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PUBLIC HEARING
STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS
STATE OF CALIFORNIA

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SUBJECT: AMENDMENT OF CITY OF LOS ANGELES' WATER RIGHT
LICENSES FOR DIVERSION OF WATER FROM STREAMS THAT ARE
TRIBUTARY TO MONO LAKE

---o0o---

Held at:
901 P Street
Sacramento, California
Wednesday, November 10, 1993

VOLUME XI

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Reported by: Kelsey Davenport Anglin, RPR,
CM, CSR No. 8553

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01 SACRAMENTO, CALIFORNIA
02 WEDNESDAY, NOVEMBER 10TH, 1993, 8:30 A.M
03 ---o0o---
04 HEARING OFFICER DEL PIERO: Ladies and Gentlemen,
05 this hearing will again come to order. For those that
06 have not been with us, this is the hearing in regards
07 to consideration of amendments to the water rights held
08 by the Los Angeles Department of Water and Power on
09 tributaries to Mono Lake.
10 My name's Mark Del Piero. I'm vice-chairman of
11 the state Water Resources Control Board. With me this
12 morning is my good friend and colleague, Jim
13 Stubchaer. We will also be joined by other members of
14 the State Board during the course of the day.
15 When last we left, Mr. David Hanson, our witness
16 on behalf of the L.A. Department of Water and Power,
17 was testifying as to the fisheries issues in the Mono
18 Basin.
19 Mr. Roos-Collins, had you completed -- you had not
20 completed yet?
21 MR. ROOS-COLLINS: I had not started yet.
22 MR. DEL PIERO: You had not started yet. Well
23 then, I think it's appropriate for you to start,
24 Mr. Roos-Collins.
25 MR. ROOS-COLLINS: Thank you.

01 CROSS-EXAMINATION BY MR. ROOS-COLLINS
02 Q Good morning, Mr. Hanson.
03 A Good morning, Mr. Roos-Collins.
04 Q Let's begin at the beginning. The purpose for
05 this proceeding -- yesterday, Mr. Dodge asked you what
06 the purpose of this proceeding is.
07 Do you recall that question?
08 A Yes, I do.
09 Q Was your answer that the purpose is to establish a
10 flow regime for several purposes, including fish
11 maintenance?
12 A Yes.
13 Q You would agree that's a general purpose?
14 A Well, yes. That is a general purpose. I was
15 answering the question as to what I viewed the purpose
16 of the hearings to be, and the charge of the Water
17 Resources Control Board. And my view, as I think I
18 stated yesterday, as it is today, is to develop a plan
19 for water management of tributary waters to Mono Lake.
20 And part of that is consideration of stream flows in
21 Rush and Lee Vining Creek necessary to maintain fish
22 populations that presently exist there.
23 Q Have you read the Court of Appeals case entitled,
24 "California Trout Incorporated versus Superior Court,"
25 dated February of 1990?

01 A No. I have not read that.
02 Q Let me ask you to assume, for the purpose of this
03 line of questioning, that the Court of Appeals has
04 instructed this Board to establish a flow regime to
05 reestablish and maintain the fishery which existed
06 before L.A. began diversions in 1941.

07 A Okay.
08 Q With that assumption, what is the relationship
09 between a self-producing population of brown trout,
10 which you describe on page 45 of your testimony, and
11 the historic fishery in Rush Creek?
12 A I would say they're fairly close. I would imagine
13 that the pre-diversion conditions supported, although
14 there has been some testimony to say there may have
15 been some dry periods during certain times of the year,
16 a self-sustaining fishery in Rush Creek.
17 Q What specific knowledge do you have about the
18 historic fishery in Rush Creek?
19 A Only information I've gathered from these hearings
20 and listening to others speak on it. I haven't
21 investigated the historic fishery data.
22 Q So you wouldn't have an opinion as to whether the
23 historic fishery was 1,000 adult fish or 100,000?
24 A I do not have an opinion on that subject.
25 Q Page 50 of your testimony states that the flow

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01 regime you recommend would establish a brown trout
02 population, quote, comparable to others in the Owens
03 Basin, unquote.
04 What's the relationship between an Owens Basin
05 fishery on the one hand, and the historic fishery in
06 Rush Creek on the other?
07 A I can't answer that question. I don't, again,
08 know what the historic fishery was in Rush Creek. I'm
09 using present day conditions, that is what the fishery
10 was or is as sampled by the E.A. in the '80s, as
11 compared to other eastern Sierra Nevada streams.
12 It's not a comparison to what I would consider
13 historical fishery levels to be in Rush Creek.
14 Q Now, your flow regime would produce 80 percent of
15 maximum weighted usable area, according to pages 50 and
16 51 of your testimony.
17 A Yes.
18 Q Is that correct?
19 A That's what I was shooting for.
20 Q What's the relationship between 80 percent of
21 model weighted usable area, on the one hand, and the
22 historic fishery in Rush Creek on the other?
23 A Well, I don't think I can answer that question.
24 Again, if you're expecting me to know or have a value
25 as to how many fish existed in Rush Creek

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01 historically -- I'd also point out that it's very
02 difficult to -- this is one of the problems that has
03 plagued the IFIM analyses, is to make the jump from
04 weighted usable area values to numbers of fish,
05 predictions of numbers of fish in the stream as a
06 result of that.
07 So even if I had some indication of what I felt
08 was the, say, pre-historic fishery levels, whether
09 these values of weighted usable area, 80 percent or 100
10 percent of the maximum weighted usable area would
11 achieve those levels of fish population is very
12 difficult to say.
13 Q Would you give the same answers to the same

14 questions as applied to Lee Vining Creek?

15 A Yes.

16 Q Let me read you a statement from page 73 of
17 Dr. Morhardt's testimony. In the section entitled,
18 "Will Increase in Weighted Usable Area Increase
19 Populations?" he states, among other things, "Tacit
20 assumption is that increase in the flow and therefore
21 the weighted usable area will result in increased trout
22 populations."

23 And then he goes on to discuss ways in which that
24 tacit assumption might be incorrect. In preparing your
25 testimony, what is the basis for your correlation or

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01 connection of weighted usable area and fish population?

02 A I didn't make a connection between weighted usable
03 area and fish population in preparing my testimony.

04 Q Let me read from the first paragraph on page 45.

05 You state, "The testimony finds that minimum flows
06 between 20 and 30 cfs on Rush Creek will provide
07 habitat needed to maintain a self-reproducing
08 population of brown trout.

09 You aren't saying there that your flow regime will
10 maintain a self-reproducing population of brown trout?

11 A Well, yes, I am there. What I'm saying is that by
12 attaining the weighted usable area values as 80 percent
13 of maximum weighted usable area, the general assumption
14 behind that is that the fish population in Rush Creek
15 will be a self-sustaining one.

16 My connection to Dr. Morhardt's testimony was
17 based solely on information data -- or information,
18 excuse me, related to fish populations and stream flow,
19 and I think that's the gist of Dr. Morhardt's
20 testimony. And it's part of my testimony that I
21 evaluated the fishery levels in Rush Creek associated
22 with the flow regime that existed during this period of
23 sampling. But it is not connected to weighted usable
24 area calculations.

25 Q You said that you had a general assumption that

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01 there is a connection between weighted usable area and
02 fish population.

03 My question is: What's the basis for that
04 assumption?

05 A Well, the basis for the assumption is that if you
06 provide near maximum levels of weighted usable area,
07 assuming other things are equal, that impacts or
08 affects population levels of fish, that the fishery
09 should be a self-sustaining population.

10 Now, if, for example, water temperature values or
11 food were limiting factors in the stream, then that
12 would be brought into the discussion. But most of the
13 studies that have been done on Rush Creek so far seem
14 to indicate that those factors aren't operating.

15 So my assessment, and I think this is a common
16 assessment in instream flow studies, is that if you
17 provide near maximum levels of weighted usable area,
18 the fishery will be a self-sustaining one.

19 Q You've used the term "limiting factor". Could you
20 define that as it applies to a fishery?

21 A Well, limiting factors are generally those factors
22 that are thought to have significant impacts on the
23 numbers of fish in a stream.

24 There can be limiting factors that affect the
25 fishery at different life stage levels. For example,

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01 there could be a limiting factor of water temperature.
02 There can be limiting factors of such things like if it
03 was a migratory species, the dams and other things that
04 limit the potential of the fish to move and migrate. I
05 already mentioned water temperature.

06 Food availability is also a potentially limiting
07 factor. And minimum weighted usable area values for a
08 given species in a life stage at a critical time of the
09 year can also serve as a limiting factor.

10 Q Wouldn't it be fair to say that you are assuming
11 in your testimony that availability of habitat is a
12 limiting factor in Rush Creek today?

13 A Yes. I think that's fair to say.

14 Q Now, you said that you have seen --

15 A I would say it has the potential to limit, if the
16 weighted usable area values are exceedingly low.

17 Q Before Judge Finney, we had several months of
18 testimony last year about limiting factor analysis,
19 which I understood to be a systematic method for
20 collecting and evaluating data to determine which of
21 the candidate factors actually limit fish population in
22 a given stream.

23 Have you undertaken a systematic limiting factor
24 analysis for Rush Creek?

25 A Only in the sense that I've reviewed the Cal Fish

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01 and Game report which purported to do that. I haven't,
02 personally, gone through a limiting factor analysis as
03 you describe it.

04 Q Is it possible that the absence -- strike that.
05 Is it possible that the shortage of deep water habitat
06 is a limiting factor in Rush Creek today?

07 A Well, anything's possible, of course. I think the
08 deep water habitat or lack of pools in the stream
09 probably does not limit the fishery based on the
10 population data that has been collected on the river
11 for those years that were described in Dr. Morhardt's
12 testimony.

13 Q Let me read to you from page 21 of L.A. Exhibit
14 15, The Instream Flow Analysis for Lower Rush Creek. I
15 believe you previously discussed this passage with
16 Mr. Dodge.

17 It states, "If in fact the habitat preference
18 curves developed in the study are correct, and brown
19 trout adults and juveniles in Rush Creek prefer depths
20 greater than 2.0 feet, that the PHABSIM, that's
21 P-H-A-B-S-I-M, analysis clearly shows the habitat
22 improvement cannot be gained by flow manipulation.

23 Regardless of the amount of water that is released
24 from Mono Gate Number One, the water in most of the
25 macro habitat in Rush Creek is simply too shallow. The

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are suitable are pools."

02 Would it be reasonable to conclude from that
03 statement that increasing the availability of two-foot
04 and deeper habitat might affect the fish population in
05 Rush Creek?
06 A I would say, yes, it would have a beneficial
07 effect. The question from the weighted usable area
08 perspective or from the IFIM perspective is: If you try
09 to do that in these runs and riffles which are
10 inherently shallow and dominate the stream, then by the
11 time you start achieving those depths and velocities,
12 excuse me, the depth that you're going after, the
13 velocities may become so swift that you're
14 counteracting the benefit of the depths.
15 Q Understood. Let me ask you about Cal-Trout
16 Exhibit 15, which is a Trihey and Associates
17 publication entitled, "Summary Comparison of Pre-1941
18 and Post-1941 Conditions Affecting Fish Populations in
19 Lower Rush Creek Mono County, California," dated
20 September 1993.
21 Have you previously seen this publication?
22 A No, I have not.
23 Q So you would not have any basis for disputing
24 Mr. Trihey's conclusion that the channel form riparian
25 vegetation and other conditions which might affect the

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01 fishery have been degraded between 1941 and the
02 present?
03 MR. BIRMINGHAM: Objection. Assumes facts not in
04 evidence.
05 Q BY MR. ROOS-COLLINS: If that were Mr. Trihey's
06 conclusion in this --
07 HEARING OFFICER DEL PIERO: Sustained.
08 MR. ROOS-COLLINS: Excuse me, Mr. Del Piero. I
09 withdraw the question.
10 Q BY MR. ROOS-COLLINS: If that were Mr. Trihey's
11 conclusion in this report, you would have no basis for
12 disputing it?
13 A That's correct. I have not evaluated that.
14 Q Do you have an opinion whether the loss of channel
15 length, between 1941 and the present in Rush Creek,
16 affects the fishery in Rush Creek today?
17 A I have not studied those types of changes, and I
18 really don't have an opinion on the subject as to
19 whether there was or was not a loss in length and what
20 effect that might have on the fishery today.
21 Q Let's turn now to the suitability curves which
22 you've discussed in your testimony.
23 Page 45 you state that, "The Department of Fish
24 and Game uses site specific criteria only for adult
25 fish."

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01 Is that correct?
02 A Actually, that's what it says, but in fact, the
03 correct life stage is juvenile. Miss Cahill pointed
04 that out yesterday.
05 Q Excuse me. You did make that correction yesterday
06 in your testimony.
07 The implication of your testimony is that the
08 published criteria used by the Department of Fish and
09 Game are less reliable than the site-specific criteria

10 which E.A. developed. Was that your implication in
11 your testimony?

12 A Well, there is that concern, yes. I mean,
13 whenever you're bringing in data from the literature
14 from -- data collected on other streams, there is that
15 concern.

16 One thing that is typically done in instream flow
17 studies when data are transferred from one area into
18 another is what's called a validation study, which is a
19 collection of some data to determine whether you feel
20 you have adequately validated the data that you're
21 proposing to use from the literature.

22 So there always is a concern when you're using
23 data from another stream. And it's generally agreed
24 that site-specific data is better than -- so let's say,
25 curves generated from site-specific data are better

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01 than curves taken from the
literature.

02 Q Better than?

03 A Better than, which means more appropriate.

04 Q Wouldn't that depend on the representativeness of
05 the transects used to establish the site-specific
06 criteria?

07 A You don't use transects to establish the
08 site-specific criteria. Site-specific criteria are
09 established by the snorkeling process. The transects
10 are the hydraulic end of the PHABSIM model.

11 Q Then let me ask a more proper question. Wouldn't
12 the utility of the site-specific criteria depend on the
13 accuracy of the data collection and analysis that went
14 into the creation of those criteria?

15 A Of course it would, yes.

16 Q Do the site-specific criteria used by E.A. for the
17 Rush Creek IFIM include cover?

18 A No. Depth and velocity.

19 Q Depth and velocity only, no cover?

20 A That's right.

21 Q Doesn't cover affect the location and population
22 of fish?

23 A Cover is a variable that is sometimes included in
24 instream flow studies, yes.

25 Q So you excluded cover?

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01 A Yes.

02 Q And you agree that it might affect the location
03 and population of fish?

04 A There are several reasons why I excluded the
05 cover. Because the cover curves, or the manner in
06 which cover was defined in the IFIM study done by Beak,
07 is cover analysis that I have some problems with.

08 There are what are called cover-specific weighted
09 usable area curves that were generated by the Smith and
10 Acitunal (phonetic) Report 1987 for eastern Sierra
11 Nevada streams. And the application of those curves to
12 instream flow studies has always been problematic from
13 my point of view.

14 I have used them on other studies, on our IFIM
15 studies that we've done, for example, on Bishop Creek
16 and elsewhere and have run into theoretical problems

17 with the application, not only from the standpoint of
18 the data collection, but from the standpoint of
19 applying them to the transects.

20 There are, in fact, difficulties with applying
21 them in the standard PHABSIM model as it stands,
22 because the PHABSIM model, for example, doesn't allow
23 for cover-specific curves. There's only supposed to be
24 one curve of depth and velocity that is applied to the
25 model. And in this case there's a separate curve for
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01 four different cover types.

02 Q So, Mr. Hanson, you did not include cover in your
03 site-specific suitability criteria, because there are
04 problems with including cover in any such criteria?

05 A There's problems with including the cover in the
06 manner in which it was collected on the transects on
07 Rush Creek.

08 Q But wouldn't you agree that there are problems as
09 well excluding cover from --

10 A Well, the primary --

11 Q -- the site-specific criteria?

12 A Pardon me.

13 Q If your purpose is to determine the location and
14 population of fish?

15 A The primary variables of the IFIM models are depth
16 and velocity. Cover doesn't change the function of
17 depth and velocity. Excuse me. Cover does not change
18 the function of stream flow in the model.

19 The most important variables are depth and
20 velocity. The key variables that almost always drive
21 these analysis are depth and velocity.

22 There are several other factors that are often not
23 included in IFIM studies that could also be added if
24 you had a mind to add those.

25 The effect of including or excluding cover from
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01 your analysis or substrate or any other physical
02 variable that doesn't change as a function of flow,

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the shape of the curve

04 as much as it has to do with changing the total amount
05 of habitat that's being predicted.

06 I've looked at this on several studies before, and
07 oftentimes, including or excluding cover, depending
08 upon the distribution of cover to some degree, just
09 changes the total amount of habitat that's being
10 predicted. But the shape of the curve oftentimes
11 remains relatively unchanged. And that's, again, a
12 function of the fact that cover doesn't change as a
13 function of flow.

14 Depth and velocity are very dynamic in the system
15 and very critical and sensitive in terms of the output.
16 But cover is not as sensitive. And I would point out
17 that there are a great many instream flow studies done
18 throughout California where cover is not a variable.

19 Q Understood. But there are many where cover is a
20 variable, correct?

21 A I don't have a count, but I can tell you in many
22 of my experiences there are cover; there is not cover.

23 Q In any event, your site-specific criteria were

24 applied in this IFIM without regard to the presence or
25 absence of undercut banks, boulders, trees and other

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01 items which might provide cover?

02 A That's right.

03 Q Let's turn to page 46 of your testimony, section
04 A, where you state, with respect to the Department of
05 Fish and Game report, "This results generally in
06 different flow recommendations for each month of
07 different water years," parenthetical, "dry, normal and
08 wet," close parenthetical.

09 "This exercise is unnecessary given that Rush
10 Creek flows have been incontrovertibly altered."

11 What does that statement mean?

12 A That statement means that the small differences in
13 flow that are recommended by the California Department
14 of Fish and Game in my view do not make much difference
15 in terms of weighted usable area.

16 If you -- the method by which they came to their
17 flow recommendations was this habitat duration
18 analysis. And it was a standard approach. And I don't
19 think that it -- that in applying it, they evaluated
20 the weighted usable area curves.

21 If you look at those weighted usable area curves
22 from the Cal Fish and Game report, you'll see that
23 there's a fairly flat plateau. I don't have my graph
24 up here for the adult brown trout curve, but the brown
25 trout curve for adults, for juveniles, and for

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01 spawning, all sort of come up to this threshold value,
02 around this 20 to 30 cfs flow range. And then are
03 relatively flat beyond that.

04 Cal Fish and Game recommendations are within that
05 flat area. And they're bouncing up and down by a few
06 cfs. And I think from a weighted usable area
07 perspective, those differences are indistinguishable
08 from one another. That's what that statement says.

09 MR. ROOS-COLLINS: Mr. Del Piero, I request an
10 additional 20 minutes due to the complexity of the
11 issues and also the centrality of this witness'
12 testimony to the section 5937 --

13 HEARING OFFICER DEL PIERO: Granted.

14 MR. ROOS-COLLINS: You discussed yesterday that
15 your recommendation is for a flow between 20 and 30
16 cubic feet per second.

17 Leaving aside whether it's 20 or 30 cubic feet per
18 second or somewhere in between, are you recommending
19 that the flow in each month be the same but for
20 whatever time this flow occurs?

21 A More or less. Basically, what I'm saying is that
22 the flows for any given month should not fall below
23 that range. The -- if there are other reasons for
24 flows being outside of that range, for any other
25 purpose, then I don't have an argument with that. I'm

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01 talking about the minimum values below which flows
02 ought not to fall.

03 Q Let's leave aside channel maintenance flow. Let's
04 aside any flow necessary for protection of the

05 public trust in Mono Lake or any other environmental
06 purpose, and focus only on a flow to produce 80 percent
07 of the maximum weighted usable area.

08 Your recommendation is that this Board fix a
09 monthly flow to not vary from month to month?

10 A That's correct, with the exception of a flushing
11 flow.

12 Q How would such a fixed flow regime compare with
13 the natural flow regime in Rush Creek?

14 A Well, the natural flow regime in Rush Creek
15 obviously varies to some degree. It's a standard
16 practice in instream flow studies to recommend stream
17 flows that are constant.

18 If you look at stream flows that are set up at
19 hydroelectric projects, they're constant from month to
20 month. Sometimes they vary, but the standard is to
21 have a fairly constant flow based on the same kind of
22 analysis, the same kind of assessment of results of the
23 weighted usable area that I've talked about here.

24 Q Right. That may be the standard in other
25 proceedings, for example, before the Federal Energy

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01 Regulatory Commission. But this is the State Board,
02 and this is, among other things, a section 5937
03 proceeding.

04 In this proceeding are you comfortable making a
05 recommendation that the flow regime for fish purposes
06 be fixed, and not vary from month to month?

07 A From the standpoint of what I think the impact
08 that would have on the fishery, yes. I don't think
09 that a constant flow is going to be detrimental.

10 Q Do you disagree, then, with Dr. Beschta's
11 testimony that the flow regime should mimic natural
12 variability?

13 A I think Dr. Beschta was speaking more toward
14 riparian and geomorphological characteristics of the
15 stream.

16 Q Would you agree that riparian and geomorphologic
17 characteristics of the stream have a direct effect on
18 fish, though, wouldn't you?

19 A Yes.

20 Q If there are no trees, there won't be many fish?

21 A Well, I thought you asked me a minute ago to put
22 all that aside and just focus on the weighted usable
23 area.

24 Q I did. I did. And so your answer concerns the
25 relationship between weighted usable area and flow?

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01 A If there are other considerations posed by other
02 parties, then I -- I, again, say that if those flows
03 needed to perform other functions, riparian
04 geomorphological, delivering water to Mono Lake for
05 whatever purpose, are above the minimums, I'm not
06 saying that's going to have a negative impact on fish
07 habitat from weighted usable area perspective.

08 Q So you aren't expressing an opinion about the need
09 for flow for riparian or geomorphic purposes?

10 A That's correct.

11 Q Or the amount of flow necessary for those
12 purposes?

13 A That's correct.
14 Q Even insofar as those purposes affect the fishery?
15 A Yes.
16 Q Okay. Let me ask you to look at Table 3A dash 3
17 entitled, "Monthly Cumulative Flow Distribution of
18 Diverted Streams from the Draft Environmental Impact
19 Report."
20 Are you familiar with this table?
21 A Yes, I've seen it. I believe I've seen this table
22 or several of these tables. Are they not right here?
23 MR. STUBCHAER: Can you give the page?
24 MR. ROOS-COLLINS: My apologies.
25 HEARING OFFICER DEL PIERO: First of all, which

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01 volume is it?
02 MR. ROOS-COLLINS: No page is given --
03 HEARING OFFICER DEL PIERO: Which volume? There
04 are three volumes. Ô
ROOS-COLLINS: Excuse me. Volume one.
06 Following page 3A-34, table 3A-3. And I will focus on
07 the section entitled "Rush Creek."
08 Q BY MR. ROOS-COLLINS: Mr. Hanson, is it your
09 understanding that this table shows the number of
10 months that the specified flows are exceeded?
11 A The number of months that the specified flows are
12 exceeded, yes. I put it another way. There's a flow
13 duration curve on a monthly basis.
14 Q Now, I'm no hydrologist, much less a fishery
15 biologist. My understanding of the table is that the
16 zero percent row, for example, describes the flow that
17 is exceeded nearly all the time.
18 Is that your understanding of the table?
19 A The zero percent?
20 Q That's right.
21 A Yes.
22 Q How does your flow recommendation fit within the
23 exceedences shown in table 3A-3?
24 A I say it fits.
25 Q It's most comparable to the zero percent

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01 exceedence flow, isn't it?
02 A Yes.
03 Q So you're recommending a flow to this Board that
04 pre-diversion was exceeded nearly all the time.
05 A The results are based on the weighted usable area
06 curves. They were not based on a flow duration
07 analysis.
08 Q Yes or no?
09 A I'm sorry. You'll have to repeat the question.
10 MR. ROOS-COLLINS: Can I have the court reporter
11 read the last question back?
12 (Whereupon the record was read as requested.)
13 MR. HANSON: Yes.
14 MR. ROOS-COLLINS: Let me turn now to a subject
15 that you touched upon yesterday with both Miss Cahill
16 and Mr. Dodge.
17 I'm referring now to page 51 where you state
18 quote, There is a lack of relationship between trout
19 biomass and stream flow, unquote.
20 Is that your testimony?

21 A That's on page 51?
22 HEARING OFFICER DEL PIERO: Excuse me. Mr.
23 Hanson, just for a clarification purposes, in regards
24 to the line, the zero percentage line?
25 MR. HANSON: Um-hum.

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01 HEARING OFFICER DEL PIERO: When you were talking
02 about your recommendation, was that your recommendation
03 for median flow, or was that your recommendation for
04 minimum flow?
05 MR. HANSON: Minimum.
06 HEARING OFFICER DEL PIERO: It was minimum?
07 MR. HANSON: Yes.
08 MR. STUBCHAER: So then by definition it would
09 have to be the zero percentile flow, because it's
10 exceeded at all times.
11 WITNESS: That's right, yeah.
12 Q BY MR. ROOS-COLLINS: Mr. Hanson --
13 HEARING OFFICER DEL PIERO: Excuse me,
14 Mr. Roos-Collins. Hold on a second.
15 Is it normal in terms of that type of analysis to
16 recommend a minimum that's exceeded at all times?
17 MR. HANSON: No, not necessarily. Flow
18 recommendations are sometimes comparable to low flow
19 conditions as they occur in the summertime.
20 HEARING OFFICER DEL PIERO: Are they always?
21 MR. HANSON: No.
22 HEARING OFFICER DEL PIERO: Are they regularly?
23 MR. HANSON: Probably not regularly.
24 HEARING OFFICER DEL PIERO: Okay. Pardon me,
25 Mr. Roos-Collins, proceed.

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01 MR. ROOS-COLLINS: Thank you, Mr. Del Piero.
02 Q BY MR. ROOS-COLLINS: Mr. Hanson, I was reading from
03 the top of page 51 where your testimony states that,
04 "The lack of a relationship between trout biomass and
05 overflow and stream flow based on these comparisons,"
06
07 then continues.
08 Are you saying there is no relationship between
09 trout biomass and stream flow in Rush Creek?
10 A Not necessarily, but there is an indication from
11 looking at these data that a strong relationship
12 between stream flow, solely stream flow, and we're
13 talking about not Rush Creek, but streams throughout
14 the eastern Sierra Nevada, and biomass is not indicated
15 by the data.
16 Q Right. I'm asking you to focus specifically on
17 Rush Creek. Your testimony states or describes a lack
18 of a relationship.
19 A Well, that's not specific to Rush Creek.
20 Q I see.
21 A That lack of relationship is based on data from
22 several other streams besides Rush Creek.
23 Q In Rush Creek, is there a relationship between
24 stream flow and biomass?
25 A I haven't evaluated that specifically.

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01 relationship exists, if any, between stream flow and

02 biomass in Rush Creek?

03 A I have not just looked at the Rush Creek data in
04 comparison to biomass and stream flow levels.

05 Q Well, let's assume for the moment that the results
06 in the Owens Basin apply to Rush Creek. If there is a
07 lack of a relationship between biomass and stream flow,
08 why not recommend five cubic feet per second?

09 A Well, you know, there are conflicting -- there are
10 conflicting data that sometimes suggest that flow may
11 not be as strong a variable as we think it is.

12 I still believe that the weighted usable area data
13 are a good indication of space availability for fish
14 for feeding stations, if you like, the total square
15 feet of area that's usable for fish.

16 And there have been studies, it's again one of
17 these problems sometimes with IFIM studies, that there
18 has not been a strong relationship shown or correlation
19 between IFIM results and biomass or population levels
20 of fish.

21 Q Mr. Hanson, I appreciate and Cal-Trout appreciates
22 the difficulties of using IFIM for any regulatory
23 purpose and also the utilities of using it for any
24 regulatory purpose. But you're here today to advise
25 this Board what flow regime would satisfy its objective

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01 in this proceeding.

02 So my question to you is: Is there a relationship
03 between trout biomass and stream flow in Rush Creek
04 that you're willing to stand by in establishing a
05 recommended flow regime?

06 A I'm willing to stand by the results based on the
07 as -- the results of the IFIM, based on the assumption
08 that there is, and this is an assumption, a
09 relationship between stream -- or rather weighted
10 usable area and biomass or fish population numbers.

11 Q Okay. Let me ask you to assume that this Board,
12 or the El Dorado Superior Court, adopts a restoration
13 program that involves channel intervention. Okay?

14 Let me ask you to assume, more specifically, that
15 the restoration program addresses the losses in channel
16 form and length described in Cal-Trout Exhibit 13, by
17 Dr. Scott Stein entitled, "Past and Present Geomorphic,
18 Hydrologic and Vegetative Conditions on Rush Creek",
19 dated September of 1992.

20 And to provide some of those specifics, he states,
21 "Today Rush Creek below the narrows flows from a
22 channel that is from roughly 70 percent to over 200
23 percent wider than the pre-1941 channel.

24 He also states that, "One half or more of the
25 channel length in the bottom lands has been lost

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01 between 1941 and the present."

02 He also states that, "The same flow that
03 previously created two to four feet of water depth now
04 creates only six inches to one foot of depth in the
05 bottom lands."

06 Assume that the restoration program corrects all

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flow recommendation

08 change?

09 A That's a complicated question.
10 Q And I apologize for asking the complicated
11 question.
12 A I'm not certain I can come up with an answer that
13 easily because of the complexity of the question.
14 Q Then, Mr. Hanson, let me withdraw that. Let's
15 assume that a restoration program increases the channel
16 depth, narrows the channel width, and rewaters
17 currently dry channels. Would your flow recommendation
18 change?
19 A Probably not. Because some of those processes
20 that you've just described may be happening already
21 based on Dr. Beschta's testimony. And those are the
22 kinds of changes that I think would be beneficial to
23 the fishery along the lines of some of my
24 recommendations, and the instream flow report that
25 pools be created in Rush Creek.

