5 and 6.

Figure 5 is looking downstream from near the county road -- just downstream of the county road on Lee Vining Creek, and you can see Mono Lake barely in the background, but it is looking toward the delta region, and you can see scattered cottonwoods and willows.

The Figure to the right, which is Figure 6, shows the

same general area in August of 1993, again looking downstream, and you can see the prolific response of vegetation. Willows that were present before have gained incredibly in stature. They are much thicker, and the volume of the biomass is increased and it's been prevalent all along that channel. The vegetation is coming back in, so I would just like to have those as examples of some of the things that are happening along this stream.

Now the fundamental importance of the recovering riparian vegetation along these two streams, Rush and Lee Vining Creeks, as shown in the previous video tape and the photographs before you, I think, cannot be overemphasized. It is these plants that are providing, and will progressively provide, a wide array of ecosystem benefits and functions.

For example, the increasing numbers and sizes of streamside willows, cottonwoods, and other woody plants provide:

Increasing shade and moderation of stream temperatures,

Improved nutrient and carbon cycling from leaf fall that supplies food for instream invertebrates and other aquatic organisms,

And, indeed, there are places on Rush Creek where the canopy is now covering the entire channel. It's reaching across.

There's an increased hydraulic roughness along the

channel margins from the multitude of plant stems so that fine sediments in transport are deposited, thus causing streams to narrow and for the stream, in essence, to become deeper.

You end up with increased root strength and stabilized banks during periods of high flow, yet allow overhanging stream banks to develop, and, in fact, to have overhanging streams banks almost by necessity you need roots in the system.

This vegetation provides an increased diversity in channel morphology that is demonstrated by the forming of pools and riffles and the occurrence of spawning gravels in hydraulically appropriate locations, and greatly increased recruitment of large, woody debris within a couple of decades.

So with healthy riparian plant communities, these streams, in conjunction with their adjacent wetland and riparian areas, will increasingly provide for an array of functions beneficial to fish and other aquarian organisms.

Now the multiple and interacting ecosystem benefits that depend upon these plants cannot be simply replicated by structural approaches that manipulate physical habitat. In other words, the restructuring of a channel does not necessarily represent restoration. Some of the approaches that have been used on Rush and Lee Vining Creeks include, for example, excavating large pools within and along channels, adding spawning-sized gravels to a channel, even though such

gravels are a natural component of the bed and banks and are already present, the placing of weir logs and boulder dams in channels, the armoring of the outside of meander bends, the dredging and filling of near-channel and off-channel wetlands, and disturbing channel banks, riparian vegetation, and upland vegetation by the heavy equipment that is utilized with these various practices. These structural approaches obviously are detrimental to the system.

These practices represent an attempt to significantly modify the characteristics of a naturally-recovering aquatic and riparian ecosystem. And this active intervention with construction equipment has created significant adverse impacts to the natural restoration that is occurring on Rush and Lee Vining Creeks.

As another example of the misplaced efforts of the active intervention approach as it is practiced, limitations to high flows have been proposed because they might move gravels downstream. This type of flow restriction represents a general misunderstanding of how channel banks, bed material, and streamside vegetation interact to cause local hydraulic conditions that provide for the long-term presence of spawning gravels in these stream systems.

Gravel deposits form naturally in channels during periods of high flow, and they occur at specific locations in the channel that are of benefit to fisheries. In contrast,

gravels that are artificially placed in channels and which are accompanied by flow restrictions may have few fisheries benefits.

So, in summary, structural approaches to habitat manipulation in Rush and Lee Vining Creeks are unneeded and provide little functional improvement to either stream or riparian systems. In many instances, these efforts have been counterproductive to the goal of achieving sustainable fisheries and aquatic habitat.

Such conclusions are not unique to Rush and Lee Vining Creeks. Over the past decade, there have been widespread efforts at structurally modifying streams for improved fisheries habitat throughout the Western United States. The ability of these practices to provide fisheries benefits in mountain streams have not been widely demonstrated.

My next set of comments, which follow again from the written testimony, relate to future restoration activities for both Rush and Lee Vining Creeks. I will attempt to address the following Notice of Public Hearing question: "What measures should be undertaken on an interim basis until the fisheries have been reestablished and on a long-term basis to maintain the fisheries once they have been reestablished?"

Stream and riparian ecosystems draining the Sierra mountains have evolved over the millennia in response to a variety of natural disturbance patterns. The dynamics of

seasonal snowmelt flows represent perhaps the most important natural disturbance regime affecting Rush and Lee Vining Creeks.

In particular, it is the variation in flows, both seasonally and from year to year that is crucial for creating pool and riffle habitat, for the building of stream banks and floodplains, for creating near-channel wetlands, and for causing the appropriate hydro periods that ensure the establishment and growth of streamside vegetation and also the succession of those species.

Hence, in the short term, I would recommend the continued rewatering of these streams and the continued exclusion of livestock grazing. I would also recommend the cessation of structural approaches to channel and habitat manipulations because of their often counter-productive impact to aquatic and riparian systems.

For the long-term, it is crucial to continue practices that ensure the establishment, growth, and succession of riparian vegetation as these diverse plants provide a multitude of ecosystem benefits and functions necessary to sustain aquatic organisms and healthy fisheries.

These riparian functions include such things as short- and long-term surface water storage, stream velocity reduction due to the effects of above-the-ground plant parts -- both the stems and their roots are working here -- moderation of

extreme flow events, moderation of groundwater discharge, nutrient and particulate retention, nutrient processing, maintenance of species diversity and plant community biomass, maintenance of food web support and habitat characteristics, and perhaps others.

Another fundamental component of any long-term restoration plan for Rush and Lee Vining Creeks is a future flow regime that will bypass the LADWP's diversions.

These bypassed flows need to incorporate several important features of the undisturbed flow regime so that aquatic and riparian systems are not only restored in the short-term, but are also sustained in the long-term.

I would strongly recommend that three criteria need to be considered:

First, some flows must always bypass any irrigation or LADWP diversion structure, and, indeed, every minimum streamflow that will be set for fisheries will probably be more than adequate for what is necessary there, but certainly not lower than what would have happened naturally.

Secondly, some consideration needs to be given to ramping constraints, that is the rapidity with which water is brought up and down in these channels, and this should be developed from an analysis of historical hydrographs. These constraints should attempt to prevent excessively rapid changes in flows that might significantly and adversely affect

fisheries.

Furthermore, at least in some years, flow recession following a hydrograph peak should occur sufficiently slowly so that the vertical root growth of young plants, particularly willows and cottonwoods, can keep pace with the receding water table.

A third, but perhaps most important, component is that some of the natural high flow dynamics need to periodically occur in Rush and Lee Vining Creeks downstream from the LADWP diversions. The occurrence of peak flows within the range of natural conditions is critical for providing disturbance patterns that will cause the restoration of channel morphology, vegetation, and ecosystem functions.

These high-flow disturbances not only assist in meeting short-term restoration goals, but are a necessary component of the long-term sustainability of both the aquatic and riparian ecosystems associated with these streams. So dynamics is certainly part of what is necessary.

My last set of comments provide a brief assessment of work undertaken by the Restoration Technical Committee, or RTC, and I will attempt to address again a question that was in the Notice of Public Hearing. The question is: "What is the status of work undertaken by the RTC at the direction of the Superior Court in connection with the coordinated Mono Lake Water Right Cases?"

My assessment of the RTC work includes field reviews of Rush and Lee Vining Creeks during the last two years, inspection of aerial photographs, and the reading of reports and recent testimony.

Except for the return of continuous flows, the grazing exclusion, and in some cases, for example, in Lee Vining Creek, the rewatering of some depressions, which have been called old channels, I have concluded that the other treatments have often resulted in a significant net loss of riparian functions, have not assisted in the establishment of riparian vegetation, nor have they significantly improved natural habitat conditions for fish and other aquatic organisms.

Although the RTC has indicated a desire to reestablish vegetation along these streams, the mechanical treatments imposed on the channel and streamside areas has often retarded natural revegetation.

The inability, I would say, of the RTC to understand or correctly predict the rapidity of natural revegetation and its importance to these ecosystems is illustrated in the conceptual sketches of riparian vegetation and channel cross-sections over time, as shown in my Figure 7 in my original testimony -- if I could have that put up on the left. The Figure I am referring to, of course, is in Section 2, page 41, of our original testimony. The figure that is shown on the

top of page 41 is taken from a 1992 report, entitled "Description and Evaluation of Restoration Alternatives for Lower Lee Vining Creek, Mono County, California," that was authored by Trihey, Katzel, English, and Larsen.

Alternative One, which is depicted in two locations in this Figure, is meant to represent what will happen to the vegetation and channel if it is left alone.

Alternative Two represents what should happen if a more proactive approach to channel modification is undertaken.

Please note that Alternative One shows relatively slow growth of streamside vegetation and a wide channel for up to 60 years. In actuality, natural revegetation and natural channel changes in both Rush and Lee Vining Creeks are already underway. Channel narrowing is underway, revegetation and growth is prolific.

However, where mechanical treatments have been undertaken, for example the dredging and filling of wetlands or the dredging of large pools and placement of spoils, the natural establishment and growth of streamside vegetation has been significantly retarded.

Without this vegetation, sediment deposition along stream banks is reduced, and channel narrowing is unlikely to proceed. Furthermore, many of the constructed pools have adversely impacted the natural bedload transport of these streams.

The active intervention approach of the RTC has not only focused on controlling channel morphology by manipulating pools, boulders, and gravels, but also by constraining flows. For example, while emphasizing a desire to rewater "historic channels", the RTC indicates that "It is the intent of the planning team to permanently restrict floodwaters from entering the reoccupied historic channels". And, again, this is a publication of Trihey, et al, in 1992.

It would appear that the RTC failed to realize the important interaction of dynamic flow regimes and vegetation in the restoration of these channels.

To permanently restrict floodwaters from entering a channel is not restoration; to not allow flows above a particular level because they might scour artificially-placed gravels is not restoration; to destroy the prolific regeneration of riparian plants so that channels can be altered with heavy equipment is not restoration.

In summary, although the restoration of Rush and Lee Vining Creeks is generally proceeding very nicely as a result of the rewatering and removal of grazing, structural treatments by the RTC are instead obstructing progress.

That really ends my oral testimony, but I would like to add here I realize many of my preceding comments were very brief and may have lost the intent of my not being entirely clear, but because I tried to summarize. But I would be glad

to answer questions relating to any of those.
MR. DEL PIERO: Thank you very much. Ms. Cahill. Before Ms. Cahill gets up here and starts to cross-examine, I will have Mr. Tillemans come up and sit with Dr. Beschta.
Dr. Beschta, I have one question for you in regard to your qualifications. You indicated that you were serving on a committee established by the National Academy of Sciences in regard to salmonids. Can you tell me how one is selected on that panel?
DR. BESCHTA: Well, I have never made the selection, so I can't give you first-hand evidence. All I can give you is my impression.
MR. DEL PIERO: How were you selected? Were you nominated by someone or some agency?
DR. BESCHTA: The National Academy of Sciences has their own personal staff, and they are charged with a particular topic. The Congressional Delegation gives the topic they want studied to the National Academy of Sciences, and their staff begins to contact people around the country.
MR. DEL PIERO: And which Congressional Delegation was involved in the topic on which you were selected?
DR. BESCHTA: Mark Hatfield, I believe, from Oregon in this case.
MR. DEL PIERO: Thank you very much.
(Thereupon Mr. Tillemans was sworn.)

MR. DEL PIERO: Would you state your name for the record?

MR. TILLEMANS: My name is Brian Tillemans. I work for the Department of Water and Power.

CROSS-EXAMINATION,

BY MS. CAHILL:

Q Good morning, Dr. Beschta. I am Virginia Cahill, representing the California Department of Fish and Game.

Dr. Beschta, I am going to go through some of the issues raised in your direct testimony, even those questions you didn't summarize today.

On page two, you put forth as one of your conclusions that a high-flow event in 1938 did not significantly alter the stream channels because residual riparian vegetation was still sufficiently intact to resist erosive forces.

Does the fact that the high flows in 1938 failed to alter the streams suggest that the grazing that had occurred up to that time had not been sufficient to affect the stability of the streams?

A The grazing was already affecting the stability of the channel. What I said in my testimony is it had not yet changed. As you continued the process in place prior to 1941, you would ultimately have seen significant channel changes occurring in the system, but, as of 1939, there was still sufficient root structure to withstand the high flows in 1938.

Willows and cottonwoods can live a hundred years, so, yes, that vegetation will be around for a long time.
Q Was water, to your knowledge, ever diverted from Rush Creek below the narrows?
A Yes.
Q Is it likely that between the 1938 flood and the beginning of the Los Angeles diversions, the riparian vegetation and stream channels remained stable; in other words, between 1938 and 1941, was there any significant change in the stream channels?
A I am not aware of any gross changes.
Q Would you conclude that water diversions were a greater factor in the decline of the vegetation and channel degradation than say livestock grazing in the period from 1940 to 1989; in other words, between 1940 and 1989, which had the greater impact on the streams, the diversion of water or grazing?
A Well, they interact. If I have plants growing, some of those plants would have continued to grow, even though you were taking water out of the system, diverting it, there is certainly some water that gets into the system so those plants would continue to grow, but reestablishing plants would have a tough time, and the grazing would have an impact also. So water is definitely important. If you don't have a lot of water, if it is all taken out, yes, you obviously won't get

plants, but the grazing was having an important impact on establishing plants. They just never had a chance to get off the ground, and those are important.
Q Well, in that period, from approximately 1970 to the early 1980's, when, in fact, almost all the water was taken out, wasn't that the primary factor in the decline of vegetation?
A Yes, there was, I would believe, substantial loss of vegetation because of the diversion out of the Basin.
Q And do you believe that the Rush Creek bottomland can be restored to its prediversion conditions?
A Well, this may seem a little bit surprising to you, but I think they may be approaching prediversion conditions or better today.
Q What was the width of the riparian forest in the Rush Creek bottomlands prior to diversion?
A I never measured that.
Q Do you believe the current floodplain vegetation is of the same width and structure as it was prediversion?
A Well, when you ask a floodplain question, that's an interesting one, and I haven't seen any measurements which have told me how wide the pre-1941 floodplain was. It's talked about in testimony, but I haven't seen any numbers. There is an existing floodplain occurring in the bottomlands today. It varies. It may be 100 feet or more in some places

and in other places it is very narrow. The concept of the floodplain is not quite the same thing as in a large river system like the Mississippi. These are dynamic systems. They have localized small floodplains, micro-topography all across that bottom.

Q Have you examined aerial photographs and noticed the riparian vegetation prediversion?

A I examined aerial photographs. I really didn't look for that.

Q In your answers here, are you taking into account the incision that has altered the natural floodplain on Rush Creek?

A Channel incision has occurred.

Q And there has also been groundwater table lowering?

A I'm sure that's occurred. It has occurred in other places. The incision of a channel may not have affected it at all. It is not an easy one to extrapolate or project because those water tables underneath that valley are not flat, and we are finding in our research, as you move across an alluvial valley bottom, you find in places where the water regime seems to be in concert with what is happening in the stream and in other places it is operating independently, and, again, the mixture of materials that you have present on that bottom and the ability of channels to move around, I would expect you would have a very similar thing out there. I would not expect

a uniform water table across there.
Q You have said you have not actually examined the historical records in any detail?
A I didn't say that. I didn't examine them with regard to how wide the riparian zone is.
Q So you are unable to conclude that we are now approaching a riparian zone of the same width as the. historical period?
A Well, the Draft EIR figures show there has been significant reduction. In my walking around there, I would say, yes, there's been significant loss of plant growth certainly in many areas, but, by the same token, those areas where there has been significant loss of plant growth, many of those are now showing revegetation in willows and even cottonwoods coming back in.
Q The cottonwoods coming back in, how close are they to the margin of the stream?
A They are right up to the edge in places.
Q And was there historically cottonwood growth over a wider area than there is now?
A Yes.
Q Now how long would it take to restore the area equivalent to natural conditions with mature trees that were lost if you just left it to the natural processes to work?
A Will you repeat the question?

Q If you rely entirely on natural processes, how long would it take to approach conditions that were similar to the pre-1941 conditions with a wide floodplain with a wide band of riparian forest?

A I am going to have difficulty answering that one in any simple way because in the pre-1941 period the growth of a lot of those plants along the bottoms, there was an incredible amount of water being moved around on the bottomlands. There were ditches taking water out of Rush Creek, there were ditches in the bottomlands moving water around in Rush Creek. There may have been considerable amounts of the area wetted by irrigation pre-1941 that were not natural back there either. So I can't go back to 1941 as my target. What I can argue is that the restoration of a functional system with all of the things that we would argue are working hydrologically and ecologically are already underway, and it's just at a certain stage in its life history, if you will. It's a young stage.

Cottonwoods are indeed coming in. I have stood out on the bottomlands of Rush Creek and counted over 30 cottonwoods within a hundred-foot radius right close to the stream channel. They are not always that thick, but they are there, and they are coming in. There are some older cottonwoods 12 to 15 inches in diameter that have been broken off which, if I had looked at those a few years ago, I would have said they are dead. They are now regrowing.

So there is a lot of regrowth taking place in that system, and I can't get you magically the large cottonwoods in three or four years, but I can in 15 to 20 years have significant cottonwoods in that system if that is what your target is. If you are after recovery of channels and pools, things like that, it is already happening. There are pools in excess of four feet and a series of those out there. There are spawning gravels recovering in the system, so it's already got a lot of features that I would argue are part of a pre -- and I would go back pre-1941. I would go beyond that and go much farther than that -- were indicative of that system prior to any human perturbations. It's already happening.

Q At this point, you have stated the cottonwoods are coming up mostly along the margins of the streams?

A No, I didn't say that. I said there are some around the margins of the stream. There are cottonwoods that are also occurring farther away from the channel system.

Q Are there a significant number of cottonwoods within the historic floodplain, the areas that would have been floodplain in the historic period?

A You are going to have to -- again, I am having difficulty with the question about the floodplain. There are cottonwoods that are coming within the historic riparian area of Rush and Lee Vining Creeks, yes.

Q Have we had sufficient overbank flows to be

establishing cottonwoods -- how far from the creek are new cottonwoods germinating?
A Cottonwoods generally require gravelly substrate and a moisture supply and often will come in profusely after a disturbance, a major disturbance, but they can come in in backwater areas or other places where there is sufficient moisture and the seed comes in at the right time of the year, and so it is possible, and indeed it is occurring. There are places where cottonwoods are occurring away from the existing floodplain, but it is not nearly as common as those which are closer to the stream.
Q Are there channels that have not been rewatered that, if rewatered, would support cottonwood growth?
A I am sorry, you'll have to repeat that.
Q Are there historic channels that have not yet been rewatered that, if rewatered, would support cottonwood growth?
A I spent a great deal of time in the last day trying to figure out this question of historic channels, particularly on Rush Creek.
I was out on the ground, in fact, yesterday with that particular question in mind, what did the historic channels look like, where were they, and I've also looked at the photographs again. I've looked at the historic aerial photographs, and I guess I would come to the conclusion that what has been called "historic channels" on the Rush Creek

bottomlands is to a large degree a result of irrigation movement of water around those bottomlands and rewatering of areas off to the side of the main channel, so where are the historic channels? The historic channel is really the main stream with braids, with little side tributaries, but not extensive historic channels in regard to channels that are running parallel to the main stream off on the other side of the valley. So the historic channel question is an interesting one.