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01 The same idea that is described in your question
02 is the idea I had relative to instead of putting more
03 water down to create the deeper water, if natural
04 processes or man-induced efforts deepened the stream,
05 that would be beneficial. My flow recommendation
06 wouldn't change, probably.
07 Q Cal-Trout concurs with your suggestion, that
08 natural processes do affect channel form, as I stated
09 at the outset of my cross-examination of Dr. Beschta.
10 Whether the changes in channel form come about through
11 natural processes or restoration program or both,
12 wouldn't the rewatering of channel length, now dry,
13 substantially change the weighted usable area in the
14 existing channel?
15 A Well, it depends on what the flow is. If the flow
16 is at a given level, and a channel is rewatered, then
17 there may be a drop in the weighted usable area in the
18 main channel.
19 If the flow is higher and, say, it's too swift and
20 water is returned to side channels, then there may be
21 improvement in the channel. So it's all a function of
22 what the flow is, whether or not rewatering those
23 sections would be an improvement or not.
24 Q Let's say that we double the available channel
25 length in the bottom lands of Rush Creek. Are you

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01 prepared today to express an opinion whether your
02 recommended flow regime would maximize weighted usable
03 area?
04 A I cannot answer that question.
05 Q How -- excuse me. How do Parker and Walker Creeks
06 fit into your flow recommendation for Rush Creek?
07 A I had not considered Walker and Parker Creek. To
08 the extent that flows enter in from Walker and Parker
09 Creek, however, augment the flows and reach the level
10 of flow and habitat that is part of my recommended
11 release that would be part -- I mean, they would be
12 involved.
13 What I'm saying is to some degree, my analysis was
14 based on a release from Mono Gate Number One, assuming
15 no input from Walker or Parker Creek.
16 Q One last question. Do you have an opinion about

17 the advisability in fish population in terms of
18 rewatering the stretch of Rush Creek between Grant Dam
19 and the confluence of the return ditch?
20 A I haven't evaluated that area well enough to
21 provide an opinion on that.
22 Q Thank you. No further questions.
23 HEARING OFFICER DEL PIERO: Thank you very much,
24 Mr. Roos-Collins. Miss Scoonover?
25 MS. SCOONOVER: I have no questions of the

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01 witness.
02 HEARING OFFICER DEL PIERO: No questions.
03 Miss Niebauer's not here today. Do we have anyone
04 else? Mr. Frink?
05 MR. FRINK: Yes.
06 HEARING OFFICE DEL PIERO: I'm getting better
07 Mr. --

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R. FRINK: Frink, yes. I have a few. And I
09 assume Mr. Herrera may have some more.

10 CROSS-EXAMINATION BY THE STAFF

11 Q BY MR. FRINK: Mr. Hanson, in your experience, have
12 you found that it is common for flow recommendations
13 that are based on an IFIM study to include separate
14 recommended flows for dry, normal and wet years?

15 A Sometimes and sometimes not.

16 Q In the instances in which they do include flow
17 recommendations that are based on a dry, normal and wet
18 year flow scenario, what's the reason for having the
19 flow recommendations based on your type, instead of
20 relying on a single-flow recommendation for all years?

21 A No, those cases, as I stated -- the flow
22 recommendations that I'm familiar with that are based
23 on different water years do have a fairly constant flow
24 for several months.

25 There are sometimes biological considerations,

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01 different species or different life stages, that are
02 considered during one month or another. But most of my
03 experiences, as I think back on this, when we have
04 normal wet and dry water years, have constant flows for
05 long periods of time, rather than variable flow regime
06 changing every month.

07 Q Okay. But in the instances in which the flow
08 regime does vary, for a period of months, what's the
09 underlying assumption for having the variable flow
10 regime based on water year?

11 A For each and every month?

12 Q No. No. I would acknowledge that in many
13 instances, you may have very similar flows in certain
14 months under either a dry, normal or wet year flow
15 scenario.

16 But the fact that you have three different flow
17 scenarios for dry, normal and wet years would indicate
18 that there is a reason for having the difference.

19 What is that -- what is your understanding of the
20 reason for having the different flows in dry, normal
21 and wet years?

22 A My general understanding is water availability.
23 That I think, comes into play in hydroelectric

24 projects, for example. That's where all my experience
25 generates from primarily. And other considerations are

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01 such things as water temperature may dictate why there
02 are different flow regimes, and the differences between
03 normal, wet and dry water years.

04 Q If temperature were the criteria, wouldn't you
05 normally have a higher flow regime in a dry year?

06 A You could.

07 Q Assuming that you have a higher flow regime for
08 certain months of a wet year, are there any benefits to
09 the fishery served from doing that?

10 A Any benefits associated with having a higher flow
11 regime in certain months for a wet water year than you
12 would have for those same months in a dry water year?
13 Well, it's -- I could give you a complicated -- I'll
14 try to give you a simple answer to that question.
15 Sometimes it gets complicated in the sense that when we
16 establish flow regimes for some projects, we're looking
17 at the habitat that existed under a pre-project
18 condition, naturally, which of course fluctuates on the
19 basis of different amounts of water in different years,
20 and develop a flow regime or a release pattern in a
21 post-project scenario that provides enough habitat for
22 the population to maintain it's levels -- maintain the
23 same levels as under the pre-project conditions.

24 And in certain cases, we've applied population
25 response models that are based on the population

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01 response to weighted usable area, differences through
02 time and time series analysis of weighted usable area
03 differences.

04 And if in the wet year there was a certain amount
05 of habitat produced in the pre-project condition, and
06 we're trying to, not mimic the flow, but provide
07 similar weighted usable areas in the post-project
08 condition for that same year, then you would have a

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water year than you

10 would in the normal water year, because you're trying
11 to maintain habitat levels comparable in the
12 post-project to the pre-project. I don't know if I
13 made that clear.

14 Q Yeah. I think you did. So it is based on an
15 attempt to mimic the natural conditions, where in wet
16 years you would normally have higher flows than you
17 have in dry years. Now, do fishery populations
18 generally fluctuate with the fluctuations in flow
19 between dry normal and wet years? Is that a common
20 occurrence?

21 A Yes, I'd say it is.

22 Q And is it common that having the higher flows in
23 wet years serves to offset any losses in the fishery
24 that may occur in dry years?

25 A It's hard to say. It's hard to answer that

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01 question. It depends on what the flow characteristics
02 of the wet water year are, whether they would offset,
03 say, poor habitat conditions in the dry water year.

04 Q But -- assuming everything else is equal, though.

05 Isn't it reasonable to assume that in many streams, the
06 additional water that you get, and the additional
07 habitat that may be provided from higher flows in a wet
08 year, serves to offset the less desirable conditions
09 that may occur in a dry year?

10 A That certainly can be the case. But on the other
11 side of the coin there, wet water years sometimes can
12 have flows that produce low amounts of habitat because
13 the current level, the flow is too high. These
14 weighted usable area curves that I talk about for
15 individual life stages generally go up to some peak
16 level and then start tailing off.

17 Sometimes wet water years, for a good part of the
18 year, for, say, the dry months of that year, provide
19 good habitat. But the amount of flow that occurs
20 during the wettest time of that year, of that wet water
21 year, say in June or May, for example, produces less
22 habitat than you actually would have in a dry year.

23 So it can go both ways. But I think in
24 general, only -- I think, generally, to answer your
25 question, it's probably true.

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01 Q Okay. Based on that, then, would it seem
02 reasonable to recommend a flow regime for all years
03 that is based upon the lowest flow that has ever
04 occurred in the stream, historically?

05 A Well, I see your point there, but I am relying on
06 the weighted usable area curves. That analysis was
07 done to develop this functional relationship between
08 stream flow and weighted usable area. And a lot of
09 these streams that we talk about, particularly streams
10 below hydroelectric projects, we go from a natural
11 condition to a regulated condition.

12 And the minimum flow that is set for these curves,
13 is based on what the weighted usable area curves tell
14 us. And that may be different from the flow
15 duration -- yeah. From the flow date that we have.
16 But the -- I think the weighted usable area versus
17 discharge curves speak for themselves.

18 Q Okay. But the fact that you would use that
19 approach in regulating certain hydroelectric projects
20 does not mean that your attempt in those efforts is to
21 restore a pre-diversion fishery?

22 A Absolutely.

23 Q Would you agree with that?

24 A Yes. The attempt on those projects, and it's
25 basically the modus operandi that I came here with is

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01 to develop a flow regime that will insure the
02 self-sustaining fishery, based on these weighted usable
03 area curves.

04 Now again, as I stated earlier, that doesn't
05 include flows that may be higher that are needed for
06 other purposes.

07 Q Okay. Thank you. In preparing your flow
08 recommendations for Rush and Lee Vining Creek, did you
09 attempt to determine whether the quantity of habitat

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ble for any particular life stage of brown trout
11 served as the limiting factor on overall trout

12 populations?

13 A No. That would involve something like these
14 population response models that I'm talking about,
15 which is sort of a time-series analysis evaluating the
16 changing patterns of weighted usable area for the
17 different life stages, and having one life stage
18 graduate into another life stage.

19 And those kinds of analyses allow you to identify
20 limiting factors or sort of bottlenecks in terms of
21 weighted usable area.

22 Q Okay. If the limiting factor for a particular
23 fish population in a particular stream is food supply
24 or habitat for one particular life stage of the fish in
25 that stream, would increasing the available habitat for

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01 a different life stage serve to increase the fish
02 population?

03 A That's a good question. And no, it may not.
04 Because you have a limiting factor going on somewhere
05 else, and the amount of habitat that you provide for
06 another life stage may be all for naught because of
07 that.

08 Q Okay.

09 A Those are the kinds of things that do come out
10 when we do population response models. They're not
11 often done, but that's the kind of information that you
12 gather from that analysis.

13 Q Okay. Similarly, if there were more habitat
14 available at a given life stage than the fish are
15 using, then would decreasing the amount of habitat
16 available for that particular life stage serve to
17 decrease the fish population?

18 A Not necessarily, under that assumption.

19 MR. FRINK: Okay. I believe that's all the
20 questions I have.

21 HEARING OFFICER DEL PIERO: Mr. Satkowski?

22 MR. SATKOWSKI: I just have a couple of questions
23 to clarify a few things.

24 Q BY MR. SATKOWSKI: In your testimony, you recommend
25 that minimum flows between 20 and 30 cfs on Rush Creek

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01 be maintained.

02 At which point on Rush Creek are you recommending
03 that these flows be maintained?

04 A At the point of release on Mono Gate Number One.

05 Q In L.A. Department of Water and Power's management
06 plan -- actually, I guess it's their summary of their
07 management plan, under their fish flow releases
08 section, they mention periodic flushing flows.

09 And I think yesterday you had mentioned that you
10 did not have a recommendation for flushing flows; is
11 that correct?

12 A Yeah, that is correct.

13 Q Do you know -- well, let me read the sentence in
14 here. It says that, "Periodic flushing flows will be
15 incorporated into the plan."

16 Do you know when they will be incorporated into
17 the plan?

18 A I don't know the answer to that question. I
19 didn't develop the plan.

20 Q Thank you.
21 HEARING OFFICER DEL PIERO: Mr. Smith?
22 MR. SMITH: After Mr. Canaday, please.
23 HEARING OFFICER DEL PIERO: Mr. Canaday?
24 MR. SMITH: Oh, Mr. Herrera.
25 HEARING OFFICER DEL PIERO: I need a program to

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01 keep you guys straight. You're all starting to look
02 alike.
03 MR. FRINK: Tired and unshaven.
04 Q BY MR. HERRERA: First of all, I'd like to discuss
05 your reports that E.A. apparently prepared. There was
06 three of them that were presented the other day for us
07 to consider, in your testimony, and of which you
08 indicated there was one or two of them that you had no
09 participation in preparation of?
10 A Yeah. I was not involved in the preparation of

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reports.

12 Q And those were prepared by staff at E.A.?
13 A That's correct.
14 Q But you had no --
15 A Well, only in a sense that I may have discussed
16 some of the issues that were to be brought up and some
17 of the data. But I did none of the writing, for
18 example, on those reports.
19 Q I notice some of the dates on these go back
20 several years, 1990 and before. To your knowledge,
21 when were these reports made available to -- for
22 example, Department of Fish and Game or to Jones and
23 Stokes?
24 A I submitted -- well, we -- I, E.A. submitted
25 those reports on the date that's indicated there to the

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01 Department of Water and Power. And I don't know at
02 what point they were then transmitted to other parties.
03 Q And they were submitted shortly after the dates
04 that are listed on those?
05 A Essentially in the month. I think there's a month
06 given. Most of those reports, we hold to that month.
07 We put the month that it was published and produced and
08 shipped for the most part.
09 Q Could you tell me a little bit about the review of
10 those materials? Was that sent out for any other
11 review other than that of E.A. or LA DWP?
12 A I don't believe it was.
13 Q Okay. So the only ones that had looked at it at
14 that time when you submitted it to L.A., was just
15 yourself and E.A.'s staff, I'm assuming, and the LA
16 DWP?
17 A Yes, that's correct.
18 Q I'd like to change subjects here just a little
19 bit. When you were discussing the IFIM process, you
20 indicated that there was four primary items that were
21 used: depth, velocity, substrate, and cover. And E.A.
22 adopted to use depth and velocity only. And you
23 discussed a little bit further about cover, why cover
24 wasn't used. Can you discuss a little bit why
25 substrates were not used?

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01 A Well, for a couple of reasons. First of all, I do
02 not believe that substrate necessarily defines the
03 position at which you see a fish, or defines the
04 suitability of the habitat, with the one exception of
05 spawning criteria.

06 For the fry juvenile and adult life stages,
07 I don't think where you observe a fish, whether it's
08 over gravel, cobble, rubble, or boulders or bedrock is
09 the determining factor defining the position that that
10 fish is holding. It's nearly purely depth and
11 velocity.

12 And that -- in fact, when we are doing instream
13 flow studies that don't include spawning, substrate is
14 generally not considered.

15 Q So what you're saying is substrate does not
16 provide habitat for the fishery?

17 A Substrate does provide habitat. I mean
18 substrate --

19 Q I'm sorry. Other than spawning. Excuse me.

20 A Yeah. Substrate is critical, of course, to the
21 spawning life stage. But it is not as important to the
22 other life stages.

23 Q How important would you say cover is to life
24 stages, various life stages?

25 A Cover is important.

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01 Q Very important or --

02 A Well, a stream that doesn't have any cover isn't
03 going to have many fish in it. And I think that's the
04 explanation I gave for why the return ditch -- for
05 example, I had recommended that some boulders and some
06 riparian vegetation be put in, because it essentially
07 lacked cover when I viewed it in 1987. There have been
08 some changes to it.

09 But -- the reason that I didn't include cover in
10 the analysis I've described, briefly, in response to
11 Mr. Roos-Collins' questions, and I don't know if you

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through that again --

13 Q No, not necessarily.

14 A I'm not saying that cover's not important, but I
15 think the points that I've made are that I do have a
16 fundamental problem with the cover as it's used in the
17 criteria that were developed by the Department of Fish
18 and Game and collected on the transects.

19 When you're moving across these transects, you
20 have to make a decision of whether there's object
21 cover, no cover, or what's called overhead cover.

22 First of all, I'm not certain that there is any
23 such thing as a fish sitting in a place with no cover.
24 Most of the positions that a fish is sitting at,
25 particularly brown trout, has some cover associated

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01 with it. There's no question about that.

02 The problem is where -- what cover is that fish
03 responding to? Where are the hiding places that that
04 fish inherently knows of and runs to when frightened.
05 The distance to those places, whether they're above the
06 transect, below the transect, on the transect line --

07 those are some of the problems that I'm talking about.
08 Those are very difficult things to know.
09 Q But in your analysis of the Rush Creek, in looking
10 at the transects, you did not consider cover?
11 A That's correct.
12 Q And the flow recommendations that you made did not
13 consider cover?
14 A That's not quite correct, because I evaluated the
15 results of the E.A. studies and the results of the Fish
16 and Game studies, which had these cover-specific
17 curves. And my recommendations to you are based on an
18 evaluation of both sets of results.
19 Q Were you here during Dr. Beschta's testimony?
20 A Yes.
21 Q There were some questions asked of Dr. Beschta
22 about what kind of flows -- what kind of vegetation
23 would be maintained by various flows.
24 And the question was: Somewhere around 20 cfs,
25 would that -- what would that do to the riparian

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01 vegetation? Was it good or bad? And his comment was
02 that at 20 cfs, it would diminish revegetation
03 significantly. And it would also not support or
04 reestablish vegetation.

05 And your flow recommendation of 20 to 30 cfs is
06 somewhat contradictory with what Dr. Beschta is saying
07 for maintaining cover --

08 A My understanding of Dr. Beschta's response to that
09 question is that he was responding to a proposed
10 permanent 20 cfs flow regime. Not a flow regime where
11 there is periodic high flows released for the purposes
12 of channel maintenance, riparian maintenance and
13 flushing of sediments.

14 Q I think that was his point, was that there was a
15 flow regime that existed well above 20 cfs that
16 mimicked the natural flow regime, is what he was
17 discussing.

18 A Well, yes, but I think he was also describing a
19 circumstance where that flow, whatever the value of
20 that flow is, occurs for a very short period of time.

21 I remember he was talking about a day or so of a
22 peak flow to perform these functions, followed by a
23 ramping up and a ramping down. And that necessarily
24 wouldn't even be recommended for each year. This is,
25 again, getting back to this need for channel

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01 maintenance flows, and how often do you need to release
02 channel maintenance flows.

03 The question that I'm addressing is: Once you've
04 released water for the purposes of meeting the needs
05 that Dr. Beschta was speaking of, what minimum flows
06 should the creek fall to and still maintain adequate
07 trout habitat.

08 Q Well, I guess my point there was that Dr. Beschta
09 was recommending flows that were -- appeared to be
10 higher than your recommendations to maintain the
11 vegetation, which is again your -- as you're stating
12 that cover is essential to the fishery. And yet you're ô

14 sufficient.

15 A 20 to 30 is the minimum value that you would fall
16 to once you have released flows for other purposes, is
17 what I'm saying. Based on the results of the weighted
18 usable area versus discharge curves that have been
19 generated by E.A. and by Cal Fish and Game, I'm saying
20 that the minimum that you would take the stream down to
21 is 20 to 30 cfs range.

22 If there are other purposes, channel maintenance,
23 riparian vegetation maintenance, flushing of sediments
24 from the gravels, whatever your other -- your other --

25 Q So what you're saying is other flows are necessary

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01 for the development of channels, the complexity of the
02 stream itself, for pools that you discussed a little
03 earlier. That's what you're saying? There's other
04 flows to do that? And once that's done, then your 20
05 cfs to 30 cfs scenario is appropriate to maintain those
06 conditions?

07 A Yes.

08 Q As a fishery biologist, can you give me just an
09 opinion on how important you think substrate and cover
10 is to the reproduction of trout?

11 A Well, I don't think cover is important during --
12 you're talking about the reproductive process?

13 Q Um-hum.

14 A Spawning, for example?

15 Q What would -- would it maintain the reproductive
16 conditions or availability for reproduction in the
17 stream, self-sustaining reproduction?

18 A Well, there has to be an adequate supply of
19 spawning gravels or spawning substrate for the process
20 of spawning, for successful spawning. There's no
21 question about that.

22 I don't think many spawning fish are as concerned
23 about cover as other fish. They -- when fish are
24 spawning, they generally aren't utilizing cover to the
25 extent they are when they're not spawning. You can,

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01 for example, go up to spawning fish and come quite
02 close to them, and they don't spook in the manner in
03 which they do when they're not spawning.

04 So I don't think cover's important. Substrate is
05 critical.

06 Q And that was, again, that's the area that you
07 didn't --

08 A Yeah. I didn't model spawning substrate for the
09 purposes I described in my oral testimony.

10 Q Your comment, too, was that in an IFIM -- that in
11 the process that you used with depth and velocity --
12 that cover does not change with depth or velocity?

13 A That's correct.

14 Q That's correct?

15 A From the model perspective.

16 Q So the model's not picking up -- because you did
17 not include substrate and cover, it does not analyze
18 cover in depth and velocity in your transects. Just
19 depth and velocity. Not having anything to do with
20 whether cover was there or --

21 A That's right.

22 Q While we're on depth and velocities a little bit,
23 you indicated that, generally, by increasing depths in
24 the stream channel, it would increase the velocity of
25 the flow, which would be somewhat detrimental to the

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01 habitat there; is that correct?

02 A Well, as flows increase, depths increase and
03 velocities generally increase. And depending upon your
04 habitat suitability criteria, at some point the
05 velocities, or even the depths for that matter, if
06 you're talking about a life stage like fry are looking
07 for shallower depths perhaps. Those increasing depths
08 or increasing velocities start going on the downside of
09 the habitat suitability curve, and weighted usable area
10 will decline as a result of that.

11 Q In terms of -- let me change gears here a little
12 bit. You talked a little bit about your observations
13 and the methods you used for observations. You used Ô

were

15 residing, so to speak, and snorkeling?

16 A No. We didn't use electrofishing at all.

17 Q You mentioned -- you didn't use electrofishing at
18 all in any of your analysis of the streams?

19 A I'm quite certain of that. I wasn't there for all
20 the field studies, but we never used electrofishing for
21 that purpose. Sometimes it's used in these studies,
22 but it's often used in rivers where the water is murky,
23 and you can't actually see the fish. But typically in
24 instream flow studies done in the Sierra Nevada, it's
25 not used. Sometimes bank-side observation is used.

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01 Q You indicated that E.A. has some on-going studies
02 in the Mono Basin there. And one of those was, you
03 have some sort of electrofishing going on, some sort of
04 transect analysis. Could you tell me what those are?

05 A Well, we don't have any on-going studies in Rush
06 Creek right now. There had been some studies -- and
07 frankly, I wasn't involved in those studies to a large
08 degree. So I can't be very specific about what those
09 studies were doing, and what number of transects were
10 involved in those studies.

11 But we were doing studies looking at some weighted
12 usable area calculations in specific habitat types. We
13 also did some habitat suitability studies, looking at
14 more habitat use observations than we had done in
15 1987. That was part of a study that we were doing for
16 the Electrical Power and Research Institute. But my
17 knowledge of what exactly was done on those studies is
18 limited, because I was not actively involved in it.
19 I'm peripherally involved in them.

20 Q Let's go back to velocity just a little bit. We'd
21 heard from previous witnesses that -- you used the term
22 sinewocity, which is quite a term. But talking about
23 creating, I guess, for maybe a little simpler term,
24 meanders or adding actual length to the stream, rather
25 than it's typified now as being fairly straight,

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01 moderate flows, and if we went to -- if we were to
02 attempt to develop a meandering stream or to go back to
03 what has been depicted, it was in pre-diversion times,
04 would that change your comment regarding the velocity
05 being detrimental to the fishery?

06 A Well, I don't think I'd state it explicitly, the
07 velocity is detrimental to the fishery. First of
08 all --

09 Q Let me clarify a little bit. You stated earlier
10 that if you were to increase the depth or add water to
11 increase the depth of the stream, that it's likely that
12 velocity would become detrimental to the habitat in the
13 stream.

14 Now if we added the meandering scenarios here,
15 would that velocity still be detrimental to the
16 habitat?

17 A It could or it could not. If you add meandering,
18 you're generally in an area where it's very low
19 gradient to begin with. Meandering doesn't occur in
20 steep gradient sections of the stream in any case. I
21 think where meandering might take place is already in
22 an area that is low gradient and may not have the same
23 problem.

24 Remember, Rush Creek has different reaches that we
25 looked at. There's a big difference between, for

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01 example, what we call Reach B, which was an upper
02 canyon -- I don't know if you've been to the stream,
03 but the upper section is sort of in a small little
04 canyon. There's not going to be any sinewocity in
05 there. The area right below that is sort of a long run
06 of riffle and rock garden --

07 Q I'm quite familiar with this area.

08 A Okay. Where the sinewocity would occur, where you
09 could create sinewocity by some of these methods, is
10 probably down in the area that we call the meadow, the
11 lower area below the notch. And I'm not certain that
12 even in that area that you would have this problem with
13 velocities, because you already have a low gradient
14 section of stream where adding additional flows there

the

16 suitability criteria.

17 Q So in other words, the area you're discussing is
18 probably just directly above the old 395 bridge to the
19 narrows?

20 A No, the area I'm thinking of is, I think it was
21 referred to generally as the bottom lands.

22 Q Okay. As a fishery biologist, how would you
23 depict IFIM as a tool to determine the flows necessary
24 to sustain a fishery?

25 A How would I depict it?

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01 Q Yes. Is it a useful tool? Is it an exacting
02 tool?

03 A Well, I'll put it this way. It's a very commonly
04 used tool. It has its problems, as I think I've
05 already described. Sometimes the relationship between
06 weighted usable area and fish populations and biomass
07 has not been well established, and there have been some

08 criticisms of the method for that reason.

09 But it is still used considerably in just about
10 any study relating to stream flow and rivers and its
11 relationship to or its impact on fish. So --

12 Q Are there other studies other than IFIM that's
13 used for that purpose?

14 A There are other techniques that are used in the
15 place of IFIM. IFIM is sort of like an umbrella
16 study. The purpose of IFIM is to look at all factors
17 that may limit the fish populations. If you look at
18 the literature that's developed by the U.S. Fish and
19 Wildlife Service on this method, the notion is that
20 you're looking at all potential limiting factors. And
21 that could include habitat as predicted by the model
22 that we've talked about here, this PHABSIM model, which
23 is just one element of IFIM. The evaluation of water
24 temperature and other limiting factors such as food,
25 are all part of the overall umbrella of IFIM, if you

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01 talk to the authors of the IFIM.

02 Q Okay. But essentially, the IFIM is the process
03 used today. There really is, underneath the umbrella
04 of that, there's a number of other things. But that's
05 accepted methodology?

06 A Absolutely. There are other methods used. People
07 in the southeast, for example, don't use the IFIM.

08 They don't believe in the IFIM. They have other
09 techniques that they will apply in certain instances.

10 Q It really is designed for a certain purpose, too.
11 Any way, that really concludes my questions. Thank you
12 very much.

13 HEARING OFFICER DEL PIERO: Mr. Canaday?

14 Q BY MR. CANADAY: Mr. Hanson, earlier you testified on
15 what you -- where you establish your release point for
16 the minimum flow recommendations, you said that was at
17 Mono Gate One?

18 A That's right.

19 Q Do you know if Rush Creek below that point is a
20 gaining reach or a losing reach?

21 A It's a losing reach to my knowledge.

22 Q Well, if it's a losing reach -- therefore, if
23 we -- if the release was 30 cfs to maintain the
24 fisheries in good conditions at Mono Gate One, then you
25 could not assure that that same release was being met

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01 as it entered the lake; is that correct?

02 A The release, the actual amount of water released
03 from Mono Gate One, yes, would not necessarily be the
04 same volume of water entering Mono Lake. But the
05 analyses done both by E.A. and Fish and Game took
06 that -- that losing aspect of the stream into
07 consideration.

08 Those weighted usable area curves are based on an
09 integration of the changes in stream flow from the top
10 of the stream to the bottom of the stream, and reflect
11 releases from Mono Gate One. I'm quite certain that
12 both studies evaluated that.

13 But you're right. The flow changes from the
14 release point down the river.

15 Q So if below the narrows, you were to open up some ô

that 30 cfs

17 might not be adequate to permanently rewater those
18 channels, to make the full beneficial use of the
19 existing channel morphology than for fisheries?

20 A I suppose that's possible, but I haven't evaluated
21 where those channels are, and the volume of water
22 necessary to water those channels.

23 Q In the E.A. study, you -- in developing your
24 curves, you used a utilization curve; is that correct,
25 based on visual observations?

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01 A I used both. I used a utilization curve and a
02 preference curve.

03 Q But you said the state of the stream, we'll call
04 it, the state of the stream that you evaluated in your
05 study, was a state that had very little depth to it; is
06 that correct? It was mainly riffles, fast, high
07 velocity water?

08 A I don't know if I would classify it as high
09 velocity of water, but certainly shallow water. Rush
10 Creek is a shallow, riffle dominated stream, riffle
11 run, rock garden. It is not dominated by deep water.
12 Deep water is very infrequent, at least it was in 1987.

13 Q Do you have an opinion that that was the state of
14 the stream prior to diversions by the L.A. Department
15 of Water and Power?

16 A I've heard that there were not a lot of pools,
17 based on Eldon Vestal's testimony, but I haven't -- I
18 have no other information other than that.

19 Q You've stated in your testimony that the
20 productivity of brown trout in Rush Creek is comparable
21 to other Owens Basin streams; is that correct?

22 A Well, the population level and the biomass levels
23 seem to be comparable.

24 Q So that would kind of dispute Dr. Chapman's
25 suggestion that Rush Creek in particular was not

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01 comparable to other Owens River streams?

02 A In what sense?

03 Q In producing brown trout.

04 A I'm -- I did not hear Dr. Chapman say that.

05 Q Well, it's in his testimony.

06 A Okay.

07 Q In developing these curves, and you had -- in your
08 testimony you had a lot of experience working in the
09 hydrofield in a lot of streams on the east side of the
10 Sierras.

11 Does Rush Creek, the state of the stream that you
12 studied, is it typical of those other kinds of streams,
13 in other words, not having a lot of depth?

14 A No. I would say it's atypical.

15 Q Atypical stream.

16 A Compared to the other streams that I looked at.

17 Most of the other streams that I worked on in the
18 eastern Sierra Nevada are a little higher gradient.

19 They're very similar to that upper canyon region.

20 That's what I'm talking about: Upper Rush Creek, Upper

21 Lee Vining Creek, Mill Creek, Bishop Creek and Misty
22 Green (phonetic) Creek. They all more resemble that
23 upper reach.
24 Q But in developing the utilization curve, if -- are
25 brown trout, adult brown trout, territorial?

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01 A Yes.

02 Q So if there's not a lot of -- and we -- you
03 testified earlier that given cafeteria-style choices,
04 brown trout will choose deeper water?

05 A Well, I'm not sure that I -- if they're given a
06 complete array of all depths?

07 Q Yes. In the stream. If they had -- in a sense,
08 you had a stream that had a multiple or a complex
09 habitat forms, which include different velocities and
10 different water depths, based on your knowledge of
11 brown trout, they would be found in the more deeper
12 water?

13 A I'm not sure I could say that. I don't know
14 exactly what I would expect if they had a
15 cafeteria-style choice of water depth.

16 Are you suggesting that if the deepest water were Ô

would all be in

18 ten feet deep water?

19 Q No. What I'm suggesting is that you're saying
20 they didn't have much of a cafeteria-style choice in
21 Rush Creek where you found them; is that correct?

22 A Rush Creek is dominated by shallow water.

23 Q But you found brown trout and other eastern Sierra
24 streams that their comparable to, but yet those streams
25 probably had a larger choice of habitat types than Rush

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01 Creek had?

02 A I haven't done snorkeling studies in other streams
03 in the eastern Sierra Nevada.

04 Q What preference curves did you use for those IFIM
05 studies?

06 A I used the curves of Smith and Acitunal
07 (phonetic).

08 Q So if the Rush Creek at the present condition was
09 atypical of eastern Sierra streams, because of likely
10 changes --

11 A Well, I -- sorry. Go ahead.

12 Q Wouldn't it seem better to use the Smith and
13 Acitunal (phonetic) curves, as kind of a composite of
14 what -- if you had those kinds of habitat choices for
15 those fish?

16 A You're saying if Rush Creek is atypical?

17 Q Well, you said Rush Creek -- you have said Rush
18 Creek is atypical of eastern Sierra streams.

19 A Well, now, wait a minute. I didn't say that. I
20 said Rush Creek is atypical of the streams that I've
21 worked on. I'm talking about the reaches that I've
22 worked on.

23 Q But you've stated you had raw experience on many
24 of the streams that are either in the Mono Basin or
25 nearby in the Owens River system; is that correct?

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01 A Yes, experience doing instream flow studies.

02 Q Yes?

03 A Right.

04 Q And so my question is if the stream, at least the
05 conditions that you observed in 1987, were atypical of
06 streams that you had familiarity with, but yet you
07 chose to use utilization curves based on the conditions
08 at the time, it seems to me those utilization curves
09 would be atypical as well.

10 A No. I wouldn't agree with that. Those curves
11 reflect the conditions in Rush Creek and are more
12 suitable, I think, for use in the IFIM than curves
13 taken from other streams that don't resemble Rush
14 Creek.

15 Q But if you would -- utilization of the fish in
16 that stream at that particular time would be using the
17 only -- only the amount of water that they had
18 available for the type of habitat they had available,
19 which is shallow, fast running water? That was your
20 testimony, wasn't it?

21 A Right. But Rush Creek is always going to have
22 that.

23 Q So you're saying Rush Creek is not going to have

24 deep water habitat then?

25 A In its present condition. Well, things are

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01 changing in Rush Creek, as I think has been pointed out
02 before.

03 But the flows -- if we go back to 1987, when these
04 snorkeling studies were conducted, Rush Creek was then,
05 and is to a large degree now, dominated by runs,
06 riffles and rock gardens, shallow water. And that --
07 those were the circumstances under which data were

08 collected, both by E.A. and by the Beak consultants.
09 Q What I'm asking you as a professional biologist,
10 you assumed that those conditions are going to remain
11 that way?

12 A Well, I'm not an effluvial-geomorphologist, but
13 I've heard testimony that things will change in Rush
14 Creek gradually, and there's also been some changes as
15 part of the restoration program.

16 Q But Dr. Beschta talked about changes that were
17 going to occur. Ô

the

19 amounts of flow that are necessary to cause these
20 natural evolution of deep water pools and other types
21 of habitat that will be possibly preferable to brown
22 trout?

23 A I don't think so. I think Dr. Beschta was
24 referring to high flows that will do that on a periodic
25 and infrequent basis. That was my understanding of his

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01 testimony. It was my understanding of channel
02 maintenance flows and flushing flows. They are not a
03 constant condition. They are an infrequent condition.

04 Q Dr. Beschta, I believe, testified that the stream
05 is healing itself now.

06 Are the flows today greater than they were in
07 1987?

08 A Today, this very day, I believe they are.

09 Q I mean, since 1989?

10 A Yes, they've been increased.

11 Q How would you define good condition? And besides
12 being able to define it, how would you measure it? If
13 we were -- if you were asked to, first of all define
14 it, which I'm asking you to do, and then give me a
15 series of measurable factors that we could determine
16 whether the fish were in good condition, not individual
17 fish, but the population of fish. What would you
18 recommend?

19 A How would I define good condition?

20 Q Good condition.

21 A You're not talking about condition factors with
22 fish, of an individual fish, or of the population in
23 terms of their length and weight relationship?

24 Q Well --

25 A That is generally one way of looking -- talking

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01 about good condition of the fishery, that is one of the
02 measures of condition that are performed, looking at
03 the condition factor, which is a function of length and
04 weight.

05 Q Okay. And that's on the individual fish.

06 A Well, it could be --

07 Q And then relates to the population?

08 A Population.

09 Q What kind of physical habitat conditions might we
10 look at that would -- we would use as a standard that
11 we could say that that's maintaining fish in good
12 condition?

13 A Physical factors in the stream?

14 Q Um-hum.

15 A There's a variety of things that could be --

16 Q I'm -- you're free to suggest some.

17 A Well, adequate amounts of weighted usable area,
18 adequate water temperature regime, adequate food
19 supply, adequate flushing of flows. Various things
20 that I think have been talked about to some degree
21 previously. Those are all the things that lead to a
22 stream that is in good condition.

23 Q I believe you testified yesterday that the E.A.
24 report did include some -- suggestions for habitat

25 improvement; is that correct?

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01 A That's correct.

02 Q And those kinds of things were increasing deep
03 water habitat?

04 A Yes.

05 Q And planting and boulders. And you said that was
06 more specifically just at the Mono ditch? That wasn't
07 anywhere else in the stream system?

08 A That was my recommendation specifically for the
09 Mono ditch.

10 Q Okay. I think that's all I have. Thank you.

11 HEARING OFFICER DEL PIERO: Thank you. Mr. Smith?

12 Q BY MR. SMITH: Mr. Hanson, thus far you've given us
13 some very strong testimony about the 20 to 30 cfs
14 giving us approximately 80 percent maximum habitat.
15 I'd like to be very specific in terms of a
16 recommendation.

17 See, we have a problem here. Some people say
18 leave the stream alone. There are a lot of people who ô

20 Just as a hypothetical, assume that you give
21 protective flows to the main stem, okay? This was part
22 of your testimony before. We wanted to make sure that
23 we had protection for the main stem of the stream. And
24 we rewater one, two, three graded streams over to the
25 side with your minimum 20 or 30 percent.

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01 Would you get additional habitat?

02 A At the flow that I'm recommending?

03 Q Um-hum.

04 A It depends -- you will in some cases, and you will
05 not in other cases, depending on what happens to the
06 main stem of the stream. If the main stem of the
07 stream --

08 Q Is protected okay? You have -- again, you have
09 protective flows.

10 A You would maintain the flow in the main stem of
11 the stream, and then you would open up other areas with
12 additional flow.

13 Q With additional flow -- provide 20 to 30 minimum
14 flows that you have been suggesting.

15 A For the main stem.

16 Q The main stem would get whatever regime is -- that
17 the Board deems is protected. And you rewater the side
18 stems with 20 to 30. One two, three braided streams.

19 Would you get additional habitat?

20 A You absolutely would. If you kept the flow in the
21 main stem, if you didn't take flow out of the main
22 stem, if you used additional flows to rewater sections
23 there's no question. Depending on how you create the
24 side channels, what their depth and velocities
25 characteristics are. I'm talking about the weighted

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01 usable area perspective, of course. Yes, if you kept
02 the flows constant in the main stem that I'm
03 recommending, and then opened up additional side
04 channels, it just opens up a broader stream.

05 Q Thank you.

06 HEARING OFFICER DEL PIERO: No questions by the

07 Board members? Mr. Brown? Mr. Stubchaer? Questions?
08 Questions? I've got one.

09 CROSS-EXAMINATION BY THE BOARD

10 Q BY HEARING OFFICER DEL PIERO: In the area where
11 there's a losing channel, you indicated that you
12 recommended 20 to 30 cfs release from the Mono gate.
13 You also indicated, I think, in response to questions
14 from Mr. Canaday, that 20 to 30 cfs would not be
15 sustained at the mouth of Rush Creek because of losses.

16 A That's right.

17 Q You also indicated that those losses were taken
18 into consideration in the analysis done by Dr. Beschta;
19 is that correct?

20 A No. What I indicated was those losses of stream
21 flow were taken into account in the IFIM studies
22 performed by E.A. and by me.

23 So in other words, there was knowledge of what the
24 flows were further down the river, and the weighted
25 usable area was calculated for the entire river. It

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01 was based on weighted usable area at one flow near the
02 top of the river and the weighted usable area based on
03 a lower flow in a lower part of the stream.

04 Q Did you include losses due to the percolation in
05 that analysis?

06 A It would. Yes.

07 Q Dr. Beschta told me that he hadn't, in terms of
08 his calculations on riparian -- on riparian vegetation
09 and the relationship to groundwater in that corridor.

10 A The losses, I think, that we took into account,
11 definitely incorporated percolation. They were based
12 on actual flow measurements at different points in the
13 river.

14 Q But one of the factors in the calculation was loss
15 to percolation?

16 A Lost water, whether it's percolation,
17 evapotranspiration or evaporation.

18 Q I'm asking very specifically on the issue of loss
19 due to percolation into the groundwater. Was that one ô

21 Evapotranspiration is not something I'm
22 particularly concerned about. It doesn't amount to
23 anything. The loss in terms of percolation in the
24 groundwater and the dewatered channel where there's
25 significant amount of alluvial soils and no water can

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01 be very significant.

02 That's the question I'm asking you, and I'd like
03 an answer.

04 A The analysis did not have a variable in it that
05 said this is loss of water due to percolation. And
06 that may have been associated with different
07 groundwater levels, saturation of the soil levels. The
08 analysis that was done by E.A. simply evaluated changes
09 in flow from the ditch down to the lowest transect,
10 based on the flow measures that had been taken on all
11 the transects down the stream. Now, that's all we
12 did. We didn't have a variable in the model that said

13 this is -- this is loss due to percolation. Is that
14 clear?

15 Q You calculated -- okay. You knew what was in the
16 stream channel at the beginning, and what was in it at
17 the end, and at various points along the stream channel?

18 A That's correct.

19 HEARING OFFICER DEL PIERO: Yes, Mr. Brown?

20 Q BY MR. BROWN: With a 20 cfs release, how much of
21 that makes it to the lake?

22 A The measurements that I took led to about 11 cfs
23 entering the lake.

24 HEARING OFFICER DEL PIERO: Ladies and Gentlemen,
25 we're going to take a break. And then, Mr. Birmingham,

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01 you're back on again. Redirect?

02 MR. BIRMINGHAM: Yes, sir.

03 HEARING OFFICER DEL PIERO: Good.

04 (Whereupon a recess was taken at this time.)

05 HEARING OFFICER DEL PIERO: Ladies and Gentlemen,
06 if you would be good enough to take your seats.

07 Mr. Birmingham?

08 MR. BIRMINGHAM: Thank you, Mr. Del Piero.

09 REDIRECT EXAMINATION BY MR. BIRMINGHAM

10 Q First, Mr. Hanson, I'd like to ask you just a few
11 questions that relate to some of the questions asked of
12 you by staff and by the hearing officer. Also, I think
13 these questions relate to questions asked by other
14 members of the Board.

15 You indicated that Rush Creek was a losing stream
16 in response to a question asked of you, I believe by
17 Mr. Canaday. Is that correct?

18 A Yes, I said that.

19 Q Now, that was based upon your study that was
20 conducted in 1987?

21 A Yes.

22 Q In 1987, isn't it correct that the Department of
23 Water and Power was appropriating the entire flow of
24 Walker and Parker Creek?

25 A Yes, that's correct.

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01 Q I'd ask you to assume, hypothetically, that the
02 flows of Walker and Parker Creek were flowing past
03 DWP's diversion facilities unimpeded, and that there
04 are no other diversions of those streams below DWP's
05 diversions facilities.

06 Would your answer about whether Rush Creek is a
07 gaining or losing stream be the same?

08 A I would consider it probably at that point a
09 gaining stream. I don't know the exact flows that
10 would enter it, but I would think by the time we hit
11 those streams, we would more than supply the water that
12 was lost up to that point in time.

13 Q This morning Mr. Roos-Collins asked you a question
14 about table 3A-3 from Volume One of the Draft
15 Environmental Impact Report.

16 Do you recall those questions?

17 A Yes, I do recall those questions.

18 Q And I believe he asked you if it wasn't correct
19 that you were recommending flows that were present --
20 that were present in the stream 100 percent of the

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22 A Yes.
23 Q I'd like to show -- show you again table 3A-3 and
24 refer you to that portion of the table that refers to
25 Rush Creek.

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01 What is your understanding of that table?
02 A My understanding of this table is that it was
03 based on flow duration analyses that were performed by
04 Beak as part of the Fish and Game studies.
05 Q And your minimum flow recommendation of 20 to 30
06 cfs when compared to that table simply means that there
07 is always water in the stream that would be available
08 to meet your minimum flow recommendation; isn't that
09 correct?
10 A That's correct.
11 Q And that for a majority of the months, there is
12 additional water in the stream above that required to
13 maintain fish in good condition?
14 A That's what the table shows, yes. I might add
15 that in remembering how -- if I'm correct in this, how
16 these data were generated, the analysis that I reviewed
17 in the Beak report flow duration analysis and data
18 presented there, were for flows in the creek that
19 were -- are associated with the operation of a southern
20 Cal Edison hydroelectric project up river of Lower Rush
21 Creek. And so there is some level of management of
22 stream flows out of the three reservoirs that are
23 regulated by southern Cal Edison.
24 Q Mr. Roos-Collins asked you other questions related
25 to the IFIM that you prepared, and the model that

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01 served as the basis of the IFIM.
02 I believe that's PHABSIM; is that correct?
03 A That is correct.
04 Q Now, we've heard testimony about the PHABSIM model
05 and other models, and we've heard testimony to the
06 effect that there are certain assumptions that underlie
07 models.
08 Have you heard some of that testimony?
09 A Yes.
10 Q Now, is it correct that one of the assumptions
11 that underlies the IFIM methodology or approach is that
12 additional habitat will result in additional fish?
13 A That is the general assumption. Although as I've
14 stated also earlier, there is debate as to whether
15 that's valid, that there is a one-to-one correlation
16 between habitat and fish population response, either
17 biomass or numbers.
18 Q Well, in your opinion, does additional discharge
19 necessarily mean that there will be additional fish in
20 the stream?
21 A Additional flow? Simply additional flow?
22 Q Yes.
23 A No.
24 Q Would you explain why not?
25 A If you at least agree that there's a correlation

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01 between weighted usable area and fish population
02 response, that there are some flows that are higher

03 than other flows where weighted usable area will
04 decline as a result of water that's too swift, mostly,
05 and that certainly isn't -- that goes against what you
06 said in that you would expect the fish population to
07 respond negatively at these higher flows, rather than
08 positively.

09 Q I'm left with the impression from your testimony
10 that in your opinion there are factors other than flow
11 that relate to the number of fish that exist in the
12 stream; is that correct?

13 A Yes. Well, flow influences quite a few things in
14 the stream, but there are other factors other than
15 weighted usable area that influence the fishery in the
16 stream.

17 Q So creating additional weighted usable area is not
18 necessarily going to result in additional fish in the
19 stream?

20 A Not if there are other limiting factors,
21 certainly.

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Cahill asked you questions about

23 the predominant depth of Rush Creek at 19 cfs.

24 Can you tell me what does the term "predominant
25 depth" mean?

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01 A Well, in the way in which I was describing it,
02 it's basically the peak of the frequency distribution.
03 That is, if you were to randomly put down a yardstick
04 in a stream, it's the depth that you would most often
05 measure with your yardstick.

06 Q And in response to a question by Ms. Cahill, you
07 said that at 19 cfs the predominant depth in Rush Creek
08 is 0.4 feet; is that correct?

09 A That's right.

10 Q Does that mean that there is no water in Rush
11 Creek that is deeper than 0.4 feet, at a flow of 19
12 cfs?

13 A No. That certainly doesn't mean that. There are
14 other deeper waters throughout the stream. Quite a
15 few, perhaps. It's just -- that predominant depth
16 notion is simply a frequency distribution notion. It
17 really doesn't tell you how much deeper water there is.
18 It's relative numbers, but not how much deeper water
19 there may be in other parts of the stream.

20 Q In your direct testimony, and in response to some
21 questions that were asked of you on cross-examination,
22 you stated that according to population studies
23 conducted by E.A. Sciences, Engineering and Technology
24 in Rush Creek, the population of adult brown trout in
25 Rush Creek was comparable to the population in

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01 comparable eastern Sierra streams; is that correct?

02 A Yes, that's what I said.

03 Q Now, were those studies conducted when the minimum
04 flows in Rush Creek were 19 cfs?

05 A Yes.

06 Q So do we understand, then, that -- a minimum flow
07 of 19 cfs was capable of maintaining a population of
08 brown trout in Rush Creek that was comparable to
09 populations of brown trout in comparable eastern Sierra

10 streams?
11 A That's what the data indicates.
12 Q There were also questions of you yesterday by Ms.
13 Cahill that related to the E.A. version of the
14 hydraulic simulation model that was used in connection
15 with preparation of L.A.D.W.P, Exhibit 15.
16 Do you recall that question?
17 A Yes --
18 Q And she asked you to compare that with the
19 hydraulic simulation model that was used by Beak in
20 connection with the instream -- instream flow
21 incremental methodology study prepared on behalf of the
22 Department of Fish and Game.
23 Do you recall that question?
24 A Yes.
25 Q Has the E.A. version of the hydraulic simulation

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01 model been reviewed by any regulatory agencies?
02 A It's been reviewed on two occasions. Initially,
03 when I first developed it, it was reviewed by the U.S.
04 Fish and Wildlife Service, the developers of the
05 earlier version of the model, or I should say the
06 developers of the PHABSIM model that was commonly used.
07 I corresponded with Bob Millhouse, the
08 hydrologist with the U.S. Fish and Wildlife Service,
09 and had him compare model output from the E.A. model to
10 output from the PHABSIM model. He concluded in a
11 letter to me, I think around 1981, that while there was
12 some differences in some calculations, the models were
13 essentially the same.
14 I've also had a review of the model with the
15 California Department of Fish and Game. And the result
16 of that comparative analysis was a letter of approval
17 for the use of the model.
18 Q There have been numerous questions of you about
19 the recommendations that you made on page 21 of LA DWP
20 Exhibit 15 concerning the creation of additional pool
21 habitat in Rush Creek.

22 Would you please explain why you made the
0 additional pool habitat

24 be created in Rush Creek?

25 A The reasoning behind that, I think, as I stated

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01 previously, was looking at the results of the weighted
02 usable area curves and the dynamics of Rush Creek.
03 There was this balancing of depth and velocity that I
04 was noticing that as flows increased and depths got
05 better for the fish, the velocities tended to become
06 less suitable for the fish. And so there was these
07 counter balancing variables in the model. And I think
08 that was what sort of led to the plateau like results
09 over those broad range of flows that I described. My
10 thoughts were that rather than trying to put large
11 amounts of water down the stream to attain those
12 desirable depths for the fish, the better plan would be
13 to actually artificially create deeper water by digging
14 pools. That was the basis for that recommendation.
15 Q To create additional habitat where there would be
16 lower velocity water?

17 A Well, deeper and lower velocity. Generally, by
18 deepening the water in a pool circumstance, the
19 velocity will slow down.
20 Q Now, is it your understanding that since 1987 the
21 condition of Rush Creek has changed?
22 A There have been changes, yes.
23 Q Is it correct that since 1987 the rye -- grazing
24 has been removed from Rush Creek, and that as a result
25 there has been a resurgence of riparian vegetation?

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01 A I have seen that, yes.
02 Q And is it correct that because of flows in excess
03 of those that you're recommending as a minimum, there
04 have been the natural creation of pools?
05 A Yes. I've seen some of that starting to form.
06 Q And would the natural creation of deeper habitat
07 with lower velocities accomplish what you were
08 recommending on page 21 of LA DWP Exhibit 15?
09 A Yes. Whether it would occur naturally or
10 artificially would accomplish the objectives of my
11 recommendation.
12 Q Now, Miss Cahill asked you a question about your
13 IFIM study, LA DWP Exhibit 15, and whether or not you
14 included transects outside of the Mono gate return
15 ditch. Do you recall that question?
16 A Yes.
17 Q And you -- I believe you indicated that you would
18 not include the transects from the Mono gate return
19 ditch.
20 A Well, in the curve that was shown on, I believe it
21 was Figure 1 -- let's see what figure was it? Figure 2
22 of my testimony, that curve was generated from the
23 transects outside of the Mono gate return ditch.
24 Q And why did you exclude transects from the Mono
25 gate return ditch?

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01 A Partly because there was essentially zero coverage
02 in the Mono gate return ditch. And that since my
03 analysis was based simply on depth and velocity, it
04 would inaccurately represent the amount of -- or the
05 value of the habitat in that reach.
06 Essentially, I think, the value of the Mono Gate
07 One reach, even though the depths and the velocities
08 are very good, and its condition in 1987 would provide
09 poor habitat for fish, because of the essentially lack
10 of cover.
11 Q Essentially, you thought that there would be few
12 fish in the Mono gate return ditch; is that right?
13 A Well, based on my observations of few fish.
14 Q I'd like to show you a table -- I'm sorry. It's
15 table 24 from Department of Fish and Game Exhibit 52.
16 And if table four is -- 24 is correctly
17 identified, it's a table of fish collected by
18 electrofishing in Lower Rush Creek, Mono County,
19 California, from August 4 through August 24, 1987. Is
20 that correct?
21 A That's what it says. Yes.
22 Q Now, there is a reach on -- in table 24 that's
23 identified as reach one, and can you tell us in August

7 how many brown trout were collected in reach
25 one of Lower Rush Creek?

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01 A Eight fish.
02 Q And how many total brown trout were collected in
03 Rush Creek in August of 1987 as a result of the
04 electrofishing survey conducted on behalf of the
05 Department of Fish and Game?
06 A 4,055.
07 Q If I told you that reach one was the Mono gate
08 return ditch, would that be consistent with your view
09 in 1987 that reach one would have provided poor
10 habitat, and as a result, few fish?
11 A Yes, absolutely.
12 Q Finally, there were some questions about your
13 recommendation of a constant flow that did not take
14 into account dry, normal, and wet water years.
15 Do you recall those questions?
16 A Yes, I do.
17 Q Is that issue addressed in your direct written
18 testimony?
19 A No. I do not propose flows for different water
20 years.
21 Q Did you, in your written testimony, did you
22 explain why not? And -- there's -- I'll eliminate the
23 suspense. What I'd like to do is refer you to page 46
24 of your written testimony. And there, isn't it correct --
25 HEARING OFFICER DEL PIERO: You're allowed to ask

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01 him questions about his recollection of it also.
02 Q I don't think he understood my question. But --
03 on page 46, and on to page 47, isn't it correct that
04 you explained why you think in Rush Creek the
05 Department of Fish and Game's recommendation of
06 different flows for dry, normal and wet years is
07 inappropriate?
08 A Yes.
09 Q I have no further questions.
10 HEARING OFFICER DEL PIERO: Thank you.
11 Ms. Cahill?
12 RE-CROSS-EXAMINATION BY MS. CAHILL
13 Q Good morning.
14 A Good morning.
15 Q There has been some discussion today of the fact
16 that there may have been some pools created, or pools
17 that are in the process of being created, in Lower Rush
18 Creek at present. Is that your understanding?
19 A Yes.
20 Q What I'd like to do is explore a bit what your
21 suitability curves would tell us about the suitability
22 of pools that may be forming in Lower Rush Creek.
23 If you would tell me again, if you used your
24 utilization curve, and you had water three feet deep,
25 what would be the suitability of that water for brown

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01 trout according to that curve?
02 A It would be zero.
03 Q And if you used your preference curve starting at
04 approximately 3.2 feet, would the suitability be zero?
05 A For the adult or --

06 Q Yes, for the adults.
07 A Yes.
08 Q I'd like to perhaps oversimplify, but can you
09 correct me -- I'd like to get the basic concept of how
10 these curves are input into the model.
11 In the IFIM, you define a cell in the stream
12 that's basically a column of water in the stream. Is
13 that correct?
14 A Yes, but it represents an area, even though it's
15 in a column.
16 Q Right. So at some point your model is going to
17 take the width of that cell, multiply it by the length
18 of the cell, and then you will multiply by your
19 suitability criteria for depth and the suitability
20 criteria for velocity; is that correct?
21 A That's right.
22 Q So let's assume a one foot width. Let's assume a
23 one foot length, and let's -- at this point assume a
24 one foot velocity. \hat{O}
on your suitability curve, if we had water

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01 that was approximately 1.6 feet deep, would your
02 suitability be one? That would be maximum, wouldn't
03 it?
04 A Close, yeah.
05 Q Okay. And that would be one. So in that case,
06 you would have -- this product would equal weighted
07 usable area.
08 MR. BIRMINGHAM: For the record can we ask that
09 the product be identified?
10 MS. CAHILL: The product is the width times the
11 length times the criteria for depth times the criteria
12 for velocity, equals weighted usable area. Roughly.
13 So in the example, in my first example, you would
14 have -- that cell would add one square foot -- this
15 would be one square foot --
16 HEARING OFFICER DEL PIERO: That's cubic foot.
17 MS. CAHILL: No, it's actually square feet. This
18 is foot and this is foot and these are not. Your
19 weighted usable area will always be in square feet.
20 HEARING OFFICER DEL PIERO: Yeah.
21 MR. BIRMINGHAM: Can we ask that Miss Cahill be
22 sworn?
23 MS. CAHILL: That's true.
24 Is that true, Mr. Hanson?
25 MR. HANSON: Yes.

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01 HEARING OFFICE DEL PIERO: This is instructional
02 for the hearing officer. We have the two engineers
03 here who don't need this.
04 Q BY MS. CAHILL: Let's assume that we now have a one
05 foot by one foot cell. And in this case, the water
06 depth is three feet deep. Let's say four feet deep.
07 Okay?
08 Now when the depth is four feet, according to your
09 criteria, the suitability factor is then zero; is that
10 right?
11 A That's right.
12 Q And then let's assume, again, a one-foot
13 velocity. Now, in that case, our weighted usable area

14 goes to zero, and this, then, this transect -- this
15 cell would add nothing at all to the weighted usable
16 area. It would effectively say, fish won't use this
17 water. Is that basically right?
18 A Yes.
19 Q So when we saw Mr. Tillimans wading in some water
20 that appeared to be waist high, unless he was on his
21 knees, under your curves, that water would -- because
22 of the zero depth suitability, would be found to be not
23 suitable for adult brown trout; is that right?
24 A Yes. I would point out that at deeper depths the
25 same thing would happen with the Cal Fish and Game

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01 curves.
02 MS. CAHILL: Well, actually, could someone bring
03 me the Smith and Acitunal (phonetic)? No, actually not
04 that. All right. That will do.
05 Let me mark this as Exhibit DFG next in order,
06 which I think is number 135.
07 (Exhibit Number 135 was
08 marked for identification.)
09 Q BY MS. CAHILL: Yes. Now, Smith and Acitunal
10 (phonetic) is the DFG curve. Does it in fact go to
11 zero any time before seven feet?
12 A I was referring to the juvenile curves that were
13 developed in the site-specific study.
14 Q I've been talking about adult brown trout. So if
15 we were talking about adult brown trout, would DFG find
16 a suitability of one in that 3-foot deep water?
17 A Yes, it would.
18 Q And it would find a suitability of one even in
19 the -- a suitability of one even in six-foot deep
20 water?
21 A Yes.
22 Q And now that I have this up here, are you familiar
23 with Rally?
24 A Yes.
25 Q And would Rally find a suitability of one or of

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01 zero at three feet and four feet?
02 A It would be one.
03 Q And are you familiar also with Bovee (phonetic)
04 78?
05 A Yes.
06 Q And does Bovee (phonetic) find a suitability of
07 one or of zero at three feet, four feet, five feet and
08 six feet?
09 A Yes.
10 MR. BIRMINGHAM: Excuse me. Mr. Del Piero, I
11 wonder if Miss Cahill could be asked if she's
12 representing to the Board that the graphs that she is
13 showing the witness actually depict the suitability
14 curves from the reports that she's identifying?
15 MS. CAHILL: I would be happy to make that
16 representation. And I will be willing to have one of
17 my experts who prepared the graphs for me testify to
18 that --
19 HEARING OFFICER DEL PIERO: I appreciate you
20 indicating that. And I also have to assume that

21 Mr. Hanson wouldn't be acknowledging that he recognizes
22 them if he didn't recognize them.
23 MR. HANSON: I recognize them from the
24 literature.
25 HEARING OFFICER DEL PIERO: Okay.

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01 MS. CAHILL: And this last one is your preference
02 curve. This one is perhaps a bit fair, because I think
03 your table two was developed with your utilization
04 curve.
05 But if instead we had your utilization curve, it
06 also would come to zero at somewhere around three feet;
07 is that right?
08 I'd like to mark this at least for identification.
09 HEARING OFFICER DEL PIERO: The plastic
10 transparencies --
11 MS. CAHILL: Yes.
12 HEARING OFFICER DEL PIERO: -- or the calculations
13 in back?
14 MS. CAHILL: Well, the calculation, I have already
15 numbered DFG 135. I'd like to do this as well. And it
16 would be, then, DFG 136.
17 HEARING OFFICER DEL PIERO: Any objections?
18 MR. BIRMINGHAM: Maybe we label it DFG 136, A, B,
19 C and D?
20 HEARING OFFICER DEL PIERO: Is that acceptable to
21 you?
22 MS. CAHILL: Fine.
23 HEARING OFFICER DEL PIERO: Any other objections?
24 Hearing none, so ordered.
25 MR. DODGE: I have no objection, but I'd like a

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01 copy of them.
02 (Exhibits Number DFG 136
03 A, B, C, and D
04 were marked for
05 identification.)
06 MR. HANSON: One thing I'd like to point out --
07 HEARING OFFICER DEL PIERO: Of the calculation,
08 Mr. Dodge, or of the transparency?
09 MR. DODGE: The transparency.
10 MS. CAHILL: We will provide them.
11 HEARING OFFICER DEL PIERO: Thank you.
12 MR. HANSON: One thing I'd like to point out about
13 the different curves that you've shown, at least
14 comparing the DFG curves and the E.A. curves, is that
15 while there are different depth suitability,
16 particularly at the higher depths, you've got to bear
17 in mind the sensitivity of the models to the amount of
18 deep water in the stream.
19 The pool habitats in Rush Creek comprise a very
20 small fraction of the total length of Rush Creek. Rush
21 Creek again is dominated by depth and velocities. And
22 while these suitability criteria are different and
23 would produce different results, as you indicated in
24 your calculations, what's important to consider is the
25 change in the weighted usable area curves, which will

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based on the small

02 fraction of deep water in the stream. The shallow
03 water that exists throughout all the other transects
04 will dominate the weighted usable area curves.
05 And furthermore, as I stated, I think, yesterday,
06 you have to consider the sensitivity of the policy
07 decisions made regarding the results of the curves to
08 these suitability criteria which is the next step.
09 Q BY MS. CAHILL: Okay. But in fact, I think we looked
10 at the transect for the return ditch the other day, and
11 it would, at higher flows, have water of these depths;
12 is that right?
13 A Yes.
14 Q And you indicated you eliminated the return ditch
15 because it lacked cover; is that your testimony?
16 A Absolutely.
17 Q So in other words, you didn't take cover into
18 account for the stretches on which you -- which you
19 relied --
20 A Right.
21 Q -- in developing your Figure 2, but you eliminated
22 the return ditch because of lack of cover?
23 A There is cover in Rush Creek in a good many
24 places. There are the problems that I described as to
25 how you deal with cover along the transects. It's

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01 problematic, and it doesn't change substantially the
02 shape of the curve. It changes the total amount of
03 habitat that's being predicted.
04 But if you were to assume that there is adequate
05 cover and there are problems with many of the things
06 that I describe -- one other I didn't mention is what's
07 cover to different life stages. There's different
08 rocks and sticks and other things that present
09 different amounts of cover of different value to
10 different life stages which is not incorporated into
11 the analysis when you use cover.
12 Q Was there any aquatic vegetation in the return
13 ditch in the year you did your study?
14 A There was some. There's more now than there was
15 then.
16 Q Yeah. I believe you've recommended that there be
17 some riparian -- it might be beneficial to have
18 riparian vegetation along the return ditch?
19 A Yes.
20 Q Do you know whether Los Angeles Department of
21 Water and Power has, in fact, cleared the ditch from
22 time to time?
23 A I don't know whether they have.
24 Q Assuming that aquatic plants and riparian
25 vegetation were allowed to grow so that there were --

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01 there was cover as well as the correct depths and
02 velocities, that could constitute good habitat for
03 adult brown trout, couldn't it?
04 A It would improve it, but I think the better thing
05 to do, the thing that really is lacking in the return
06 ditch, is instream cover in the form of boulders and
07 hiding places within the stream where fish can dart to
08 when surprised. I think that's the primary reason why
09 there's darn few fish, as I said yesterday, in the

10 return ditch than in 1987.