Q And it is true, isn't it, that some of the historic Rush Creek was lost due to the incision?

A Oh, I'm sure.

Q Let me ask you just briefly about an article on which you are an author, and the article is entitled, "Ecological and Geomorphological Concepts for Instream and Out-of-Channel Flow Requirements," and the authors were Mark Hill, William Platts, and yourself. It appeared in Rivers in 1991. Are you an author of that article?

A Yes, I am.

Q And the first sentence in the abstract of the article says, "Healthy fish populations are dependent on streamflow regimes that protect the ecological integrity of their habitat." Do you agree with that statement?

A Yes, I do.

Q The article speaks of four types of flows, including

instream flows, channel maintenance flows, and valley maintenance flows, also riparian maintenance flows.

Would you believe that all four of those would be required on the Rush and Lee Vining Creek systems?

A The valley maintenance flows is probably the toughest one to say that yes, it is required. We are looking at perhaps major events resiting the system. You have already had major resites in the last 20 or 30 years. I don't think Rush or Lee Vining Creeks need those, but I would argue that the other flows, the channel maintenance flows, the fishery flows, the riparian flows are all, yes, these are part of the system.

Q Have you made any attempt to determine what the channel maintenance flows ought to be on either Rush or Lee Vining Creeks?

A Not a quantitative number, no.

Q Have you made any attempt to determine what the flows ought to be for riparian maintenance?

A I have indicated in my written testimony that you need to be thinking about having peak flows occurring at sometime within the range of historical conditions.

Q And so did you ever attempt to quantify that and come up with a specific flow?

A I quantified the period of record that was available to me.

Table A of my written testimony, 20 years of available record with regard to Lee Vining Creek -- this is on page 38 -- 20 years of available record on Lee Vining Creek show an average flow of 263 and a standard deviation of plus or minus 125, and on Rush Creek 256 cfs plus or minus one standard deviation of 168 cfs.

What I am arguing here for is that that's the historic range. Whoever is setting the flows for those streams ought to be thinking -- at least at some times they ought to be bumping back up into that range again.

Q And by "that range" do you mean the average or the average plus the standard deviation?

A Within the range of the average plus or minus the standard deviation, and let me clarify further. This is a flow range then. Two-hundred-fifty-six plus or minus 168 is a broad range. I am not suggesting that it should always be 256 minus one standard deviation. I am saying it ought to be up within that broader range. There should be high flows, there should be moderately high flows, and there should be lower high flows occurring.

Q And how would you determine the duration of those flows?

A Those flows don't last very long. These are instantaneous or daily average peaks, so they don't stay up there very long, and they should not be held at those high

levels. They should occur, and then you are looking at ramping up and down from those. And so it's not just simply getting them up there and holding them.

You would not want to hold Rush Creek, for example, at a high flow for a month period based on these peak-flow data.

Q And in your article in Rivers that we have discussed before, it states: "In the absence of supporting research, we recommend that flows be reduced by no more than ten percent of the previous day's flow, and in most cases a reduction of less than ten percent of the previous day's flow would be highly preferred."

Would you recommend that on Rush and Lee Vining Creeks?

A If I could have rewritten that sentence in retrospect, I would have said "In the absence of supporting research or local information...." In my written testimony, I talk about utilizing the existing flow records that are available for making that determination.

So although I am saying research, I would have loved to have rewritten and say "research and local data." If you have local knowledge, use it. You cannot wait for the research to tell you exactly what to do on Rush and Lee Vining Creeks if you have specific information which is beneficial in making a decision.

Q Have you, in fact, determined a ramping rate for those streams other than the ten percent recommended in the article?

A I don't have a recommendation on ramping rates.
Q For the record, I would like to point out this article I am referring to has been submitted, and it's DFG-72.
My understanding is that your testimony was that you do not believe it is necessary to cap flows at either 60 or 100 cfs for geomorphological use; is that correct?
A If you want to reestablish plants, if you want to initiate channel-holding processes, if you want pools that are of benefit for fisheries, you should not be capping flows.
MS. CAHILL: Mr. Del Piero, I believe I am close to the end of my original 20 minutes. What I would propose would be to apply for a 10-minute extension to be used with Mr. Tillemans on the video and I would ask if we could take a break prior to that because I wasn't expecting to have to do that examination at this time.
MR. DEL PIERO: And how much time is there left?
MR. STUBCHAER: Three minutes.
MS. CAHILL: Let me use the last three then.
MR. DEL PIERO: Why don't we take a break, and you will have 13 when we get back.
MS. CAHILL: Thank you.
(Recess)
MR. DEL PIERO: Ladies and gentlemen, this hearing will again come to order. Ms. Cahill, why don't you proceed.
MS. CAHILL: Dr. Beschta, you mentioned Table A on page

38 in your report. That table shows the peak average daily flows. It's true, isn't it, that instantaneous peaks might be higher than these?
A Yes, it is.
Q And if, in fact, the historical record shows that on occasion flows remained on the order of 250 cfs for a month on one of these streams, would you recommend then, from time to time, flows on that range for that duration?
A Well, you can calculate an average flow for a month and come up with 250 cfs, but it is unlikely in any stream I am aware of where that flows on a natural way, so you have got days where you are above 200 cfs, above 300 cfs or whatever, so it is fluctuating, and you calculate an average.

Now those plants then don't recognize that average flow. They are responding and those channels are responding to the dynamics of the flow regime they create at the 250 cfs average. So, no, I would not recommend holding a 250 cfs flow, even though that's a typical monthly flow for some time of the year.
Q If, in fact, though, in the historical record there were flows that were consistently over a particular level -- assume that there were flows consistently fluctuating but consistently over 200 cfs for a month. Would you recommend that at least in some years similar flows be used?
A I think in some years that would be appropriate, to

have those kinds of flows, yes.
Q Thank you. Let me just clarify one thing. On page 29 of your report, in paragraph A, on stream rewatering, you mention that in June 1990 Court ordered seasonal minimum flows and flushing flows were established for Rush, Parker, Walker, and Lee Vining Creeks. And then you state, "The return of continuous flows to these streams represents the most important aquatic and riparian restoration activities undertaken in the Mono Basin."
You didn't intend to suggest, did you, that those continuous flows have been only those arising from those Court ordered streamflows?
A No.
Q In fact, you are aware that since approximately December of 1989, the Lake Level Injunction has precluded any export from the Mono Basin, with one exception?
A I am not intricately familiar with that, but I understand that, yes.
Q So, in other words, in the four years between -- well, in the years between 1989 and 1993 when you have seen such phenomenal growth, there has in fact been no export from the Mono Basin by way of the Los Angeles diversions?
A I really have no knowledge of what the export has been. I would have to look at somebody's dates and figures.
Q One last question -- given that your opinion that a

stream should work in a holistic fashion, if we were to restore the Rush Creek bottomlands, wouldn't you also recommend that the entire system be maintained so that it could function well?
A I don't think I have segregated a specific reach, that I have targeted a specific reach. I have been arguing for, yes, those stream systems.
Q I guess actually I lied when I said "last". I have one last set of questions.
With regard to Figures 5 and 6, it is true, isn't it, that Figure 6 has been taken from a point somewhat more downstream from Figure 5? Isn't this tree this tree which is clearly closer in Figure 6 than in Figure 5, and this little tuft of vegetation is the same little tuft here?
A Yes.
Q And, in fact then, these willows are probably these plants -- weren't they already there, and aren't they simply growing?
A That's the whole point. 1991 was the first year of nongrazing of the system. I first saw the Basin in April of 1992. I was astounded at what one year release from grazing was doing for the system, and it's obviously continuing when you look at the plants on the left-hand side of the channel. They are much ranker. They are coming back again and it's only three years of nonuse.

Q But, in fact, these plants, this plant and this plant and this plant were all present in 1991; is that correct?
A May I approach the picture?
Q Certainly.
A Yes. You can see plants that indeed were established out here and were beginning to start, but notice also the sedges are also coming in here and notice the trapping of fines that is occurring alongside the stream.
This channel is beginning to build banks along the side. This channel over here didn't have any and wouldn't on a continuous grazing because the plants were continuously being cropped back.
Q In fact, this part, this driest looking part of this Figure isn't included when we've taken this picture from farther downstream. If you can't tell, you don't need to answer. It appears the left margin in Figure 5 is not included in Figure 6.
A The left margin may be off. I'm not sure.
Q And your mentioning sediments or fines raised another question. Do you know when a dam on Lee Vining Creek was removed?
A I believe it was taken out this year.
Q Are you familiar with the removal of the dam in October of 1992?
A Is this the one above the highway?

Q Yes.
A I wasn't around. I really don't know specifically when it was taken out. I just know that in the lest year that dam was removed.
Q If a dam were removed, wouldn't that be likely to have the effect of releasing sediments that had been trapped below the dam?
A Sure, but in comparison with what else we do on that stream system, it is a very, very small component.
Q I think we would like now to shift to the video. I am not quite sure how we are going to do this. Dr. Stine has volunteered to run the controls.
MR. DEL PIERO: Dr. Stine, do you have a license to do this kind of work?
DR. STINE: Sworn by the State.
MS. CAHILL: While we are waiting, Dr. Beschta or Mr. Tillemans, do either of you know what the range of flows has been in Rush and Lee Vining Creeks in 1993?
A MR. TILLEMANS: I know the summer flows were sustained, I think it was between 160 and 100 cfs for several months at a time.
Q Is that in Rush or Lee Vining?
A In Rush.
Q And what about Lee Vining?
A Lee Vining Creek, the natural flows went down Lee

Vining Creek this year, and the peaks kept rising, and it would cool off and it would go down, and I think we peaked -- I don't know the exact numbers, but somewhere near 300 cfs, 290.

Q And let me ask you, have you found those flows to be beneficial or damaging?

DR. BESCHTA: A Beneficial or damaging to what?

Q To the Stream system as a whole.

A This is kind of asking a one-sided question because it is more complicated than that. Having the flows out there has certainly provided a sustained period of growth for the existing plants. The fact that flows have been kept up though indicates that certain plants along the channel, perhaps cottonwoods that we are trying to establish, may have gotten drowned out this year and did not come in, so I don't have a simple yes or no answer on that one.

Q But, in fact, the thrust of your testimony has been there has been a tremendous recovery in recent years, including this year?

A That's true.

VIDEO TAPE: This video shows a comparison of streams at four locations in mid-September, 1987, and mid-September, 1993. The September, 1987, footage was shot for the Department of Water and Power by Dames and Moore. The 1993 footage was shot in the same location by the Media Resources

Department of the University of California, Riverside.
MS. CAHILL: Why don't we stop right here. Mr. Tillemans, can you tell us where you are in this?
MR. TILLEMANS: A That's in Rush Creek bottomlands. I think it is referred to as Site 3.4.
Q And this appears to be a pool; right?
A That is showing the depths that are there. I don't know if you referred to it as a pool, but it is not a typical pool.
Q And was that deep area there even prior to this year?
A I'm not sure of that.
VIDEO TAPE: Also included in the video are scenes shot in May, 1992, and August, 1993, by the Department of Water and Power. For Lee Vining Creek --
MS. CAHILL: Q Can we stop just a moment. In that last picture, Mr. Tillemans, do you know what the flow was when that picture was taken, the one showing you wading in the stream?
MR. TILLEMANS: A That was in August, and the flows were somewhere probably around the range of 160, 100.
Q Thank you.
VIDEO TAPE: This site is an example of natural recovery of riparian vegetation since the restoration of flows and the removal of grazing in 1991.
MS. CAHILL: Q Do you know what the flow is in this

picture?
A The 1987 flows?
Q Yes.
A Substantially less than there was this year. I don't know. I can't recall right now exactly what they were.
VIDEO TAPE: As our point of view shifts to the upstream area, we can see that the entire area is virtually devoid of riparian vegetation.
MS. CAHILL: Can you stop here?
Q Do you know whether this area had been relatively recently plowed with a road grader to repair damage from the high flows of 1986?
A Let's see, that was taken in 1987, and that would have been at least one growing season past that at that time, and there was still no riparian vegetation there, and they may have done construction on that county road crossing in '86 because of the high flows in the spring.
Q So it is possible that there was -- never mind. Okay, we will continue.
VIDEO TAPE: Note the size of the cottonwood tree on the right bank of the creek.
MS. CAHILL: Let's stop here.
Q If you were in fact to have continued farther to the right, would you have seen additional vegetation?
A Yes, I would have.

Q And what is that vegetation in the background, if you could back up just a bit?
A Basically cottonwood and willows.
Q And they were there in '87.
VIDEO TAPE: Note the size of the cottonwood tree on the right bank of the creek.
MR. TILLEMANS: A Yes, they were there in '87.
MS. CAHILL: Thank you. The tape can go on.
VIDEO TAPE: As we look at the same site in September, 1993, we can see that there's a great deal of new riparian vegetation. The growth is a result of the rewatering of Lee Vining Creek and removal of grazing.
MS. CAHILL: Okay. Can you stop it right here?
Q First of all, can you tell me what the flow was when this picture was taken?
A What day was this taken?
Q Well, according to the tape, it's September of 1993.
A The flows in the creek, after we took the video, I was given the absolute flows over there, and I can't recall exactly what they were.
Q Okay. And isn't there an area shown in this section where, in fact, the vegetation has not come back in?
A Would you be more specific.
Q Well, for example, along the right bank of the stream?
A In the upper slope there?

Q Yes, or right down to the water's edge. You don't see the same type of growth over there that you saw in the earlier portions of this particular segment.
A That site there does have some herbaceous growth and there's some smaller clover and other herbaceous species coming in along the banks.
Q But you don't see any large-scale or two- or three-year-old cottonwoods or willows?
A No. I might add that in 1991, and a couple of previous years, we had some problems at this site. In fact, there were complaints about bands of sheep in the floodplain, and, on further investigation, we found out that a U. S. Forest Service permittee was running his sheep down from the Conway Summit area and felt that it was okay for him to run sheep in Lee Vining Creek without asking anybody. And so even though we had a grazing moratorium going on, this site was heavily grazed.
Q I'm assuming that the far bank is on the other side of Lee Vining Creek from the Conway area; is that right? Do you know for a fact that sheep crossed the stream here and grazed on that far bank that we are looking at?
A Yes, I do.
Q How many?
A At least -- a band runs anywhere, depending on the year, from a thousand to two thousand sheep.

Q And for how long?
A He kept his sheep in there several days at a time. We also had a sheep crossing in which the sheep lessees are allowed to cross the creeks at certain specific sites and not allow grazing in the floodplain, but he is allowed to move sheep through, and when they do move sheep through, they are supposed to push them through and not allow any grazing. But, of course, there's always incidental grazing occurring.
Q So the fact there is grazing in one location doesn't necessarily mean it is happening up and down the whole stretch?
A When you are referring to "stretch", which part?
Q Let's say this entire reach.
MR. DEL PIERO: Your time is up. You had requested extra time.
MS. CAHILL: I would request additional time to go through the video.
MR. DEL PIERO: Granted.
MS. CAHILL: Thank you. We can continue.
VIDEO TAPE: Note substantial growth of the cottonwood tree on the right bank. The tree shades the stream and provides shelter and cover for fish --
MS. CAHILL: Stop here.
Q Now this cottonwood is on the north or south bank of the stream?

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A It is on the Lee Vining side of the stream, which probably is referred to as the north.
Q And so, in fact, the sun is going to be coming from the left side of the picture; isn't that right? So most of the shade would be cast onto the land, not on the stream?
A In the early morning light, yes, but in the afternoon that would change.
Q Basically, most of this stream section is still unshaded; is it not?
A I wouldn't say that. I walked that creek quite a bit, and as soon as you head upstream, or, for that matter, downstream --
Q I am referring to right here. Right here is there anything that would cast significant shade on this stretch of the stream?
A As a matter of fact, it would because one of the best pools on Lee Vining Creek is right there, and that tree shades it and reduces light for fish and produces some cover for them and also, if there's any fish in there, it provides protection from kingfishers or blue heron or something else.
Q This was a preexisting tree. This is not due to the restoration effort?
A Yes, but there is a lot of herbaceous growth appearing below it and on the other side of it.
Q And even though it does shade a portion of the channel,

that is only really a small portion of the channel that we see here.
A Yes, and I might add that was just due to the filming constraints and time we had. Rather than visit the whole creek, it was just to illustrate what is happening as trees grow.
MS. CAHILL: Thank you. We can go on.

VIDEO TAPE: To capture the full extent of revegetation, this site was reshot at an elevation of approximately 13 feet above ground level. It allows comparison of the vegetation regrowth more clearly. It is clear that the reestablishment of flows and the removal of grazing have caused great resurgence of riparian vegetation along this stream and floodplain.
MS. CAHILL: Let's halt right here.
Q You say "along the stream and floodplain". In this picture, do we see the vegetation primarily along the stream, or is there significant new growth in the floodplain?
A I think in this picture you see the growth happening primarily around the stream. I think Dr. Beschta would best be asked this question because I am not a geomorphologist. My impression is when herbaceous growth comes in and starts trapping sediments, there is a successional process that occurs, and sets the seedbed for willows and cottonwoods, and, in the future, you would expect this to turn into a riparian

site.
Q What we are seeing now is herbaceous plant life right along the margin of the stream?
A Right, and I must add that we are running into seedlings again, and while there was a grazing moratorium, that was not adhered to, as I previously explained.
Q All right. We can continue.
VIDEO TAPE: The side-by-side comparison of the left bank upstream of the county road crossing illustrates the deposition of fine materials necessary for bank building.
MS. CAHILL: Q And again we have already asked, but let me ask you, Mr. Tillemans, are you familiar with the removal of the dam on Lee Vining Creek?
A Yes, I am.
Q And would that, in fact, have provided more fine sediments than might have been there otherwise?
A In talking with people dealing with sediment transport, they told me it is very insignificant.
MS. CAHILL: Let's continue.
MR. DEL PIERO: Excuse me, how long was that dam in?
A The Lee Vining Dam?
MR. DEL PIERO: Yes.
A Historically, it was put in there by the Sierra Pacific Power Company in the early 1900's. It had been there quite a while.

MS. CAHILL: Q Mr. Tillemans, can you tell me approximately what the flow was when this picture was taken?
A Again, I'm not a hydrologist, and the flow figures are not something I remember too exactly, and I can tell you that if that was in August, it was still fairly high, and I am not quite sure what the flow was.
Q In order not to take up too much time, if you have any fast forward feature, we might fast forward to the Rush Creek portion of the tape, and, in the meantime, Mr. Tillemans, you have had a picture of the Lee Vining delta, and the text stated that the delta wetland would be inundated at higher lake levels. Do you know at a lake level of approximately 6,400 feet how much new wetland might be created in the Lee Vining delta?
A I couldn't tell you that.
Q Thank you. Mr. Tillemans, when was this taken?
A There is sparse vegetation. This was taken, to my knowledge, in September of 1987 by Dames and Moore.
Q And do you know what the flow was at that time?
A It is stated on the film, but as far as remembering the figures, I am looking more from a standpoint of how high flows and low flows and everything functions in the stream, but, again, when it comes to exact figures, I think the video said there was somewhere around 100 cubic feet per second, and in Lee Vining

Creek it was somewhere around 120.
Q Okay. On September 19, 1987 --
MR. DEL PIERO: Excuse me, do you think that's 100 cubic feet per second? Is that what your testimony is, sir?
A I couldn't tell you exactly. As I said, I am not a hydrologist, and I know from the dates that these videos were taken, I asked when I did the video that they give the flows for those --
MS. CAHILL: Q According to DWP Exhibit 488, the flows in Rush Creek would have been 19 cfs on September 19, 1987. Does it appear to you, however, that there's more than 19 cfs in this picture?
A Again, you are asking the wrong person.
MS. CAHILL: All right, we can continue. Thank you.
VIDEO TAPE: Also note the significant live vegetation on the upstream gravel bar.
MS. CAHILL: Q Mr. Tillemans, was there some overbank flooding that allowed that vegetation to get established up there?
A There could have been, but willows will establish --
VIDEO TAPE: -- and begun to form in this untreated portion.
A -- willows will establish independent of overbank flows, also cottonwoods will. If they release their seeds and there's enough water table and there's moist ground, willows

will establish.
MS. CAHILL: Q This water that you are wading in here, do you know what the depth of that portion of the stream was in 1987?
A In 1987, no, I was not there in 1987.
MS. CAHILL: We can continue now to the portion that deals with the Rush Creek delta.