11 I don't know the numbers of fish in the return
12 ditch now. But if you're going to make the return ditch a
13 valuable stream segment, you've got to put in more than
14 just riparian vegetation. You can't just have the dirt
15 bottom that it has with some aquatic vegetation growing
16 from it to provide a stream in good condition as
17 Mr. Canaday was talking about.

18 That is a stream -- not a stream, really, but it's
19 a man-made channel that has a good depth and velocity
20 profile, but it doesn't have the other components to
21 make it a stream in good condition for fish to inhabit.

22 Q I don't mean to cut you off, but I'm very aware
23 that my time is running out. Let me ask you with
24 regard to Lee Vining Creek, is it your testimony that
25 your recommendations are based on the Department of

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01 Fish and Game IFIM, and that you've basically selected
02
03 cent of maximum habitat?

03 A Yeah. That was the method I was applying.

04 Q And so if I were to now show you the table from
05 DFG's final report that corresponds to the table 18 in
06 the draft that you reviewed, your approach would be to
07 determine the maximum -- and if I were to ask you to
08 focus on the adult life stage, and I -- in fact, I can
09 provide you --

10 MS. CAHILL: If someone could bring him from my
11 table a copy of DFG 54? And this is table 16 --

12 HEARING OFFICER DEL PIERO: Virginia, would you be
13 kind enough to move it to the other easel, so we can
14 see?

15 MS. CAHILL: Certainly. I'm sorry.

16 HEARING OFFICER DEL PIERO: That's quite all
17 right.

18 Q BY MS. CAHILL: This was the figure as it appeared in
19 his testimony. This is, in fact, the final table from
20 DFG 54. It's Figure 16.

21 And properly labeled with the little squares, the
22 little solid squares being the adult habitat, where
23 does the adult habitat peak, at least so far as it's
24 shown here?

25 A I believe that's 95 cfs.

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01 Q Okay. And in terms of habitat, how -- what I'm
02 going to try to do is to figure out what 80 percent
03 habitat is on this. So the amount of habitat here
04 would be something near 65,000 square feet?

05 A Something like that.

06 Q And what would be --

07 HEARING OFFICER DEL PIERO: You need to identify
08 for the record where "here" is.

09 MS. CAHILL: Okay. Here is on Figure 16 from
10 DFG's final Lee Vining report, it's on the curve marked
11 for adult brown trout at the maximum flow shown, which
12 is 95 cfs.

13 Q BY MS. CAHILL: And at that level, the amount of
14 weighted usable area is somewhere in the neighborhood
15 of 65,000 square feet?

16 A That's correct.

17 Q And what would 80 percent of that be?
18 A 50.
19 Q Okay. And so then if we come down and find the
20 flow that corresponds to 50,000 square feet, is that
21 flow going to be approximately 30 to 35 cfs?
22 A Judging from this, just eyeballing, something like
23 that.
24 Q So, in fact, if you have presented a
25 recommendation of 15 and 25 in Lee Vining Creek, based

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01 on DFG's study, and the idea that it would be 80
02 percent of maximum habitat -- in fact if you were
03 basing it on the final report, your recommendation
04 would be different, wouldn't it?
05 A I don't know if I want to make a recommendation
06 right now. I haven't reviewed the data that carefully,
07 and I don't necessarily make a recommendation on the
08 results of a single life stage. But I would say that
09 there might be a probability that the upper range would
10 be somewhat higher.
11 Q And in fact that curve is still rising even as it
12 goes off the chart at 95 cfs, isn't it?
13 A Could be.
14 Q So that it's possible we're not at the maximum?
15 A It could be right at its peak as well.
16 Q Let me ask you very briefly, do you have any
17 recommendations with regard to the flows in Walker and
18 Parker Creek?
19 A No, I do not.
20 Q Do you understand that DWP's management plan
21 proposes not to divert water from those creeks?
22 A Yes.
23 Q And do you assume that if that water is left in
24 the streams, it will maintain fish in good condition in
25 those streams?

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01 A I presume. We have never generated any weighted
02 usable area versus discharge curves.Ô
03 \lù,ù,Ú Ú
04 management plan brochure. Did you say you were not
05 familiar with this?
06 A I said I had not worked in the development of that
07 plan.
08 Q If I were to tell you that it says that, "minimum
09 stream flow releases from Lee Vining Creek will range
10 from 16 cubic feet per second to 74 cubic feet -- in
11 the winter -- to 74 cubic feet per second in June," do
12 you know where those minimum recommendations would have
13 come from?
14 A No.
15 Q And one final question with regard to Walker and
16 Parker, at the time you did your study, a Mono gate
17 release of 20 cfs would result in approximately what
18 flow at the county road?
19 A At the time of our studies?
20 Q Yes.
21 A In 1987?
22 Q Yes.
23 A About 11 cfs.
24 Q Okay. And if you were to assume that Walker and

25 Parker had flows of approximately 15 cfs combined,
0102

01 would you assume that all that flow would make it into
02 Rush Creek, or would those streams also lose before
03 joining Rush Creek?

04 A I'm not sure I have an opinion on that. I haven't
05 looked at the data on Walker and Parker Creek, nor do I
06 feel comfortable talking about percolation on those
07 streams.

08 Q But it's at least possible that if they also lost
09 water to percolation by the time they joined Rush
10 Creek, they might not make up for the other losses
11 between the Mono gate release and the point -- their
12 point of confluence with the stream?

13 A Well, it depends on what the flow is in the
14 summertime from those -- emanating from those creeks.
15 The analysis that we did that showed the creek fell
16 from 20 cfs down to 11 cfs was a summertime study. And
17 I believe there were other studies done during other
18 times of the year when that loss was much less.

19 Q I would -- I think that's -- actually one other
20 question.

21 You referred to the E.A. population studies and
22 you said the streams were comparable. Did you, in
23 fact, take into account all the other limiting factors
24 that might have been at work in assembling that data?

25 A All limiting factors that may have been operating
0103

01 on all of the other streams?

02 Q Yeah. How did you determine they were comparable?

03 A Just -- just by evaluating the scatter of points
04 in a plot. I think Dr. Morhardt will discuss that in
05 more detail.

06 Q Isn't Lee Vining -- excuse me, Rush Creek in its
07 natural condition larger than almost any of the streams
08 included in that study?

09 A I don't know.

10 Q Didn't the study, in fact, leave out most of the
11 large streams such as the Owens River?

12 A I'd ask you to refer to Dr. Morhardt with that
13 question.

14 Q Thank you.

15 MS. CAHILL: I have no more questions.

16 HEARING OFFICER DEL PIERO: Thank you very much.

17 MS. CAHILL: I would move that we admit DFG 135,
18 and I will do the other when I have my witness to
19 identify it.

20 HEARING OFFICER DEL PIERO: Unless I hear
21 objections to that, that will be so ordered.

22 (Exhibit Number DFG 135
23 was received into evidence.)

24 MR. FRINK: Miss Cahill? In order that our record
25 is clear, on Exhibit 136, I would request that you mark

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01 each one of the sheets with an A, B, C, or D, as is
02 appropriate. And in order that it isn't overly
03 burdensome, I wonder if we could have a paper version

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t exhibit?

05 MS. CAHILL: Yes, I will provide that. Thank you.

06 MR. FRINK: Thank you.
07 HEARING OFFICER DEL PIERO: Mr. Dodge?
08 MS. CAHILL: In fact, I have copies of those, now,
09 I can provide. They're not exactly each separate sheet
10 on the same scale, but if you don't need to overlay
11 it --
12 MR. FRINK: Fine.
13 MS. CAHILL: I'll give them to you now, and to the
14 other parties.
15 HEARING OFFICER DEL PIERO: Thank you.
16 Mr. Dodge?
17 MR. DODGE: Yes --
18 HEARING OFFICER DEL PIERO: Where did you send
19 Mr. Flinn?
20 MR. DODGE: Back to work.
21 MR. BIRMINGHAM: Another admission. When
22 Mr. Flinn is here, he's not working. Thank you.
23 MR. DODGE: I've had Mr. Hanson's declaration of
24 September of 1989 reproduced overnight. And we've
25 marked it as National Audubon Society Exhibit 220. And

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01 I've asked Mr. Payne (phonetic) to distribute copies to
02 everyone. And I would move the admission of Exhibit
03 220.

04 HEARING OFFICER DEL PIERO: Any objections?

05 MR. BIRMINGHAM: I need to see a copy of 220.

06 HEARING OFFICER DEL PIERO: Any objections?

07 MR. BIRMINGHAM: No objections.

08 HEARING OFFICER DEL PIERO: So ordered.

09 (NAS Exhibit Number 220

10 was received into evidence.)

11 RE-CROSS-EXAMINATION BY MR. DODGE

12 Q Now, Mr. Hanson, we were talking about this
13 Exhibit 220 yesterday, and we talked about the gradual
14 increase in adult habitat in Rush Creek up to 150 to
15 189 cfs.

16 Let me ask you, sir, was that -- was that estimate
17 that you made in this declaration, was that based on
18 your utilization curve or your preference curve?

19 A I was thinking about that last night. I really
20 don't know the answer to that question. I'm not even
21 sure it was based on those data at all, or it may have
22 been based on the generic curves from the Smith and
23 Acitunal (phonetic) report. I really don't know. This
24 was done some time ago, and I really can't recall.

25 Q So it may have been based on Smith and Acitunal

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01 (phonetic)?

02 A Could have been.

03 Q And that would be a preference curve, then, right?

04 A Yes. I'm just not certain of the data on --

05 Q Smith and Acitunal (phonetic) curve is the same
06 curve that's being used in the proposed flow regime
07 being recommended by the Department of Fish and Game,
08 correct?

09 A Well, for all life stages but juvenile.

10 Q So in 1989 you were using the Smith and Acitunal
11 (phonetic) curves for Rush Creek?

12 A I'm not saying that. I don't know what curve I
13 was using.

14 Q You might have been.
15 A I could have.
16 MR. BIRMINGHAM: Excuse me. I wonder if
17 Mr. Hanson could be given an opportunity to read the
18 entire declaration before these questions go on.
19 HEARING OFFICER DEL PIERO: Mr. Hanson, do you
20 need to read --
21 MR. HANSON: I haven't read the entire thing.
22 I've only focused on --
23 HEARING OFFICER DEL PIERO: Stop the clock. Go
24 ahead and read it.
25 MR. HANSON: Maybe the answer's in there. Yes, in

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01 fact, the answer is right here.
02 Q BY MR. DODGE: What's the answer, sir?
03 A It's in paragraph three. They were based on the
04 data collected by

E.A.Ô

E.A. data. Was that
06 utilization data or preference data?
07 A I think it would have been utilization data, but
08 I'm not certain of that.
09 Q But if you look at Figure 2, over there right
10 behind you, sir, if you'd look behind you. Figure 2,
11 which you've submitted with your testimony today,
12 that's based on utilization data; is that correct?
13 A Yes. I can't tell you why the differences are
14 there. I have some ideas why there are different
15 results here than there. This was a preliminary
16 evaluation. And for one thing, I think at that time we
17 didn't have knowledge or had not worked in for the
18 analysis, the losing nature of the stream that I
19 discussed previously in my testimony. That is one of
20 the factors that we built into the model, I think, near
21 the end after this declaration was provided.
22 All I can say is this was a preliminary evaluation
23 and was based on data that I had and an analysis that I
24 performed at the time, which was preliminary. And I
25 had, subsequent to that time, developed a more final

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01 analysis.
02 Q Let me talk to you about this 80 percent of
03 weighted usable area goal as it relates to limiting
04 factors.
05 Now, when Mr. Roos-Collins asked you questions
06 about limiting factors, you talked about various
07 factors that have an impact on fish, and you mentioned
08 temperature and food.
09 Would you agree with me that enough refuge
10 habitat -- by refuge, I mean refuge from high velocity,
11 can also be a limiting factor?
12 A You mean an inadequate amount of refuge habitat?
13 Q Correct.
14 A Yes. I would say, theoretically, that could be a
15 limiting factor.
16 Q And could another limiting factor be an absence of
17 suitable over wintering habitat?
18 A Yes.
19 Q And you told us in response to Mr. Roos-Collins'
20 question, that today, habitat is a limiting factor in

21 Rush Creek. Do you recall that testimony?
22 A Well, yes. What I was stating there was that the
23 assumption behind my testimony is that weighted usable
24 area can be a limiting factor. And I utilize the
25 weighted usable area curves to insure that it isn't a

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01 limiting factor.

02 I can't say with absolute certainty that those
03 weighted usable area calculations that were made by the
04 model, either out of E.A. or Fish and Game's analysis,
05 will, in fact, limit the fishery, but that's the
06 assumption behind the PHABSIM model.

07 Q Now, let me ask you about this 80 percent factor.
08 Let me ask you to assume that our goal in this
09 proceeding is the restoration of pre-diversion
10 fisheries. All right? And let me ask you to assume,
11 further, that the limiting factors in Rush Creek today
12 are different than they were pre-diversion.

13 Hypothetically, for example, that -- a limiting
14 factor today is lack of refuge habitat from high flows,
15 and that that was not a limiting factor pre-diversion.

16 Now, based on those assumptions, would you agree
17 with me that we should restore the fishery in terms of
18 limiting factors to it's pre-diversion condition before
19 we applied your 80 percent rule?

20 A Yes. If there are other limiting factors, outside
21 of weighted usable area, say food, I think what you're
22 saying is there may be some other limiting factor
23 operating now that wasn't operating pre-diversion days,
24 so let's say it's food.

25 Q Let's say it's food, for example, hypothetically?

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01 A Then would you want to eliminate that limiting
02 factor. Yes. Well, I would say that, you know, it's
03 not necessarily you go for one after the other, or that
04 one comes before the other. You would essentially want
05 to try to, in a sense, optimize conditions for the

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y by eliminating that limiting factor, if it in
07 fact is a food limitation, and at the same time, insure
08 that your eliminating the possibility of weighted
09 usable area then taking over as a limiting factor. But
10 I wouldn't say that one comes before the other,
11 necessarily. It's a combination, or let's say a
12 simultaneous optimization of all factors. That's how I
13 would approach it.

14 Q But wouldn't it be correct that you would have to
15 equalize the present situation with the pre-diversion
16 situation before you applied your 80 percent test?

17 A What you mean by equalize -- you mean the fishery
18 numbers?

19 Q The fishery habitat. The factors that limit
20 fishery habitat.

21 A You would want to equalize those --

22 Q If your goal is to restore historic conditions.

23 A The same limiting factors that may have existed.

24 Q Yes.

25 A Or the lack of limiting factors.

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01 Q Right. You'd have to correct the present

02 condition in terms of the limiting factors before you
03 applied the 80 percent test?
04 A Well, again, I'm not sure whether I would do it as
05 a before or after. I would do it as a simultaneous.
06 I'm not sure why you think one needs to come before the
07 other, necessarily. I view it as a simultaneous
08 process.
09 Q All right. Mr. Herrera asked you some questions
10 about substrate, and you testified that they were --
11 that substrate was critical to spawners and that -- but
12 you had not modeled that.
13 Do you have any opinion as to whether Lee Vining
14 Creek, as it exists today with the DWP diversion dam,
15 needs gravel added to it from time to time in order to
16 have successful spawning?
17 A I don't have an opinion on that.
18 Q Now, I may have misunderstood this testimony, but
19 you were talking in response to -- I believe it was,
20 again, Mr. Herrera.
21 And did you say that the IFIM does take into
22 account limiting factors?
23 A Yeah, in a general sense, yes. In fact, it very
24 much does.
25 Q But it doesn't take into account things like

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01 temperature or food, does it?
02 A Oh, yes.
03 Q The one you did took into account temperature and
04 food in?
05 A The analysis I did, no. It did not take into
06 account -- I did not do a temperature modeling
07 exercise. I evaluated the temperature modeling
08 exercises performed by the Beak facilities.
09 Q Your IFIM at least was limited to depth and
10 velocity?
11 A That's correct.
12 Q So there may be other limiting factors that aren't
13 covered by your IFIM's?
14 A Or by the Beak IFIM. Certainly there are others
15 that might not be that well known.
16 Q Now, changing subjects in response to a question
17 by Mr. Canaday about other IFIM's that you've performed
18 in the eastern Sierra, did you testify that you used
19 the Smith and Acitunal (phonetic) curves in those
20 IFIM's?
21 A Yes.
22 Q And again, those are exactly the curves that are
23 being used by the Department of Fish and Game in its
24 proposed recommendations, correct?
25 A Well, all but with the exception of the juvenile

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01 life stage. The reason I used those in the previous
02 studies is because they, in fact, are the only curve --
03 curves for eastern Sierra Nevada streams. And in
04 hydroelectric projects that I've been involved with,
05 Cal Fish and Game has recommended that they be used,
06 and they have been
used.ô
in the eastern Sierra;
08 isn't that true?

09 A Yeah -- well, I don't know. I think they are.
10 Q Now, in response to another question by
11 Mr. Habitat -- Mr. Habitat -- Mr. Canaday about -- oh,
12 I wrote it down right here, habitat. In response to
13 another question by Mr. Canaday about keeping fish in
14 good condition, and he asked you what the habitat
15 components of that were, and you responded, "adequate
16 weighted usable area, temperature, food and flushing."
17 Would you -- would you add to that list the
18 adequate spawning gravel?
19 A Yes.
20 Q Adequate over wintering habitat?
21 A Um-hum.
22 Q And adequate refuge from high flows?
23 A Well, anyone of these variables could be a
24 limiting factor. I don't know to what degree they
25 operate on Rush Creek, at least all of them.

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01 Q Just a couple more questions, sir. In response to
02 a question by Mr. Birmingham about the natural creation
03 of pools, you said, quote, some are starting, if I
04 wrote it down correctly. And then you went on to say
05 that, "pools would be formed naturally."
06 Would you agree with me in that this potentially
07 could take hundreds of years?
08 A Not necessarily. I think that it could occur more
09 rapidly than that.
10 Q Over what time frame?
11 A I don't have an opinion. But it seems to me that
12 100 years is much more rapidly. I believe, if I recall
13 Dr. Beschta's testimony, he said ten years.
14 Q But this is not an area of your expertise, is it?
15 A No.
16 Q Finally, final question, Ms. Cahill -- Ms. Cahill
17 drew on the Board there exhibit -- Fish and Game
18 Exhibit 135, and the way she drew it at four-foot
19 depth, that you had basically zero weighted usable
20 area, correct?
21 A Yes.
22 Q And that's because under your curve, four-feet
23 deep water has zero value for adult brown trout,
24 correct?
25 A That's correct.

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01 Q Now, would you agree with me that that result,
02 i.e., zero weighted usable area for four-foot deep
03 water flowing at one foot per second is biologically
04 unrealistic?
05 A I would say that there could be fish in that
06 depth, at that depth. There would be probably adult
07 fish at that depth. I would also repeat the response
08 that I made in regards to her comments relative to the
09 sensitivity of model output and policy decisions.
10 Q As a biological matter, simply as a biological
11 matter, water four feet deep flowing at one foot per
12 second is extremely good habitat for adult browns;
13 isn't that true?
14 A It's good habitat.
15 Q No further questions, thank you.
16 HEARING OFFICER DEL PIERO: Thank you very much.

17 Mr. Roos-Collins?
18 MR. ROOS-COLLINS: Mr. Del Piero, let me begin
19 with a procedural request to you. Mr. Hanson's answer
20 to one of Mr. Birmingham's questions prompted me to
21 attempt to obtain documents that I think are relevant
22 to Mr. Hanson's answer. I will be able to obtain
23 those documents during the lunch recess.
24 Could I reserve five minutes of time for direction
25 to Mr. Hanson after lunch.

0116

01 HEARING OFFICER DEL PIERO: Mr. Hanson, are you --
02 MR. HANSON: I'll be here.
03 HEARING OFFICER DEL PIERO: Yes.
04 MR. ROOS-COLLINS: Good. Thank you.
05 RECROSS-EXAMINATION BY MR. ROOS-COLLINS
06 Q Mr. Hanson, let's begin again with table 3A-3 from
07 the draft Environmental Impact Report.

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s your flow recommendation a monthly median flow?

09 A No.
10 Q Is it an instantaneous flow?
11 A It's a constant flow for a month.
12 Q So at any time, and on average, the flow would be
13 fixed at some specified cubic foot per second?
14 MR. BIRMINGHAM: Objection, compound.
15 MR. ROOS-COLLINS: I withdraw the question.
16 Q BY MR. ROOS-COLLINS: At any time the flow would be
17 fixed at some specified cubic foot per second?
18 A Yes.
19 Q And on a monthly basis, as well, the flow would be
20 that fixed cubic foot per second?
21 A With the exception of any other flows necessary to
22 perform other functions that have been described
23 already in my testimony.
24 Q Let's assume that the State Water Board adopted
25 your flow recommendation for weighted usable area and

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01 did not supplement that recommendation with any other
02 flows.

03 Your flow recommendation for Rush Creek
04 corresponds to the flow which was exceeded before
05 diversions began nearly 100 percent of the time; is
06 that correct?

07 A Well -- based on these data here?

08 Q Yes.

09 A Before diversions began, was a circumstance in
10 which there was control or regulation of flow
11 associated with southern Cal Edison hydroelectric
12 projects up river.

13 Q I believe that table 3A-3 purports to estimate
14 mean monthly flow in a natural setting.

15 My question to you is: Does your recommendation
16 for Rush Creek correspond to the flow that would have
17 been exceeded nearly 100 percent of the time in a
18 natural setting?

19 A Yes. I think that's consistent with what I'm
20 saying.

21 Q The same question for Lee Vining Creek, again
22 referring to table 3A-3. What does your flow
23 recommendation most closely correspond to?

24 A The zero or the ten percent value, somewhere in
25 there.

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01 Q In answer to questions by Mr. Dodge, you stated, I
02 believe, that you were not familiar with the Fish and
03 Game report 86-3 entitled, "Survey of Fish Populations
04 in Streams of the Owens River Drainage, 1985."

05 Was that your answer?

06 A What -- would you name the report again? I've
07 seen this report before.

08 Q Is this report the basis for your discussion on
09 page 50 of the fish populations in the Owens Basin?

10 A It's part of it.

11 MR. HERRERA: Mr. Roos-Collins, could you identify
12 that report there again for me, please?

13 MR. ROOS-COLLINS: Yes. The report is entitled,
14 "Survey of Fish Populations in the Streams of the Owens
15 River Drainage," colon, "1985, by John M. Deinstadt,"
16 that's D-E-I-N-S-T-A-D-T, et al. Fish and Game inlands
17 fisheries report 86-3.

18 Miss Cahill, is this report a Fish and Game
19 exhibit in this proceeding?

20 MS. CAHILL: No, it is not.

21 MR. ROOS-COLLINS: Mr. Birmingham, is this an LA
22 DWP exhibit in this proceeding?

23 MR. BIRMINGHAM: No.

24 MR. ROOS-COLLINS: Mr. Del Piero, I will have
25 copies made of this report over the lunch recess and

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01 will produce it after lunch.

02 Q BY MR. ROOS-COLLINS: Let me ask you, Mr. Hanson, to
03 focus on table three which appears to be a list of the
04 creeks contained within this study.

05 Are you familiar with table three in this
06 publication?

07 A Yes, I think I've seen this table.

08 Q Which of the streams listed in table three

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pre-41 condition most

10 closely?

11 A Corresponds to it in what way?

12 Q Let's break that down. Flow?

13 A I couldn't answer that question.

14 Q Channel form?

15 A I don't know.

16 Q Vegetation?

17 A No. I don't know.

18 Q Thank you.

19 MR. ROOS-COLLINS: No further questions. Although
20 I do reserve time to review this matter after lunch.

21 HEARING OFFICER DEL PIERO: After the lunch hour,
22 Mr. Roos-Collins. Thank you very much.

23 Miss Scoonover's gone? No?

24 MR. VALENTINE: Miss Scoonover is gone, but I
25 don't have any questions, Mr. Del Piero.

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01 HEARING OFFICER DEL PIERO: Okay. Anyone else in
02 terms of recross? Mr. Frink?

03 MR. FRINK: No, I don't. But I believe
04 Mr. Herrera does.

05 HEARING OFFICER DEL PIERO: Mr. Herrera?
06 MR. HERRERA: Yes, I just have a couple of
07 questions here regarding --
08 RE-CROSS-EXAMINATION BY THE STAFF
09 Q You indicated that you had done population
10 estimates or studies for a variety of hydroelectric
11 projects in the Owens Basin, Mono Basin. About how
12 many of those?
13 A Oh, a dozen to 20.
14 Q And were those population analysis based on brown
15 trout, rainbow trout, or --
16 A Mostly brown trout.
17 Q Mostly brown trout. Were any of these streams
18 heavily fished?
19 A Some were and some weren't.
20 Q Were they planted fish?
21 A Some were planted with rainbow.
22 Q With rainbows. Do you know if they planted any
23 brown trout?
24 A I don't think so.
25 Q Do you have knowledge if they do or do not?

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01 A I don't have any specific knowledge. I believe
02 they don't plant brown trout in those streams.
03 Q Okay. Do you know whether or not the Department
04 of Fish and Game had planted Rush Creek prior to your
05 observations?
06 A I was never aware that it had occurred. I do not
07 think they did.
08 Q Did you talk to Fish and Game to ask them whether
09 they had or not?
10 A I did not specifically discuss it with Fish and
11 Game.
12 Q I have one other question regarding the Mono gate
13 return ditch. You had indicated here that there are --
14 there is more aquatic vegetation there today than there
15 was during your examination in 1987?
16 A I think that's my assessment. I've seen it
17 recently, and it appears to me that there's more
18 aquatic vegetation there today than there had been
19 previously in 1987.
20 Q Is that vegetation desirable for the fishery?
21 A It is, to some degree, I think it is.
22 Q Would you attribute that additional vegetation to
23 higher flows that are there today than were there in
24 1987?
25 A I'm not sure I would say that. I really don't

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01 know what factors dictate growth. I'm not -- again,
02 I'm not a specialist in aquatic vegetation.
03 Q Okay. That concludes my questions. Thank you.
04 HEARING OFFICER DEL PIERO: Mr. Canaday?
05 Q BY MR. CANADAY: When you developed your utilization
06 curves from observations in 1987 on Rush Creek, did you
07 observe many adult brown trout?
08 A Would you repeat the last part of that question?
09 Q Did you observe many adult brown trout?

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ell, are you talking about E.A. Engineering?

11 Q Yes.

12 A I can't tell you the exact number of brown trout,
13 but there were enough brown trout observations taken to
14 generate a curve.
15 Q And I believe you stated earlier that the fish
16 populations in a natural condition are very dynamic and
17 change from year to year; is that correct?
18 A Yeah. If I didn't say that, I believe it.
19 Q Has E.A. been collecting more fisheries data on
20 Rush Creek since 1987?
21 A Well, E.A. has been involved in some
22 electrofishing studies since 1987, yes.
23 Q Have the relative numbers of adult fish, brown
24 trout, increased?
25 A I haven't looked that closely to say yes or no to

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01 that question.
02 Q That's all I have.
03 HEARING OFFICER DEL PIERO: Thank you very much.
04 Anyone else? Board members? No questions? Thank you
05 very much, Mr. Hanson. I appreciate all the time and
06 effort you put in. We'll see you back after lunch.
07 Mr. Roos-Collins, we're going to break right now
08 for lunch. Ladies and Gentlemen, it's 20 to. Rather
09 than starting again, I anticipate being back here right
10 at 1:00 o'clock. Okay? Mr. Birmingham?
11 MR. BIRMINGHAM: Mr. Del Piero, for purposes of
12 time, both Dr. Hardy and Dr. Morhardt are here.
13 They're our two remaining witnesses on fisheries.
14 We'll put them on as a panel this afternoon, so we can
15 hopefully conclude our fisheries testimony today.
16 HEARING OFFICER DEL PIERO: Okay. You have an
17 additional witness, also?
18 MR. BIRMINGHAM: Mr. Tilliman is -- he skipped
19 town. He's not here. But he'll be here this
20 afternoon.
21 HEARING OFFICER DEL PIERO: Let me ask you,
22 Mr. Birmingham, is the nature and complexity of the
23 testimony -- well, I've seen the nature and complexity
24 of the written testimony.
25 Do you -- well, perhaps the question is better put

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01 to Ms. Cahill and Mr. Dodge. Do you folks anticipate
02 that the nature and complexity of the cross-examination
03 of the two witnesses that Mr. Birmingham proposes to
04 put on as a panel will be comparable to that of
05 Mr. Hanson?
06 MR. DODGE: I anticipate having a few questions of
07 Mr. or Dr. Hardy. I don't know which it is. And I
08 will have some questions of Dr. Morhardt.
09 HEARING OFFICER DEL PIERO: Am I to assume from
10 your statement that you -- when you say you will have a
11 few questions --
12 MR. DODGE: I will say that I will have
13 substantially fewer questions to either of those
14 gentlemen than I had for Mr. Hanson.
15 HEARING OFFICER DEL PIERO: Okay. Miss Cahill?
16 MS. CAHILL: I will have considerable questions
17 probably for Dr. Hardy, although we've already laid
18 some of the ground work. We already know some of the
19 basic concepts --

20 HEARING OFFICER DEL PIERO: I'm just trying to
21 figure out whether or not my expressed desire, and
22 Mr. Birmingham's indication that we're going to be done
23 with the fisheries witnesses today is, in fact, going
24 to be correct,.
25 So -- we'll take a break now. We'll be back here

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promptly at 1:00 o'clock, and we'll start right then.

02 Thank you.

03 (Whereupon the lunch recess was taken at this
04 time.)

05 HEARING OFFICE DEL PIERO: Ladies and Gentlemen,
06 this hearing will again come to order.

07 Mr. Birmingham, Mr. Dodge, Miss Cahill, I've given
08 certain issues a tremendous amount of consideration
09 during the two minutes or so I had while I was eating a
10 burrito between the eighth floor of the Resources

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12 And I've decided that we are not going to be
13 successful in getting all of the witnesses that I had
14 hoped done today.