VIDEO TAPE: This site, in 1987, was taken about one-half mile from the shore of Mono Lake and looks out across the delta from a high stream bank. In 1987, the stream was a wide, unconfined channel, and no riparian vegetation is apparent.
MS. CAHILL: We can stop here for a moment.
Q The condition of that channel was partly related to some large flood events on the stream; is that right?
A Yes, that's my understanding.
MS. CAHILL: All right, please continue.
VIDEO TAPE: I saw grazing was removed.
MS. CAHILL: Q We are none of us recommending this; are we?
A As far as what?
Q This type of condition.
A No.
Q On the banks.
A No, and it's not in that condition today.

VIDEO TAPE: In 1993, this stream reach is well vegetated and has begun to narrow and deepen. The riparian system is now interacting with the channel.

MS. CAHILL: Let's halt here.

Q Now, are you confident that the establishment of the riparian vegetation we see that is causing the channel to widen and deepen, as opposed to another cause such as incision or geomorphological processes regarding erosion caused by the force of the water?

A I think you misstated it, widened and deepened. What has begun there is that the vegetation --

Q Narrowing.

A -- is narrowing of the channel and with successive deepening as that process continues.

Q So at this point in time, the vegetation has not caused any deepening of the channel?

DR. BESCHTA: Can I answer that?

MS. CAHILL: Yes.

A The vegetation is already interacting with the channel. There is increasing sinuosity occurring out there, and I know this is tough looking into the future, but, as I look at that stream, you are going to see deepening of the outside meander bends. It's already happening out there today.

Q Well, I'm not looking to the future, I am focusing on what's there now, and the text said it has begun to narrow and

deepen. Has there been significant deepening to date caused by the riparian vegetation?
A In this channel?
Q In this channel.
A This channel is firming up and indeed is beginning to deepen in locations. Pools are beginning to develop, yes.
Q And is that due primarily to the vegetation or to stream incision or the work of flows in the stream?
A Well, this is down in the delta, which underwent massive incision years ago back in the 60's and was reworked again in the 80's. There was a lot of sediment moved around out there.

Then, in more recent years, the flows have been put in place, and there has been a moratorium on grazing. The vegetation has come back in, so you have got three years of growth out there. The vegetation is already tightening down the base, and indeed you are beginning to see deep areas develop.
Q Are you telling me that it's the vegetation that's the primary cause of that deepening?
A Well, I can't separate vegetation from flows. They go hand in hand. I can't get flows without either one -- well, if you just run water in the channel without any vegetation at all, which is kind of what we had for a long period of time -- I read the testimony, and I read the reports, and they were

telling me there were no flows, that it was a very shallow stream system out there, and I would agree, you have cobbles, sand, and very few pools. I can go out there today and find pools in the bottomlands of three to four and a half feet or deeper. I can see the beginnings of pools out there, and there's interaction between flows and vegetation. I cannot separate them.

Q I just didn't want us to be overstating the effect of the vegetation we see here. It seems unlikely that in a two-year period that vegetation would by itself have caused significant deepening.

A I don't know what you mean by "significant". I was saying that it is already having an impact out there. If you want four- to five-foot pools out there, you are going to have to wait a while, but they are coming.

Q And then, let's go to the last shot on the video.

MR. DEL PIERO: Your time is up.

MS. CAHILL: I have just one last question. I would like to get to that last side-by-side comparison.

VIDEO TAPE: The side-by-side comparison --

MS. CAHILL: Right here.

Q Throughout this there has been better color in the 1993 photos than in the 1987 photos. Do you know if there was a blue filter used when the '93 footage was shot?

MR. TILLEMANS: A I have no idea.

MS. CAHILL: Thank you. I have no further questions.
MR. DEL PIERO: Mr. Dodge.
MS. CAHILL: At this time, if I may, I would note that Mr. Birmingham has joined us, and I would like to yield my part on this to him.
MR. DEL PIERO: Aren't you lucky, Mr. Birmingham?
MR. BIRMINGHAM: Maybe I could leave.
MR. DODGE: I would like to start with the video.
MR. DEL PIERO: Before you start, Mr. Dodge, I need to advise you of something. The State Water Resources Control Board has a matter scheduled at 11:30 today, so you have exactly 20 minutes. If you go over that 20 minutes, we may have to continue this after lunch. Why don't you proceed.
MR. DODGE: What I would like to do then is do my portion on the video and then break.
MR. DEL PIERO: Fine.

CROSS-EXAMINATION

BY MR. DODGE:
Q If we could start at about 400 on that counter, I will try to go through this quickly.
VIDEO TAPE: Let's face the deposition of fine materials necessary for bank building.
MR. DODGE: Let's stop right there.
Q The question to both of you is: Would you agree that the Los Angeles Department of Water and Power Dam on Lee

Vining Creek limits the amount of fine material that goes down Lee Vining Creek?

DR. BESCHTA: A I don't know what the operation of that dam was. I didn't know whether they could bypass sediment from that structure or not. It's a fairly small storage reservoir.

Q So you don't know whether it could bypass sediments?

A I'm trying to think what it looked like before they took the dam out, and I don't remember now whether there was a bypass structure off to the side --

Q I am talking about the Los Angeles DWP Dam on Lee Vining Creek.

A Oh, the diversion structure.

Q Yes. Did that limit the amount of fine sediment that goes down Lee Vining Creek?

A That would.

Q Now, we have heard talk about the other dam being removed which, in fact, happened in October, 1992. I believe it was the Lee Vining Public Utility District Dam. And there was a question Ms. Cahill asked you about fine material shown on the video resulted from removal of that dam. Do you recall that question?

A I recall the question, yes.

Q And I believe you testified that the fine sediment resulting from the removal of that dam was a small component

of what was available in Lee Vining Creek. Do you recall that testimony?
A Yes.
Q What calculations have you made in that regard?
A I don't have the numbers. I was on the site, and I saw the dam that was removed, and I did some preliminary calculations on the number of cubic yards that came out of there, and then, in my walking the stream and looking at the pools that were filled with fine sediments, not the pools, the off-channel actually, but in looking at this fine sediment that was being stored along there, the numbers were just too different ballparks. What came out of the dam was a small amount. What I was seeing along Lee Vining Creek, there was more fine sediment there.
Q Can you give us any specifics as to the number from the dam?
A I don't remember those. I did a quick calculation in the field, but I don't recall it.
Q Mr. Tillemans, you testified that you had been told that the amount of fine sediment that came from the Lee Vining Dam was "very insignificant". From whom did you hear that?
MR. TILLEMANS: A That's basically being on the Creek with Dr. Beschta and Dr. Platts, who is a fluvial morphologist also.
Q In fact, Dr. Beschta, one of your written

recommendations is to consider a sediment bypass at the Los Angeles DWP Dam; isn't that right?
DR. BESCHTA: A That is true.
Q So you think that the stream potentially suffers from the lack of fine material; isn't that right?
A No -- well, you've got a diversion structure out there on a system that has the potential if you are retrieving sediments -- I'm looking long-term. That was a long-term recommendation, but that structure, if that structure is going to be there for the next hundred years, you have the capability of stored sediments, cleaning it out, storing sediment, cleaning it out, and, in essence, not allowing anything to go downstream, and it seemed to me that if it is possible and prudent, I would certainly recommend bypassing the sediments past the structure into the main channel so that they could remain part of the natural system, and that's what I was suggesting.
MR. DODGE: You can roll the tape.
VIDEO TAPE: Immediately downstream of the county road, there is a portion of Lee Vining Creek where the recovery of riparian vegetation has been dramatic, as demonstrated by these scenes. As vegetation has recovered, multiple channels have formed and begun to narrow.
MR. DODGE: Stop right there.
Q You say, Mr. Tillemans, that as vegetation has

recovered, multiple channels have formed. What evidence do you have that those multiple channels didn't exist prior to the riparian vegetation recovering?
MR. TILLEMANS: A Being out there on the site and seeing what has been going on over the last several years. Every time vegetation has come in, it is very apparent that multiple channels form and remain. During high flows for very short periods, multiple channels may come in here and there, but the key to sustaining multiple channels would be the recovery of vegetation from what I have seen in the last couple of years.
Q Didn't those multiple channels exist prior to the riparian vegetation recovery?
A Could you be specific on which area?
Q Lower Lee Vining Creek, the area we were looking at at approximately 420 on that tape.
VIDEO TAPE: The basin has recovered. Multiple channels have --
MR. TILLEMANS: A Well, I guess my answer to that, there were multiple channels now that the vegetation has come back. There has also been one channel that has been rewatered permanently by some of the restoration measures, but the majority of the multiple channels have occurred since the vegetation has come back.
MR. DODGE: Q Well, in fact, Lee Vining Creek has

received higher flows than it has in the last 50 years; isn't that right?
A Not in the last 50 years, but in the recent past.
Q You're not suggesting, are you, that the vegetation is causing channels to form?
A Again, I am not a geomorphologist, but, from what I understand and from what I have observed every time I see vegetation coming in substantially, it leads to multiple channels. It traps debris, it traps vegetative material, it causes deflection, and the process of multiple channels seems to be accelerated.
MR. DODGE: Let's go up to about 650 if we may.
VIDEO TAPE: The Lee Vining Creek delta also provides important wetland and waterfowl habitat. This footage shows Lee Vining Creek delta in August, 1993. The depicted lake level is approximately 6,375 feet. Most of this delta wetland will be inundated at higher lake levels.
MR. DODGE: Q Now let me ask you, sir. You were asked what the wetlands would be at approximately 6,400 feet. Do you recall that question?
A Yes.

Q Have you read Dr. Stine's testimony on that point?
A I haven't read Dr. Stine's testimony in great detail, no.
Q Dr. Beschta, have you read his testimony on that point?

DR. BESCHTA: A I have read his testimony, but I am not sure --
Q I am curious about the amount of wetlands that will be at the Lee Vining Creek delta at elevation approximately 6,400 feet.
A I haven't made that calculation.
Q Can you give the Board any idea what the figure would be?
A I haven't done the calculation.
Q Do you know it is substantially greater than it is today?
A I believe it is greater than what the elevation is today.
Q My last point, and I will leave this video alone if we can go up to about 1,100, please.
VIDEO TAPE: In 1993, this stream reach is well vegetated and has begun to narrow and deepen. The riparian system is now interacting with the channel. This natural recovery has occurred without artificial restoration.
MR. DODGE: Let's stop there. This question can be addressed to either of you.
Q Now Ms. Cahill was asking questions about the deepening of the streams related to riparian vegetation. I want to ask you questions relating to the alleged narrowing of the stream due to riparian vegetation.

Now, Mr. Tillemans, what is the basis for your conclusion that the narrowing resulted from riparian vegetation as opposed to incision?

MR. TILLEMANS: A If you notice in the video, I said "has begun to narrow and deepen," and again I am basically coming from a functional standpoint on what you see happening out there. In terms of riparian vegetation coming back, it was in a very short period, and it had begun to confine that channel, rather than what you saw in the 1987 photo. It has fanned out and is hanging over in various areas, and so it is more of the beginning of that process occurring and what's going to continue in the future as far as succession.

Q What was the level of Mono Lake in 1987?

A I don't know that.

Q It was substantially higher than it is in 1993; correct?

A Yes, probably.

Q Does that suggest to you that the narrowing might have been a result of incision?

A I think you should probably ask Dr. Beschta, a geomorphologist.

MR. DODGE: Fine.

DR. BESCHTA: A You may be getting some incision right at the base of the delta. You have to keep in mind that you are in the delta deposit right there, and indeed, as the

lake goes up and down, you may see some incision taking place. That's a dynamic piece of stream, and it is in the very early stages of revegetation in that particular system, so some of the deepening, yes, could be due to some incision occurring on the delta. Some of it could also be due to natural channel processes at work operating with the vegetation.

Q And if I ask the same question on narrowing, would your answer be the same?

A Incision and channel narrowing is an interesting question. The immediate response of the system when incision takes place, you end up with a deep, narrow channel. That doesn't last very long. The delta here is a good example. Most systems incised back in the early 60's and early 80's. They went down several feet, and they took out tremendous volumes of sediment across that delta. Now that was incision, but notice there was an incredible lateral component to it. So incision and narrowing don't go together; short-term, yes; long-term, no.

Q Short-term, yes; long-term, no -- I am interested in the comparison between 1987 and 1993 and the suggestion that this channel has narrowed due to riparian vegetation, and my question is: Isn't it a fact that during that six-year time period it narrowed due to incision?

A I don't think that is a fact.

Q How much did Mono Lake go down during that six-year

period?
A I don't know, I don't have those numbers.
Q If you don't know, how can you have an opinion as to whether the incision was the cause?
A Let me look at the chart. You asked me how much it went down?
Q I am trying to get the basis for your opinion, sir. I'm asking you whether you know how much Mono Lake went down during that timeframe?
A If you want a specific number, I have seen the lake level numbers. If I can look at those, I would be glad to tell you. I don't remember what they are.
MR. DEL PIERO: Mr. Dodge, I'm going to break it off right here. We are going to come back, and in that period of time, perhaps you could find in your record the lake levels of Mono Lake so Dr. Beschta can more familiarize himself with the lake levels.
We will be in recess until 1:30.
(Noon recess.)

MONDAY, NOVEMBER 8, 1993, 1:30 P.M.

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MR. DEL PIERO: Ladies and gentlemen, this hearing will again come to order.

When last we left, Mr. Dodge was cross-examining the two witnesses. Please proceed, sir.

As I recall, Mr. Dodge, you have 23 minutes.

MR. DODGE: I'll do the best I can.

MR. DEL PIERO: Before you begin, I would point out that the justification for extension of time, as previously articulated so well by Mr. Birmingham, related to the number of individuals who were then appearing on the panel, may not necessarily have direct application, particularly inasmuch as Los Angeles Water and Power has chosen to divide everybody up into individualized presentations. I guess it works out so that everybody gets the same amount of time. They just don't necessarily get extensions of time in terms of cross-examination, without some greater showing than multiple individuals on the panel. Okay.

Please proceed, Mr. Dodge.

CROSS-EXAMINATION, CONTINUED

BY MR. DODGE:

Q When we left we were talking about the possibility that incision leads to the narrowing of the channels between 1987 and 1993, and have you had a chance to review the drop in lake

levels, Dr. Beschta?
DR. BESCHTA: A I have had a chance to look at the Draft EIR, which only goes to 1990, but I am informed that the lake level as of 1993 is 6,375.
Q So there was in fact a drop in lake levels from 1987 to 1993, something in excess of four feet; correct?
A I'm not sure it was that much.
Q Well, assume with me that it was slightly in excess of four feet. Would you agree with me that the incision, rather than the growth of riparian vegetation, led to the narrowing of this channel?
A No, I wouldn't necessarily agree, and I have to qualify a bit here. It depends where I am at in the system. If I am sitting right down along the lake and I drop the lake, it is entirely likely that indeed the channel would incise, cut down. If I am some distance upstream, those same effects aren't felt all the way upstream, so it begins to shift gears as you move upstream.
Q I am asking you about Rush Creek near the delta which was pictured on your video.
A For example, these pictures we have behind us are of the delta.
MR. DEL PIERO: Actually, Dr. Beschta, he was referring to the video. If you would like it turned back on -- it's a reference you had in your video to the delta.

DR. BESCHTA: Let's go back to the picture then.
MR. DODGE: It's roughly 1,100, I believe.
(After locating the picture)
Okay, let's hear this.
VIDEO TAPE: The riparian system is now interacting with the channel. This natural recovery has occurred without artificial restoration.
MR. DODGE: Q Now you heard Mr. Tillemans talk about narrowing and deepening, Dr. Beschta. My question really is quite a simple one: Isn't it a fact that the narrowing at that section resulted from incision rather than from riparian vegetation growth?
DR. BESCHTA: A No, I would say not at that section. We have some blowups on the floor of that section, still pictures, and you can see pretty clearly that vegetation is indeed tightening that channel up.
Q At the point that we were looking at on that video, how much has the bed of the creek fallen as between 1987 and 1993?
A I haven't measured that.
Q Assuming hypothetically it was approximately two and a half feet, would that suggest to you that it was due to incision -- would that suggest to you that the narrowing of the channel resulted from incision rather than from growth of riparian vegetation?
A Well, these are systems with several variables going on

at the same time. If indeed you got incision, let's say, taking place down right adjacent to the lake, that is one process. You've got a flow regime coming through there, and you have revegetation taking place at the same time. They are all working at the same time. To pull one of those out and say "this is the cause," I am having a real tough time saying, yes, there is a specific cause for that, although, for me, the vegetation is playing a very predominant role in this reach the way it is tightening up this channel.

Q The last question on the video, Dr. Beschta -- I asked Mr. Tillemans about Lee Vining Creek near the county road, and I asked him a series of questions as to whether the riparian vegetation had caused the creation of new distributary channels in Lee Vining Creek or whether rather the riparian vegetation had grown up around existing tributaries. Do you recall those questions?

A In a general sense, yes.

Q Do you have an opinion on that subject, sir?

A Well, you are at a road location, and, as Mr. Tillemans indicated, that is also the place where you have sheep going through. You have a disturbed area. It is not a natural channel in the sense that the channel is creating necessarily all of its own channels. There are other things going on, but it could well be those were separate channels where the vegetation indeed is growing up.

Q Let me ask you a few questions about your direct testimony, sir, as it relates to restoration. What do you understand to be the goal of this license amendment proceeding?
A This proceeding?
Q Yes.
A To figure out what to do with water in the Mono Basin.
Q And specifically as it related to stream restoration, do you have an understanding of what the goal is?
A Well, I have seen in various reports the objective of returning back towards pre-1941 conditions, as if that's the part that people are shooting for.
Q On page 22, you talk about the impacts of grazing and diversions do not preclude the restoration of the functional streams and riparian systems. Do you see that, sir?
A That's true, I wrote that.
Q What is a "functional" stream?
A That's a stream that does the kind of things that I was talking about this morning. It's able to meander, able to store sediments, able to have spawning gravels. It provides long-term and short-term storage of water, processes nutrients. It's got organic matter coming in, and so there's a lot of ecosystem processes going on.
Q It's not necessarily the same as restoration of a pre-diversion stream; is that correct?

A You can't go back to the prediversion streams. That's what seems to be a little bit ironic about wanting to go to pre-1941, in that the streams then were already being altered, and since then those channels have changed dramatically, so if you are trying to get exactly back to where you were prior to 1941, you have to go back and install some land-use impacts.

Q All I am trying to establish with you, I think, is the obvious, that the functional stream is not necessarily the prediversion stream; isn't that correct?

A I cannot create prediversion streams.