15 So it is my sense that you need to go back to
16 Bishop and take your daughter with you, okay?

17 MS. GOLDSMITH: Not that she's not welcome here.

18 HEARING OFFICER DEL PIERO: Not that she's not
19 welcome. And I understand our staff had a wonderful
20 time on the tour yesterday. I understand you had a
21 pretty good time, too. But I think given the fact that
22 it's starting to show some precipitation outside, and
23 that tends to turn into snow on top of the summit,
24 unless I hear any vehement objections from any of the
25 counsel, which I probably won't pay any attention to

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01 anyway, I will -- I would suggest, sir, that we aren't
02 going to take you up today. And we'll take you -- were
03 you scheduled to go on with another witness at the
04 same --

05 MR. CANADAY: We would -- Mr. Del Piero, we'd
06 prefer that Mr. Tilliman was paneled with Dr. Gel
07 (phonetic).

08 MR. BIRMINGHAM: That's acceptable.

09 HEARING OFFICER DEL PIERO: Fine. Have a safe
10 trip. Okay. Where were we? We were here with
11 Mr. Hanson.

12 Mr. Roos-Collins, you've got five minutes.

13 MR. ROOS-COLLINS: I have reserved time.

14 RECROSS-EXAMINATION BY MR. ROOS-COLLING

15 Q Mr. Hanson, let's return to table 3A-3. During
16 The lunch break, Mr. Vorcter (phonetic), who is a very
17 precise hydrologist and has been sworn in this
18 proceeding, informed me that I was close, but not quite
19 accurate in describing this.

20 He informed me that the table depicts flow above
21 the points of diversion by LA DWP, taking into account
22 regulation by upstream hydroelectric facilities.

23 With that understanding, would you still
24 characterize your flow recommendation as being
25 comparable to the zero percent exceedence level shown

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01 in that table for Rush Creek?

02 A Yes, I would say so.
03 Q And would you still characterize your flow
04 recommendation for Lee Vining Creek as being comparable
05 to the zero to ten percent exceedence levels shown in
06 that table?
07 A Yes, sir.
08 Q Thank you. Let me turn, in the few minutes that I
09 have, to your answer to Mr. Birmingham's question about
10 the review by the Fish and Wildlife Service and the
11 Department of Fish and Game of E.A.'s proprietary fish
12 flow model.
13 Do you recall Mr. Birmingham's question?
14 A Yes, I do.
15 Q And what was your answer?
16 A That the model has been viewed by two parties, the
17 U.S. Fish and Wildlife Service and the California
18 Department of Fish and Game.
19 And then -- the letter that I received from the
20 U.S. Fish and Wildlife Service indicated that while the
21 models were somewhat different, they were essentially
22 the same. Their predictions were somewhat different
23 for this test data set, essentially, they were the
24 same. The letter I received from Cal Fish and Game
25 evaluated the similarities of the model and proved the

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01 use of the model.

02 Q You don't mean to imply, however, that the Fish
03 and Wildlife Service and the Department of Fish and
04 Game had accepted E.A.'s use of its model as accurate
05 or sufficient in all regulatory proceedings, do you?

06 A Yes, I view it to be that.

07 Q I will show you now exhibits, which we will mark
08 in order, Cal-Trout 17 through 22.

09 For clarification, Exhibit 17 is a November 5th,
10 1993, letter from Mike Mines (phonetic) of the State
11 Water Board to the U.S. Fish and Wildlife Service

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ing the Playv River Project.

13 Cal-Trout Exhibit 18 is an October 22nd, 1993,
14 letter from Dale Pierce of Fish and Wildlife Service to
15 you at E.A., again regarding the Playv river project.

16 Cal-Trout Exhibit 19 is a letter dated March 31st,
17 1993, from Dean Schumway (phonetic) Federal Energy
18 Regulatory Commission to John Mills, project manager
19 Playv river project.

20 Cal-Trout Exhibit 20 is a January 19th, 1993,
21 letter from the Department of Fish and Game signed by
22 Mr. John Turner to the Federal Energy Regulatory
23 Commission. Let's stop there.

24 You understand that these documents concern E.A.'s
25 fish flow studies submitted as part of the application

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01 for the Playv river project to the Federal Energy
02 regulatory commission; is that correct?

03 A Yes.

04 Q Would you agree with me that these letters express
05 concerns about the habitat suitability criteria used by
06 E.A. in that study?

07 A I haven't read all these letters. So I can't
08 necessarily agree to that right now.

09 Q Let me have you turn to Cal-Trout Exhibit 18,
10 second paragraph?
11 A Now, which letter is that?
12 Q That's the October 22nd, 1993, letter from the
13 Fish and Wildlife Service to you.
14 A Which paragraph?
15 Q Second paragraph. "The service is not satisfied
16 with the habitat suitability curves for rainbow trout
17 that were developed by E.A."
18 Have you received this letter?
19 A I don't recognize the letter.
20 Q Let me lay the foundation, Mr. Hanson, for
21 Cal-Trout Exhibits 21 and 22. Cal-Trout Exhibit 21 is
22 an August 31st, 1993 letter from Fred Worthley, that's
23 W-O-R-T-H-L-E-Y, regional manager, region five,
24 Department of Fish and Game, to the Southern California
25 Edison Company concerning Bishop Creek.

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01 And Cal-Trout Exhibit 22 is a January -- excuse
02 me, June 14th, 1993 letter from Dean Schumway
03 (phonetic) to Southern California Edison, also
04 regarding the Bishop Creek project.
05 Are you familiar with these letters?
06 A Yes, I think I recognize these letters.
07 Q Do these letters express concern about the habitat
08 suitability criteria used by E.A. in connection with
09 that project?
10 A Yes.
11 Q Thank you.
12 MR. ROOS-COLLINS: Mr. Del Piero, I would move for
13 admission of these exhibits at the proper time in the
14 presentation of our case.
15 HEARING OFFICER DEL PIERO: Fine.
16 MR. ROOS-COLLINS: Thank you very much.
17 HEARING OFFICER DEL PIERO: Thank you very much.
18 Mr. Hanson, we thank you for your presence and for your
19 cooperation. Okay. Mr. Birmingham, your next
20 witnesses.
21 MR. BIRMINGHAM: Certainly. At this time the
22 Department of Water and Power would like to call
23 Dr. Thomas Hardy and Dr. Emil Morhardt.
24 HEARING OFFICER DEL PIERO: Dr. Hardy, you've been
25 sworn already?

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01 DR. HARDY: Yes, sir.
02 HEARING OFFICER DEL PIERO: Dr. Morhardt, have you
03 been sworn?
04 DR. MORHARDT: Yes, I have.
05 HEARING OFFICER DEL PIERO: Okay. Good afternoon,
06 gentlemen.
07 MR. BIRMINGHAM: I'd like to start, if I may, with
08 Dr. Hardy.
09 DIRECT EXAMINATION BY MR. BIRMINGHAM
10 Q BY MR. BIRMINGHAM: Dr. Hardy, LA DWP Exhibit 17 has
11 been identified as the direct testimony of
12 Dr. Thomas B Hardy. Ô
13 Have you had an opportunity to review LA DWP
14 Exhibit 17?
15 A Yes, sir.
16 Q And is LA DWP Exhibit 17 a copy of the direct

17 testimony that you prepared in connection with these
18 proceedings?

19 A Yes, sir.

20 Q LA DWP Exhibit 18 is a document identified as
21 background and experience of T. Hardy Ph.D. Is LA DWP
22 Exhibit 18 a document which contains a description of
23 your education experience and professional
24 qualifications?

25 A Yes, sir.

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01 Q Would you please briefly summarize the testimony
02 that is contained in LA DWP Exhibit 17?

03 A That's my qualifications?

04 Q No, that's your written testimony.

05 A The testimony that I presented before this Board
06 concerned issues that I was asked to evaluate regarding
07 the technical instream flow reports on Rush and Lee
08 Vining Creek.

09 Q Excuse me, Dr. Hardy, perhaps before you do that,
10 you could give us a brief summary of your
11 qualifications and background?

12 A I received my Bachelor of Science in secondary
13 education in biology in 1977 from the University of
14 Nevada at Las Vegas. I received a second Bachelor's of
15 Science in 1978 in biology from the University of
16 Nevada at Las Vegas.

17 I received a Master's of Science in biology,
18 aquatic ecology, from the Nevada-Las Vegas in 1982.

19 And I received my Ph.D. in 1988 from Utah State
20 University in civil and environmental engineering.

21 I am presently a faculty member in the Department
22 of Civil and Environmental Engineering. I am the
23 director of the Institute for Natural Systems
24 Engineering. And as part of the College of
25 Engineering, I have a joint appointment with the Utah

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01 Water Research Laboratory at Utah State University, and
02 an adjunct position with the Watershed Science Unit in
03 the College of Natural Resources at Utah State
04 University.

05 For the past 15 years, I have focused my research,
06 scientist and engineering expertise on the development
07 and testing and application of multi-disciplinary
08 assessment methods, primarily in aquatic ecosystems,
09 and in particular in looking at the effects of altered
10 flow regimes on the aquatic environment. The
11 particular instream flow incremental methodology
12 experience includes modeling in over a thousand streams
13 and rivers in Canada and the United States.

14 I have performed all aspects of study design, and
15 in particular the modeling aspects of these studies, as
16 well as determination of impacts and instream flows.

17 At present, for the last three years or more, I
18 have been the lead instructor for these computer
19 modeling classes, and teach them for the Fish and
20 Wildlife Service across the country, and have
21 personally developed the existing lecture material that
22 is used to teach those classes.

23 In addition, I have done considerable model
24 development in cooperation with the U.S. Fish and

25 Wildlife Service on the PHABSIM models. I have been
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01 the principal author of the user interface that is
02 currently part of that package. I wrote the curve
03 development package that comes with the PHABSIM
04 computer models and have many versions of my own
05 routines that are used within PHABSIM.

06 I am a certified fishery scientist, in addition to
07 my experience in open channel flow modeling and
08 engineering.

09 In terms of my specific experience in the Mono
10 Basin, I have worked on Bishop Creek and reviewed
11 several reports relative to that for the southern
12 California Edison Company. I, as part of that work,
13 reviewed the suitability curve report, which I'm sure I

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e getting questions on relative to Smith and

15 Acitunal (phonetic) eastern Sierra trout streams.

16 And I have looked at the instream flow reports for
17 Lee Vining Creek, Rush Creek, both for California
18 Department of Fish and Game and E.A. Engineering. I
19 have also reviewed the material on Walker and Parker
20 creeks, as well as both the middle and Upper Owens
21 River.

22 I'd like to go on now and summarize my oral
23 testimony for the Board and proceed with that. I was
24 asked to provide an independent review of the instream
25 flow technical reports that were utilized in the Mono

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01 Basin EIR, and evaluate the Mono Basin EIR in terms of
02 their use and interpretation of those data within the
03 Mono Basin EIR.

04 These reviews, as I've indicated, included Rush
05 Creek, Lee Vining Creek, Walker and Parker creeks, and
06 the middle and Upper Owens River. My review elements
07 from my experience included the factors of study
08 design, the habitat mapping and reach delineations, the
09 number and selection of cross-sections, field data
10 collection methods, hydraulic modeling, which included
11 both water surface and velocity predictions and
12 calibrations.

13 It included the development and selection of the
14 suitability index curves, the actual habitat modeling
15 that was conducted, the voracity and consistency of the
16 interpretation of the study results and their
17 integration into the formulation of instream flow
18 recommendations, and then how those recommendations
19 matched up with those being presented in the Mono Basin
20 EIR.

21 Based on that review, I have broken this oral
22 testimony into, in essence, two phases. One concerns
23 what I will call broad issues or concerns that cut
24 across most, if not all, of the instream flow
25 assessments that are discussed, and in particular how

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01 they were utilized in the Mono Basin EIR.

02 I think the Board is aware of, but needs to be
03 reminded that there are some apple and oranges type
04 comparisons in assessing what alter flow regimes or
05 instream flows may be, depending upon which creek is

06 under discussion.

07 The Upper Owens River basically looked at a
08 percent of optimal habitat beginning at 80 percent, and
09 then considered other geomorphical or sediment
10 movement conditions in the channel to come up with the
11 flow recommendations.

12 In Rush Creek, the flows were associated with the
13 median habitat duration analyses. Lee Vining Creek, in
14 the version of that report that I reviewed initially,
15 based the flow recommendations on simple flow duration
16 analyses. While Walker and Parker Creek utilized a
17 modified Tenant Method.

18 The ability to distinguish between different lake
19 levels and how that relates to flows and impacts
20 becomes difficult when there are different methods used
21 to assess what those impacts are on a stream by stream
22 basis.

23 I also have taken issue with the utilization of
24 the eastern Sierra trout stream curves of Smith and
25 Acitunal (phonetic) and have made the statement that

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01 they are, generally, biologically irrational for many
02 of those relationships, and when compared with
03 site-specific preference curves developed on-site, in
04 comparison to these regional curves, I believe are
05 symptomatic of the problems of using preference curves
06 at all in instream flow studies.

07 And if I might have my first two figures, please?
08 And Mr. Del Piero, may I approach the charts?

09 HEARING OFFICER DEL PIERO: Certainly.

10 DR. HARDY: Thank you, sir.

11 HEARING OFFICER DEL PIERO: Actually, can you
12 approach them, Dr. Hardy? If you take the
13 microphone -- can you -- I think you need to come
14 around the table to get the cord to

work.ô

all, I'd like to point out

16 for the benefit of the Board and other members of legal
17 counsel, in Figure D-2, this is the Brown Trout
18 Juvenile Overhead and Object Cover Curve for Water
19 Depths. And this is Figure A-2 from the volume two of
20 the California Fish and Game report on Rush Creek.

21 The point I want to notice here is, in terms of
22 the biological irrationality of the curves, are things
23 in the Smith and Acitunal (phonetic) curves that
24 commonly for the water depth, and many times for the
25 velocity, show bimobile characteristics that, in my

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01 opinion, are an artifact of the sampling procedure, the
02 frequency distributions of those observed data, and the
03 problems of attempting to correct or availability to
04 develop preference curves, which is not recommended at
05 this time when we teach the courses.

06 And I would question as a biologist familiar with
07 brown trout, and in this case, for brown trout
08 juvenile, that you see effects like this that make
09 biological sense, that a brown trout juvenile at
10 approximately 1.5 feet of water, shows a preference of
11 one, a declining preference out to two feet of depth,
12 and then an increase in preference out in the range to

13 three-and-a-half feet, and then a decline. There is
14 no, in my opinion, biological basis for these
15 relationships.

16 Also, in terms of the applicability of utilizing
17 continuing the regional preference curves of Smith and
18 Acitunal (phonetic) one discovers that if you look at
19 all of the site-specific curves that were developed,
20 none of them for the variables reflect the
21 relationships of the regional curves, and to me is
22 further evidence of the non-transferability to
23 site-specific conditions.

24 In fact, in many of the tests we have done with
25 site-specific curves and regional curves, preference
0139 curves in particular in their attempt to be transferred
02 to other streams, we are discovering that they are
03 universally untransferrable.

04 Where are my next two?

05 The Board may remember from previous testimony
06 that one of the key elements in the PHABSIM modeling
07 primarily relates to the sensitivity of those models to
08 velocity, and in particular, not only in the hydraulic
09 simulations of velocities, but also the utilization of
10 velocity SI curves.

11 And what I'd like to point out, again, is this
12 notion that the applications, generically, of the
13 eastern Sierra trout stream curves, or even the
14 site-specific curves that were developed, show both
15 biological inconsistencies, and also the differences
16 site by site of each and every site-specific curve are
17 different, and is further evidence that the generic
18 curve should not be applied.

19 I would point the Board's attention to the Smith
20 and Acitunal (phonetic) curves for brown trout juvenile
21 in the no-cover condition which shows, in my opinion,
22 irrational responses to a velocity gradient. There is
23 no biological reason why we should suspect brown trout
24 juveniles to show a reduction in suitability over the
25 range of zero to one foot per second, and increase over
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01 one to two feet per second, and then a decrease again.

02 And you can see there are many instances of bumps
03 and wiggles in these curves that are indicative of the
04 underlying algorithm or mathematical procedure used to
05 derive these curves. It would be much better to
06 eliminate these and think about the biological reality
07 of what the organism is doing.

08 One other issue I'd like to raise in a broad
09 categorical sense is that the monthly flow
10 recommendations for many of the sites show very little
11 change in the amount of predicted available area, which
12 are not justified by the underlying model results, if
13 you were to assume that the preference curves were
14 indeed usable.

15 Moving on now to study-specific issues, I have a

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m with the instream flow analysis on the middle

17 Owens River. In that report, the statement was made
18 that the velocity adjustment factors, which are an
19 indication of either the voracity of the water surface

20 modeling and/or the validity of the velocity
21 predictions, that one expects from theory a certain
22 pattern or relationship. And I will be happy to
23 demonstrate that for the Board if it is so desired.
24 In that report, the relationship was indicated as
25 being within valid ranges and following generally

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01 accepted relationships. Out of the 99 cross-sections,
02 each at the two-calibration discharges that I reviewed,
03 over 40 percent of those relationships did not follow
04 what I considered to be expected relationships based on
05 hydraulic theory.

06 My concern there is if that many cross-sections do
07 not follow what is anticipated, then the sensitivity of
08 the PHABSIM model to those types of errors, especially
09 in conjunction with these regional curves, which may
10 have, in fact, no applicability to site-specific
11 conditions, that I would caution the Board on reliance
12 of the weighted usable area results without recognizing
13 the high degree of uncertainty from those study
14 results.

15 Moving on to Lee Vining Creek, again,
16 site-specific issues of the suitability curves, I also
17 am concerned that the range of simulations indicated in
18 that report follow what is referred to as the rule of
19 thumb of 0.4 to 2.5, the range of simulated
20 discharges.

21 That rule of thumb is intended, in teaching the
22 course, to have students evaluate what might be
23 appropriate ranges of simulations. It is not
24 necessarily the proper range of simulation.
25 Oftentimes, those ranges can be much smaller.

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01 The fact that all of the cross-section information
02 over the measured discharges were all set at .4 and 2.5
03 seems difficult for me to believe, and I am suspect of
04 those ranges. And I raise this technical issue because
05 some of the flow recommendations occur at the higher
06 ranges of those simulated discharges.

07 I also have questions relative to the aggregation
08 of those results out in the range of 70 to 100 cfs as
09 indicated in the report. In that report for at least
10 reach six, the highest simulated discharge of 70 cfs,
11 which is 2.5 times higher than the measured discharge,
12 is considerably less than 95 or 100 cfs.

13 Reach five has a range of simulated discharge less
14 than 95 or 100 cfs, and yet aggregate results for all
15 of the reaches extend those results past even the 2.5
16 rule of thumb. And the result may, in fact, not be
17 valid.

18 I also have the opinion from review of not only
19 the instream flow reports, but other ancillary data
20 presented in these proceedings, that the instream flow
21 recommendations, at least in the original Lee Vining
22 report, essentially ignore the habitat based analysis
23 and other study results.

24 I also have the opinion upon review of the
25 information that the instream flow recommendations on a

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01 monthly basis are too high as indicated by California

02 Fish and Game recommendations, and that flows more in
03 the 30 to 40 cfs range may be appropriate, or as low as
04 20 to 30 based on the draft Lee Vining report.

05 Moving on finally to the site-specific issues with
06 the Rush Creek instream flow analysis, again, I draw
07 the Board's attention to the questions of the validity
08 of application of the regional suitability curves to
09 site-specific conditions in Rush Creek.

10 I did take a small issue with the temperature
11 simulations in Rush Creek where shading was ignored,
12 although it has been articulated as representing an
13 important element of water quality modeling.

14 I have extensive experience in water quality
15 modeling, and I feel that the failure to include cover
16 and using the hottest day of the entire period of

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inferences potentially

18 about near stress conditions for temperatures would not
19 be born out if cover were included in that analysis.

20 I also believe that the instream flow
21 recommendations established using the median habitat
22 values from the time series analysis are flawed. I do
23 not necessarily agree with the inference to the
24 citation of Bovee (phonetic) that this represents a
25 biologically justifiable criteria.

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01 I believe that flows over the ranges of 60 cfs,
02 which were indicated to cause sediment distribution
03 problems, are not mitigated by artificial gravel
04 recruitment, and therefore flows going as high as 100,
05 because they were the limit of the simulations, is not
06 a valid or logical reason.

07 And I believe that the flow recommendations that I
08 would develop if asked for Rush Creek may, in fact, be
09 lower than those specified by California Fish and Game,
10 and may clearly be in the 20 to 30 cfs range.

11 This concludes my summary of the oral testimony.

12 HEARING OFFICER DEL PIERO: Thank you very much,
13 Dr. Hardy. And Dr. Morhardt?

14 Q BY MR. BIRMINGHAM: Dr. Morhardt, LA DWP Exhibit 19
15 is a document identified as the direct testimony of Dr.
16 J. Emil Morhardt.

17 Have you reviewed that document?

18 A BY DR. MORHARDT: Yes, I have.

19 Q And is it the testimony that you drafted for these
20 proceedings?

21 A Yes, it is.

22 Q LA DWP Exhibit 20 is a document entitled
23 professional profile of J. Emil Morhardt, Ph.D.

24 Is that a document which contains a description of
25 your education, experience and qualifications?

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01 A Yes.

02 Q And LA DWP Exhibit 21 is a document entitled,
03 Effects of Flow Regulation and Diversion on Standing
04 Crops of Brown Trout in Eastern California,
05 J.E. Morhardt, et al, 1991.

06 Is LA DWP Exhibit 21 a document which you were
07 responsible for drafting?

08 A Yes, it is.

09 Q And is it a document on which you relied in
10 forming opinions that you expressed in your testimony
11 LA DWP Exhibit 19?

12 A Yes, in part.

13 Q Would you please summarize your education,
14 experience, and qualifications?

15 A Yes. I have a Bachelor of Arts degree from Pomona
16 College in Claremont, California, in zoology. And
17 while I was doing that, I was also working for two
18 summers for the California Department of Fish and Game
19 in Bishop doing stream surveys and lake surveys on
20 trout.

21 Following that, I went to Rice University and
22 received a Doctorate in physiology, ecology, and
23 biochemistry. After that I joined the biology faculty
24 at Washington University, where I taught vertebrate
25 ecology, vertebrate physiology and comparative and

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01 general physiology for eight years. Then I became
02 director of biological services, and then chief
03 scientist for Henningson, Durham and Richardson in
04 Santa Barbara, California.

05 And in 1978, I joined E.A. Engineering, Science
06 and Technology, then known as Ecological Analysts in
07 Lafayette, California.

08 I have -- since that time, I've continued to be
09 with E.A., and I've worked on trout populations on many
10 of the streams on the east side of the Sierra for
11 Southern California Edison Company, for Inyo County,
12 for the Department of Water and Power, and for the
13 Electric Power Research Institute.

14 I've also worked on trout populations on the west
15 side of the Sierra, and I've done a lot of work on
16 salmon populations in various tributaries of the
17 central
valley.ô

Q Would you please summarize the written testimony
19 that has been submitted as LA DWP Exhibit 19?

20 A Yes. I have much less complicated testimony than
21 Dr. Hardy, I'm happy to say. I'd like -- before I
22 start, I'd like to point out two errors in the
23 testimony.

24 Q Please.

25 A One of them is the -- on Figure Number 1,

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01 underneath the figure, and in fact, I'd just as soon
02 you put it up. Put Figure 1 up now.

03 Underneath the figure, the flow is designated as
04 CMS, cubic meters per second. That's a typographical
05 error. The -- all of the other figures are -- do
06 express flow in CMS, but in this case, the flow is
07 expressed in cubic feet per second.

08 I'd also like to point out that one of the
09 references I cited in my testimony needs to be
10 deleted. That's the third reference entitled, "Fish
11 Population Response Model for IFIM Unpublished
12 Research". It's not cited in the text, and it's not
13 relied upon.

14 What I would like to do today is talk briefly
15 about the relationships between flow and trout

16 populations in east side Sierra streams. The eastern
17 side of the Sierra provides a unique natural laboratory
18 for a retrospective look at how various kinds of
19 physical variables, including flow, influence trout
20 populations.

21 And it's interesting because all of the streams
22 are gauged -- or virtually all of them are gauged so
23 the flows are known. There are a variety of different
24 sizes of streams. So it's possible to look at the
25 effect of sizes of streams on fish. There are a lot of

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01 different kinds of flow regimes that occur there
02 because of various sorts of management practices.

03 And most important, there was a large synoptic
04 study done of the trout populations in 1984 and 85 by
05 the Department of Fish and Game, which I have referred
06 to in my testimony as Deinstadt et al, 1985 and 1986.
07 And at the same time, E.A. was doing similar kinds of
08 studies in Bishop Creek, Rush Creek and other Mono
09 Basin streams.

10 So it's a large collection of data, much larger
11 than one normally finds. It cuts across streams of all
12 different sizes, and makes it possible to see whether
13 or not one can tell whether there are effects of flow
14 or other variables on the other populations.

15 We pointed this out to the Electric Power and
16 Research Institute, and they funded the collection of
17 some additional data, and subsequently, the writing of
18 the paper which is referred to in my testimony.

19 The results of this study show that there is very
20 little apparent effect of flow on numbers of catchable
21 size fish, or in total numbers of weight of the fish of
22 all sizes in these streams.

23 The streams that have low flows because they have
24 been diverted have brown trout populations similar to
25 streams of the same size that have not been diverted.

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01 Streams that have low flows naturally have brown
02 trout populations similar there to streams that
03 naturally have much higher flows. And they also show
04 that the number of catchable size trout in Lower Rush
05 Creek between 1985 and 1989, when releases were usually
06 approximately 19 cfs from Mono Gate One, that the
07 population of catchable trout in much of Lower Rush
08 Creek was as great as or greater than those of other
09 streams on the east side of the Sierra.

10 If I could approach my figure, I'd just like to
11 point out some of those items to the Board. These data
12 are -- on Figure Number 1, are for fish larger than 200
13 millimeters, which is about eight inches long, per mile
14 of stream. And the flow range is -- of the streams --
15 streams indicated here, is between about zero and 70
16 cubic feet per second. These are mean annual flows.

17 The fish -- I've called out the fish in Rush Creek
18 with the round symbols, and the fish in Lower Lee

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symbols. And you can see

20 that there are a lot of points in the Rush Creek data
21 which are higher than those from the other streams that
22 I've depicted on these graphs. And the average for all

23 of the points is almost twice that for all of the other
24 streams that are depicted here.

25 I've also done similar analysis for -- I'll put
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01 Figure 2 up as an example. But I won't, I think, put
02 all the rest of them up. All of these show essentially
03 the same thing: Basically, no relationship between
04 flow and fish populations.

05 In addition to this sampling of fish greater than
06 200 millimeters, I've also looked at the total number
07 of fish per meter, the total number of fish per
08 cubic -- pardon me, for square meter of surface area,
09 and the -- the grams of fish per meter. I think I
10 misspoke myself. The grams of fish per square meter as
11 well.

12 And in these subsequent nine figures, which I
13 don't intend to go through one by one, I've also
14 plotted those three variables against the mean annual
15 flow, the average June flow, which is the high flow in
16 these streams, and the average January flow, which
17 characteristically is the low flow in these streams.

18 And in addition, I've broken out streams that are
19 diverted with triangles. These are streams like Rush
20 Creek and streams like Bishop Creek, which have
21 diversions in them for either hydroelectric or for
22 potable water reasons.

23 I've also broken out regulated streams, streams
24 like Upper Bishop Creek, wherein all of the flow is
25 released downstream, but it's released down in a
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01 regulated way. And then I've also included undiverted
02 natural flows.

03 And the result of all of these analyses is that
04 there is fundamentally no relationship at all between
05 flow and the numbers of fish in these streams.

06 That concludes my summary of my oral testimony.

07 MR. BIRMINGHAM: Thank you.

08 HEARING OFFICER DEL PIERO: Thank you,
09 Mr. Birmingham. Ms. Cahill?

10 MS. CAHILL: Good afternoon. Would somebody bring
11 those charts and just set them down?

12 CROSS-EXAMINATION BY MS. CAHILL

13 Q Good afternoon, Dr. Hardy. I think
14 you just indicated that you participated in
15 approximately a thousand IFIM studies over the course
16 of your career. Is that right?

17 A BY DR. HARDY: No. I would say that I have analyzed
18 data from over a thousand streams in the course of my
19 career.

20 Q And that career has spanned what kind of a time
21 period?

22 A The first time I got involved with actual instream
23 flow assessments was during the first year of my second
24 bachelors in late 1977 and early 1978.

25 Q And so when your testimony said you "conducted
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01 instream flow studies and analyses in over a thousand
02 streams and rivers," you certainly didn't mean to
03 indicate that you conducted in the sense of doing the
04 fieldwork, is that right?

05 A I would guess that in terms of actually being
06 involved in the collection of field data, it's probably
07 35 different river systems with multiple reaches on
08 river systems.

09 Q And with regard to your experience in the Mono
10 Lake Basin, I think you mentioned Bishop Creek. Is
11 Bishop Creek in the Mono Basin?

12 A Actually, I believe it's in the Owens drainage.

13 Q Do you have any experience on streams in the Mono
14 Basin prior to this?

15 A In terms of on-site work?

16 Q Yes, on-site or review.

17 A In a technical sense, no.

18 Q Thank you. And did I understand you to say that
19 you reviewed the E.A. IFIM on Rush Creek as well as the

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ment of Fish and Game IFIM?

21 A Yes, ma'am.

22 Q And would some of the criticisms you have made in
23 your written testimony of the DFG study apply as well
24 to the E.A. study?

25 A In which regard?

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01 Q Any of the criticisms you've made of DFG, use of
02 curves, biologically unrealistic curves, any criticisms
03 you made of Fish and Game?

04 A Well, I believe that the reliance upon the Smith
05 and Acitunal (phonetic) curves, yes. I believe that in
06 a fundamental sense, the nature of the utilization
07 curves in E.A., I think that testimony has been talked
08 about briefly today, I would take issue with.

09 Q And would you concur, then, that the E.A.
10 utilization curve is biologically unrealistic at least
11 with regard to depths for adult brown trout?

12 A In a very strict technical sense, yes, but if -- I
13 could make a statement regarding that, I think that --

14 Q I'd actually -- go ahead.

15 A Prefer not? That's fine. We're missing an
16 important point about all of this.

17 Q Let me -- I hate to take this microphone again,
18 but it's what we're going to have to do. Before I go
19 let me ask you --

20 MR. BIRMINGHAM: Before we go on, may I ask that
21 the reporter mark that last question and answer?

22 Q BY MS. CAHILL: I understand that you do have some
23 criticisms of using regional suitability curves.

24 In the event that a researcher were unable to
25 collect site-specific data, what would you recommend

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01 that they do?

02 A Well, I think that the current policy of the Fish
03 and Wildlife Service, and what I teach in the instream
04 flow course is, is that if one were to rely first of
05 all upon preference curves that you simply should not.

06 Secondly, that if you're going to use regional
07 curves, and they are utilization curves that you should
08 go through a formal verification or validation with
09 some observations on-site.

10 And in the absence of that, that all parties
11 involved in the process sit down with species experts

12 and come up with a mutually agreeable set of criteria.
13 Q You've several times said what you currently
14 teach. At the time these studies were done, the Beak
15 study was done in 1987, was it the standard practice to
16 develop and use preference curves?
17 A I don't believe that it was ever a policy of the
18 U.S. Fish and Wildlife Service that they explicitly
19 recommended that you use preference curves in IFIM
20 studies.
21 Q I didn't ask policy; I asked practice. Was it
22 standard practice?
23 A No. It was not. Not nationwide.
24 Q In California?
25 A I wouldn't be able to speak to that directly.

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01 Q You -- are you aware that when Beak went to do its
02 study after a period of time at which the flows had
03 been 19 cfs in Rush Creek, they were unable to observe
04 sufficient adult brown trout to develop a site-specific
05 criteria?
06 A I believe it is my understanding from reading the
07 report that they considered they had insufficient
08 observations to develop a preference curve from their
09 direct observations.
10 Q And are you -- do you recall from the E.A. report
11 that they had insufficient observations in their first
12 season, so that they had to make additional
13 observations in a second season in order to observe
14 enough adult brown trout to prepare their utilization
15 curves?
16 A I believe that could be true.
17 Q Now, with regard to the shapes of the curves, most
18 of the curves you showed us were, I believe, juvenile
19 preference curves.
20 A The explicit figures are all juvenile curves in my
21
22 Q Okay. And for example you were concerned about a
23 bimodal -- bimodal distribution. You thought that was
24 biologically unrealistic.
25 A From my experience in observing brown trout

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01 juveniles in the bioenergetic studies on drift feeding
02 station locations, I don't believe that that curve
03 represents a biologically justifiable curve. It is an
04 artifact of the mathematical or algorithmic procedure
05 used to develop the preference curve.
06 Q And I believe the one we just looked at was based
07 on velocity. Now, this is from LA DWP Exhibit 15.
08 This is E.A.'s curve, also for juveniles, also for
09 velocity. It was Figure 4 in the E.A. report. And is
10 there -- and the dotted line represents juveniles.
11 Is there also a bimodal distribution in the E.A.
12 report?
13 A What does the dotted line represent on that
14 figure?
15 Q The dotted line represents a utilization curve for
16 juvenile brown trout on velocity. It would be, I
17 think, the most comparable to the -- the Smith and
18 Acitunal (phonetic) that we have just reviewed. And is
19 it not also bimodal?

20 A The utilization curve?
21 Q Yes.
22 A Yes.
23 Q And even the preference curve, less so, but still
24 some. Isn't there also a dip, can you not see that?
25 And you can feel free to approach, if you'd like.

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01 Is there not also a small bimodality or
02 stepfunction in E.A.'s curve?
03 A I would represent it as a somewhat bimodal
04 distribution.
05 Q And do you believe that a bimodality such as this
06 would have a greater impact or a lesser impact than a
07 complete change from entirely suitable to not at all
08 suitable?
09 A I was hoping you'd ask me that. Could I have
10 Figure 2 from Dr. Hanson's testimony?
11 MS. CAHILL: I think we should stop the clock. I
12 have a feeling --
13 HEARING OFFICER DEL PIERO: Mr. Stubchaer is real
14 quick with the clock.
15 MR. STUBCHAER: It doesn't matter. You all get
16 extra time any way.
17 DR. HARDY: Mr. Del Piero, I'm interested in
18 getting out of here as soon as I can, so I hope to be
19 brief.
20 MS. CAHILL: I'm really tempted at this point to
21 withdraw the question.
22 MR. BIRMINGHAM: I'll just ask the reporter to
23 mark it.
24 DR. HARDY: There has been considerable discussion
25 about the utilization curves versus the preference

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01 curves. And the differences between the curves
02 developed in Beak and the curves developed by -- or the
03 application in this particular instance of the regional
04 curves, and the issue of what deeper water is, and what
05 impact having -- as the question was posed, zero
06 utilization out here past approximately two and a half
07 or three feet.
08 And the point I tried to make earlier, I said I
09 would probably come back to is: If you look at the
10 comparison of the results in Figure 2, which shows the
11 weighted usable area result derived from the
12 application of the preference curve in this instance
13 only, and then the results generated from the
14 utilization curve showing no preference and therefore
15 no weighted usable area, vis-a-vis in pools or deeper
16 water habitat, the end result of the decision making
17 process of those results is that it flows approximately
18 above 40 cfs, as indicated in Figure 2 of Dr. Hanson's
19 report.
20 The incremental change in magnitude or the
21 functional relationship between those two curves \hat{O}
22 \l\grave{u},\grave{u},\acute{U} \acute{U} \grave{I},
analysis or interpretation of those
23 two curves in making the instream flow recommendation.
24 There is no difference. Just the absolute magnitude
25 between the two curves are different.

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01 Q Now, again, this is the apples and oranges curve,
02 where this one was derived using preference curves, and
03 this was derived using utilization curves. And the
04 shape is more similar, if you take E.A.'s preference
05 curve to compare. This was the one that was the output
06 from the utilization curve. Their preference curve
07 shape is similar, but also levels off.

08 But this -- this DFG curve is still rising.
09 There's still a noticeable rise throughout the whole
10 range of 40 to 60, and even if it were extrapolated off
11 the chart. And there is no dip in the DFG curve as
12 there is in the E.A. curve; is that correct?

13 MR. BIRMINGHAM: Objection. I've counted five
14 questions. And I wonder if we could break them down?

15 MS. CAHILL: Does this curve show increasing
16 weighted usable area throughout the range of 40 to 60?

17 A Yes.

18 Q And even at 100 is the curve still rising?

19 A At 100 and beyond, I can not tell you what that
20 curve will do. And from my oral testimony, I have
21 concern of the appropriateness of the hydraulic
22 modeling at ranges over 70 cfs. And at 2.5, the
23 measured discharges in that curve laying flat, if the
24 analysis were redone, may not even look like that.

25 HEARING OFFICE DEL PIERO: Miss Cahill, you need
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01 to identify which curve you're talking about.

02 MS. CAHILL: I'm sorry. I was referring to the
03 curve that's been reidentified as CDFG curve. It's the
04 dashed curve on Figure 2 from Mr. Hanson's testimony.

05 And, in fact, the peak that shows on the E.A.
06 curve, on that same figure, is not present when you
07 look at E.A.'s weighted usable area when derived from
08 their preference curve, is it?

09 A I'm sorry. I didn't understand the question. I
10 lost it.

11 Q E.A.'s curve shows a peak here. And this is
12 E.A.'s weighted usable area curve derived using their
13 utilization curve; is that right?

14 A That is correct.

15 Q It's correct that it was derived that way. And is
16 it correct that it shows a peak?

17 A Yes, ma'am.

18 Q And is there a similar peak when you take their
19 weighted usable area output when they ran their model
20 with their own preference curve?

21 A Could you show me that, please?

22 Q Yes. I think it's back there.

23 MS. CAHILL: This is Figure 8 in Los Angeles'
24 report.

25 DR. HARDY: I found it in my copy of the report.
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01 Q BY MS. CAHILL: And while it -- does that curve show
02 the same type of peak as the utilization derived curve?

03 A I'm not sure I understand what you mean by "the
04 same type of peak."

05 Q Well, there's apparently a rather sharp peak on
06 the curve in Figure 8 that was derived using
07 utilization curves that is -- and there's a dip
08 following that peak that doesn't appear to be present

09 when you look at the curve derived using preference
10 curves.
11 A Well, I don't believe -- I believe that there is a
12 dip, but it's not as pronounced in the preference curve
13 as in the utilization curve.
14 Q Now, much of your discussion focused on the
15 juvenile curves. In fact, in the end, did DFG use the
16 weighted usable area derived from the juvenile curves
17 to set its flow recommendations?
18 A No, they utilized the results of the adult and/or
19 spawning curves. And I believe that I still have
20 issues relative to the applicability of the Smith and
21 Acitunal (phonetic) adult curves utilized in the study.
22 Q These are now the Smith and Acitunal (phonetic)

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are cover conditioned.

24 There are -- in this case the model would use one of
25 the first four. Are any of the bimodalities that

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01 concerned you with the juvenile curves present in the
02 adult curves?

03 A No. Aside from the relationships as represented
04 by the depth suitability curves of Smith and Acitunal
05 (phonetic) I have no problem in a general sense with
06 those relationships. I do have a problem with the
07 cover condition.

08 Q And with regard to the Smith and Acitunal
09 (phonetic) velocity curves, there may be -- is there --
10 there one here that shows the type of bimodality with
11 which you're concerned?

12 A The no cover curve has a bimodality in it. The
13 overhead -- which is the no-cover curve. The overhead
14 and object cover curve with the flat no-change in
15 habitat preference between three and six feet per
16 second is problematic.

17 And I also have a problem with the bimodality in
18 the cover types combined suitability curve for
19 velocity.

20 Q The cover types combined curve is probably not
21 used, though, is it?

22 A It was almost -- I, frankly, could not tell with
23 absolute certainty how the mechanical aggregation of
24 these results in the application of the PHABSIM
25 modeling between no cover, object cover, overhead cover

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01 and the overhead and object cover were actually
02 implemented within the analysis. It's not specified
03 directly in a tractable review process in their report.

04 Q Do you know which of those cover types was the
05 most common on Rush Creek?

06 A No, ma'am.

07 Q I believe in your testimony you indicated that you
08 had no difficulty with the Smith and Acitunal
09 (phonetic) brown trout depth criteria.

10 A In terms of their functional relationships
11 representing the response to brown trout to depth
12 utilizations, no.

13 Q And I also believe you thought one of the -- that
14 you objected to some Smith and Acitunal (phonetic)
15 curves, but an exception was the spawning curves.

16 Do you have any problem with the spawning curves?
17 They're not up there.
18 A Do we have a copy of Smith and Acitunal's
19 (phonetic) report that I could examine?
20 Q Well, we do. I thought maybe what we could do is
21 look at your own testimony where you said that, on page
22 55 of your testimony, where you state, "A review of
23 suitability curve sets from Smith and Acitunal
24 (phonetic) reveals biologically unrealistic
25 relationships for nearly every brown trout life stage.

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01 The sole exceptions are depth for adults and the
02 spawning criteria".
03 A Right. I believe that my recollection of the --
04 both depth and velocity suitability curves from Smith
05 and Acitunal (phonetic) I felt adequately represented
06 what was there.
07 Q So, in fact, of the ones that the Department of
08 Fish and Game ultimately relied on in preparing their
09 report, it is only the adult velocity set of curves
10 with which you have a problem?
11 A Well, the results in the instream flow report also
12 presents information on the adult juvenile fry and
13 spawning. And as I evaluated those reports, in terms
14 of not just adult habitat, for instance, but the other
15 life stages present in the stream, the ability to
16 adequately review what would be appropriate for those
17 streams, I looked at the consideration of all the life
18 stages.
19 Q Do you know whether the no-cover condition is rare
20 on Rush Creek?
21 A In terms of a -- in terms of what?
22 Q In terms of would it have been commonly used, the
23 no-cover criteria, would that have been input for many

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transects, or is it likely that it was rarely
25 used, because that's not a common condition on the

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01 stream?
02 A I can't answer that question, because I have no
03 knowledge from the review of the report how those
04 specific cover or no-cover curves were actually applied
05 within the model, and/or whether the coding of cover in
06 the cross-sections reflect the existing or conditions
07 that might be anticipated to be present in Rush Creek.
08 Q Are -- are you confident that E.A.'s method of
09 collecting samples to derive their utilization curve
10 was appropriate?
11 A From my brief discussions with Mr. Dave Hanson on
12 how they approached the collection of their data
13 historically, and the relative proportion of habitat
14 types from the habitat mapping, and where he has
15 indicated to me they collected, I didn't see a
16 particular problem with their data.
17 Q Assuming that one summer they collected by
18 macrohabitat unit, and the second summer they collected
19 by a fixed distance unit, would you have trouble with
20 summing those in order to create a sufficiently large
21 number to develop a curve?
22 A Again, I believe I can't answer that directly. As

23 Mr. Hanson indicated in his testimony, their review of
24 that and sensitivity and examining the data, they felt
25 that they could combine that. But I have not reviewed

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01 that directly.

02 Q Are there any biologically unrealistic
03 relationships in the E.A. curves?

04 A Which curves?

05 Q Any of the curves used by E.A.?

06 A I presume you're referring to suitability curves
07 and not habitat?

08 Q Yes. Yes.

09 A Well, again, I think that if you are referring in
10 particular to the zero suitability at depths greater
11 than two feet, the suitability curves for utilization,
12 and/or preference as presented in the report, I don't
13 believe would represent biologically justifiable
14 criteria.

15 But again, I think that what's missing are the
16 results as presented in Figure 2, showing that the
17 relative differences in an instream flow
18 recommendation, especially at flows about 40 cfs, are
19 inconsequential, regardless of which curves are
20 utilized.

21 Q Were there any others that -- any other
22 biologically unrealistic bimodal curves, anything else
23 that you would find fault with?

24 A Not -- I have nothing that comes immediately to
25 mind.

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01 Q With regard to the Lee Vining flow study --

02 HEARING OFFICER DEL PIERO: Miss Cahill, your 20
03 minutes are up.

04 MS. CAHILL: I would make an application for a
05 second 20, and I may not use it all. And I would cover
06 both of the witnesses by the end of that period.

07 HEARING OFFICER DEL PIERO: Granted.

08 Q BY MS. CAHILL: With regard to the Lee Vining study,
09 when did you receive a copy of DFG's final Lee Vining
10 report?

11 A Yesterday, after the lunch break.

12 Q So your testimony, your entire written testimony
13 was based on the draft; is that correct?

14 A Yes, ma'am.

15 Q And I believe you stated that you had criticized
16 that study because it was based on flow duration
17 without taking into account the habitat results; is
18 that correct?

19 A Yes, ma'am.

20 Q And if I were to tell you that the final -- in
21 fact, have you looked at the final to see if that is
22 still true?

23 A I have managed to find the page where the instream
24 flow recommendation criteria used in the final were

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have not examined that

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01 report in any detail.

02 Q How long have you known that you would be
03 testifying in these proceedings?

04 A Perhaps six weeks, a month to six weeks.
05 Q And when was the first that you learned that there
06 was a final?
07 A Yesterday after lunch.
08 Q I want to touch just briefly on your comment
09 regarding temperature modeling on Rush Creek. In
10 addition to modeling, did that report also present
11 actual measured temperature data?
12 A I believe that to be true.
13 Q And in the event of a conflict between the
14 modeling and the actual measured data, would you be
15 comfortable relying on measured data for a particular
16 flow.
17 A I'm a great proponent of empirical measurement.
18 Q So the answer is yes?
19 A Yes, ma'am.
20 Q Have you ever seen Rush Creek?
21 A Many times.
22 Q In your written testimony, you've indicated that
23 flows that protect 80 to 85 percent of the maximum
24 potential habitat over the ranges of discharges
25 anticipated to occur are typically targeted under

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01 multiple use consideration.
02 Are you specifically making flow recommendations
03 on Lee Vining Creek?
04 A I was asked to evaluate the information contained
05 in the Lee Vining instream flow report. That included
06 the PHABSIM analyses, and in terms of instream flow,
07 incremental methodology, all of the other related
08 information in that report, and to make a
09 recommendation of what I felt would be a minimum flow
10 that would protect the resource.
11 Q Okay. And so you have made a recommendation in
12 your testimony?
13 A Yes, ma'am.
14 Q And it was based on the draft?
15 A Yes, ma'am.
16 Q And is it subject, then to, being changed in light
17 of the final?
18 A I believe there would be that potential.
19 Q Almost finished here, I think, with you. With
20 regard to your criticisms of the DFG report and flows
21 over 60 cfs as they relate to gravel, have you listened
22 to Dr. Beschta's testimony?
23 A Yes, ma'am.
24 Q Do you believe in light of Dr. Beschta's testimony
25 that flows over 60 cfs would be detrimental to fishery

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01 habitat in Rush Creek?
02 A No, ma'am.
03 Q Thank you.
04 MS. CAHILL: Dr. Morhardt, I have just a -- very
05 few questions.
06 Q BY MS. CAHILL: First of all, can you tell us what
07 your involvement was in the two fish population reports
08 that were submitted, I believe they were LA DWP 16 A
09 and B; is that correct? Dr. Morhardt, do you know what
10 the exhibit numbers were on those two reports?
11 A BY DR. MORHARDT: I don't, but these are the E.A.

12 reports you're referring to?
13 Q Yes. And did you do the bulk of the research in
14 those reports?
15 A No, I did not.
16 Q And did you do the bulk of the analysis?
17 A No, I did not.
18 Q And who did?
19 A Carl Meesic (phonetic) did most of it.
20 Q What are some of the factors that affect the size
21 of trout populations in the eastern Sierra?
22 A That's a very good question. We did extensive
23 regression analysis on all the data produced by
24 Deinstadt in the EPRI model and were unable to explain
25 more than about half of the variability in population

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01 size.
02 I truly believe that the actual controlling
03 factors of fish populations in the eastern Sierra are
04 hardly understood at all.
05 Q But can you give us some of the factors?
06 A Well, I wish I could. I mean, we took as hard a
07 look at the existing data as one can take, I think,
08 using all of the different kinds of habitat data that
09 were produced and collected by the Fish and Game
10 requirement, and got very few strong correlations of
11 any sort.
12 Q Well, I guess let me ask this a different way.
13 Does water temperature affect trout populations?
14 A It certainly can. But water temperature did not
15 turn out to be significant under the analysis that we
16 did.
17 Q Does conductivity affect --
18 A It could. It's possible. But in the analysis of
19 those data, it had very little effect.
20 Q Do the existence of nutrients in the water affect
21 the size of trout?
22 A There were no data in that data set on nutrients.
23 Q In general?
24 A They could, yes. If something else were not --
25 Q Does stream elevation affect the size of the

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01 population?
02 A There was some effect of stream elevation in that
03 data set.
04 Q Does gradient affect the size of trout
05 populations?
06 A I think we found very little effect in gradient.
07 Q How about habitat quality?
08 A What is that? I don't know what you mean by
09 habitat quality.
10 Q I'm not sure I know what I meant by that. Let me
11 go on.
12 MR. DODGE: Is that the same as Mr. Habitat?
13 HEARING OFFICER DEL PIERO: That's his cousin.
14 Q BY MS. CAHILL: Is it true then that trout population
15 size is controlled by a number of factors other than
16 flow?
17 A There are a great many things that could be
18 effecting trout populations. The problem is that we

19 just don't know what they are in the eastern Sierra.
20 Q But to look at flow alone wouldn't take into
21 account all the factors that might, in fact, be
22 affecting the size of those populations?
23 A That's absolutely right. The data -- the
24 analysis that we did for EPRI looked at all of the
25 factors for which we had data. What I've plotted here

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01 in these figures is just the effect of flow.
02 Q Is there a difference in capture efficiency
03 between electrofishing results on small streams and the
04 results on large streams?
05 A There was not in the Deinstadt data. We looked at
06 the variants associated with the sample sizes with the
07 samples on all of the different streams. They did
08 produce that. And there is no correlation between flow
09 and variants in their samplings.
10 Q Typically, though, aren't electrofishing results
11 such that on a small stream, it's easier to capture a
12 larger percentage of the fish that are actually there,
13 than it is when you electrofish a large stream?
14 A Well, it certainly can be, but if you make enough
15 passes, you may get all the fish in any case. What
16 must have happened in Deinstadt's case is on the larger
17 streams, they made more effort. They have quantitative
18 data as to whether or not they did catch fewer of the
19 fish on large streams. And in fact, they did not.
20 Q And are the Deinstadt data from a single year per
21 report?
22 A No. They're from several years. The largest
23 stream, the Owens River, was sampled in 1980. The rest
24 of them were between 1983 and 1985.
25 Q When you put together your exhibits, each of them

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excluded data from the

02 Bishop Canal, the Owens River and Hot Creek.
03 Are those three of the largest streams in the
04 Mono/Owens area?
05 A No.
06 Q How many other streams are of comparable size?
07 A Well, the Bishop Creek Canal certainly isn't one
08 of the largest streams.
09 Q With regard to the Owens River and Hot Creek, how
10 many streams in the Owens/Mono Basin are larger than
11 those two?
12 A I think none are larger than the Owens River. I
13 actually don't know what the flow is in Hot Creek.
14 Q What is Rush Creek? Is Rush Creek similar in size
15 to Hot Creek?
16 A Since I don't know what the flow on Hot Creek is,
17 I can't answer that.
18 Q Are the Owens River and Hot Creek two of the most
19 productive streams in the Owens/Mono Basin?
20 A Hot Creek certainly is. I'm sure it is, because
21 it has a fish hatchery just upstream from the reaches
22 which were sampled. And there's literally thousands of
23 fish and fish food being thrown into the stream.
24 The Owens River, however, the data that Deinstadt
25 collected were collected in reaches which were clearly

01 influenced by upstream migrants on spawning runs.
 02 So I think the data from the Owens River, both in
 03 the upper reach and in the lower reach between Pleasant
 04 Valley Dam are not representative of resident trout
 05 population.
 06 Q We, in fact, in attempting to correlate size of
 07 flow or size of stream and productivity, you in fact,
 08 eliminated two of the most productive streams in the
 09 area; isn't that right?
 10 A I did, because I thought data that Deinstadt had
 11 collected were inappropriate for the analysis. I was
 12 looking at resident trout populations. And it makes no
 13 sense to look at migrant on the spawning run when
 14 you're sampling resident populations.
 15 Q I think I'm finished. Let me just have one
 16 moment. That's all. Thank you both very much.
 17 HEARING OFFICER DEL PIERO: Thank you.
 18 Mr. Dodge?
 19 CROSS-EXAMINATION BY MR. DODGE
 20 Q Dr. Hardy, I have just a couple of questions for
 21 you. On page 58 of your testimony, you say, "Flows
 22 which protect 80 to 85 percent of the maximum potential
 23 habitat over the ranges of discharges anticipated to
 24 occur are typically targeted under multiple use
 25 considerations."

01 Do you see that, sir?
 02 A BY DR. HARDY: Yes, sir.
 03 Q Now, you say 80 to 85 percent, that is a
 04 percentage of habitat as it exists today; isn't that
 05 right?
 06 A Potentially in many instream flow studies where we
 07 may reconstruct native or natural hydrographs versus
 08 existing conditions, which may be altered hydrographs
 09 or conditions, that may be based on historical
 10 conditions.
 11 Q But the IFIM's that are at issue in this
 12 proceeding relate to an existing stream channel, as it
 13 exists when the IFIM's were taken; isn't that right?
 14 A That is correct.
 15 Q Now, let me ask you to assume, hypothetically,
 16 that our goal in this proceeding is to reestablish
 17 conditions that benefited the historical fishery. And
 18 ask you to assume, hypothetically, that the weighted
 19 usable area today in Rush Creek is much lower than it
 20 was historically pre-diversion, because after
 21 diversions, the riparian vegetation died and great
 22 amounts of water came down the Rush Creek Channel
 23 widening and straightening the stream and cutting off
 24 multiple channels, so that the weighted usable area
 25 today in Rush Creek is much lower than it was

01 historically. Ô
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 that assumption in mind?

03 A Yes, sir.
 04 Q Would you agree with me that establishing flows
 05 which protect 80 to 85 percent of the maximum potential
 06 habitat today would not accomplish the goal of

07 restoring conditions that benefited the fishery?
08 A Actually, I believe it would probably be an
09 underestimate of how much better conditions would be.
10 And that is based on my observation that if you were to
11 take, for example, 20 cubic feet per second and run it
12 down the cross-sections collected from Rush Creek,
13 representing those hypothetical conditions, and then
14 evaluate those same channel geometries as Rush Creek
15 begins and has been shortening the channel widths and
16 deepening the water, that that same unit volume of
17 water would actually produce more weighted usable area
18 than what exists under current analysis.
19 Q Did you understand my question, sir?
20 A I believe so.
21 Q And hypothetically, if there were a great deal
22 more weighted usable area pre-diversion than there is
23 today, then applying the 80 to 85 percentage that
24 you've used with respect to the existing IFIM's really
25 doesn't restore the historical conditions, does it?

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01 Let me ask it another way. Wouldn't you have to
02 attempt to restore the historical conditions before you
03 applied the 80 to 85 percent that you referred to?

04 HEARING OFFICER DEL PIERO: Dr. Hardy, do you
05 understand what he's asking you?

06 DR. HARDY: I'm not exactly sure, Mr. Del Piero.

07 HEARING OFFICER DEL PIERO: Would you like to have
08 the question read back? The original question read
09 back to you?

10 DR. HARDY: I think so. I think I misunderstand
11 what --

12 HEARING OFFICER DEL PIERO: Mrs. Anglin, I think
13 if you would be kind enough to recall the original
14 question, and could you please read that back to
15 Dr. Hardy.

16 (Whereupon the record was read as requested.)

17 HEARING OFFICER DEL PIERO: Do you want to respond
18 to that question?

19 DR. HARDY: Let me think for just a second. I
20 want to work through the assumptions.

21 HEARING OFFICER DEL PIERO: Do you understand the
22 question?

23 DR. HARDY: I think so.

24 If I may articulate my understanding of those
25 assumptions, what you're indicating is that if I assume

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01 that per-unit discharge historically generated more
02 weighted usable area habitat than what currently exists
03 because of those factors --

04 Q Correct.

05 A -- that is what you asked me to assume.

06 Q Correct.

07 A Would protecting 80 percent of the weighted usable
08 area that exists now accomplish the goal of
09 restoring --

10 Q The pre-diversion weighted usable area?

11 A Perhaps.

12 Q But wouldn't it be extremely unlikely?

13 A I don't think it would be extremely unlikely at
14 all.

15 MR. BIRMINGHAM: Would the reporter mark that
16 please?
17 Q BY MR. DODGE: Would you agree with me that if our
18 goal is to reestablish the historical weighted usable
19 area, and that it is now, for reasons that I set out in
20 the hypothetical, substantially less than it was
21 historically, that it makes sense for us to have a
22 restoration program which reestablishes the historical
23 weighted usable area, and then to apply your 80 to 85
24 percentile?
25 A I guess in a very, very broad general sense, I

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01 would have to agree with the statement. Where I'm
02 having difficulty is that when I look at the stream and
03

is, and what that

04 constitutes, as I can see multiple scenarios and
05 conditions that could accomplish that set of
06 assumptions, and that's why I'm having difficulty
07 answering in a more direct manner.
08 Q BY MR. DODGE: Dr. Morhardt. Now, as I understood
09 the sum and substance of your testimony, that you
10 looked at Rush Creek at 19 cfs and counted fish,
11 correct?

12 A BY DR. MORHARDT: Rush Creek and the rest of the
13 streams on the east side, yes.

14 Q Rush creek was 19 cfs?

15 A Correct.

16 Q And not any other flows?

17 A That's correct. Well, the flows along Rush Creek
18 differ, of course, because it's a losing stream.

19 Q Right. But in terms of the discharge, it was 19?

20 A That's correct.

21 Q And basically, you found twice as many large trout
22 in Rush Creek at 19 cfs than you found in most other
23 eastern Sierra trout streams?

24 A That's probably an oversimplification, but on the
25 average of all the samples that were taken, that was

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01 true.

02 Q And you concluded, therefore, that 19 was okay?

03 A I think that suggests that it's doing just fine in
04 terms of producing trout, compared to other streams in
05 the eastern Sierra under that flow regime.

06 Q In terms of the DFG flow regime, you really don't
07 know what sort of trout that would produce?

08 A That's right. I don't. But there are other
09 streams that have flows that are like the DFG flow
10 regime, which don't produce any more trout, making me
11 think that flow probably has had most of its effect by
12 the time you get to flows of about 19 cfs, and
13 something other than that is limiting at that point.

14 Q The size of the streams you used to compare Rush
15 Creek and Lee Vining Creek, approximately how large
16 were these streams in terms of mean cfs?

17 A Pardon me. I'll give you an answer. I'm going to
18 have to give you the average in the log of the mean
19 annual flow, which is in meters cubed per second, which
20 is minus 1.13.

21 HEARING OFFICER DEL PIERO: Mr. Dodge, don't worry

22 about the time. We've turned the clock off until he
23 gets an answer for us.
24 MR. DODGE: Let me --
25 Q BY MR. DODGE: What document are you looking at?

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01 A This is the Eperidge report.
02 Q Spell that for me, please?
03 A The report cited in my document that was done for
04 the Electric Power Research Institute. It gives the
05 mean flow of tall streams and the standard deviation of
06 the mean flow.
07 Q Is that a copy of a document that we have? I've
08 got a document here entitled, "Effects of Flow
09 Regulation and Diversion on Standing Crops of Brown
10 Trout in Eastern California."
11 Is that the same document that you're looking at?
12 A It is.
13 Q Let me see if I can shortcut this, sir. We may
14 have to go back and do it the hard way. But would you
15 agree with me that Rush Creek and Lee Vining Creek are
16 far larger than any of the other eastern Sierra streams
17 with which you're making a comparison?
18 MR. BIRMINGHAM: I'm going to object on the
19 grounds that it's a compound question. And I wonder if
20 it could be asked in terms specifically of Rush Creek
21 and Lee Vining Creek.
22 HEARING OFFICER DEL PIERO: Dr. Morhardt, respond
23 in regards to Rush Creek, individually, and Lee Vining
24 Creek, individually.
25 DR. MORHARDT: I don't believe that Rush Creek is

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01 a good deal larger than Bishop Creek. And I don't have
02 the flows of the other streams in front of me, but
03 there are other large streams in that population.Ô
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What is the --

05 HEARING OFFICER DEL PIERO: Excuse me. That was
06 not a responsive answer.
07 DR. MORHARDT: The answer is -- please repeat the
08 question?
09 Q BY MR. DODGE: I'm trying to determine whether it
10 isn't a fact that in terms of mean cfs, that Rush Creek
11 is substantially larger than any of the other so-called
12 comparable streams.
13 A In the first place, I don't know what the
14 unimpaired flow in Rush Creek is.
15 Q Let me ask you to assume that the unimpaired flow
16 in Rush Creek is -- mean average is 85 cfs.
17 A I think that the mean flows in some of the other
18 streams are as high as that.
19 Q Which ones?
20 A I think Bishop Creek.
21 Q Any others?
22 A I don't know.
23 Q Let me ask you to assume that the mean average
24 flow in Lee Vining Creek is 70 cfs. Are there any of
25 your so-called comparables that are that large?

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01 A I don't recall exactly, but I think possibly not.
02 Q Now, you excluded the Owens River and Hot Creek.

03 Can you give me the approximate mean average flow of
04 the Upper Owens River without Mono Basin infusions of
05 water?

06 A I think it's around 55 cfs.

07 Q It could be as high as 76 cfs?

08 A It could be.

09 Q The same question for Hot Creek as it runs into
10 the Owens River. What is the approximate size of Hot
11 Creek?

12 A I don't know. I haven't seen gauge data on it.

13 Q Could it be as high as 50 to 60 cfs?

14 A Yes, I think it could be.

15 Q Now, if -- if you had just -- let me back up on
16 that. You talked also about large fish. And your
17 definition of a large fish is what?