Q Now, would you agree that -- you have obviously a very impressive resume' in a whole variety of fields. You have no particular background in brown trout habitat; is that right?

A I am not an expert in brown trout.

Q In fact, the blurb next to your picture here doesn't mention fisheries at all; does it?

A It doesn't.

Q And I tried to go through this long list of publications you have, and they don't relate to brown trout either.

A Well, they relate to fish habitat.

Q Not to brown trout.

A I have worked with brown trout streams in Montana.

Q Which of these publications relates to brown trout habitat?

A None specifically.
Q You are not a fisheries biologist; are you?
A No, I'm not.
Q In your written testimony, did you consider the limiting factors on brown trout as they relate to a possible restoration program?
A Many factors is an interesting concept which has been used a lot in the fisheries arena by fisheries biologists, and I work with a lot of fisheries biologists. That's a concept that I would suggest going through fairly substantial transitions today with regard to its role in local streams. If you are looking at a degraded stream system, it is easy to step into a limiting factor approach.

If you are looking at trying to reestablish a functioning stream system that has many things happening out there, many processes, the concept of limiting factors begins to fall apart.
Q It is not a concept that you used in preparing your direct testimony?
A I did not look at individual limiting factors as a concern. I looked at the system.
Q I think it is fair to say you have been fairly critical of the restoration program to date, and I would like to ask a few questions about that.

If you will look at the bottom of page 39 of your

testimony, let me just quote, because it will be the basis of some of my questions:

"With the exception of rewatering historic channels along Lee Vining Creek and removing grazing from Rush and Lee Vining Creeks, I would conclude that none of the other treatments have caused a significant net improvement in riparian functions, have assisted in the establishment of riparian vegetation, or have significantly improved fish habitat."

Do you see that, sir?

A Yes, sir.

Q Now historical channels have been rewatered on Lee Vining Creek; correct?

A I have been looking at the photographs on Lee Vining Creek, and particularly the 1929 photos and the 1940's and I have been reading over the years and hearing about this idea of historic multiple channels across the bottom, and that's an interesting one.

And so, as I looked at those, I am trying to look at, is that really what's happening out there, so when we talk about historic channels, an historic channel to me is generally the mainstream channel.

Q Well, let me ask it another way, sir. The Restoration Technical Committee has rewatered channels on segment 3 of Lee Vining Creek; correct?

A That's true.
Q Do you recall being out on the stream in June of 1992 and telling people that you did not recommend the rewatering of those channels?
A That is true, in the field I think I said that.

Q And do you now think that was a good idea or not?
A It's a mixed bag. You have obviously done some good things for riparian vegetation, but if you think you are growing fish habitat there, then I would suspect not.
Q You say that none of the treatments have assisted riparian vegetation. Are you aware of the plantings done by the consultants in the spring of 1993 on Lee Vining Creek?
A Yes, I am.
Q And have you followed up on the results of those plantings?
A I have not seen this year's results. I have heard the numbers for the first year, but I don't remember those, but I haven't seen results for this year.
Q We are in 1993; aren't we?

A That is true.
Q It was done this spring; correct?
A I am sorry, I thought you were asking about the earlier ones, 1991.
Q You are telling us there were plantings in 1991 along Lee Vining Creek?

A I am sorry, I got confused with the years. Please ask me and I will do my best.
Q I want you to assume in the spring of 1993 there were plantings of cottonwoods and willows along Lee Vining Creek, and I asked you whether you had seen the results of those plantings?
A I misread your question. I was thinking of earlier plantings.
Q Your testimony is that there were earlier plantings?
A Yes.
Q Let me focus on the plantings in the spring of 1993. How have they done?
A I haven't assessed those.
Q You don't know whether the planting team work has assisted vegetation on Lee Vining Creek?
A I think it's premature for anybody to know because the first year or even second year means nothing in regard to planting of riparian vegetation. So even if I had the numbers, I'm not sure I would know what to do with them at this point in time.
Q You go on to say that: "The RTC work has not significantly improved fish habitat."
Can you tell me the basis for that testimony?
A I first saw the work that was going on in 1992 and have seen some obviously since then. The dredging of large pools

in systems, the placing of gravels wanting to limit flows, dredging of wetlands and filling of wetlands, placing of spoils on channel base, all of these were features that were moving that system in the opposite direction.
Q Let me talk about the large pools first. That refers to three large pools dug in Lee Vining Creek in 1991; is that correct?
A That's true. That's where most of the bigger ones were.
Q What did you understand from a fisheries standpoint the purpose of those pools to be?
A As rearing habitat.
Q Rearing habitat?
A Yes.
Q And do you know how they have done as rearing habitat?
A I haven't seen the fisheries data.
Q So you don't know whether they were successful for that purpose or not?
A No, I don't know the numbers.
Q Spawning gravel has also been placed in Lee Vining Creek.
A That is true.
Q Do you know whether the spawning gravel placed by the consultants was in fact utilized?
A I may have heard stories that it was, but I am not sure

that they have been used.
Q Do you have any data on that?
A No, I don't.
Q And it is also true that the so-called bar pool thalwegs were placed in Lee Vining Creek in 1992; correct?
A That is, I believe, correct, yes.
Q Would you tell the Board what a bar pool thalweg is?
A That is an attempt to deepen a pool along a system and create a bar in the downstream side.
Q The purpose, from a fisheries standpoint, is what, sir?
A Is to create deeper water.
Q How successful were the bar pool thalwegs dug in 1992 in achieving their stated purpose?
A For fish?
Q For fish.
A I don't know.
Q Well, you say on page 39 that "none of the other treatments have significantly improved fish habitat." Now, again, do you have any basis for that?
A I am looking at the functional habitat feature of those streams and what is required generally for a system to work, and just by creating a pool, I mean we have done lots of those in the Northwest, and we know they don't work for fish up there, and I suspect similar things are true for these streams.

Q In fact, you go on to say, on page 32, that "a lot of this work is counterproductive." Do you remember that?
A Yes, it is.
Q Placing of gravel is included in that; is that right?
A Well, the placing of gravels was oftentimes in the context of, if we place the gravels, then the flows should be controlled. The controlling of flows because of the artificial placing of gravels doesn't push that whole system back towards any type of improvement. In fact, you are focusing on a single reach and ignoring the rest of the system entirely.
Q But didn't you say, at page 32, that "Lee Vining Creek would provide sufficient gravels"?
A Yes.
Q Without placement?
A Yes.
Q Over what time period?
A It is already happening, and it will continue to happen. There are plenty of gravels in those banks. There is plenty of gravels in those beds. It is just a matter of time for them to hydraulically sort out as vegetation begins to operate in the channel.
Q How many spawning gravels do the fish need in Lee Vining Creek?
A I suspect it is not very limiting because I understand

the young-of-the-year, those numbers are quite high.
Q You have also been critical of heavy equipment, sir, the effect of heavy equipment.
A Yes.
Q Do you recall that in the middle of 1992 you went out in Lee Vining Creek and saw some of the bar pool thalwegs work that Mr. Larsen had done?
A Yes.
Q That was on Lee Vining Creek, correct?
A That was on Lee Vining.
Q When you first saw that work, you thought it was the stream naturally; correct?
A I don't think I said it was natural. I said it appears like it is replicating some of these that a natural stream would do.
Q Well, the first time you saw it you didn't even realize somebody had worked there; isn't that true?
A Not initially.
Q You didn't realize it initially, and were later told Mr. Larsen had been out there?
A I was drug over this pool, and I was given this wonderful explanation of all the wonderful things happening there, and I wasn't really asking the question, is this natural or not. I was just observing at that particular point in time.

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Q Your first tour was with the Department of Water and Power representatives; correct?
A My first tour was with Bill Platts and Brian Tillemans.
Q And you subsequently had a tour with the Department of Water and Power?
A Yes.
Q And, at that time, in May of 1992, you walked right by some of Mr. Larsen's bar pool thalwegs?
A I may well have because that was a tour that we really didn't get a chance to look at all the creek.
Q It wasn't until a subsequent tour that Mr. Larsen attended that you realized he had been doing that work; isn't that right?
A I was informed then.
Q That was work Mr. Larsen did with heavy equipment; wasn't it?
A I don't know how he did it.
Q Wouldn't you agree with me if someone uses heavy equipment sensitively that the work can be done without substantial damage to anything?
A I guess that's possible, but I sure wasn't seeing it when I was looking at the first treatment. I was seeing some pretty incredible changes occurring, and the revegetation or the placement of vegetation back onsite to me looked like a mitigation measure to try and cover up the damage that had

been done to existing vegetation.
Q You are also critical of the planning team for filling up wetlands; isn't that correct?
A Yes, I am.
Q Now, let's talk about Lee Vining Creek. What was the net wetland effect of the work in 1992 on Lee Vining Creek?
A I haven't measured that.
Q We have established that part of the work was to rewater channels; correct?
A That was an objective of the RTC.
Q And another part of the work was to create or enlarge backwaters; correct?
A That is true.
Q And both of those add to wetlands; don't they?
A It depends on if you are digging this pool in wetlands, which is oftentimes the case. If you are digging this backwater pool or area of wetland, you are destroying wetland.
Q Would it surprise you there was a net increase in wetland as a result of the 1992 work on Lee Vining Creek?
A I would expect a net increase in wetland occurring in that system just naturally in a major way had nothing been done. I have not seen any numbers on the net effect of the treatments.
Q Could you answer my question?
A I think I did.

Q Would it surprise you that there was a net increase in wetland as a result of the 1992 work on Lee Vining Creek?
A Well, there were a couple of areas that were dredged out and indeed filled in, end I guess we would characterize those as wetlands today, and, during subsequent field tours, there was discussion about redredging those again because they were backwater areas, and that's what they were supposed to be.
MR. DEL PIERO: Your time is up.
MR. DODGE: Could I have another ten minutes?
MR. DEL PIERO: Do you want to make an offer as to why?
MR. DODGE: Because it is a complicated subject matter, and the witness is giving long answers, only some of which are responsive to the question.
MR. DEL PIERO: I will grant you ten minutes.
MR. DODGE: Thank you.
MR. DEL PIERO: I would point out that responses to the questions that are succinct is a great help.
MR. DODGE: Q The historical Rush Creek situation below the narrows, sir, I want to focus on that. Now you told us this morning that you were walking that area yesterday, and you had some question as to whether the historic channels were really multiple channels or whether they were irrigation channels. Do you recall that testimony?
A Yes. I was out there for several reasons.

Q Now let me ask you to take a look at Mono Lake Committee and National Audubon Society Exhibit 122, which is a 1992 report prepared by Dr. Stine, where he is talking about section 5b of the creek, and he lays out existing channels -- 1929 to 1940 channels and the famous Indian Ditch that is the subject of a bet between me and Mr. Chapman, and let me ask you, Dr. Stine on this report shows multiple historical channels in dotted lines. Do you disagree with his conclusions?

A Well, there's dotted lines and dashed lines and I'm not sure which ones --

Q I'm interested in the ones 1929 to 1940. I described those as dotted lines.

A Yes, I would disagree.

Q Which of those channels that Dr. Stine has listed as historical channels would you list as ditches, irrigation ditches?

MR. DEL PIERO: Excuse me, gentlemen, but it would be nice if everybody could return to their seats, and I will give everybody a couple of minutes to find those exhibits in their own files. Mr. Birmingham, do you have a copy of that, sir?

MR. BIRMINGHAM: I don't have a copy of that, Mr. Del Piero.

MR. DEL PIERO: Which exhibit is that?

MR. DODGE: Mono Lake Committee 122.

MR. DEL PIERO: Mr. Canaday, do you have a copy?
MR. CANADAY: No, I don't think we do, Mr. Del Piero.
MR. SMITH: It is upstairs.
MR. DEL PIERO: I have all the Los Angeles ones here, too.
MR. BIRMINGHAM: One of the engineers of the Department of Water and Power has a copy.
MR. DEL PIERO: Why don't you proceed?
DR. BESCHTA: Can you tell me the date of this photography?
MR. DODGE: 1929 and 1930.
DR. BESCHTA: A Well, this channel off in the true right-hand side, which is looking down valley, is one I would consider most likely an irrigation conveyance system. Now it is possible that it is an old channel that water was put back in, but I think it is really an irrigation system coming back.
Q Anything else?
A Well, as you are well aware, looking at aerial photographs and looking at all these dashed lines, this is the first time I have seen this. Looking at all the dashed lines on here is not something you do at a table like this. I need to be looking at these stereoscopically.
But I could pick out this one down this side, which feeds on down into, at least on the 1929 photos, and I am not sure these are 1929, but on the 1929 photos, it feeds into a

pond, which I have got willow in the middle of that pond, so there is some type of artificial thing, obviously, going on in that.

MR. DEL PIERO: May I point out that when you say "this one" or "that one", you need to refer to which side of the picture you are referring to.

DR. BESCHTA: I'm sorry. It is not easy, and I really apologize, trying to figure out --

MR. DEL PIERO: You don't have to apologize. Just identify which one you are talking about.

DR. BESCHTA: I am on this page going to call it the true right-hand side. Looking downstream -- when I was in New Zealand, they talked about true right and, so true right is always looking down. The current channel, which is drawn along the right-hand side, comes all the way down and feeds back into the real Rush Creek channel down here at the bottom of the picture, but the right-hand side of the page.

MR. DODGE: Q Would you agree -- as I understand it, the remaining channels shown on Exhibit 122, you would agree with Dr. Stine were historical channels?

A No, I wouldn't, because one of the things that isn't out there is that it looks like people were moving water around in a big way, and so what is an historic channel? Just because it's got water in it in 1940 and is being irrigated, does that constitute an historical channel? I would say no,

it is an old channel with water in it.
Q I am trying to distinguish between irrigation ditches and historical channels. Indian Ditch is an irrigation ditch. I am asking you whether any of the other dotted lines on this Exhibit 122 were irrigation ditches.
A It would look to me like the channel which is on the true left-hand side towards the upper right of the picture is also potentially a location of an irrigation diversion. It's the one that parallels the total slope, but it's below the Indian Ditch. Indian Ditch is on the hillside, and it shows here very clearly toward the top of the page, and immediately downslope is the main channel, and then there is the dashed line which continues to the right on top of the page.
Q Would you agree that the historical now-dry channels in Rush Creek below the narrows would not be rewatered naturally given the current configuration of that stretch and the incisions that occurred there?
A Would the historical channels not be rewatered?
Q Right.
A Naturally?
Q Without human intervention?
A Well, that system underwent a very substantial change, and so to try and rewater historic channels, I don't know how you do that. They are gone.
Q They are gone?

A The historic main channel has been changed.
Q But I am really trying to ask a very simple question, and would you agree with me that without human intervention the historic channels will not be rewatered?
A No, I wouldn't agree with that. They will not all be rewatered, but some of them indeed will be picking up water and indeed some of them today are picking up water.
Q You talked about riparian vegetation creating pools. Do you remember that testimony?
A Yes.
Q How long does that take?
A There is not a simple answer to that. Again, that is dependent upon the rate at which vegetation grows, it depends on the channel substrate that you are working with, and it depends upon flow regimes that you are facing in the system, in addition to the gradient of the channel.
Q It can take many, many decades; isn't that true?
A In some streams it can take decades, in other channels, it can take a few years.
Q Now, would you agree that riparian vegetation is not coming back uniformly on Lee Vining Creek?
A That is true.
Q And that there are areas where the soils were stripped by the floods in the 60's and the riparian vegetation is not coming back -- would you agree with that?

A No, it's coming back. It is not coming back as fast.
Q Could we show the video one more time and show it at about point 300?
VIDEO TAPE: It allows comparison of the vegetation regrowth more clearly.
MR. DODGE: Q Dr. Beschta, would you agree this area right here is an example of a situation where the soils have been stripped away and the riparian vegetation is coming back very slowly?
A Well, it is certainly not as prolific as near the stream, so it is coming more slowly, but as far as the soils being stripped away, I mean you can certainly support vegetation there. You may have lost some fines on top.
Q Would you agree with me that that is representative of a number of places on Lee Vining Creek where the riparian vegetation is not coming back as quickly as in other areas?
A Well, it is coming back in that system. When I walk along that channel, it is certainly there.
Q My question tried to relate to the rate of speed compared to other sections of Lee Vining Creek.
A You are saying some places are slower than others?
Q Yes.
A Yes, that's the case.
Q And this is an example of one such place; correct?
A Well, when you see riparian vegetation recovering, you

don't expect the entire bottom to go green immediately. I mean this is a process. This is an ecosystem that takes time and needs establishing. When you look along the channel, it's obviously becoming heavily vegetated, and, as the water table shifts around, you may see vegetation back there, but it could take a long time.

Q Would you agree that planting of riparian vegetation could accelerate the reestablishment at places like what we are looking at at number 300 on the video?

A In comparison to total number of plants, yes, you can go to a specific site and put plants in the ground, but in comparison to total numbers of plants in the system, it really doesn't add much.

Q Dr. Beschta, I am going to conclude with an area where I think you and I are going to agree. I put it at the end because I knew there would be very few. You agree that the high flow event of 1938 did not significantly alter the stream channel; correct?

A Did not significantly alter it from a platform view. I'm sure there were changes alongside the bank.

Q Would you agree with me that in a few years, when the riparian vegetation gets reestablished, that the channel and banks will be highly stable?

A Which stream are you talking about?

Q Either one.

A When I get all this vegetation back, I will have a dynamic stream. I will have changing channels in that system. I will be seeing cuttings and fillings, undercut banks, and so stability is a term I am having a hangup on.

Q Once the riparian vegetation gets back, you are not going to see substantial bank erosion; isn't that right?

A You will see localized bank erosion, but by and large the system will be intact, yes.

Q And you won't see substantial channel movement; will you?

A Oh, you could see radical channel changes. That's the way these systems evolve, and when you walk across the Rush Creek bottom, that's the story.

Q But wouldn't you agree once the riparian vegetation gets reestablished, you see no need to limit flows in either Rush Creek or Lee Vining Creek?

A I would say yes.

MR. DODGE: Thank you. No further questions.

MR. DEL PIERO: Thank you very much, Mr. Dodge. Mr. Roos-Collins. Are you ready to go, sir?

MR. ROOS-COLLINS: Yes, I am.

CROSS-EXAMINATION,

BY MR. ROOS-COLLINS:

Q Good afternoon, Dr. Beschta.

DR. BESCHTA: A Good afternoon.

Q The last time I saw you we were before Judge Finney in El Dorado Superior Court. Do you recall that hearing?
A Yes, I do.
Q I would like to take a different approach to this cross-examination. Cal Trout stipulates for the purpose of this cross-examination, that the reintroduction of flows and the removal of grazing has resulted, in some instances and in some locations, in an increase in the groundwater table, an increase in riparian vegetation, change in channel form, including deepening of pools, narrowing of the channel, and movement of gravel. We stipulate to all of that. So, for the purpose of this cross-examination, none of my questions go to whether reintroduction of flow and removal of grazing have had an effect. Instead, all my questions go to the pace and extent of change in Rush and Lee Vining Creeks as that change relates to the conditions that existed before Los Angeles began diversion in 1941. Are you with me?
A I think I follow you.
Q Let me also say Cal Trout has great respect for you as a scientist. With those two deductions --
A Can we stop there?
(laughter)
Q With those introductions, let's discuss your testimony. Your testimony indicates that you conducted a field review of the tributaries to Mono Lake; is that correct?