18 A I talked about catchable size fish, I believe.
19 And the definition -- the sample that I used in Figure
20 Number 1 are fish over eight inches long.

21 Q And fish over eight inches long, you didn't
22 purport to call out streams that produced very large
23 fish. If a fish hit eight inches, it was a, quote,
24 large fish; is that correct?

25 A I don't think I characterized it thus. I have
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01 looked at data for fish over 12 inches long as well.

02 Q But in terms of this testimony, you didn't -- you
03 didn't call out any comparison as between high flows
04 and very large fish, correct?

05 A I have done that analysis, but I didn't do it in
06 this testimony.

07 Q Okay. Now, could you tell the Board why you
08 excluded the Upper Owens River?

09 A I excluded most of the sites on it, because the
10 population that was sampled by Deinstadt included fish
11 that had run upstream from Crowley on their annual
12 spawning run, and I was more interested in resident
13 trout populations.

14 I excluded the uppermost reach above the Albert's
15 Ranch, because the population was about half rainbow
16 trout. And I excluded all streams from the analysis
17 for which the population was not predominantly brown
18 trout.

19 Q Did you recall in your direct testimony that you
20 said you excluded the Upper Owens because it was,
21 quote, much larger, end quote?

22 A The Lower Owens. The Lower Owens. It is much
23 larger.

24 Q Now, could you have just as easily compared Rush
25 Creek and Lee Vining Creek to the Upper Owens River and
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01 Hot Creek?

02 A Indeed, I have done so.

03 Q And had you done so, would you agree with me that
04 you would have found that the fisheries in Rush Creek

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any measure that you

06 care to use, would be substantially inferior?

07 A Well, it's very hard to say, because the data set
08 for the Upper Owens River includes fish that have swum
09 up stream on their spawning runs. And I don't know

10 what the resident population is. To my knowledge, it
11 has not been sampled. Hot Creek --
12 Q Okay.
13 A Hot Creek --
14 Q Excuse me, sir. Go ahead.
15 A Hot Creek, I believe, is a radically different
16 situation. It's an extremely low gradient stream that
17 has vast amounts of nutrients and food, in fact, put
18 into it just upstream in the reach that is -- was
19 sampled by Deinstadt. And I think that contributes in
20 a way which makes it completely uncharacteristic of
21 other Sierra streams.
22 Q Let's put aside the question of resident versus
23 migratory fish in the Upper Owens River and assume
24 we're going to count them all.
25 Would you agree with me that had you decided to

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01 exclude the other eastern Sierra streams as not
02 comparable because they were much smaller than Rush
03 Creek and Lee Vining Creek, and instead decided to
04 compare the fisheries in Rush and Lee Vining Creek with
05 the fisheries in Hot Creek and the Upper Owens River,
06 that you would have found Rush Creek and Lee Vining
07 Creek sadly lacking?
08 A Well, had I included sites of that nature, I would
09 also have included, I think, a site in the Owens River
10 Gorge, which I also excluded, which has a flow of 15
11 cfs, which has the highest population of fish over
12 eight inches in the entire eastern Sierra.
13 HEARING OFFICER DEL PIERO: Dr. Morhardt, that
14 also was not responsive.
15 DR. MORHARDT: Pardon me. Please repeat the
16 question.
17 HEARING OFFICER DEL PIERO: Mrs. Anglin, would you
18 please read back the question?
19 (Whereupon the record was read as requested.)
20 DR. MORHARDT: We're talking about just the Upper
21 Owens River and just Hot Creek?
22 Q BY MR. DODGE: Correct.
23 A I don't know that I would characterize it as sadly
24 lacking. But there are more fish in the samples taken
25 by Deinstadt in both the Upper Owens River and Hot

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01 Creek, except for a reach of the Upper Owens River
02 upstream at Albert's Ranch, in which they are
03 comparable.
04 Q And had you made that comparison, would you then
05 be here before this Board recommending flows higher
06 than 19 cfs?
07 A I'm not before the Board recommending flows. I'm
08 only commenting on the effect of flow on fish
09 populations.
10 Q Under your analysis, would that suggest to you
11 that a higher flow was appropriate?
12 A Would what suggest to me?
13 Q Your findings as you've just told us about the
14 comparison between Rush Creek and Lee Vining Creek with
15 the Upper Owens River and Hot Creek?
16 A As I've stated, I don't believe that the
17 population sampled in the Upper Owens River is

18 characteristic of resident trout. So I don't think I
19 have the data base on which to make that conclusion.

20 MR. BIRMINGHAM: Would the reporter mark that
21 question please?

22 Q When you make stream versus stream comparisons of
23 populations, would you agree with me that different
24 streams have different limiting factors?

25 A That's undoubtedly true.

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01 Q And some streams have inherently better habitat?

02 A I'm sure that's true.

03 Q Now, when you say Rush Creek has twice as many
04 large trout, could that be a function of its habitat as
05 opposed to the 19 cfs?Ô

07 Q Now, I was interested in your testimony at page 72
08 that you found a lack of correlation, I believe that's
09 your term, between population and flow.

10 Do you recall that?

11 A Yes.

12 Q Now, there has been testimony about a method of
13 recommending flows called the Tenant Method? Are you
14 familiar with that method?

15 A I am.

16 Q Is that also called the Montana Method?

17 A It is.

18 Q And is the fundamental premise of the Tenant
19 Method that a higher percentage of the natural flow
20 leads to a better fishery?

21 A Yes, it is.

22 Q So that -- the Tenant Method is just fundamentally
23 inconsistent with your statement that you see little
24 correlation between population and flow?

25 A The Tenant Method is based on percentage of annual

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01 flow. What -- the correlations I have done are not
02 based on that, they're based on the actual flow in the
03 streams.

04 Q But you just told me that the Tenant Method
05 assigns a better fishery to a higher percentage of the
06 natural flow, correct?

07 A That is correct.

08 Q And you have testified that you have found a lack
09 of correlation between population and flow, correct?

10 A The two things are not -- they're not comparable.
11 What you've -- I've -- what the Tenant Method is saying
12 within a given stream, the higher the flow, the better
13 will be the fish habitat.

14 What I've done is compare the populations across a
15 series of streams with the flows in those streams,
16 without regard to the percentage of the actual natural
17 flow.

18 Q So the Tenant Method says that the fish habitat is
19 going to be better within a given stream the higher the
20 percentage of the natural flow?

21 A That's correct.

22 Q And you're here today telling us that the fishery
23 is not going to be better in Rush Creek if the flows go
24 up from 19 cfs, correct?

25 A I'm telling you that in other streams in the

01 eastern Sierra where the flows -- what my data shows is
02 that even where flows have been diverted to a very
03 small percentage of the natural flow, the fish
04 population still remains high.

05 Consequently, I conclude from that that reducing
06 flows rather sharply, or for that matter conversely
07 increasing them beyond a certain point, I think, is not
08 going to have a very strong effect on the fish
09 population.

10 Q But you're here today telling us that an increase
11 in Rush Creek over and above 19 cfs, in all
12 probability, is not going to improve the fishery; isn't
13 that a fair statement?

14 A That is a fair statement.

15 Q And that is fundamentally inconsistent with the
16 Tenant Method; isn't that true?

17 A Yes.

18 Q Okay. Thank you. Have you ever -- have you ever
19 used the Tenant Method to recommend a flow?

20 A Yes, I have.

21 Q Tell us about that?

22 A I've used it on Walker Creek and Parker Creek.

23 Q And, in fact, in front of Judge Finney in the
24 spring of 1990, you yourself used the Tenant Method on
25 Walker and Parker Creek to recommend a flow; isn't that

01 right?

02 A That is right.

03 Q Now, you also tell us at page 73 that you might
04 increase the weighted usable area in Rush Creek, but
05 you wouldn't necessarily get more fish.

06 Do you remember that testimony?

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08 Q Now, am I right that that is a -- simply a
09 fundamental disagreement with the underlying premise of
10 the IFIM approach?

11 A That may be true. Very seldom is it stated in
12 defense of the IFIM that there should be a linear
13 relationship between weighted usable area and flow.

14 And I think perhaps I should ask Dr. Hardy to
15 comment on that.

16 Q Well, I'm just trying to get your testimony on
17 this. I mean, you did tell us at page 73 that you
18 could increase the weighted usable area, but not the
19 fish, right?

20 A It certainly is possible if weighted usable area
21 is not the limiting factor that increasing it will have
22 no effect on the fish population.

23 Q Let me read your testimony and ask you whether you
24 still subscribe to this.

25 "To the best of my knowledge there is no

01 scientific evidence that increasing either flow or WUA
02 in any eastern Sierra Nevada stream has ever produced a
03 larger trout population, and I doubt that it is likely
04 to do so in Rush Creek."

05 That's your testimony?

06 A That is.

07 Q And would you agree that that is fundamentally

08 inconsistent with the IFIM approach about increasing
09 weighted usable area?

10 A As Mr. Hanson testified, the IFIM approach
11 includes factors other than weighted usable area. It
12 explicitly includes other things that might be limiting
13 if they're used. And I think that because of that,
14 it's not inconsistent with the statement.

15 Q Assuming that other limiting factors are equal,
16 there's no difference, do you still believe that
17 increasing weighted usable area will not increase fish
18 populations?

19 A I don't understand the question.

20 Q Do you have it?

21 A No, I heard what you said, I just didn't
22 understand it. Assuming -- whatever you said about
23 assuming.

24 Q Assuming there are no differences in other
25 limiting factors not encompassed by an IFIM, would you
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01 agree or disagree that increasing weighted usable area
02 is likely to increase fish populations?

03 A If the limiting factor is weighted usable area,
04 then I might agree that increasing it would increase
05 the fish populations.

06 The question remains, though, whether or not
07 there's any sort of a linear relationship.

08 Q So if weighted usable area is the limiting factor
09 in Rush Creek, you would agree that in all likelihood
10 increasing the weighted usable area would increase the
11 fish population, although perhaps not linearly?

12 A Yes. I would agree to that.

13 Q So that if weighted usable area is the limiting
14 factor on fish populations, you would no longer say
15 that 19 cfs is going to produce a fishery, quote, as
16 large as can be expected, end quote.

17 A Yes. I would no longer say that.

18 Q You had data on fish populations of 19 cfs -- and
19 I may have asked you this, and if I have I apologize.
20 You had no data on Rush Creek and other flows, correct?

21 A That's correct.

22 Q So that we really have no empirical data as to
23 whether the fish populations in Rush Creek might be
24 higher at higher flows, such as those recommended by
25 the Department of Fish and Game?

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01 A Well, we do have data on Rush Creek at lower flows
02 inasmuch as the flow diminishes to about half of 19 cfs
03 over the course of the stream.

04 Q My question related to higher flows, sir?

05 A We have no data.

06 MR. DODGE: Thank you. I have no further
07 questions.Ô

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very much.

09 Ladies and Gentlemen, we're going to take a break.

10 We'll be back in about ten minutes.

11 (Whereupon a recess was taken at this time.)

12 MR. DODGE: Mr. Chairman, before Mr. Roos-Collins
13 starts, may I have just a couple of minutes to ask one

14 more line of questions?

15 HEARING OFFICER DEL PIERO: Sure. Your time has
16 run out.

17 Q BY MR. DODGE: This is a question for both of you
18 and -- I don't mean as a flip question. This is a
19 serious question: We've talked about the Tenant Method
20 and the Montana Method setting stream flows. And we've
21 talked about the IFIM method, which produces weighted
22 usable area at various flows, and it seems like as you
23 read it it's certainly complicated, seems like a
24 scientific method.

25 In the spring of 1990, when at least you and I
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01 were together, Dr. Morhardt, I don't think Dr. Hardy
02 was with us, there was another method of determining
03 flows which got the acronym of BOGSAS, which was, as I
04 understood it, a bunch of guys standing around the
05 stream.

06 And, you know, this is a serious question. You
07 have knowledgeable fisheries people taking a look at
08 the stream and trying to determine what flows are good
09 for trout.

10 Now, is the BOGSAS method in your view a
11 reasonable method of doing this?

12 A BY DR. HARDY: I defer to my distinguished colleague,
13 Dr. Morhardt.

14 A BY DR. MORHARDT: A lot of decisions on fisheries in
15 biology are made using that method, but it's the method
16 of sort of last resort. We actually had some method
17 that produces real data. You out -- and produces
18 something that actually produces a result which is
19 correlated with the resulting fish population, I think
20 we ought to use that. Absent anything else, you're
21 often reduced to something like that.

22 DR. HARDY: I would agree with that. Typically,
23 one should consider all available information. And
24 whether any particular information is produced from
25 some modeling effort, you still have to go through the

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01 exercise of exercising professional judgment in the
02 interpretation of those results, vis-a-vis, does it
03 make intuitive and/or rational sense?

04 Q BY MR. DODGE: And in making that -- in exercising
05 that professional judgment, is it helpful to have the
06 person or persons exercising that judgment to have had
07 substantial experience with respect to the streams at
08 issue?

09 DR. MORHARDT: Yes and no. Many times, what
10 happens is that once some real scientific research is
11 done, one discovers that all of the professional
12 opinions that have been vented heretofore, even by
13 people very familiar with the situation, are just plain
14 incorrect.

15 People tend to develop theories and use them and
16 apply them when, in fact, there are no data to support
17 them, and often they're just wrong. This is true for
18 any branch of science.

19 And I don't think great familiarity with a system
20 necessarily improves one's perspective on what's
21 actually correct. Often, getting someone in who has no

22 familiarity at all, but hasn't developed a bunch of
23 prejudices toward that system over time has a clearer
24 view than someone who's been looking at it for a long
25 time.

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01 MR. DODGE: Thank you very much.

02 HEARING OFFICER DEL PIERO: Thank you very much.

03 Mr. Roos-Collins?

04 CROSS-EXAMINATION BY MR. ROOS-COLLINS

05 Q Good afternoon, Dr. Hardy. Good afternoon,

06 Dr. Morhardt.

07 Dr. Hardy, I will begin with you. On page 53 of

08 your direct -- of your written testimony, you describe
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to sustain a viable

10 fishery; is that correct?

11 A For which creek?

12 Q Lee Vining Creek.

13 A Yes, sir.

14 Q Did you hear my questions earlier today to

15 Mr. Hanson regarding the objective for this proceeding?

16 A I believe so.

17 Q What's the relationship between a, quote, viable

18 fishery, unquote, and the historic fishery in Lee

19 Vining Creek?

20 A It is my understanding from having reviewed the

21 testimony admitted -- that the experts submitted in

22 this hearing and listening to the testimony, that the

23 flow ranges that I have recommended to sustain a viable

24 fishery in terms of reproducing brown trout for the

25 flow ranges, and what I would anticipate to be

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01 representative numbers would represent, in my opinion,

02 conditions in the population prior to the 1941 period.

03 Q What was the brown trout population in Lee Vining

04 Creek before 1941?

05 A I believe it to have been lower than it is today,

06 and primarily the fish numbers were sustained by

07 California Fish and Game stocking.

08 Q And what is the basis for that belief?

09 A From a general review of the testimony in these

10 proceedings and discussions with those in LA DWP

11 familiar with the materials presented.

12 Q Are you familiar with Mr. Trihey's analysis of

13 historic conditions in Lee Vining Creek?

14 A I've only seen that report briefly. I have not

15 reviewed it in detail.

16 Q Do you have an opinion, then, whether habitat

17 conditions related to the fishery have degraded since

18 1941?

19 A I believe they have somewhat.

20 Q Let's talk about instream flow incremental

21 methodology. The hearing officer has reminded us on

22 several occasions that he has experience in air quality

23 law. In air quality law, districts often have guidance

24 manuals to assist in dispersion modeling.

25 Are you familiar, generally, with the guidance

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01 manuals which air quality districts use for that

02 purpose?

03 A No, sir.
04 Q Let me put the question to you more directly.
05 Does the California Department of Fish and Game have a
06 guidance manual or document which governs the instream
07 flow incremental methodology studies done under its
08 jurisdiction?
09 A I do not know that.
10 Q Have you ever seen the document entitled, "DFG
11 Requirements for an IFG-4 Incremental Instream Flow
12 Study" dated, November 17th, 1983, published by the
13 Department of Fish and Game?
14 A I have no independent knowledge of that document.
15 Q So you would have no opinion whether the studies
16 conducted by the Department of Fish and Game for this
17 proceeding are consistent with that guidance document,
18 if it is a guidance document?
19 A That is true.
20 Q What about the U.S. Fish and Wildlife Service?
21 Does it have a guidance document which generally
22 governs instream flow studies conducted under its
23 jurisdiction?
24 A There are actually several.
25 Q Could you name them?

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01 A Well, I believe, if I am not mistaken, that the
02 U.S. Fish and Wildlife Service Instream Flow
03 Information Paper, I believe, 21, and in the -- and I'd
04 have to check on the number for sure. I can tell you
05 the color of it. It's an off-color orange. It's
06 sitting right here on my desk.
07 I also know this: We provide specific and some
08 also general guidelines in the lecture note material
09 that I have written and cooperated with in editing with

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teaching

11 the instream flow methodology computer course that
12 outlines guidelines in terms of how you approach the
13 study, how you review the information that should be
14 collected and obtained, and how it's to be analyzed and
15 interpreted.
16 Q Does the U.S. Fish and Wildlife Service
17 consistently apply the second document in its review of
18 instream flow studies?
19 A By second document, are you referring to my
20 lecture notes?
21 Q Yes.
22 A Yes, in so much that it is the principal document
23 that is used for all of the instream flow training for
24 application of PHABSIM.
25 Q What would a good name for the first document be

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01 for purposes of my cross-examination? Shall we call it
02 Document 21?
03 A I think until I could come up with a better name
04 for it. There's a specific title. Gary might know
05 what it is.
06 Q That will do. I just don't want to confuse you by

07 my question.
08 A Okay.
09 MR. BIRMINGHAM: How about the Orange Paper?
10 DR. HARDY: The Orange Paper I think would work.
11 DR. LI: It is 26.
12 DR. HARDY: It is 26?
13 DR. LI: Yeah, 21 or 26.
14 MR. ROOS-COLLINS: Let's call it at this time
15 Orange paper, per the excellent suggestion of Mr.
16 Birmingham.
17 MR. BIRMINGHAM: Let the record reflect that it
18 was Dr. Stacy Li who stated that it was 26. Spelled
19 L-I.
20 Q BY MR. ROOS-COLLINS: Dr. Hardy, is there anything in
21 the Fish and Game flow study submitted in this
22 proceeding which you believe was inconsistent with the
23 Orange Paper?
24 A Probably the one element would be the failure to
25 specifically validate the regional suitability curves

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01 in the application for these studies.
02 Q Have you talked with the Department of Fish and
03 Game biologist and contractors who did these studies to
04 express that concern to them?
05 A Not directly. Back in, I believe, 1989 when I
06 reviewed the Rush Creek instream flow report when it
07 was in draft form for LA DWP, I passed on my review to
08 them. And I do not know whether those were eventually
09 passed on to the consultants or California Fish and
10 Game for that report.
11 And I did provide some level of review comments in
12 the review of the Lee Vining instream flow report to LA
13 DWP, but I do not know whether those were forwarded on
14 to either the consultant or California Fish and Game.
15 Q Do you know whether the U.S. Fish and Wildlife
16 Service has recommended the use of Smith and Acitunal
17 (phonetic), or any published suitability criteria for a
18 flow study in any other proceeding?
19 Let me put that question to you more directly.
20 Does the U.S. Fish and Wildlife Service always insist
21 on the development of site-specific criteria to comply
22 with the Orange Paper?
23 A It is the -- according to the lecture notes, which
24 are a co-authored document with the Fish and Wildlife
25 Service in the chapter on suitability curves, there is

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01 a series of policy statements.
02 It is the policy at this point, and I am not
03 speaking for the Fish and Wildlife Service as a Fish
04 and Wildlife Service employee, but the policy statement
05 as articulated in the document says that the
06 suitability curves should be validated.
07 If they are literature curves, you should attempt
08 to develop site-specific curves, number one. If you
09 use literature curves, they should be validated
10 site-specific.ô
worse case scenario is all parties should
12 critically review with species experts literature based
13 curves to be applied. And that agreement for all
14 parties in the study should be reached.

15 Q Tell me again what is the basis for your belief
16 that the published curves used by the Department of
17 Fish and Game for studies in this proceeding have not
18 been so validated?

19 A To my knowledge there has never been any explicit
20 statistical testing using recommended procedures by the
21 Fish and Wildlife Service or others in a formal sense
22 to validate those curves. Nor have I seen any evidence
23 of the frequency distributions of use of those fish
24 within these creeks versus the distribution of
25 suitability. Or in the case of Acitunal's (phonetic)

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01 curves or Smith and Acitunal's (phonetic) curves, how
02 those observations fell out in light of the preference
03 curves utilized.

04 Q And you have not talked with Fish and Game
05 biologist or contractors regarding these studies and
06 the purported lack of allegations since 1989; is that
07 correct?

08 A Not directly, no, sir.

09 Q Let me ask you about the statement on page 54 of
10 your written testimony that the Lee Vining Creek report
11 by the Department of Fish and Game is, quote, generally
12 correct in its conceptual approach to assessing
13 instream flows, end quote.

14 Do you have the same opinion regarding the Rush
15 Creek study?

16 A Yes, I do. One of the things that I did find that
17 I liked a lot about both Lee Vining and Rush Creek was
18 the multidisciplinary aspects of the approach in terms
19 of the different physical, chemical and biological
20 components that were at least studied and considered in
21 those reports.

22 Q So given that you believe that the Fish and Game
23 reports are generally correct in their conceptual
24 approach, and given your identification of one apparent
25 inconsistency between the Orange Paper and these

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01 studies, would you be willing to make recommendations
02 to the Board for improvements in the Fish and Game
03 studies to correct that inconsistency if asked?

04 A Yes, with the qualification that in terms of your
05 question earlier about inconsistencies with the Orange
06 Paper, I still did have some issues in those reports on
07 their use of the multidisciplinary information and
08 integration of information within the instream flow
09 recommendations.

10 There are, of course, a number of technical issues
11 primarily surrounding the hydraulic simulations and
12 choice of suitability curves that I believe would be
13 solid recommendations for improving those studies.

14 Q Thank you. Now in response to a question by
15 Miss Cahill earlier today, you've stated that you had
16 talked with Mr. Hanson regarding the data collection
17 and analysis that went into the suitability criteria
18 for the Rush Creek report; is that correct?

19 A Yes. We've had some brief conversations about how
20 that data was collected.

21 Q On the basis of those conversations, are you
22 prepared to compare E.A.'s Rush Creek report, and the

23 Department of Fish and Game's for reliability?
24 A Reliability in terms of what, sir?
25 Q Scientific reliability as a basis for this Board's

01 decision, what flow regime is necessary to reestablish
02 the historic level?
03 A I believe that the level that the terminal, if I
04 may call them that, results that are presented on
05 Figure 2 of Mr. Hanson's testimony, that the general
06 functional relationships in a broad sense, are very
07 similar, the insensitivity of the predictions in terms
08 of changes in weighted usable area, especially over the
09 range of higher discharges, to me would lead to the
10 same management decision. The answer to that would be
11 yes, sir.ô

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13 A Correct.
14 Q You've heard the saying that, "a little knowledge
15 is a dangerous thing"?
16 A I believe I've heard that before.
17 Q Would you agree that your review of E.A.'s Rush
18 Creek report is preliminary?
19 A No. I've actually looked at quite a bit of detail
20 in E.A.'s Rush Creek report. And I have had several
21 conversations with Mr. Hanson on the mechanics of that
22 study.
23 Q Are you familiar with Cal-Trout Exhibit 18 which
24 is the October 22nd 1993 letter from the U.S. Fish and
25 Wildlife Service to Mr. Hanson regarding the Plavy

01 River Project?
02 A I have not seen that document.
03 Q Did you hear my earlier question to Mr. Hanson
04 regarding the relationship of weighted usable area to
05 the fish population?
06 A I think so.
07 Q Let me be more specific. How would you convert
08 weighted usable area into a fish population estimate
09 in this proceeding?
10 A I wouldn't.
11 Q You would not use Department of Fish and Game's or
12 E.A.'s weighted usable area estimates to determine or
13 to predict likely fish populations?
14 A No. I believe what I would do is use the analysis
15 from the PHABSIM results as appropriate to make
16 recommendations for the protection of fisheries habitat
17 in those streams, and rely upon other ancillary
18 information such as the population data in eastern
19 Sierra streams versus discharge and other factors to
20 increase my confidence that establishing flow
21 recommendations based on physical habitat would indeed
22 then translate into and protect fisheries populations.
23 Q Dr. Hardy, have you ever heard Winston Churchill's
24 saying that, "Democracy is the worst of all possible
25 systems of government, except for the alternatives"?

01 A I actually have heard that.
02 Q E.A. has not prepared a flow study for Lee Vining

03 Creek; is that correct?
04 A That is my understanding.
05 Q So if the apparent inconsistency you identified
06 between the Fish and Game study on the one hand, and
07 the Orange Paper on the other were corrected, would you
08 recommend that the Board rely on the Department of Fish
09 and Game's Lee Vining Creek report for setting a flow
10 regime for Lee Vining Creek?
11 A Yes, I would recommend that as the best available
12 information. But again, I would request that in that
13 the Board would consider all of the available
14 information, and not simply the PHABSIM results.
15 Q Dr. Hardy, you have previously been asked several
16 questions regarding limiting factors in Lee Vining and
17 Rush Creeks. Let me ask you to summarize your opinion
18 on those limiting factors by creek.
19 In your opinion, what are the limiting factors
20 today in Lee Vining Creek?
21 A If I understood your question, you said I had been
22 asked what those were previously?
23 Q Yes.
24 A I have not to my knowledge been asked anything
25 about limiting factors in Lee Vining Creek.

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01 Q My apologies. Let me ask you the question
02 directly.
03 In your opinion, what are the limiting factors
04 today in Lee Vining Creek?
05 A I'm not prepared to answer that question in
06 specifics. I believe that there are probably a number
07 of factors which are controlling the fish populations.
08 Q Rush Creek?
09 A Same thing. I believe that from my analysis of
10 the information on Rush Creek, I believe it's one of a
11 number of factors.
12 One in particular that comes to mind is the lack
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habitat during the winter
14 period for which to overwinter, especially adult
15 salmonids.
16 And the ultimate carrying capacity is probably
17 limited by the low primary productivity as indicated by
18 the conductivities, and therefore the secondary
19 production in terms of invertebrates.
20 Q You know, yesterday I teased Mr. Dodge for being
21 an old dog who couldn't learn new tricks. I'm not much
22 younger. My memory may be fading on your testimony.
23 So let me ask you several questions at the risk of
24 repeating testimony you've already given.
25 Do you have a flow regime recommendation for this

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01 Board for Rush Creek?
02 A In my testimony, I indicated a range of discharges
03 that would constitute a minimum instream flow and was
04 not intended to represent the only flow for the entire
05 year, that there would be obvious other flows that
06 should be considered. And that would be such things as
07 channel maintenance flows on a periodic basis.
08 Q And what was your recommendation for Rush Creek?
09 A I had indicated that based on my analysis and

10 viewing of the information that it would be in the 20
11 to 30 cfs range.

12 Q Did you hear my prior questions? Is Mr. Hanson's
13 prior answers regarding Table 3A-3 from the draft EIR
14 which describes the mean -- excuse me, the median
15 monthly flows in the tributaries to Mono Lake?

16 A Yes, sir.

17 Q Do you agree with Mr. Hanson's answer that a flow
18 regime of 20 to 30 cfs would approximate the zero
19 percentile flow in Rush Creek?

20 A If I could have reference to that table, I was
21 confused by that answer, and I believe that I would
22 like to address that.

23 The information that I am examining is contained
24 in Table 3A-3 and in the table on Rush Creek, the zero
25 percentile indicated for 29.4 cfs. If you compare that

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01 value to the flow duration curves indicating the
02 percent exceedence versus discharge for the same month,
03 what one shows is that the zero percent indicates that
04 29.4 is equal or exceeded 100 percent of the time.
05 These data indicate that 113 cfs for Rush Creek in
06 April is basically never exceeded.

07 Q So the zero percentile in Table 3A-3 is the flow
08 you would expect all the time?

09 A Right. Flows of that magnitude or greater would
10 be expected to be there at all times.

11 Q It's the lowest reliable flow in the stream.

12 A From this existing period of record.

13 Q Have you ever made a recommendation in a
14 regulatory proceeding which amounted to the lowest
15 reliable flow in the stream, exceeded in the natural
16 hydrograph 100 percent of the time?

17 A Right. I would hope that the flow recommendation
18 I would make would always be present and exceeded 100
19 percent of the time.

20 Q Let me put the question differently. If this
21 Board adopted a flow regime of 20 to 30 cfs, not as the
22 floor, but as the ceiling, that would correspond to the
23 zero percentile flow which you would expect to be
24 exceeded all of the time in natural conditions,
25 correct?

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01 MR. BIRMINGHAM: Objection. Relevance.

02 HEARING OFFICER DEL PIERO: Well, why don't you
03 expand on that Mr. Birmingham, because I'm missing the
04 point in terms of the relevance. He's pursuing
05 hypotheticals with Dr. Hardy.

06 MR. BIRMINGHAM: They're -- I think everybody's
07 cards are on the table. And nobody is proposing that
08 that be the ceiling.

09 HEARING OFFICER DEL PIERO: I understand no one is
10 proposing it at this point. I don't think he was
11 either. He was asking a supposition. We can have the
12 question read back.

13 MR. BIRMINGHAM: I guess my question is: If no

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instead

15 it's being proposed that that be a floor, what's the
16 relevance of the question?

17 HEARING OFFICER DEL PIERO: Well, because it's
18 within the range that Dr. Hardy has commented on.
19 Overruled.

20 Dr. Hardy, do you recall the question, sir?

21 DR. HARDY: Would you please repeat it, sir?

22 MR. ROOS-COLLINS: Let me restate it. I will
23 withdraw my former question.

24 Q BY MR. ROOS-COLLINS: Have you ever made a
25 recommendation in a regulatory proceeding for a flow

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01 regime which amounted to a zero percentile flow regime?

02 A I would have to say the answer to that would be
03 yes.

04 Q Which stream?

05 A I believe, if I'm understanding your question and
06 what's being referred to, is many flow recommendations
07 that have been made on many studies represent flows
08 that are always equal or exceeded 100 percent of the
09 time, which is according to this table the same as your
10 zero percentile.

11 Q Let me put the question to you again. I don't
12 think we're discussing the same subject.

13 Have you ever recommended to a regulatory agency
14 that it establish as a ceiling a flow regime which is
15 the zero percentile flow?

16 A As a ceiling, no.

17 Q Thank you. Dr. Morhardt, now questions for you.
18 You suggest that there are more trout in Rush Creek
19 than in most studied eastern Sierra streams; is that
20 correct?