A That is true.
Q You also have reviewed written testimony by other witnesses in this proceeding; is that correct?
A That's right as to some testimony. I'm sure I've not seen all of it.
Q Have you personally undertaken any measurements of vegetation growth along these tributaries?
A I have personally measured plants when I have been out there, but I have not done a systematic survey of the plants.
Q Channel form?
A Again, I have made measurements, but not a systematic survey.
Q Fish populations?
A No.
Q Have you ever designed a stream restoration program for purposes of bringing back a fishery?
A I have been involved in projects where that's the case.
Q Have you ever designed a stream restoration program for the purpose of bringing back a fishery, had primary responsibility for the design of such a program?
A It depends upon your goal, I guess. I am involved right now in a proposal to restore a stream in Alaska, and, you know, I could turn around and say, "This is really for fish," but it is for the broader ecosystem functions, which we think will help the fish, but we didn't start out saying "fish

are our objective, this is where we want to go."
Q Let's turn then to the substance of your written testimony. Your testimony states that all or nearly all of the flow was diverted at certain times from the tributaries to Mono Lake. What is the basis for that representation?
A Could you tell me where that is? I am not sure of the context.
Q Page 21.
A All right. Based on work by Dr. Bill Platts and Dr. Chapman, I put together and presented to the Board here last week or two weeks ago.
Q Other than Dr. Chapman's and Dr. Platts' testimony, do you have any basis for that statement?
A I have seen flow records for the gage up near the highway which indicates that water was absent from those channels.
Q You are referring to the records contained in their testimony?
A I don't know if it is exactly in their testimony, but I have seen flow records at various points, and I am not sure it is contained there.
Q Do you have any data that show that Rush Creek was ever dry below Highway 395 from 1920 through 1941?
A It may be one of the sets of photographs show that Rush Creek below the narrows may have once been dried up, but I

don't have any hard evidence.
Q Do you have any data that shows that Rush Creek was ever dry from Grant Dam down to the return of the Mono Ditch?
A No, I don't.
Q Do you have any data that showed that Lee Vining Creek was every dry?
A I don't have any data, but I think it is inferred in the testimony of various individuals that that creek went dry.
Q You have no data?
A I have no data.
Q Your testimony also states that the tributaries to Mono Lake underwent extremely rapid change in flow. The statement appears on page 24 of your testimony on the very final line. What is the basis for that statement?
A Again, this is part of -- I believe it would go back to Dr. John Chapman and Dr. Bill Platts, where they find that the irrigation diversions were creating rapid fluctuations. As you take it out of the stream and put it in a ditch, obviously there is a major change, and as you change that around and take water out of the ditch and it goes back in the channel, there's a very rapid fluctuation.
Q Were you here for Dr. Chapman's testimony before the State Board last week?
A Yes, I was.
Q Do you recall he examined a table from LADWP, Comments

on the Draft EIR, that showed five changes in the decade of the 1930's in excess of 100 cfs in Rush Creek?
A I remember hearing that, but I didn't have the table in front of me, but I remember some testimony relating to that, yes.
Q Other than Dr. Chapman's and Dr. Platts' testimony, do you have any basis for the statement that tributaries to Mono Lake underwent extremely rapid changes prior to 1941, rapid changes in flows, excuse me?
A I guess most of the basis of ny testimony would be that, although again I believe there's other testimony, there is information, and I can't point to an individual, but the basis I believe would be Chapman and Platts.
Q And you are familiar with Chapman's and Platts' evaluation?
A About the highway?
Q Yes.
A I am familiar with that testimony, at least I heard that testimony.
Q In the period 1935 to 1941, who owned the water rights upstream of the evaluation reach in Rush Creek?
A I don't know.
Q In the decade of 1930 to 1941, who owned the water rights for diversion from Lee Vining Creek?
A I don't know.

Q Let's turn now to grazing in the Mono Basin prior to 1941. On page 25, your testimony stated that grazing and flow alterations "generally precluded" the establishment of riparian species and of high flows. Does the term "generally precluded" mean in most places at most times?
A That would be the sense of what it is saying, yes.
Q What is the basis for that statement?
A Well, there's a lot of experience built in here, that is, in the last several years, I have had an opportunity in Oregon to review projects that have taken place in Western Oregon, Eastern Oregon, and into Idaho, and went in five, ten years after channel manipulation and habitat changes had taken place in all those systems. It is pretty apparent that as long as you sustain grazing and heavy grazing on a degraded system, that it is very difficult for regeneration of young plant species, particularly willows, particularly the cottonwoods, for them to occur.
And also I have been involved in some research projects where we are looking at that very same aspect.
Q Other than your experience elsewhere and your knowledge as a scientist, do you have any basis for the statement that the establishment of cottonwoods and willows was generally precluded along these tributaries prior to 1941?
A Well, the grazing pressure would be an important aspect of that, and one of the things that I saw when I was in the

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field, there's some places where probably sheep didn't get into in the bottomlands, and so there probably were some places where cottonwoods were coming up prior to that.
Q Do you recall a statement in Dr. Chapman's and Dr. Platts' testimony that it is impossible to determine the condition of understory vegetation from examination of aerial photos?
A I don't recall it exactly, but it becomes very difficult, yes.
Q Are you aware of any ground photos taken prior to 1941 that demonstrate that the establishment of cottonwood and willow vegetation was generally precluded by grazing?
A There were some photos that were presented during Dr. Platts' and Dr. Chapman's testimony that illustrated those effects.
Q And weren't those photos taken after 1941?
A I believe they were.
Q During the decade 1930 to 1941, who owned the land where the grazing occurred adjacent to Rush Creek?
A Apparently the Department of Water and Power.
MR. DEL PIERO: Doctor, if you don't know the answer and your colleague doesn't, it is more than adequate to say you don't know.
MR. ROOS-COLLINS: Q Let's turn now to the conditions that existed in Mono Basin between 1941 and 1983.

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First, do you know how much the average annual diversion by Los Angeles DWP was during that period?
A I have seen a number, and the number that sticks in my mind is 60,000 acre-feet or perhaps more.
Q Do you know how that diversion during that period compared to the diversion by irrigators from 1930 through 1941?
A Well, I believe there's some testimony that, what was it, 30,000 acre-feet was being spread on 2,100 acres, as a number, 14 acre-feet per acre. That's the only number that I could give you right now, and that's based on some testimony, written testimony.
Q Let's discuss grazing then -- on page 28 of your testimony, which states that grazing and diversions "regularly hampered" the establishment of riparian vegetation.
A Yes.
Q Now the term "generally precluded" sounds worse to me than "greatly hampered"; is that your intent?
A Not really.
Q Would you agree with me that riparian vegetation along the tributaries to Mono Lake declined substantially between 1941 and 1983?
A Oh, yes.
Q Do you agree with the Draft EIR's estimate that the amount of mature cottonwood and willow declined in excess of

90 percent during that period?

A It's entirely possible.
Q You testified, in answer to Ms. Cahill's question, that you have never seen a quantification or a mapping, I'm not sure which, of the riparian vegetation along these tributaries before 1941 and after 1941 so you could compare the two periods. Was that your testimony?
A I may have said that, but I would be incorrect, because in the Draft EIR there are numbers and there are maps.
Q Do you dispute the numbers and maps contained in the Draft EIR showing changes in vegetation along the tributaries to Mono Lake?
A No, I think there were rather substantial changes.
Q On page 28 of your written testimony, you state: "Lowering of Mono Lake in the 1920's to the 1960's provided an opportunity for incision of Rush Creek." Do you recall that testimony?
A Yes.
Q What was the decline in Mono Lake between 1920 and 1941 in vertical feet?
A I don't have the figure here, but it was not, as I remember, very substantial in comparison to what's happened post 1945.
Q Are you familiar with Figure 1-7 in the Draft EIR, which shows the Lake level between 1912 and 1992?

A I don't have that with me.
Q I will show it to you.
A Okay.
Q Does Figure 1-7 show that Mono Lake dropped approximately 14 feet between 1919 and 1941?
A That looks reasonable.
Q Are you familiar with Mr. Vorster's estimate that only one to two feet of that drop occurred as a result of irrigation diversions?
A I don't know that.
Q You would agree that the drop in elevation between 1941 and 1983 is substantially greater than the drop between 1919 and 1941; wouldn't you?
A It is very dramatic.
Q Would you agree with me that most of the incision that occurred in Rush Creek occurred after 1941?
A Oh, yes.
Q Finally, let's discuss the changes in channel form that occurred between 1941 and 1983. Are you familiar with Dr. Stine's report, "Past and Present Geomorphic, Hydrologic, and Vegetation Conditions on Rush Creek," which is both Mono Lake Committee and Cal Trout Exhibit 13 in this proceeding?
A Can I look at it and see?
(After looking)
No, this is the same one Mr. Dodge was showing me. I

haven't seen that.
Q Are you familiar with Trihey and Associates' estimates of loss in channel length between 1941 and 1983 in Rush Creek?
A They have some very large numbers as far as channel losses.
Q And do you dispute those numbers?
A Well, it goes back to the interpretation of what constitutes a channel.
Q Okay. You previously discussed that matter with Mr. Dodge, and I will not pursue it further. Let's turn to the subject of the impact of the restoration activities undertaken by the Restoration Technical Committee. You have criticized the RTC's understanding of ecological processes. You are aware that your client, LADWP, is a member of that Committee?
A I know they are, yes.
Q Let's begin with the grazing moratorium that began in 1991. Did LADWP voluntarily agree to exclude sheep from the Mono Basin?
MR. TILLEMANS: A Yes, we did.
Q Mr. Tillemans, are you familiar with a March 26, 1991, letter from Jim Edmonston, President of Cal Trout, to Trihey, the restoration consultant for counseling that a grazing moratorium be established?
A I can't recall that exactly.
Q Do you recall RTC met in April of 1991 to discuss

whether such a moratorium should be established?
A I recall a series of meetings in which that was discussed, yes.
Q Do you recall that a vote was taken in April of 1991 when Los Angeles specifically opposed the establishment of such a grazing moratorium?
A It wasn't in opposition to the grazing moratorium, and- I need to explain what is going on at that time.
Q Please do briefly.
A At the time there was a push not to just exclude grazing moratorium on the floodplain, there was also a push to bringing consultants in and developing grazing plans and what have you.

The Department has a range wildlife staff. We have a botanist on board. We have a consultant, Dr. Platts, who has riparian livestock expertise, and at that time, we felt it was in the Department's best interest to oppose efforts to take control of our leases in Mono Basin, because we felt we had the expertise and staff to handle that, so although it may have come across that we were opposing a grazing moratorium, we wanted to maintain the objective of maintaining our staff and Dr. Platts in dealing with those situations up there.

MR. ROOS-COLLINS: Thank you, and I will add, by way of comment, that Cal Trout is grateful that the moratorium is. still in effect with L.A.'s support. Has my time expired?

MR. DEL PIERO: Yes.

MR. ROOS-COLLINS: I request additional time on the ground that Mr. Dodge got 50.

MR. DEL PIERO: Mr. Dodge did get 50, but he gave a better reason than that.

MR. ROOS-COLLINS: He gave the reason we have all given, which is the complexity of the issues and the importance of this testimony.

MR. DEL PIERO: I recognize the significance of these two particular witnesses in regard to this. How much time do you want?

MR. ROOS-COLLINS: An additional 20 minutes, please.

MR. DEL PIERO: Granted. I am going to take this opportunity to point out something I decided over the weekend, which I am sure you will not be pleased about. I have asked Maureen Marche' to schedule additional days for this hearing. In fact, every available day in the month of December is going to be scheduled, up until I believe the 21st or 22nd of December. Additionally, it's very likely we're going to go into night sessions on this hearing in order to get this matter before the Board before the Christmas holidays. Mr. Stubchaer points out you don't have to agree. You just have to show up. Please proceed. (laughter)

MR. ROOS-COLLINS: I'm sure Mr. Canady hopes you will not have to hang up Christmas stockings.

MR. DEL PIERO: That will be an assurance.
MR. ROOS-COLLINS: Dr. Beschta, let's discuss the impact of the restoration program on wetlands. You state, on page 33, "The dredging and filling of wetlands resulted in unacceptable impact to those systems."
I will show you now a letter, dated August 31, 1992, from Ted Winfield of ENTRIX to Liz Varnhagen of the Army Corps of Engineers, which I will offer as Cal Trout Exhibit 16. I will distribute this letter. Please review it and tell me whether you have previously seen it.
MR. DEL PIERO: Do you have extra copies for Mr. Canady?
MR. ROOS-COLLINS: Yes.
Q Dr. Beschta, have you previously seen this letter?
DR. BESCHTA: A No, I haven't.
Q On page 4, the letter states --
MR. BIRMINGHAM: I am going to object on the ground of hearsay.
MR. DEL PIERO: Mr. Roos-Collins.
MR. ROOS-COLLINS: I haven't even asked a question.
MR. DEL PIERO: I think the observation that he has not asked a question is correct, Mr. Birmingham. What aspect of hearsay are you alleging? I don't think it is hearsay. Why don't you proceed, Mr. Roos-Collins:
MR. ROOS-COLLINS: Q Let me say at the outset, so

Mr. Birmingham is comfortable. I am asking you to assume, for purposes of this question, that the letter states that .024 acres of wetland habitat was affected by construction in the pilot program on Lee Vining Creek and that .68 acres of wetland developed as a result of the pilot program. I am asking you to accept that as true. What I want to know, though, is whether you have any basis for disputing that representation.

A These are numbers due to the construction activity of creating wetlands?

Q Please assume that for purposes of the question.

A I'm not sure I know how you construct those wetlands. The construction activities that were going on up there were working on the channels, and now you are pointing out they were actually constructing wetlands, and yet the wetlands I saw were going the other way. So I don't understand the numbers.

Q Then let me explain the hypothetical more clearly. Assume that in the course of construction, .024 acres of wetland were destroyed or degraded, and assume that the construction resulted in the rewatering of channels that were previously dry, and that incidental to such rewatering, .68 acres of wetland were created. The question is: Do you have any basis for disputing that representation?

A If you are picking up wetlands by rewatering channels,

then it is obvious you can make more wetlands.
MR. ROOS-COLLINS: Thank you. Mr. Del Piero, I will not move for admission of that Exhibit until the author is available to authenticate it.
MR. DEL PIERO: Thank you.
MR. ROOS-COLLINS: Q Let me turn now to your representation on page 33 that the pools created or excavated by the restoration consultant on Rush Creek were a total modification of the stream system.
A True.
Q What do you mean by the term "total modification"?
A were huge pools in a system in that particular stream, and they were not sustainable by any flow regime that I would perceive coming down through that system. So you can make pools the size of this room, literally a stream, and that's not sustainable. Those pools were not sustainable. They will fill.
Q Has Mr. Trihey made pools the size of this room?
A No, he hasn't.
Q You say the pools he constructed in Rush Creek are a total modification of the ecological system.
A They were dredging material out of the creek. They were placing it on the channel banks, on the new channel banks, so any vegetation there was no longer able to grow.

When you scour out material, the kind of banks you leave are

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not the same kind of banks that scour out with vegetation attached to it, so they are sloping sides instead of vertical sides or undercut sides. So I would argue, yes, it is total.

In addition, if you got bedload transport coming downstream, these are bedload traps. They are not going to continue on through.

Q How did those pools compare with the changes in channel that occurred between 1941 and 1983, as a result of the operation of the water supply system?

A How did those compare with the operation of Los Angeles' system? I am not sure I understand.

Q How do those pools compare to the changes in channel form that resulted from the operation of L.A.'s water supply system between 1941 and 1983?

A Well, there was obvious scouring in the upper reaches in that period due to high flows.

Q Are you familiar with Dr. Stine's estimate that the total length of channel in the bottomland alone was halved between 1941 and 1983?

A I've seen the numbers indicating major changes, yes.

Q Assume that's true, how would you compare the environmental impact with halving the channel length with construction of the four pools?

A I never said -- well, first of all, halving the channel -- again, the question is what is your reference point. You

have to start somewhere. Okay, if you are using the 1941 basis as defined, okay, then you have got, I think, an inflated number, so I don't think the channel length has been halved. That channel system, all photographs show a mainstream channel with local braiding over the years has taken place. It's happening out there today.
Q Dr. Beschta, are you familiar with the Cal Trout 2 case?
A No, I am not familiar by that name.
Q Are you familiar with the Court of Appeals Decision, which is the law governing this proceeding?
A You have to tell me something more specific. I would not say.
Q Let me move on then. You testified on page 34 that physical-mechanical intervention is "generally unsuccessful". Are you familiar with the 1991 agreement between the parties in the Mono Lake cases entered into by Los Angeles and the other parties to those cases?
A I don't believe so. You mean a written document?
Q Yes.
A No, I am not.
Q Let me read a statement and ask you to state your opinion of it: "The restoration programs will emphasize taking actions to initiate, accelerate, and facilitate the natural recovery of the aquatic and riparian resource values

and habitats in Rush and Lee Vining Creeks. This does not preclude an engineering/construction approach where appropriate."

Do you agree or disagree?

A Well, the first part is a noble goal, and I think that certainly would be an appropriate goal, but the construction techniques that I was seeing implemented and utilized in those systems were not providing, in my view, a benefit to the system, and I wasn't focusing specifically on fish as the only criteria. I was looking at fish require other organisms for food sources, they require cover, they require temperature modification.

I was attempting to take the more holistic view of what those streams can and should do, and that's the set of glasses I was wearing.

Q Since you testified you weren't familiar with the written document which I call "The 1990 Agreement," again let me ask you to assume that agreement describes conditions which maintained and benefited the fisheries in Rush and Lee Vining Creeks before L.A. began diversions. Let me ask you to further assume those conditions include streamflows, benthic organisms, riparian vegetation, channel configuration, nutrients of springs, and water temperatures. On the basis of that assumption, do you have an opinion how long it will take to reestablish the conditions that benefited the fisheries

before L.A. began diversions in 1941?
A It is already happening.
Q Are we there yet?
A You are never going to be there yet. These systems don't have any discrete end point.
You can go out there, and any little piece of gravel bar out there, and find essentially no vegetation, very dense vegetation, and you will find young age classes and modern age classes and older age classes. There's an incredible amount of diversity out there, so defining the end point is really defining the diversity of that system. That diversity is now underway. It's developing.
Q Again, as I said at the outset in my stipulation, I agree with you. The only issue I am attempting to explore in cross-examination is whether we have attained the conditions which existed before 1941. Let me ask you specifically about vegetation. Assume that the Draft EIR is correct and that between 1941 and 1989 we lost 90 percent plus of mature willows and cottonwoods adjacent to tributaries to Mono Lake. How long will it take us to get the mature willows and cottonwoods back to the extent that existed before 1941?

MR. BIRMINGHAM: I am going to object on the ground the question is ambiguous. Mr. Roos-Collins is asking this witness a question about what is stated in the 1990 agreement. In fact, the 1990 agreement --

MR. DEL PIERO: Actually, that is not the nature of the question unless I am missing something.

MR. ROOS-COLLINS: That is not my question.

MR. DEL PIERO: That is not the nature of the question. Do you have other grounds for objecting?

MR. BIRMINGHAM: I believe if we can go back to the beginning of the question, the record will show that it was initiated with a reference to the assumptions that are made concerning conditions that benefited the fishery as stated in the 1990 agreement.

MR. DEL PIERO: Actually, that was two questions before the one you asked, Mr. Roos-Collins. Perhaps you thought it was connected. I did not.

Ms. Book, will you read Mr. Roos-Collins' last question back?

(The question was read back as follows:)

Q Again, I said at the outset of my stipulation, I agree with you. The only issue I am attempting to explore in cross-examination is whether we have attained the conditions which existed before 1941. Let me ask you specifically about vegetation. Assume that the Draft EIR is correct and that between 1941 and 1989 we lost 90 percent plus of mature willows and cottonwoods adjacent to tributaries to Mono Lake. How long will it take

us to get the mature willows and cottonwoods back to the extent that existed before 1941?

MR. DEL PIERO: Dr. Beschta, do you understand the question he asked you. He asked you to assume what the representations were in the Draft EIR.

DR. BESCHTA: A Were the basis.

MR. DEL PIERO: And on that basis then, he asked you how long it would take the biomass of the cottonwood and willow riparian vegetation to be restored. Would you go ahead and answer that question?

A It is not a very easy one to answer, and I am not trying to go around the point here. We have got road systems affecting this stream channel today that we didn't have back then. We had grazing going on, we had all kinds of things. I am not trying to bring those back into the picture. I realize that, and we've had these major channel changes take place. As long as it takes me to grow large trees, I can do it. We can grow those in a very short period. We have leader growth out there two feet a year. We've got some old cottonwoods, which I thought originally would likely be dead, but are regrowing, and these are 15 and 18-inch-diameter trees, but they are only 12 feet tall, the tops are broken off. These are mature cottonwoods, and now they are regrowing from midway up. Cottonwoods are coming in. It may take 20 or 30 years to get what you might consider mature cottonwoods.

MR. ROOS-COLLINS: Q Let's talk then about channel. In Cal Trout Exhibit 9, which is entitled, "Comparison of Historic and Existing Conditions on Lower Lee Vining Creek," published by Trihey and Associates in January of 1992, Dr. Stine estimates that there was a 55 percent decrease in the occurrence of short meander bends in Lower Lee Vining Creek between 1941 and the present.

He further states that if you include subsidiary channels the total decrease in the meanders on subsidiaries is in excess of 80 percent.

Now assume that sinuosity is a condition that benefits the fisheries, assume that we have no restoration other than continuing watering of the channel, how long would it take for Lee Vining Creek to reestablish the sinuosity that existed before 1941?

A It depends upon the flow regime, which is a major factor. Vegetation is part of it. The flow regime is another part. The reestablishment of those systems does indeed take time, and I don't have a good answer for that. I mean it is a system that is recovering back again after a severe disturbance. It's had fire, it's had dewatering, it's had grazing, and it's kind of like magically when will we put it back together again. Well, we are talking about succession in ways in a system that have never experienced what we are trying to do today, so you are asking me to predict the future

in a tight context, and I can't do that, I guess.
Q Dr. Beschta, it is a very difficult question, not because I put it that way, but because the reality is complex, and I think all parties agree with that. Nevertheless, this Board has a responsibility to comply with the mandate of the Court of Appeals, and I am asking, assuming that water is put back in the channel and no further intervention occurs, do you have any opinion how long it would take Lee Vining Creek to establish the same velocity which existed before 1941?
A If you took out this 1941 view of the world, which I am going to argue is a disturbed view in the sense that those channels were already changed, that you will see sinuosity coming back, and it's starting to come back today, and within 10 years, that vegetation -- this vegetation is just at its beginning. I mean it's five to eight feet off the ground. Three years ago it wasn't a foot high.
The root mass underneath there is incredible. We are just starting to see the effects of that, and it is going to happen, and it is coming very quickly, so I am going to say within the next decade or so you will see significant development of pools in that system.
Q That wasn't my question. My question is: How long would it take to reestablish the sinuosity which existed before 1941, absent intervention?
A I cannot recreate 1941 streams because of all the

historic disturbance patterns, including diversions.
Q Let's turn finally to the recommendations you have for this Board. First, are you familiar with the LADWP Management Plan submitted to this Board, which includes a flow recommendation?
A I have heard about it, but I have not read a specific management plan.
Q Do you have a flow recommendation for the Board in these proceedings?
A No, what I have are criteria that I put forward regarding what those flows in general should look like, so criteria should be addressed when people begin to think about setting a flow regime.
For example, I have heard about setting constant flow regimes. Constant flow is not what this system is about.
Q Do you have a flow recommendation for the Upper Owens River?
A I have not done any work in the Upper Owens.
Q Do you have a recommendation about grazing on lands adjacent to the tributaries to Mono Lake? I believe your testimony contains such a recommendation.
A The long-term or the short-term?
Q Over the long-term.
A Continued removal of grazing at least for a period of time until reestablishment of vegetation occurs, and I think

it is conceivable that with some form of control grazing could be reinstituted in that system without having adverse effects. It is down the road, it is a long way down.

Q Do you have a recommendation for grazing management in the Upper Owens Basin?

A I do not.

Q Do you have a recommendation regarding the continued operation of the gravel mines in the Rush Creek Basin?

A If these gravels are ending up in the stream, I would definitely attempt to prevent that.

Q Do you have a recommendation regarding traffic management, movement of cars and people along these streams?

A Along the streams, well, roads are certainly a concern. You have already got several crossings. You have got these fords, you have got the county roads, and if you keep adding roads to that system, you're going to change that as much as anything else you're doing.

MR. ROOS-COLLINS: Thank you. No further questions.

MR. DEL PIERO: Thank you very much, Mr. Roos-Collins. We are going to take a break for 10 minutes and then we will be back.

(Recess.)

MR. DEL PIERO: Ladies and gentlemen, this hearing will again come to order. Mr. Haselton, where are you?

I have been advised by the representative of the State

Lands Commission that they have no objection to your going before them, inasmuch as you have a plane to catch. Is that true?

MR. HASELTON: Absolutely true.

MR. DEL PIERO: This is your lucky day, sir.

MR. HASELTON: I don't know if it is indicative of my lucky day, but I will take what I can get.

CROSS-EXAMINATION,

BY MR. HASELTON:

Q Dr. Beschta, I am Frank Haselton. I am working with John Arcularius and some of the other folks in the Upper Owens Valley. I have just a couple of questions, one regarding ramping, which I think was included in your recommendations, and at the bottom of page 24 of your testimony, if you went to go ahead and turn there, I think made reference that rapid changes in flow were common, and my first question is: Were those both positive and negative changes, both increase and decrease in flows?

DR. BESCHTA: A Well, a rapid change, if you are shunting water for irrigation, and you're putting it into a ditch, and you are stopping flows in the channel, I would not consider that as a positive feature. Similarly, if all of a sudden I begin to release water back into the channel and close off an irrigation ditch, I wouldn't consider that positive either.

Q Let me -- I used positive and negative in the sense of increase and decrease. My question is, that statement, rapid changes in flow were common, did that mean the changes involved both a negative, a decrease in the water, and also an increase in the water in that channel?
A Yes, it would follow both directions.
Q Would these rapid changes in any one day exceed perhaps 10 percent of what the flow might have been in those channels in any one day?
A I believe they would have, yes.
Q The reason for these rapid changes was basically for irrigation purposes?
A Yes.
Q Would another reason for the change be the immediate availability of water in the watershed and the need to convey it?
A Which period are you talking about?
Q Well, I guess I am talking about pre-1940. I share with you the difficulty of distinguishing between natural, 1940 -- I have a hard time. So let's just deal in the context of your testimony there.
A And your question is with regard to moving water around?
Q Well, the reason for the rapid changes. One reason is for irrigation. Would not another reason be because it is an

Eastern Sierra snowmelt stream, and there's a fairly significant amount of water in a short period of time, and there is a need to release it?
A From a facility?
Q Let's say old Grant Lake. I don't know if that's the proper term for it.
A I don't know what the operational status of Grant Lake was prior to 1940, whether they had that kind of control.
Q Well, let me ask this then: This is again back to the fact this is an eastern snowmelt high Sierra stream, and let's just talk of the natural context. Is not one of the characteristics of this type of stream rapid fluctuations in flows primarily due to snowmelt and gradient and other issues like that?
A Yes, if you look at a hydrograph during the summer runoff period, you see indeed rapid fluctuations on a daily scale, weekly scale, and also on a 24-hour basis you see changes occurring.
Q So, in your recommendation to ramp flows to gradually increase and gradually decrease, this is to essentially protect, if you will, the habitat from what would occur otherwise naturally?
A Well, you would provide time for organisms in the stream to respond to changing flow conditions. I mean the changes that occur even in e 24-hour period, although they are

quite significant, are coming up, they are coming down, and that's quite different than if you kind of quickly change the flow regime. So there's that situation. Over a seasonal scale, we need to be thinking a little bit about the requirements for reestablishing plants, and if we get a flow up and then we shut it down, we may be establishing plants at that particular time and then we lose the water so their root growth cannot keep up with the declining water table, so we've got a seasonal issue going on. So there are several things involved.

MR. HASELTON: Okay, thank you.

MR. DEL PIERO: Thank you very much, Mr. Haselton. Ms. Scoonover.

MS. SCOONOVER: Good afternoon. In the interest of conserving everyone's time, and not coincidentally due to the fact I have a nonrefundable airline ticket for the holidays, I will keep my questions brief. (laughter)

MR. DEL PIERO: What day do you intend on leaving?

MS. SCOONOVER: The 19th.

MR. DEL PIERO: Well, inasmuch as we are setting the schedule now, if you or other representatives of different organizations or individuals have particular considerations that you would like Board Members to think about during the course of the next two days, we need to know about them in advance. Thank you for taking the initiative and telling me

that, and if the rest of you have considerations -- a month-long vacation in Tahiti during the month of December will be an unacceptable excuse, but we will try and make accommodations if you let us know, and I would appreciate it if you would pass that information on to Mr. Canady. Please proceed.

CROSS-EXAMINATION,

BY MS. SCOONOVER:

Q I would like to start with a couple of questions for you, Mr. Tillemans, on the video.

Dr. Stine, if you could start the video at about 1,200, we are going to be looking at Rush Creek delta.

VIDEO TAPE: In 1987 the stream was a wide, unconfined channel, and no riparian vegetation is apparent. The stream remained in this condition until livestock grazing was removed.

MS. SCOONOVER: If you could stop at the side-by-side comparison.

VIDEO TAPE: In 1993, this stream reach is well vegetated and has begun to narrow and deepen- The riparian system is now interacting with the channel. This natural recovery has occurred without artificial restoration. This side-by-side --

MS. SCOONOVER: Fine, thank you.

Q Mr. Tillemans, I assume this shot at about the same

location in 1987 and in 1993?
MR. TILLEMANS: A Yes. We went to great lengths to try to make sure we duplicated that.
Q I believe Ms. Cahill asked you about the difference in color from the 1987 to the 1993 photo, and you responded you didn't know whether a blue filter was responsible for the difference in the color of the 1993 picture; is that correct?
A That's correct.
Q I direct your attention to the background, and maybe you can help me out. I am a little confused. It appears that Paoha Island is in the background of both shots.
A You can see Paoha and Negit Islands on the left-hand side.
Q And it also appears that Paoha Island in the picture on the left is two to four times larger than Paoha Island in the picture on the right. Is that also your understanding?
A I need a clearer look. It may be a little bit larger, but I don't know about factorwise.
Q Do you know whether this 1987 shot was taken with some sort of wide-angle lens?
A As far as the details of the lenses and video and that, you would probably have to refer to the person that took the shot. I just tried to duplicate the sites.
Q If we assume that, for example, a wide-angle lens was used on the shot of 1993, wouldn't that, in effect, make the

items within the shot of 1993 appear to be narrower than in the 1987 shot, which would lead to the difference in Paoha Island that you see in the background?
A Again, you are asking the wrong person as far as cameras go.
Q That's fine. Thank you. I have a couple of questions for you, Dr. Beschta, and I would like to refer to Figures 3 and 3A that you spoke about earlier, if you wouldn't mind setting up the images of 3 and 3A.
DR. BESCHTA: A Could we have a second so we could get a couple of pictures to help out in these questions?
Q Could we just go to these photos?
A These pictures?
Q Yes.
A Okay.
Q Dr. Beschta, photograph 3 is on the left and 3A is on the right. As I understand, photograph 3 was taken earlier in time than photograph 3A; is that correct?
A Yes.
Q What is the approximate date of photograph 3?
MR. TILLEMANS: A One is approximately September '87 and one is approximately September '93.
Q So the photograph 3 would be the 1987 photograph and photograph 3A on the right would be 1993.
Now, in the photograph on the left, it appears to me

that the water is up all the way to the banks, and indeed the right-hand side of the stream channel appears as if it may be about to overflow onto the land. Is that an accurate interpretation of that picture, Dr. Beschta?

DR. BESCHTA: A That the one on the right is about to overflow?

Q No, the photograph on the left -- the water appears to be close to overflowing on the right-hand bank or at least even with the banks.

A Ms. Scoonover, that's a very dish-like channel, so a little bit more water would obviously get you up.

Q In the photograph on the right, Figure 3A, there appears to be a substantial amount of bank showing above the flow of the creek. It seems the water does not appear to be ready to overflow the channel as it does in the photo on the left. Is that an accurate interpretation of the pictures?

A You're getting bank-forming processes taking place, yes.

Q Could the differences in photos 3 and 3A be because the bed of the creek dropped about two and a half feet in the photo on the right-hand side taken in 1993?

A A topographic dropping comparison to the elevation of the floodplain or previous floodplain, is that the reference?

Q Yes.

A Well, as channels do change, yes, one of the things

they do is deepen through time.
Q So the difference between the photograph on the left and the photograph on the right could indeed be because the channel is two and a half feet lower, the channel bed is two and a half feet lower in the channel on the right than in the channel on the left?
A You're saying the surface of the water being lower on a bank is due to the bed of the channel being two and a half feet lower?
Q I am simply asking if the differences we have identified between the photo on the left and the photo on the right could be because the channel in the bed on the right has dropped by about two and a half feet from where it was photographed in the channel on the left.
A It could be.
MS. SCOONOVER: Thank you. That's all I have.
MR. DEL PIERO: Thank you. Anyone else wishing to cross-examine this witness at this time? No other parties. Okay, fine. Staff.
EXAMINATION,
BY MR. FRINK:
Q I have just a few. That's one of the advantages of being at the end.
Dr. Beschta, Ms. Cahill referred to your article in Rivers which recommended a ramping criteria of 10 percent

change per day. You explained this morning that you might reword or revise that recommendation in some respect, and I don't believe that you were recommending 10 percent change in flow as a ramping criteria in this instance, but my question is: Wouldn't there be more than a 10 percent fluctuation in the daily flow rates of an Eastern Sierra stream under natural conditions as a common occurrence?
A Yes, there would be.
Q Do you know approximately what the range of daily flow rate fluctuations would be in the Rush or Lee Vining Creek situation?
A On a daily basis?
Q Yes, under natural.
A Well, I guess it would depend upon whether you have just got pure snowmelt or whether you have a rain on snow type of event. Rain on snow would drive it up considerably, maybe 100 cfs, during the course of a day.
Q Mr. Dodge asked you about the effect of a declining lake level on channel incision, and he provided you with information showing that the water elevation of Mono Lake had gone down approximately four feet from 1987 to 1993. The Draft EIR, which I believe you do have a copy of there, reports an historic low-water elevation of Mono Lake in 1982 of approximately 6,372 feet. That's approximately eight feet below the water elevation in 1987 on the graph. Are you

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following me?
A Yes, I am.
Q And approximately three feet below the present water elevation, I believe. Would you agree that if all other factors are equal that a declining lake level elevation below previous levels as occurred in 1982 could result in incision and channel erosion?
A All else being equal, as you lower the lake, you would ultimately expect channels probably incise to some degree, yes.
Q Now going back and looking at the historic water levels in Mono Lake, and I believe you are also looking at Figure 1-7 in the Draft EIR --
A I am looking at A-6. I am looking at the Appendices. I don't have the document you are looking at.
Q But it does show the water elevations through recent years; is that correct?
A It shows through 1990.
Q Through 1990?
A Yes.
Q What I am interested in is if the water elevation in Mono Lake reached an historic low level in 1982, how would you expect that to affect channel incision which might occur after that date when the water level of mono lake is higher?
A How would the low value in '82 affect channel incision

and higher lake levels?
Q Yes. The point I am getting at, I guess, is this, and you can respond to it however you wish. If the water elevation in Mono Lake had declined to an historic level and that resulted in significant channel incision, assume that if there was then a fluctuation in the water level of Mono Lake significantly above that historic low level, would you expect there to be substantial additional incision or would you expect that that incision would have already occurred?
A Well, if I look at the low point, let's say in '82 roughly, and follow the years right after that, that's when a major incision activity took place when the lake level wasn't actually rising, coming up. That's in late '82. In 1983 Rush Creek, for example, went through considerable incision at the delta, whereas I don't believe Lee Vining did much at all because it was in good shape. There was a lot of vegetation down there. There was less vegetation down at the mouth of the delta with regard to Rush Creek, so if you bring the lake level up, and your question is will it create more incision?
Q That isn't exactly my question.
A It was a long question, and I was trying to follow it.
Q I am sorry, I don't think I expressed it that well. What I am looking at, there was a long period of decline in water elevation up to 1982, and then the water elevation rose with some ups and downs, but generally rose until 1987, at

which time it began to decline again.
A Right.
Q Would you expect significant additional incision after 1987, which had not previously occurred as a result of the low water level in 1982?
A That model assumes that the lake levels are controlling the incision in a major way. If I had vegetation out there like we do today, it makes a big difference whether or not there is going to be any incision at all happening to the system. It begins to exert its effect on this system. So maybe fluctuating the lake levels then doesn't exert the control we had before, and the kind of flows that occurred; for example, in the 80's when that second set of incisions took place, there was very little vegetation to stop it from going on.
So the low lake levels at that point along with the unvegetated delta down there allowed incision to occur.
Q Would you expect there to be additional incision after 1987 that had not previously occurred?
A Additional incision post-'87? It is possible, it can always occur.
MR. FRINK: Thank you. That's all my questions. I believe Mr. Herrera has some.
EXAMINATION,
BY MR. HERRERA:

Q Thank you, Mr. Frink. First of all, could you turn to your written testimony on page 38, specifically Table A. I note on the Appendix I a summary of annual peak average daily flows for Lee Vining, 1973 to 1992, and Rush Creek, 1936 to 1992. Is there any particular reason why you selected those dates?

DR. BESCHTA: A I don't believe I selected them. I believe I asked for whatever they had for the period of record. I asked for the records they had on peak flows.

Q On both creeks, and that's the data that they gave you for those?

A That's my memory.

Q Mr. Tillemans, is there any additional data on flow records to your knowledge, other than those data, for Rush and Lee Vining Creeks?

MR. TILLEMANS: A Again, you would probably have to talk to the hydrologist or someone.

MR. BIRMINGHAM: Excuse me, the DWP, pursuant to the request that Mr. Herrera made last week, is going to make available to the State Board Staff and all of the parties all flow data that the Department has.

MR. DEL PIERO: Mr. Tillemans, you have not seen any beyond that which is represented there?

MR. TILLEMANS: A I have seen -- yes, I have. I have seen data other than '73 to '92. I have seen sporadic

data in between '36 and '92.
MR. DEL PIERO: At this point you don't have it here?
A No, I don't.
MR. HERRERA: Q My next question goes e little bit to your comment that astounding growth has occurred in revegetation. I'm not sure what you mean by "astounding growth". Could you expand on that a little bit?
A The plant density for one thing along those streams is incredibly heavy. You will have a tough time walking along many of those channels today because of the existing vegetation. When you look at the height growth of the leaders, that is pretty extensive. Two to four feet is not unknown out there in willows. Cottonwoods are doing just as well, so you are just seeing a tremendous amount of biomass beginning to accumulate in that system, and it's happening very, very rapidly.
Q Would you depict this growth in comparison to other places that you have examined as extremely quick or rapid growth in comparison to other streams you have examined for regrowth or revegetation, or is it moderate, or --
A I would say this is on the high end of the scale. It may not be the highest, but it is certainly one of the better sites I have ever seen.
Q You further indicated that -- first of all, how long a period have you been examining these two streams, Rush and Lee

Vining Creeks, for revegetation?
A How long have I been on those streams looking at them? Since April of 1992, the very first year after the grazing was stopped.
Q You also stated that first and second-year plantings have not developed enough to be quantified in your evaluation of the stream vegetation. I am a little curious, if you started in 1992 and this is a year and a half or two years later, how could you quantify the existing vegetation and not some of the plantings in that same timeframe?
A I am not sure I am picking up on your question. You're saying if the plantings were started in 1992, 1991?
Q Prior to your involvement there, which was in 1992.
A If you had plantings started?
Q Yes.
A One of the things that happens with plantings is you often get a first year's flush of success. That is, they look like they do quite well because you are putting them in a location where they have carbohydrate reserves and they can make it through a year. They've got a stem, so they will do quite well for the first year, and it's usually in the second or third year because they have not had sufficient root growth to get to the water table or get enough moisture, that they begin to fail. So, oftentimes planting of a stem, whatever, will look good for a year or two, and then it doesn't work.

In contrast, generally a natural plant that establishes and makes it through the first year oftentimes it is a very critical year and the success of it is more assured.

Q So again, after two years of the plantings being in place, you couldn't quantify them in your evaluations?

A I haven't quantified them in any evaluations, but also --

Q Your statement earlier was that you couldn't quantify them, if I was correct.

A No, I am saying you can't use the estimates of the success after the first year as an indication of what's going on in the future.

The other thing I guess to keep in mind is where the plantings were going in were places that had, if you will, destroyed or taken away native vegetation, which would have existed, so there's a net loss problem.

Q Have you evaluated other areas in the Mono Basin for reestablishing or revegetation, maybe specifically Walker and Parker Creeks?

A I haven't spent much time on Walker or Parker. I have been on Mill Creek.

Q Do you have any opinion as to how the revegetation is coming on Walker and Parker?

A No, I don't have any.

MR. HERRERA: That concludes my questions. Thank you.

EXAMINATION,

BY MR. CANADY:

Q Dr. Beschta, you testified, I believe, that the two most effective treatments to date have been the rewatering of the historic and natural side channels, and the second important treatment has been the reduction of grazing of livestock; is that correct?

A I said the most successful treatment today has been putting water back in the system, rewatering the system, and while that is main channel rewatering, there has been also, for example, putting water into some side channels.

Q Then, additionally, a second important step was the impact of the livestock?

A Oh, yes.

Q And you have also testified, in your opinion, that it is not possible to resurrect the stream to exactly the same conditions that existed in 1940; is that correct?

A That's true. It is true in a sense you can't put it back in the same place, but you can recreate how that stream functioned prior to 1940.

Q So the conditions that benefited it --

A The conditions that benefited the fish can be restored, yes.

Q I think in your testimony you listed some long-term things that need to be done, and one of those is a return to

continuous and increased flows; is that correct?
A Yes.
Q And the idea of returning these increased flows would be to allow this stream to continue to heal itself; is that correct?
A An increase was the -- obviously there was a lot of diversion going on, and that needed to be changed.
Q And by "healing itself", we are talking about, you used the word "sinuosity," that we would expect sinuosity to be increased over the existing conditions today?
A Yes.
Q We would expect to see pool development increased over what it was prior to the initiation of rewatering the streams; is that correct?
A Pools with undercut banks and cover, yes.
Q And you talked about that we need peak flow events or whatever streamflow regime that is adopted by this Board should mirror natural streamflow conditions as far as the hydrographs; is that correct?
A I'm not sure I used the word "mirror". There are features of the hydrograph that I don't think you want to go beyond. If you could, for example, put four times as much water down the system, and I am not going to recommend that, I mean there are some flows that historically have occurred in these streams. That's the natural range of conditions that

set that system prior to 1940. They were the important disturbance features.

If you want to talk about restoration with regard to that stream system, then it's the natural disturbance pattern which has really been driven by flow, that you need to begin to think about, and things like ramping is one consideration, not too fast, not too slow. You need to think about having disturbance such as peak flows, and putting them in the range of natural conditions is one way of putting some ballpark estimates on it.

Q In those peak flows, what would be the kind of benefits we would expect to get from allowing peak flows to go down the channel?

A That's the driver. That's so important in the revegetation of the system because you are putting water out subsurface as well as over the surface. You are causing channel alterations to take place, localized scouring and fill. You are sorbing hydraulically the spawning gravels and putting them in riffles where fish will use them. So it's the driver that makes these systems tick.

Q You have seen the stream under some different flow conditions; haven't you?

A Yes.

Q Do you believe a continuous flow of let's say 20 cfs would allow that stream to build and do the kind of recovery

that you are talking about with the morphology of the channel?
MR. BIRMINGHAM: I wonder if he could specify as to which stream Mr. Canady is referring to.
MR. CANADY: Q Rush Creek.
A 20 cfs?
Q Yes.
A It will reestablish a new channel within its existing, much larger channel at 20 cfs. It will develop floodplains within the existing main channel, and the floodplains will be very small.
Q But if our goal was to approximate some conditions that existed in 1941 to get us back -- assume that the goal was to go back to conditions in 1941, and different people have described ranges of riparian cover, stream channel morphology,

do you believe that that can be accomplished by that flow regime, a continuous flow of 20 cfs?
A Well, if from now on you ran 20 cubic feet per second, from today, and you start running 20 cfs through that system, that is your question?
Q Yes.
A All right. There's a lot of riparian vegetation you could support with 20 cfs, but you would not see extensive channel dynamics, you would see a collapse, if you will, of the channel, you would see more vegetation coming in. It would be a smaller channel, and you would not have the

dynamics in which you would get cottonwood seedlings off on the side probably. It would not be rewatering these areas, so you are really shunting the system down.
Q So we would be restricting the recovery that system could do.
A There is a certain potential. If 100 percent represented a certain potential, that 20 cfs would push you well below that 100 percent, whatever that was.
Q I think Dr. Platts testified, and I think your testimony as well indicates that we can get some benefits if we decide to rewater some of the, you didn't like the word "historic channels", let's call them existing channels, that occur, and we will talk about Rush Creek, that there is some definite benefit from at least some season-long rewatering and possibly even year-round rewatering; is that correct?
A You can grow more plants.
Q So, if the DEIR was correct, and we have lost over a period of time 90 percent plus of the riparian vegetation that occurred there, with the opportunity to rewater those channels, we would probably do some good things for riparian recovery in numbers?
A You might -- again, it depends upon what your objectives are. Are you trying to restore the system or rebuild it into something you want. Do you just want to grow more trees for the sake of growing more trees, or are you

trying to restore that system back to its natural dynamics or some dynamics that approach what it used to do.

If you are building irrigation canals out there for whatever reason, that doesn't fit into a sustainable picture.

Q Have you walked the dry channels on the southernmost escarpment below the narrows on Rush Creek?

A I believe I have -- above Indian Ditch or below Indian Ditch?

Q That's kind of a debate right now. I don't want to get into that. But, you know, several hundred yards from the narrows, if you are looking downstream it would be the right-hand side of the stream, and in New Zealand I think that's the right hand, would you call that a ditch or a former historic channel?

A If I may stay above Indian Ditch, say a couple of hundred yards, you are not very far, you are above Indian Ditch, and there is an old historic channel right along the side there.

Q And you walked that channel?

A I did.

Q And what would you say about the shape of that channel, your recollection?

A The banks have sloughed, but you can see the banks, and you have got a bottom there, and you have some kind of pools and things happening. Part of it is dry and part of it is

moist, and part of it is holding water today.
Q That would be a good channel if it didn't take a lot of effort to put water in, at least on a seasonal or maybe greater than that basis, to get some habitat back or grow trees, you said, but the benefits of trees is for the aquatic ecosystem and for wildlife habitat.
A Sure. There would certainly be some benefits, you know, from the standpoint of growing more vegetation by rewatering, but you begin to ask the question, well, at what point do I do that, and at what point don't I do that.
If it requires major significant construction activity out there, I think you are pushing in the wrong direction because there have been some real channel dynamics take place right below the narrows there, and I haven't looked at the head of that side channel to really get a sense of whether or not you're going to have to excavate lots of sediment to connect it -- whether it takes a lot of excavation or whether it's just simply pulling out a few rocks here.
Q I believe that Jones and Stokes looked at that in the EIR. We have looked at photographs along the stream, and different people have used different adjectives to describe the recovery, but let's talk about Lee Vining Creek. You have walked that stream several times, in fact I have walked it with you several times. Now there are areas in there along the stream, both on the south side of the stream or on the

right-hand side of the stream and the left-hand side of the stream that the remainder there is just basically cobble, large cobbles; is that correct?
A Yes.
Q How would we restore that under your idea, your professional opinion, and how long would it take to restore those areas; and they are fairly large; aren't they?
A There are some significant areas that have cobble, yes. Again, you have to tell me what is in your mind when you say "restoration". Those systems have changed, and I can't turn that clock back, and let's suppose there was a wet meadow there at one time. It is inconceivable to put a wet meadow back on that site.
Q I am talking about the ability of those, if you compare those cobbles that exist today versus what their potential was to support vegetation of a riparian nature, how long is it going to take for that to occur, or what kind of things need to happen for those particular structures to support riparian vegetation like we are seeing recovering astoundingly, which is one of your terms, along other portions of the stream?
A Well, some of these areas away from the channel take longer, but there are some things going on out there that you cannot predict nicely. For example, this business of subsurface flows, they may leave the channel at one place and show up in other places, and those pathways are not easy to

predict, nor is the timing.
Putting water back in a channel will open up some of those subsurface channels and move water around in strange ways, and you may see wet side vegetation popping up on those areas at sometime in the future. As the channel shifts upstream, you may reopen some of those subsurface pathways, and it is one these, and see it happening at some other time. On a specific site, it is unpredictable. On a general scale, it is predictable in the sense it is going to happen, but I can't tell you at which site and where.
Q But I think you testified earlier that at some of these areas the thing that is really lacking, at least today, is the fine sediments; is that correct?
A Yes.
Q And so to get fine sediments on those adjacent cobble bars along the stream, how would we get the sediments there? Would we need overbank flooding?
A Some of these cobble bars are too far away from the stream to get overbank flooding.
Q At today's conditions?
A Yes. You can't do everything -- that stream won't do everything. Indeed, if you want to put fines way up there, that is a long-term proposition. Again, the system has been reset, and some sites, to restore to what I think you are trying to restore to, may not be feasible in the sense of

restoration.
Q I am not defining anything, I am trying to restore, I am trying to understand. These were areas, there's big wood lying in there, old big wood, and I am trying to understand what, in your opinion, are the conditions that we would have or would have to be created to get big wood in there, and I recall you said it would help to get some sediment into those cobble bars.
A The fine sediments are incredibly important to streams. I know for many years we have looked upon fine sediment as bad news to channels, particularly from a fisheries impact standpoint.
When you look at how channels form, you look at those banks today and you look at what's going on, the fine sediments are incredibly important regarding species growing along there. This is part of the narrowing process, it is part of the bank-building process. As those areas become revegetated and as we get fluctuating flows and as we get floatable woody debris in that system creating local hydraulic changes, you will begin to see channel changes reworking that system and beginning to give you this diversity. Now if you've got a cobble bar which is four feet above the existing channel, it would be hard to get there. But you can certainly get pines growing up there, and if there were pines growing up and down that system, I expect they would be back in there.

Q Again, getting back to my question, if you had a goal of trying to establish vegetation with a continuous flow of 20 cfs, it would not be what we would be looking for in riparian reestablishment.
A I don't think so. That is not how those species operate.
MR. CANADY: Thank you. That's all I have.
MR. DEL PIERO: I just polled my colleagues, and none of them have questions yet, but I have a few.
I'm sorry, Hugh, you go right ahead. I didn't see that hand waving.
EXAMINATION,
BY MR. SMITH:
Q Two short questions. First off, pictures 3 and 3A, from what Exhibit do they come? Would you identify those, please, for the record?
MR. TILLEMANS: A These two right here?
Q They were called 3 and 3A, but the source was not quoted. Would someone --
MR. DEL PIERO: Let me help you. They are out of the Direct Testimony for LADWP -- no, these are different?
MR. CANADY: Those are out of Dr. Chapman's --
MR. TILLEMANS: These are also sites we duplicated.
MR. DEL PIERO: I understand they are representations of Mono Lake. What submittal do they come from?

MR. TILLEMANS: They represent sites where the video was taken. The video was taken and these are stills so one could see the general area that the video was panning across.

MR. DEL PIERO: So they are frames extracted from the video tape?

MR. TILLEMANS: I believe they are actually separate pictures and not taken from the exact video.

MR. DEL PIERO: That is why you can't figure out where they are from.

MR. FRINK: Mr. Birmingham, in order that your record is complete, would you wish to designate these as additional Department of Water and Power Exhibits? I believe you brought them up. I'm not sure who brought them up initially.

MR. DEL PIERO: In fact, Ms. Goldsmith, were they not delivered by your staff this morning?

MS. GOLDSMITH: Yes, they were. Actually, these pictures were here the last 10 days. These pictures were not referred to in the direct testimony. They are, as Mr. Tillemans has said, silent shots taken from the same tripod as the video was taken, but they are not actual frames from the video.

MR. DEL PIERO: Are you prepared to introduce them?

MR. BIRMINGHAM: We would designate them as LADWP 11A. Eleven is the video tape that has been shown, and we will designate them as LADWP 11A, 11B, 11C, and 11D, and, to make

the record more explicit, the 1987 photo --
MR. DEL PIERO: Excuse me, before you -- wait a second, I want to ask opposing counsel, have you seen these pictures before?
MR. DODGE: Not to my knowledge.
MR. DEL PIERO: Do you have any objection to their being introduced into the record?
MR. DODGE: No. We don't have copies, of course.
MR. DEL PIERO: I understand, and I assume copies will be made available because I am going to direct they be made available inasmuch as I don't have copies of them either.
Pardon me, Mr. Birmingham, for interrupting you. Do you want to finish identifying them for the record?
MS. CAHILL: I wanted to clarify whether in fact they were taken contemporaneously with the video. It's my memory of the video that that foliage was green. I assume this was taken at a different time of the year.
MS. GOLDSMITH: They were taken contemporaneously.
MR. ROOS-COLLINS: Cal Trout has no objection on the basis of these representations.
MR. DEL PIERO: Did you finish, sir? Why don't you go ahead and finish. I apologize for interrupting you, sir. Eleven-A and B are the two standing up there, C and D are the ones on the ground?
MR. BIRMINGHAM: Eleven-A is a 1987 photo of Rush Creek

delta. Eleven-B is the 1993 photo of the Rush Creek delta. Eleven-C will be the 1987 photo of the meander bend on Rush Creek. Eleven-D will be the 1993 photo of the meander bend along Rush Creek.

MR. DEL PIERO: Thank you very much. Again I apologize for interrupting your question.

(Thereupon LADWP Exhibits 11A, 11B, 11C, and 11D, were marked for identification.)

MR. SMITH: Q Dr. Beschta, in your testimony on page 36 you say that, "structural approaches to restoration are unneeded and provide little functional improvement to stream riparian systems." That was your statement?

A What page are you on?

Q Page 36 of your testimony.

A Yes.

Q Are you familiar with LADWP No. 15, Instream Flow Analysis for Lower Rush Creek, Mono County, California, prepared by E. A. Engineering? Have you read that testimony?

A It's an instream flow analysis report?

Q Yes.

A No.

Q I might again quote from page 21, "Conclusions and Recommendations": "These results suggest that habitat improvement for brown trout in Rush Creek may come in the form of increasing the number of pools within the stream."

And also, on page 22: We have certain habitat enhancement measures, such as planting riparian vegetation, etc., and such instream cover sources such as boulders could greatly improve habitat available and should support a resident population of trout.

Is this an apparent contradiction of your own testimony, or how could you explain --

MR. BIRMINGHAM: Excuse me, Mr. Del Piero, I am wondering if the witness can be given an opportunity to review that document so he can review the statement in the context of the recommendations being made. I believe it is that 20 cfs be released in the stream, and that would be the permanent flow.

MR. DEL PIERO: Dr. Beschta, do you have a copy of that?

DR. BESCHTA: I don't have a copy.

MR. DEL PIERO: What exhibit is that?

MR. SMITH: LADWP 15.

MR. DEL PIERO: Do you have a copy, Mr. Birmingham?

MR. BIRMINGHAM: I believe I do, Mr. Del Piero.

DR. BESCHTA: A Which page are you on?

MR. SMITH: Q Page 21, the fourth paragraph, the second to the last sentence, "These results suggest" -- the fourth paragraph, second to the last sentence.

A The results are suggesting essentially that you go out

and build pools and you don't need flow augmentation. Am I reading that correctly?
Q I would think so, but I believe some of your former testimony was that pools were in places were even counter-productive.
A No, I am saying the kind of pools that were constructed and where they were constructed and how they were constructed were counter-productive. Pools are important for fish. I am not taking -- I am not saying pools are unimportant for fish, but when you construct pools in certain locations and don't take into account the sediment transport dynamics or vegetation requirements for establishment, or the configuration of the pool, you are modifying a system in a way that it is pretty unpredictable in a lot of cases, but oftentimes has very detrimental effects. You are focusing on the single view of the stream system saying, if these streams just had pools, it would be wonderful.

These are ecosystems. They don't work on a single limiting factor. They work on a whole variety of things.

So just building pools won't do it. If you went pools in Rush Creek, they are already happening, and they are happening with all the features that the research would say, for example, the overhanging cover, the undercut banks -- that's going on, too. It's happening right today.
Q Also on the boulders, structural changes such as that

-- would you disagree with that recommendation?
A Boulders is an interesting one. The literature is inconclusive, but the published literature shows some pluses, some no changes, and some negatives. And, by and large, boulders by themselves are generally not looked for, certainly in the Northwest, as a solution for fishery problems.
MR. SMITH: I have no further questions.
MR. DEL PIERO: Mr. Satkowski.
MR. SATKOWSKI: No questions.
EXAMINATION,
BY MR. DEL PIERO:
Q The first question, and you will forgive some of these, but I am asking you for information for myself as much as anything. Slow ramp-up and slow ramp-down in Rush Creek, is that column based on the fact it is heavily supplied by the snowmelt?
DR. BESCHTA: A Slow ramping up?
Q Yes.
A I am not indicating necessarily a slow ramping up. I am just saying you don't want to do a dramatic --
Q I am asking in a natural condition, is the slow ramp-up, a slow ramp-down from peak flows a normal situation given the snowmelt feeding the stream?
A You tend to have a hydrographic that bumps its way up and bumps its way down, but with some inflections as you come

back down.
Q And in terms of what you are recommending for flows in streams, succinctly you recommended e slow ramp-down. Do you recommend a slow ramp-up also?
A This is where I would think it is important to go, and I haven't done that analysis of what those ramps should be, but the hydrographs exist to look at it.
Q Do you have an opinion as to what you believe the hydrology of the stream was prior to 1941?
A Do I have an opinion as to what it was?
Q Yes.
A Well, I believe you have power generation upstream, for example, at Grant Lake, and then Grant Lake was filling downstream.
Q Below Grant Lake.
A Below Grant Lake; below, what was the hydrology like?
Q Yes.
A It was controlled predominantly by flows coming down the Rush Creek System, but you also have tributaries feeding in pulses of water.
Q Were pools common?
A Yes.
Q Deep pools?
A I suspect there were deep pools in that system.
Q Do you have a sense as to what the average flow during

the summertime was?
A Pre-1941?
Q Yes.
A Well, there were periods, at least up at the gage, where apparently zero flow was coming down through the system, so you would be getting -- if you are getting water down in that channel, you are looking at perhaps irrigation return flows, subsurface movement of water down to some basement level in the rock or in the deposit and moving laterally to a location like the springs, and then coming out there.
Q Would that have been enough to sustain water in the pools?
A If the pools had already been formed, that might well be enough to keep water in the pools, yes.
Q For how long?
A All summer.
Q What kind of temperature would those be?
A The pools?
Q Yes, without flow.
A They would have been getting warm. They would have been getting warm, but I don't have specific numbers.
Q Do you have a general idea given the temperature in the summertime in the Mono Basin?
A That's a hard one to predict because it depends on flow, it depends upon whether you are getting any leakage --

Q I am going to assume no flow because that's what the gage indicated, and you indicated also, and I read that. Given that, tell me, given the average temperatures in Mono Basin, the size of those pools that you indicated you had a sense as to existing prior to 1941, tell me what kind of temperatures that could have been achieved in those pools.
A Above 20 degrees Celsius, and I would have to convert that to Fahrenheit, but 20 degrees is getting warm.
Q You made a statement, and I don't know if you intended it -- I think this was in response to a question -- I believe you said that mechanical activities of the RTC had retarded natural restoration processes. Is that correct?
A Yes.
Q Can you give me an example of how that has taken place in the last couple of years?
A This goes back to the business of trying to build pools in the system.
Q I am focusing on where it retarded natural restoration processes, as opposed to where it may retard them in the future.
A Where it has retarded?
Q Yes.
A At the time you are building those pools, and if you are destroying streamside vegetation, and let's suppose everybody wants cover over the stream, which seems to be a

desirable objective, and the streamside vegetation is destroyed during that process, and the seedbed that is left over is not desirable for existing vegetation, you may not see anything coming in. They remain barren for a long period of time.

So you have a problem right there as far as local revegetation.

Q Do you know of any circumstances where that is happening in terms of the RTC background?

A I think so.

Q You do? Whereabouts?

A Above the highway.

Q On Rush Creek?

A Yes.

Q How extensive?

A Where they build pools.

Q Are you suggesting that the entirety of the area they excavated?

A The entire area?

Q The entire area they excavated resulted in retardation of the natural restoration process?

A In some cases, yes. They made essentially permanent changes to that stream. I mean the dredging of these materials and placing them on the bank, for example, above the existing water line, this is very difficult to get

revegetation. The dredging of wetland habitat to create backwater channels and putting that on top of wetland, that's essentially a permanent change.
Q Let's talk about wetland soil then. Given the amount of flow that exists, have you quantified with a model the groundwater hydrology within the stream course of Rush Creek and Lee Vining Creek?
A No.
Q Have you quantified with any type of mapping the magnitude of the hydrologic influence of the stream on groundwater within the courses or within the limited watershed of Lee Vining and Rush Creeks below the impoundments, below the reservoirs?
A No, I haven't quantified it.
Q In terms of riparian vegetation, riparian vegetation doesn't necessarily have to be immediately adjacent to running water to be established; is that not correct?
A That's true.
Q Riparian vegetation can normally be established on saturated soils; is that not correct?
A Maybe initially saturated, but something moist somewhere along the way, I guess.
Q Have you been able to quantify the magnitude of either saturated or moist soils existing before 1941 along the course of both Rush Creek and Lee Vining Creek?

A Haven't quantified that, but I certainly have seen the aerial photographs indicating that there were wet areas out there, yes.
Q Is it appropriate to assume that those wet areas were not all dependent upon overflow from the channel?
A That is true. A lot of them would not be dependent.
Q Were some of them dependent upon groundwater?
A Groundwater --
Q Whether it be underflow or percolated water, I don't care, groundwater.
A Yes.
Q And can riparian corridors be sustained by groundwater?
A You can generally sustain vegetation through the later growth stages because the trees, the shrubs, whatever, have their roots down there, and they may do apparently quite well, but if you don't get the reproduction coming on somewhere down the road, you are asking for that system to collapse.
Q If an activity or an event took place that resulted in water that maintained the groundwater level to be eliminated, i.e., diversions, is it reasonable to assume that the riparian vegetation not immediately adjacent to the direct influence of the channel would decline, assuming that you had high levels of groundwater?
A Originally?
Q Originally.

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A If you lost that groundwater source on these areas away from the channel, it is likely you would see vegetation decline and very significantly.

Q Would that then be a possible cause of the decline of riparian vegetation along the dewatered older channels or ditches that have been referred to in the testimony in the cross-examination here today?

A The loss of groundwater?

Q Yes.

A Sure, that would contribute to it if you lost that.

Q In terms of flow in the watercourses of both Rush Creek and Lee Vining Creek, have you quantified the amount of water necessary to recharge those areas in order to allow for the restoration of comparable vegetation as existed prior to 1941?

A The science really hasn't advanced to the point that we can.

Q You don't have a model -- I don't know how you could do it, but I am asking it anyway.

A We are unable to predict that. All the studies that I have seen indicate the subsurface environment, the flows are very complicated. It's not a simple groundwater system.

Q Have you done core borings and been able to develop any kind of simulation as to how the groundwater system works in either the watercourses of Rush Creek or Lee Vining?

A Neither of these two, but I have in other places.

Q I don't doubt that. I am focusing on these two particularly. Is it your experience in terms of groundwater hydrology, even groundwater hydrology influenced by a watercourse, that direct similarities can be found from one watercourse to another, as to specific watercourses, not in terms of science, not in terms of how the systems work, as to specific watercourses.

A What I know about Rush could be transferred to Lee Vining; is that the question?

Q I am asking: Can you compare the two directly?

A Not completely. Let me just explain. For example, the gradient in Lee Vining is much steeper than it is in Rush Creek. Rush Creek has relatively unconfined systems which are low gradient, and the channel has moved around, and you have finer sediments that have deposited over time, so the mere surface environment is quite different than over on Lee Vining. So the gradient change means the streams are going to be different. Not only is the general profile different, but in various locations we see differences, too. So it is not easy to go from one stream to the other.

Q Okay, a different subject, and this question goes to both of you. I would like to ask you a question about the diversion dam on Lee Vining Creek. Dr. Beschta, you indicated that you thought a sediment bypass would be an appropriate recommendation; is that correct?

A From a long-term standpoint of sediment recruiting through that system, if you have a diversion structure that you are continually emptying or had just put a large reservoir on that site, you would create a condition where sediment bypassing would indeed help provide and sustain what the conditions were downstream.

Q I used to, in my previous life, have some dams. I had a trusty old engineer named Joe Lagrugo (phonetic) who used to go out every year and quantify as best he could for me sedimentation build-up in back of each one of the dams that we had.

Has the LADWP kept records of sedimentation build-up in back of the Lee Vining Diversion Dam?

MR. TILLEMANS: A To my knowledge, I don't think so.

Q Would you know if they did?

A That is something that was a maintenance procedure by the construction crews, and they did dredge that, and the only thing I could think of is if you talk to the construction foreman and ask him how many truckloads he took out every fifth year, something like that, I think that might be the best estimate that you could get.

Q Did you evaluate any calculations as to sediment buildup in back of the Lee Vining Diversion Dam that resulted in your making your recommendations for the sediment bypass?

DR. BESCHTA: A No, I had no access to numbers that

told what was being collected.
Q How did you arrive at the recommendation for sediment bypass? How were you able to?
A I made the recommendation that it be considered, so it is not etched in stone.
Q I understand, but I assume you didn't make a recommendation out of --
A No. The fact that they are cleaning it out says you are accumulating sediments, so that's generally fine sediment, as I understood, and that's material a lot of these banks build from, so that's kind of the thought process I went through there. I don't have specific numbers.
Q You made a comment that you have to install some land-use impacts to remedy, I think you were referring to the incision problem. Did I make a mistake in terms of my notes?
A I don't know if you made a mistake. I am not sure.
Q In terms of incision, how far back from the current mouth of Rush Creek is incision a factor, not the sole factor, but a factor? How many meters from the mouth is incision e factor currently?
A On Rush Creek it is conceivable to me that you have channel incision all the way up almost to the Narrows.
Q And how about on Lee Vining?
A My interpretation today would be I don't think incision was nearly as significant there because you do have coarser

substrates in that system, and it did not go down as much.
Q And is it safe to assume that the incision is greater near the mouth than it is -- I am talking about Rush -- near the Narrows?
A Very much so.
Q And it is a graduated system, it gets less as it goes farther upstream?
A You run into multiple factors upstream. It is not clear as to exactly what is causing what because, for example, you have a road, you have what is known as the ford in between, and you have the county road in between, and those create local nick points or points of reference for the stream.
So it is conceivable you could have the delta out here incising crazy, but when you get to one of these hard structures, it may slow it down or prevent it from going lower than the existing structure.
Q Okay. The last couple of questions I have deal with something that nobody talked about, not even you, so I want to ask a question. I read your testimony, and I come from a place where they have cows and sheep. I also come from a place where there's a great amount of erosion, and, during the course of my brief life, I worked a lot with the Soil Conservation Service, so you will understand why I am asking these questions.

The grazing that took place in the Mono Basin, particularly in the watershed of Rush Creek, and to a lesser extent in Lee Vining Creek, went on for years; is that not correct?

A Yes, I believe so.

Q Decades?

A Yes.

Q Maybe over half a Century.

A I would think so.

Q Would you characterize it as being significant grazing to the detriment of the environmental resources?

A Yes.

Q Would you characterize it as grazing done to the extent of severely impeding growth of natural vegetation?

A Some of the existing plants probably did feel the effect. It was the reproduction of the young plants where you would really see it. That is where the impedance would be.

Q There were thousands of animals.

A That is what I understand.

Q As recently as two or three years ago; is that not correct?

A Yes.

MR. TILLEMANS: A It is significantly reduced in the recent past as compared to before.

Q I understand your fences don't work so good because you

had sheep come through '89 or '90?
MR. TILLEMANS: A I think that was a misunderstanding. That was the U. S. Forest Service that had a permittee running down from up north, and he took it upon himself to go ahead --
Q I am not suggesting that LADWP did anything inappropriate. I am suggesting they are still there, nonetheless.
MR. TILLEMANS: A Okay.
Q I think it was you that testified to the nature of the damage that resulted from their presence; is that not correct?
DR. BESCHTA: A Correct.
Q In your presentation, you talked about sedimentation, you talked about the stream course. You don't talk about sedimentation due to loss of natural vegetation outside the stream course. Is there a reason why?
A Sedimentation?
Q That resulted from denuding of the landscape because of the grazing going on. You didn't talk about any impacts of sedimentation from erosion.
A Running off the hill slopes?
Q Yes.
A That was not an area that I was trying to concentrate on. Most of my focus was on the riparian stream system and not on the uplands. Now there's some obvious places where you

see erosion of hill slopes where the ditch may have busted loose and water came coursing down, and there are some places I have seen those, and so obviously you have some source of sedimentation, but I didn't focus on those.
Q When did grazing stop, when did the authorized grazing stop?
A 1991 was the first year of no grazing.
Q Has anybody quantified the magnitude of the erosion that has taken place within the watershed of Lee Vining below the dam or below the dam on Rush Creek?
A In the channel system?
Q Yes.
A I believe so.
Q The erosion that resulted from agricultural activities?
A Oh, no, I'm sorry.
Q No one has done that?
A I haven't seen it.
Q So no one can then tell us what the pre-1941 condition was; is that correct?
A You know, someone might be able to tell you, but pre-1941 erosion data are very difficult to get ahold of.
Q Do you know if Los Angeles Water and Power has kept any records of erosion at all in regard to agricultural activities that took place under their supervision?
A Not to my knowledge.

MR. TILLEMANS: A Not to my knowledge either.
Q Okay, one last question. Is it likely that erosion that resulted from agricultural activities could have found its way into the streams, either Rush or Lee Vining Creeks, or in fact could have influenced riparian vegetation along those watercourses?
DR. BESCHTA: A Again, I see some evidence on the photographs going back to 1929. You have got some alluvial fans that impinge upon these streams, and there might be some sediment coming off.
Q When I went on a field trip, I saw a bunch of it. I was wondering if you saw the same thing.
A Yes, it's there, but as far as the overall story goes, I don't feel that is the major factor that happened out there.
Q It is not a major factor that happened out there -- you have not calculated it?
A I have not calculated it, you are right.
MR. DEL PIERO: Thank you very much.
Now it's 4:30. We can start again with re-cross, Mr. Birmingham, or you can go home if you want.
MR. BIRMINGHAM: May I ask Dr. Beschta his availability tomorrow. My preference, having three hours sleep last night, would be that we go home.
MR. DEL PIERO: Can you be here tomorrow?
DR. BESCHTA: I have a real problem. I have classes.

MR. DEL PIERO: Who wants to take Dr. Beschta's classes for him? Mr. Canady is a college professor.

MR. BIRMINGHAM: Mr. Del Piero, may I ask Dr. Beschta's availability on the following day? The reason I ask is because we have another witness tomorrow, John Melack who is a professor at Santa Barbara, and Dr. Melack has asked to leave for Europe for a shuttle of experiments.

MR. DEL PIERO: When is he leaving for Europe?

MR. BIRMINGHAM: I'm not sure.

MR. DEL PIERO: Nobody goes to Europe, Mr. Birmingham, unless I do. (laughter)

MR. BIRMINGHAM: I don't know. Ms. Goldsmith could answer that better than I can. But we had talked to counsel about calling Dr. Melack out of order, and I believe we had the concurrence of counsel, and we were going to make that request tomorrow of the Hearing Officer, so perhaps if Dr. Beschta could return on Wednesday -- he is not enthusiastic about that either.

MR. DEL PIERO: Doctor, you can't do it on Wednesday either?

DR. BESCHTA: I don't like walking away from my classes. I have tried to rearrange, and today I did, and I am running into a problem.

MR. DEL PIERO: Folks, I am sorry -- Mr. Birmingham, you know what we are going to do? We are going to do it

tonight. Okay. Why don't you go ahead and start?

MR. DODGE: Mr. Chairman, Mr. Birmingham is literally dead on his feet. We would like to accommodate that, and if Dr. Beschta can come back sometime and finish this up, we would be happy to do that.

MR. DEL PIERO: Hold it. Let me give you some dates, Doctor. Actually, I have been doing some business up here. We have scheduled the 8th. That's today. The 9th, the 10th. We have also scheduled the 15th, 16th, and 17th. Ladies and gentlemen, I would like to indicate right now it is my intention to go into the evenings on all three of those days unless I hear some vehement complaints.

MR. FRINK: Mr. Hearing Officer, I spoke with Mr. Zabel of EPA at noon today, in response to his letter requesting a definite time that their witness could appear, and he is requesting that his witness be able to appear on the morning of November 15.

MR. DEL PIERO: Fine. Dr. Beschta, is that a good day for you?

DR. BESCHTA: Is the 16th open?

MR. DEL PIERO: Yes, sir.

DR. BESCHTA: That's my best shot.

MS. DEL PIERO: That's your day. Mr. Birmingham, Mr. Dodge, is that acceptable?

MR. DODGE: That's fine.

MR. DEL PIERO: Ms. Cahill?
MS. CAHILL: Yes.
MR. DEL PIERO: Ms. Scoonover?
MS. SCOONOVER: Yes.
MR. DEL PIERO: It's done. Mr. Haselton is gone, so I don't have to ask him.

Where I left off, we have the 15th, 16th, and 17th scheduled. Mr. Canady, you may well be prepared to go into the evenings on those days. We have scheduled the 2nd and 3rd of December, and we also scheduled the 6th, 7th, and 8th until 3 p.m. We are using the 8th until 3 p.m. because we are observing the holiday. I also have scheduled the 13th and 14th, but those days are scheduled for me to go back down to San Bernardino to do the Big Bear hearing with Mr. Stubchaer.

It is my sincere hope I don't have to do that. If you have been there you would know why. And if, in fact, that is the case, and I am able to get the two days of hearings done, I think we are on for next week, then we will have the 13th and 14th open also.

It is probably safe to assume that you ought to plan on going into the night on Thursday, the 2nd, Monday, the 6th, and Tuesday, the 7th.

And then, for dates after the 13th and 14th -- for dates after the 8th I will have more information either tomorrow or the next day, and I am keeping in mind your 19th.

Are you leaving in the morning or evening?
MS. SCOONOVER: Very early in the morning.
MR. DEL PIERO: How did I know that answer. So you are not here on the 19th; right?
MS. SCOONOVER: No, it's a Sunday.
MR. DEL PIERO: We will do what we can. In the event it poses a real problem, do you have counsel to replace you?
MS. SCOONOVER: Yes, I do.
MR. DEL PIERO: Anyone else have plans to leave for the Christmas holiday early? Mr. Dodge.
MR. DODGE: I don't have any plans to leave, but I have a schedule to work on another case. I really do have one or two other cases and may not appear on the week of December 20. I would personally much prefer the week of December 27.
MR. DEL PIERO: The week between Christmas and New Years?
MR. DODGE: Yes.
MR. FLINN: He would prefer that, but that's not a unanimous position.
MR. DODGE: I thought you had given us overnight to figure this out among ourselves.
This is just me and my client and Mr. Flinn.
MR. DEL PIERO: Let's see how we can play this out. The week of the 13th, Monday is the 13th -- it may well be that we are going to become very close friends during those

five days. We don't have the times and the room scheduled for that week, but you may just as well be prepared for that week.

It's the Board's desire, and this is all five members of the Board, to have this matter completed before Christmas, and we are going to do the very best we can to make sure that my four colleagues aren't upset with me.

So much for that. Now that we have got that settled, Mr. Birmingham is going to get to go home and go to sleep. Dr. Beschta, you are done I think for the day.

We will begin with your Redirect when he returns. Who is on tomorrow?

MR. BIRMINGHAM: Dr. John Melack and Dr. Wim Kimmerer.

MR. DEL PIERO: Do we have any clean-up issues to take care of before we adjourn for the day. Are these the only two gentlemen here for tomorrow, because if they are and this process goes on late -- I mean we can't keep doing this, folks, so they need to be prepared to stay here tomorrow night, and so does everyone else if this is the only day they are available.

MS. GOLDSMITH: This is the only day Dr. Melack is available.

MR. DEL PIERO: I'm sorry, folks, we are going to be here until we get finished tomorrow night in terms of --

MR. DODGE: We will be finished in the early afternoon.

MR. DEL PIERO: Mr. Roos-Collins, you have a frantic

look on your face.
MR. ROOS-COLLINS: I am listening to my esteemed colleague, Ms. Cahill, at the same time. We have no problem.
MS. CAHILL: Was it just Dr. Melack or someone else?
MS. GOLDSMITH: Dr. Wim Kimmerer and Dr. Melack.
MR. DEL PIERO: Any problems, Ms. Scoonover, any problems?
MS. SCOONOVER: No.
MR. DEL PIERO: We will see you tomorrow morning at 9 o'clock.
(Evening recess.)
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