21 A BY DR. MORHARDT: That's correct.

22 Q What's the relevance of that observation to the
23 reestablishment of the historic fishery in Rush Creek?

24 A It suggests to me that the amount of flow that has
25 been in Rush Creek has been sufficient to allow the

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01 trout population to achieve a level which is about
02 comparable to most other Sierra streams, which also
03 suggests to me that it may be about as high a level as
04 it's going to get.

05 Q That's a string of inferences, isn't it?

06 A Indeed it is.

07 Q Do you have any estimate of the fish population in
08 Rush Creek before 1941?

09 A No, I do not.

10 Q If it were ten times the average in the Owens
11 Basin, what relevance would the comparison of the Owens
12 Basin have?

13 A None.

14 Q On page 72 of your written testimony, you state,
15 quote, the models suggest that both regulation and
16 diversion of flow as they exist in the eastern Sierra
17 Nevada streams had at worst no adverse impact.

18 Is it your testimony that the diversion and
19 regulation of flow by the City of Los Angeles between
20 1941 and 1983 had no adverse impact to the fishery in
21 Rush Creek?

22 A No. It's not. The -- the statement is based on
23 the study that we did looking at streams that had had
24 water in them continuously, but streams that had been
25 of all different sizes, and in some cases diverted

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01 rather substantially.

02 And in that case, there is no -- looking at my
03 Figure Number 1, there is no relationship between the
04 flow and the fish populations. None of these streams,
05 however, were dry completely, of course.

06 Q I'll get to the relationship between flow and
07 population later in my cross-examination. For the time
08 being, let's focus specifically on Rush Creek.

09 Do you agree that the regulation and diversion of
10 flow by the City of Los Angeles between 1941 to 1983
11 had an adverse impact on the fishery in Rush Creek?

12 A Yes, I do.

13 Q On page 72, you also state, quote, In some of the
14 models, regulation and diversion of flow had a \hat{O}

numbers and

16 biomass, unquote.

17 Given your answer, you would agree that that
18 enhancement did not occur in Rush Creek between 1941
19 and 1983?

20 A I would agree with that.

21 Q And you would agree with respect to Lee Vining
22 Creek as well, wouldn't you?

23 A Not necessarily with respect to Lee Vining Creek.
24 The populations in Lee Vining Creek as shown on Figure
25 1 of my testimony show a range of populations which are

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01 well within the range of those of the other streams in
02 the eastern Sierra.

03 Q What was the fish population in Lee Vining Creek
04 before 1941?

05 A I don't know.

06 Q Did L.A. periodically dry up Lee Vining Creek
07 between 1941 and 1983?

08 A I don't know. But I don't think they dried it up
09 periodically during the years just prior to the time
10 these samples were taken, which were in 1984 and 85.

11 Q My question concerned the period 1941 to 1983?

12 A I don't know anything about the flow regime in Lee
13 Vining Creek during that period.

14 Q Let's discuss the relationship between flow and
15 fish population. In going through your testimony, I
16 found the following phrases to describe that
17 relationship.

18 Quote, very little correlation, unquote, page 71.

19 Quote, lack of relationship, unquote, page 71.

20 Quote, not the determinant, unquote, page 72.

21 Quote, nearly complete lack of relationship,
22 unquote, page 72.

23 And, quote, no scientific evidence, unquote, to
24 show a relationship, page 73.

25 For the purpose of this cross-examination, could

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01 you offer me a term which describes your opinion as to
02 the relationship between flow and fish population in

03 the eastern Sierra Nevada?
04 A There does not appear to be any relationship at
05 all above a very small flow based on the data collected
06 by Deinstadt.
07 Q No relationship at all over a threshold flow?
08 A Clearly, there has to be some water in the stream
09 before fish can live there. But of the streams that
10 were sampled, some had very low flows.
11 And as one can see by looking at Figure 1, even
12 some of those very low-flow streams had very high fish
13 populations.
14 Q In the studies you conducted, what's the
15 threshold?
16 A I don't know. I think that there are -- none of
17 these streams had flows lower than three cfs. And in
18 some of the streams of three cfs, there are fairly
19 large populations.
20 The determinant here is that these streams also
21 had some pool habitat. And pool habitat tends not to
22 be influenced by flow at all or very little.
23 Consequently there was indeed water of some depth in
24 the mean with low flow.
25 Q Let's look at Figure 2 of your written testimony.

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01 Do you have that in front of you?
02 A I will momentarily. I do.
03 Q The highest data point shown in Figure 2, which I
04 interpret to mean the highest number per meter of fish,
05 occurs very close to the left hand margin of that
06 figure; is that correct?
07 A That's correct.
08 Q Now, the X axis in that figure is cubic meters per
09 second?
10 A That's correct.
11 Q One cubic meter per second corresponds roughly to
12 36 cubic feet per second?
13 A That's correct.
14 Q Let's focus on that triangle, which is the peak in
15 Figure 2. That appears to be about one fifth of one

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17 A Approximately.
18 Q Approximately seven cfs of flow?
19 A That's probably correct.
20 Q If there is almost no relationship between flow
21 and fish population, and if the highest data point
22 shown in your studies occurred at 70 cubic feet per
23 second, why not recommend seven cubic feet per second
24 in Rush Creek?
25 A Perhaps that would be a good flow. I'm not making

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01 a flow recommendation for Rush Creek.
02 Q Same answer for Lee Vining Creek?
03 A It's conceivable.
04 Q Miss Cahill asked you several questions about
05 limiting factors. And I understood your answer to be
06 that your regression analysis accounted for
07 approximately half the variability in fish population,

08 and that the other half was unaccounted for.
09 A That is correct.
10 Q Do you have an opinion as to the limiting factors
11 that exist today in Rush Creek?
12 A I don't have a very strong opinion.
13 Q Does that mean that you are not confident in your
14 opinion?
15 A That's correct. I believe that there is very
16 little data for the entire eastern Sierra on what
17 factors are limiting to fish populations.
18 Q This Board has announced its intention to make a
19 water rights decision of permanent effect by mid next
20 year. By mid next year we're not going to be in much
21 better shape in terms of understanding limiting
22 factors.
23 Given that assumption, what recommendation do you
24 have to this Board for identifying limiting factors
25 which may exist today in Rush Creek?

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01 A Well, I think it's unlikely that anyone is going
02 to be able to identify the limiting factors in Rush
03 Creek between now and then. I suspect that they are
04 related to the availability of food, but none of the
05 data I have seen clarifies that very much.
06 Q So would you recommend that this Board not attempt
07 to identify limiting factors in Rush Creek before
08 issuing its water rights decision?
09 A I don't believe the Board is actually going to be
10 able to identify the limiting factors. I would
11 recommend that they try to. It would be very nice to
12 know what they are.
13 Q What's the basis for your belief, if any, that
14 weighted usable area is a limiting factor in Rush Creek
15 today?
16 A Are you suggesting that I believe that it is?
17 Q Let me put the question to you more directly. Is
18 weighted usable area a limiting factor in Rush Creek
19 today?
20 A I do not know.
21 Q Are you familiar with the 1990 agreement between
22 the parties in the Mono Lake cases?
23 A Somewhat.
24 Q Let me read from paragraph three in that
25 agreement.

0222

01 "Conditions which maintained and benefited
02 the fisheries in Rush and Lee Vining Creeks include,
03 but are not limited to," and then it goes on to list
04 one, two, three, four, five, six different conditions
05 which benefited the fisheries before L.A. began
06 diversions in 1941.
07 Do you have an opinion whether those six
08 identified conditions, in fact, did benefit the
09 fisheries before 1941?
10 A Would you mind reading them to me, please?
11 Q Stream flow and instream conditions.
12 A That's item number one?
13 Q Number one.
14 A I'm sure that when there was no stream flow in the
15 stream, the fish population suffered tremendously.

16 Q In the interest of time, why don't we do this in a
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18 Yes, means that you agree that it benefited the
19 fishery. No means that you disagree.
20 A Yes.
21 Q Benthic organisms and nutrients, number two.
22 A Yes.
23 Q Riparian and canopy vegetation, species,
24 structure, density, distribution, location and acreage?
25 A I'm not convinced of that.

0223

01 Q Channel configuration, bed composition and
02 structure?
03 A Yes.
04 Q Contribution of water benthic organisms and
05 nutrients of springs.
06 A I'm not convinced of that.
07 Q Water temperatures and other water quality
08 parameters?
09 A Perhaps.
10 Q Is there a relationship between flow and any of
11 the conditions which you agree benefit the fisheries?
12 A There's certainly a relationship between the first
13 one, which is flow. The others are related to a point
14 with flow.
15 Q You would agree that flow is related to riparian
16 vegetation?
17 A Not necessarily. In many streams in the eastern
18 Sierra they are almost completely diverted. The
19 riparian vegetation is intact, as much as I can tell.
20 Q In Rush Creek is there a relationship between flow
21 and riparian vegetation?
22 A Well, Rush Creek is a special case, because it was
23 completely dried up, and so indeed there is. But I
24 doubt that there's any sort of a functional
25 relationship between it now. I doubt that you could

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01 draw any sort of a regression relating the amount of
02 riparian vegetation to the amount of flow along the
03 stream.
04 Q Dr. Morhardt, I understand it's a special case,
05 but it is the focus of this proceeding. And I take it
06 from your answer that you do not believe that there's a
07 functional relationship between flow and riparian
08 vegetation in Rush Creek; is that correct?
09 A There may be in parts of it, particularly in the
10 meadowlands.
11 Q Have you reviewed the riparian vegetation model,
12 which is described in the environmental impact report
13 and set forth as an attachment to that report?
14 A Is that the Taylor model?
15 Q I don't recall its name. Have you reviewed any
16 such model contained in or attached to the draft EIR in
17 this proceeding?
18 A I have reviewed the Taylor model.
19 Q Do you have an opinion about it?
20 A Yes. I don't think it's valid.
21 Q Is there any relationship between flow and channel
22 configuration in Rush Creek?
23 A Yes.

24 Q Do you agree that channel configuration can effect
25 the fishery?

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01 A Yes, it can.

02 Q If there's a relationship between flow and channel
03 configuration, and in turn, if there's a relationship
04 between channel configuration and fishery, how can you
05 say there's no relationship between flow and fishery?

06 A I'm saying, based on the data that were collected
07 across eastern Sierra streams by Deinstadt, there in
08 fact is no relationship between flow and trout
09 population.

10 Q And I'm asking you specifically about Rush Creek.

11 A I don't know if there will turn out to be one or
12 not. From what I've seen so far, there is a very
13 little one.

14 If you look at my Figure 1, for example, you'll
15 see that over the range of flows that existed during
16 the period of time we were sampling fish, which is
17 about somewhere between 19 cfs and 11 cfs, there is no

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19 And if you look at -- I looked at the date that
20 Dr. Meesic presented in his testimony, there have been
21 higher flows since then.

22 From what I can tell by looking at that, there has
23 not been any sort of significant change in the fish
24 population. So I think it's quite possible there will
25 not be.

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01 HEARING OFFICER DEL PIERO: Mr. Roos-Collins, your
02 initial 20 minutes are up.

03 MR. ROOS-COLLINS: I request an additional ten
04 minutes of time.

05 HEARING OFFICER DEL PIERO: Based on?

06 MR. ROOS-COLLINS: The complexity of these issues
07 and the importance of Dr. Morhardt's testimony.

08 HEARING OFFICER DEL PIERO: Fine.

09 Q BY MR. ROOS-COLLINS: Dr. Morhardt, let's turn now to
10 the Deinstadt reports to which you have referred and
11 which are cited in your written testimony.

12 I'm distributing now the reports which I believe
13 are your Deinstadt reports. And I ask that they be
14 marked Cal-Trout Exhibits 23 and 24.

15 (Cal-Trout Exhibits 23 and 24
16 were marked for identification.)

17 MR. ROOS-COLLINS: 23 will be a survey of fish
18 populations in the streams of the Owens River drainage
19 1983 to 84, DFG Administrative Report number 85-2.

20 MR. BIRMINGHAM: What was the Cal-Trout
21 identification for this?

22 MR. ROOS-COLLINS: Number 23.

23 MR. BIRMINGHAM: Excuse me, counsel, we weren't
24 given 23.

25 MR. ROOS-COLLINS: It will be there. And 24 will

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01 be survey of fish populations and streams in the Owens
02 River Drainage, 1985, DFG Inland Fisheries Report

03 number 86-3.
04 Do you have these reports in front of you,
05 Dr. Morhardt?
06 DR. MORHARDT: I do.
07 HEARING OFFICER DEL PIERO: I don't think these
08 documents are the same. One is the DFG 84 document,
09 and the other one is an 85 document?
10 MR. BIRMINGHAM: I've been given two that are the
11 same.
12 HEARING OFFICER DEL PIERO: Which year do you
13 have?
14 MR. BIRMINGHAM: I've got 83-84.
15 MR. ROOS-COLLINS: He's in the market for a trade.
16 HEARING OFFICER DEL PIERO: We have -- I know we
17 have excess copies at the head table. I'm sure
18 Mr. Birmingham is welcome to have one of the -- what do
19 you have? You've got 185?
20 MR. BIRMINGHAM: I've got 85-2.
21 HEARING OFFICER DEL PIERO: Do you have an 83-84
22 to give to Mr. Birmingham?
23 MR. BIRMINGHAM: That is 83-84.
24 HEARING OFFICER DEL PIERO: Pardon me? Oh, you're
25 talking about the administrative numbers 85-2. You've

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01 got 83-84. Do you have the 85 one?
02 MR. CANADAY: Mr. Del Piero?
03 HEARING OFFICER DEL PIERO: Yes.
04 MR. CANADAY: When exhibits are presented to staff
05 and the Board, we need at least ten copies so that the
06 Board members --
07 HEARING OFFICER DEL PIERO: Yes, I know.
08 MR. ROOS-COLLINS: Mr. Canaday, I believe the ten
09 copies were presented to the Board and staff.
10 HEARING OFFICER DEL PIERO: These are supplemental
11 copies?
12 MR. ROOS-COLLINS: I'm sorry. Mr. Del Piero, I've
13 lost track of how many copies were handed out. We made
14 a total of 15 of each exhibit. Apparently they have
15 not been distributed to the Board --
16 HEARING OFFICER DEL PIERO: Have you got yours?
17 MR. BIRMINGHAM: I've got two separate reports.
18 I'm happy.Ø
OFFICER DEL PIERO: Have a seat folks.
20 I'm trying to make sure that we get folks to start
21 sitting down, so that I can figure out what is going on
22 here. Then perhaps we can eventually get out of here
23 tonight.
24 Now, Mr. Canaday, how many copies did you get?
25 MR. CANADAY: We don't know.

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01 HEARING OFFICER DEL PIERO: We don't know. We'll
02 clean it up later on. Okay? Mr. Roos-Collins, you may
03 be obliged to produce additional copies for us in the
04 event that you didn't have enough. But we'll count
05 them up at the end. Why don't you proceed with your
06 cross-examination?
07 MR. ROOS-COLLINS: My apologies for the confusion.
08 HEARING OFFICER DEL PIERO: That's quite all
09 right.
10 Q BY MR. ROOS-COLLINS: Dr. Morhardt, do you have the

11 Department of Fish and Game report 85-2, which is
12 Cal-Trout Exhibit 23 in front you?
13 A Yes, I do.
14 Q And do you have the DFG report 86-3, which is
15 Cal-Trout Exhibit 24 in front of you?
16 A I do.
17 Q Are these DeinStadt reports to which you referred
18 in your written testimony?
19 A Yes.
20 Q What was the purpose for the reports?
21 A They were a synoptic study of the fish populations
22 in the eastern Sierra.
23 Q What was the purpose for the reports?
24 A It was to examine the fish populations in streams
25 throughout the eastern Sierra.

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01 Q Let me read to you from the introduction, page
02 three, of Cal-Trout Exhibit 24.
03 "A major part of the legislation was directed
04 towards improving wild trout angling in California by
05 identifying and designating streams in which fishing
06 quality could be improved through the use of catch and
07 release angling regulations.
08 The inventory requirement of the legislation not
09 only provided an opportunity to identify potential
10 quality wild trout streams, but provided the impetus
11 needed to collect fish population data required to more
12 effectively manage and protect a major segment of
13 California stream resources."
14 Is that a fair statement of the purpose for that
15 report as you understand it?
16 A I presume. They were the ones who decided what
17 their purpose was.
18 Q And do you believe it is consistent with the
19 purpose for this report to conclude there is no
20 relationship between flow and fish population?
21 A The data in the reports speak for themselves.
22 Q Okay. Fish population data are typically
23 collected by snorkeling or electrofishing or both; is
24 that correct?
25 A Correct.

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01 Q The fish population data contained in E.A.'s
02 studies for the Mono Lake tributaries were collected by
03 snorkeling; is that correct?
04 A No. It's not. They were all collected by
05 electrofishing. They were using the same techniques as
06 used by DeinStadt.
07 MR. BIRMINGHAM: We had long debates about that in
08 front of Judge Finney, and you were very supportive of
09 that technique, as I recall.
10 MR. THOMAS: Are you testifying here,
11 Mr. Birmingham?
12 HEARING OFFICER DEL PIERO: Gentlemen, gentlemen,
13 the Court Reporter, first of all, isn't going to
14 recognize any of you. And second of all, it's four
15 o'clock.
16 Proceed Mr. Roos-Collins.
17 Q BY MR. ROOS-COLLINS: Let's turn to page 16 of
18 Cal-Trout Exhibit 24.

19 A Could you tell me which of those two reports that
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21 Q Again, that's DFG report number 86-3, dated April
22 1986.
23 A Thank you. What page?
24 Q Page 16. This appears to be a description of Ash
25 Creek, the first creek included in this report; is that

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01 correct?
02 A Yes, it is.
03 Q It shows characteristics including length, width,
04 elevation, gradient and erodiant bank; is that correct?
05 A Correct.
06 Q How would you characterize the data set forth in
07 this report as to the characteristics of the stream?
08 MR. BIRMINGHAM: Objection. Ambiguous.
09 MR. ROOS-COLLINS: Is this data general?
10 HEARING OFFICER DEL PIERO: Sustained.
11 MR. ROOS-COLLINS: My apologies.
12 HEARING OFFICER DEL PIERO: Go ahead and ask.
13 DR. MORHARDT: Is this data general? Some of it's
14 quite specific.
15 Q BY MR. ROOS-COLLINS: Would you agree that the data
16 set forth in this report constitutes a summary of the
17 characteristics along the entire reach of each stream
18 studied?
19 A The entire reach is about 100 meters long. And
20 yes, it does.
21 Q Yes, and some of the other creeks are much longer
22 than Ash Creek; isn't that correct?
23 A No, the areas sampled are about 100 meters long,
24 and the descriptions shown in this report are of that
25 hundred meter section.

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01 Q Let me put the question to you more directly. On
02 the basis of the data contained in Cal-Trout Exhibits
03 23 and 24, are you confident that you can determine
04 which of these streams are comparable to Rush Creek?
05 A I've made no attempt to do so.
06 Q So it's quite possible that every creek in these
07 exhibits are not comparable to Rush Creek, in terms of
08 habitat quality?
09 A Well, these are basically all of the streams that
10 exist along east side of the Sierra. So to the extent
11 that Rush Creek is in some way related to those
12 streams, they must be comparable to it. However,
13 probably every single one of these streams is unique in
14 some respect.
15 Q Let's turn to Table Three on page 14 of this same
16 exhibit, Cal-Trout Exhibit 24. That appears to list
17 the creeks which are contained in the study; is that
18 correct?
19 A Yes.
20 Q Which of these creeks is most like Rush Creek in
21 its habitat quality?
22 A I wouldn't care to venture that. I don't know.
23 Q Which is most like Lee Vining Creek?
24 A In what respect?
25 Q In terms of habitat quality?

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01 A I can't say. I have seen virtually all these
02 streams, and I find it difficult to make that sort of a
03 conclusion.

04 Q So you are comparing Rush Creek and the creeks
05 described in these reports without having any specific
06 knowledge as to how the habitat qualities compare?

07 A I have a great deal of specific knowledge. These
08 streams, however, if you want to make a comparison on
09 any sort of specific details, had I the data in front
10 of me, I could do that.

11 These, however, are all of the streams on the east
12 slope of the Sierra, essentially.

13 Q Let's focus, then, on riparian vegetation.

14 A All right.

15 Q I believe you previously testified that riparian
16 vegetation has an impact on the fishery.

17 A I don't believe I did.

18 Q Do you agree with me that riparian vegetation has
19 an impact on a fishery?

20 A I believe it can, but I don't think necessarily it
0

22 Q Which of the conditions that benefited the pre-41
23 fishery as listed in the 1990 agreement do you believe,
24 in fact, most benefited the fishery?

25 MR. BIRMINGHAM: Perhaps the witness could have a
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01 copy of the 1990 agreement so that he can see the
02 conditions laid out in that agreement.

03 HEARING OFFICER DEL PIERO: Mr. Roos-Collins, do
04 you have a copy available?

05 MR. ROOS-COLLINS: I do, Mr. Del Piero. I
06 withdraw that question in the interests of time.

07 Q BY MR. ROOS-COLLINS: Dr. Morhardt, let me ask you
08 this. You previously agreed that channel configuration
09 has an effect on the fisheries; is that correct?

10 A Yes, it does.

11 Q Which of the creeks listed in the Cal-Trout
12 Exhibit 24 has a channel configuration most like Rush
13 Creek?

14 A I don't know.

15 Q Does it bother you that you are testifying that
16 these creeks are comparable to Rush Creek without
17 having an understanding of the channel configurations?

18 MR. BIRMINGHAM: Objection. Argumentative.
19 Misstates the evidence.

20 HEARING OFFICER DEL PIERO: Actually, I'm going to
21 allow that. I don't think it's argumentative, and I
22 don't think it misstates what was just elicited in
23 terms of a response. You can go ahead and answer that,
24 Dr. Morhardt.

25 DR. MORHARDT: I haven't testified that they're
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01 comparable, that Rush Creek is comparable to these
02 streams, I don't believe.

03 But I would say that if there are many streams that
04 are comparable to Rush Creek, it must be these, because
05 these are all of the streams that are along the eastern
06 slope of the Sierra.

07 I think there are many similarities between
08 these streams and Rush Creek. And I have not seen any

09 other streams that are closer to Rush Creek than this
10 subset of streams.

11 Q Let me ask a related question. Would you
12 recommend to this Board that a comparison between Rush
13 and Lee Vining Creek on the one hand and other eastern
14 Sierra streams on the other, figure into its
15 determination of the flow regime remedy in this
16 proceeding?

17 A I certainly would. I think that it's the best
18 possible set of data in order to make some
19 determination of about what might happen in Rush Creek.

20 Q Given what I characterize as the superficiality of
21 data as to stream characteristics in these reports, and
22 given your knowledge of those same stream
23 characteristics, how would you recommend that the Board
24 go about collecting that data by summer of 1994?

25 A Well, that's a difficult question. I think if the
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01 Board decided that what it wanted to do was to look for
02 stream sections that were comparable to sections of
03 Rush Creek, it could do so.

04 Each section of Rush Creek has certain
05 characteristics which are bound to be duplicated in
06 sections of other streams. And I would imagine that it
07 would be possible to find sections of other streams
08 that had physical characteristics that were essentially
09 identical to the ones that the Board thinks are going
10 to occur in Rush Creek after it's restoration has
11 matured.

12 And by doing that, I would think you could make a
13 fairly strong guess about what the fish populations
14 would look like by looking at these comparable
15 sections.

16 Q Can you recommend a scientific methodology which
17 this Board could use, first, to identify a comparable
18 stream; and second, to evaluate the limiting factors in
19 that stream; and third, to compare those limiting
20 factors with the limiting factors in Rush Creek?

21 A I think I wouldn't concern myself with the

to

23 find stream sections that resembled what people think
24 Rush Creek will resemble following restoration, and
25 then simply see how the riparian vegetation and the

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01 fish populations fair or, in fact, in fact, what they're like.
02 I wouldn't do it on a whole stream basis, because
03 there are no streams that are equivalent along their
04 entire lengths to Rush Creek, but there certainly are
05 sections that are.

06 Q One final question about these exhibits and then
07 I'll leave them behind. You have described your
08 personal knowledge of these streams.

09 Does any of these streams have a stretch
10 comparable to the bottomlands that existed in Rush
11 Creek before 1941?

12 A I don't think so. The only streams that seem to
13 me to be comparable in some respects are perhaps
14 Mammoth Creek. But I've been thinking about this, and
15 I don't think there are any that are identical to it.

16 Q Let me ask you finally about the --

17 HEARING OFFICER DEL PIERO: Last question,
18 Mr. Roos-Collins. This is your last question.

19 Q BY MR. ROOS-COLLINS: Thank you. Let me ask you
20 finally about the last sentence in your written
21 testimony.

22 Quote, To the best of my knowledge, there is no
23 scientific evidence that increasing either flow or
24 weighted usable area in any eastern Sierra stream has
25 ever produced a larger trout population, and I doubt

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01 that it is likely to do so in Rush Creek, unquote.

02 Is it your opinion that the flow regime which
03 existed before the first injunction in Mono Lake cases
04 produced a fish population comparable to the fish
05 population today?

06 A Well, there was no flow before then, so obviously
07 not.

08 MR. ROOS-COLLINS: I have no further questions.

09 HEARING OFFICER DEL PIERO: Thank you, very much.
10 Miss Scoonover?

11 MS. SCOONOVER: I have no questions.

12 HEARING OFFICER DEL PIERO: You have no
13 questions? Anyone else have any questions of these
14 folks? Mr. Frink?

15 Oh, I'm sorry. Mr. Haselton's with us. Good
16 afternoon, sir.

17 MR. HASELTON: Thank you. Dr. Hardy, Dr.
18 Morhardt. It's been a long day, I know. I hope you
19 find me refreshingly brief.

20 First of all, Dr. Hardy, I have a pre-existing
21 condition of statistical phobia, so I probably won't be
22 asking you any questions for fear I may not understand
23 a lot of your answers.

24 Dr. Morhardt, I have a couple of questions,
25 and they relate to the Upper Owens River. But before

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01 we do that, I want to ask you to make sure I understand
02 what your target was, if you will.

03 CROSS-EXAMINATION BY MR. HASELTON
04 Q First of all, it was your assignment or charge or
05 responsibility to compare what I'm going to call the
06 variable of flow to fish population, and specifically
07 brown trout; is that true?
08 A BY DR. MORHARDT: Well, what I'm reporting on is the
09 results of a study that I did for the Electric Power
10 Research Institute that looked at all of the variables
11 for which we had data, and attempted to determine what
12 their effects were on brown trout.
13 Q Okay. And is not flow -- it's one of several if
14 not many variables, I think Mr. Roos-Collins did a
15 pretty good job of listing a lot of the variables that
16 comprise the stream system.

17 And is it also -- it's the combination and the
18 interrelationship of these variables that actually
19 define or describe the individual systems?
20 A I'm sure that's true.
21 Q I'm relating back to the difficulty of trying to
22 specifically identify and compare individual stream

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24 They may have all these variables, but because of
25 the different interrelationships between them, they are
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01 unique.
02 I will venture a little bit into statistics. In
03 order to strengthen and really -- this is a truly
04 objective question. In order to strengthen analysis of
05 a single variable, such as flow, between that and
06 another factor, such as brown trout, isn't it important
07 to find a group of systems that are similar, that have
08 a similar set of variables that relate to each other in
09 a similar way, to isolate the one variable you are
10 looking at, and that is flow?

11 A I don't think that's true. I think that -- oh.

12 Q Go ahead. Keep going.

13 A That's it.

14 Q Okay. Let me ask it a different way then. In
15 order to isolate a variable and to strengthen the
16 testing of that variable, if you will, doesn't it
17 assist what you're trying to do to have similar systems
18 with similar variables relating to each other in a
19 similar fashion?

20 A Let me answer the question this way. If you had a
21 series of streams that were essentially identical, you
22 would have a much greater chance of being able to
23 explain the factors which control the fish population.

24 Progression models of this type that are done on a
25 few streams that are quite similar, or even on the same
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01 stream, characteristically can explain more of the
02 variance than we are able to.

03 Q Okay. Thanks. Are you familiar with the Upper
04 Owens River?

05 A I have walked along it, yes.

06 Q Okay. We talk about the Upper Owens River, you
07 know, from Big Springs down to Crowley. Have you
08 walked along the area up, let's say, near Big Springs,
09 the Albert's Ranch, Arcularius Ranch, in that area?

10 A Yes, I have.

11 Q Would it be safe to say that in our general
12 discussion of eastern Sierra streams that the Upper
13 Owens is a unique system?
14 A Yes, I think so.
15 Q And to take that maybe a step further, do you need
16 primarily spring fed, as opposed to snow melt?
17 A Yes.
18 Q Low gradient?
19 A Low gradient as soon as it gets down to --
20 Q Yes.
21 A -- Arcularius Ranch.
22 Q That's true. That's true. And then is it safe
23 for me or anyone to state that although the Rush and
24 Lee Vining, they might -- Rush and Lee Vining creeks
25 may have all the variables that comprise a system that

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01 are also contained in Owens River, they are
02 significantly different because these variables are
03 arranged differently?
04 A Well, in particular, I agree with you completely.
05 And I think, in particular, what the Upper Owens River
06 has is Crowley Lake connected to the bottom of it. So
07 it has a gigantic reservoir of food and a good place
08 for large fish to grow.
09 Q And I guess then my last question, and what I'm
10 trying to find out, then, is it correct to state, then,
11 that -- to isolate one variable, flow, for the purpose
12 of comparing fish population between, say, Rush and Lee
13 Vining Creek and the Owens River, is statistically
14 weak? I mean, because they are different systems and
15 perhaps even not relevant?
16 A Well, the way that flow --
17 Q You want me to rephrase the question?
18 A Yes, yes. I'm having trouble grasping the
19 question.
20 Q Maybe if I put it in a series of statements and
21 finish with a question.
22 There was some questioning by, I think it was
23 Mr. Dodge, relating to why you didn't include the Owens

the

25 obvious difference, all the streams that you did

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01 include in your analysis were somewhat grouped or
02 similar, okay? And the Owens River is unique, and it
03 is different, because it is stream fed.

04 And to compare, knowing that both those systems
05 may have all the same variables, but they're arranged
06 differently, gradient, you know, the source of water,
07 what have you, but they're related differently. And
08 that's what comprises the different systems. That's
09 what makes them unique.

10 To extract one element such as flow for the
11 purpose of saying, well, one system has more fish than
12 the other because of flow, is not really very strong
13 statistical effort.

14 A It's a completely legitimate statistical question
15 to do that. The first thing one does in looking at any
16 variable is to look at a single regression or
17 correlation just using that variable.

18 Usually, if that variable is important to the
19 system, there will be some sort of a discernible
20 correlation with it, even though it may be strengthened
21 substantially by using multiple regression and adding
22 other variables.

23 When one looks at tables like this where there's
24 essentially no correlation with one of the variables,
25 it's very unlikely that adding other variables and

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01 correcting for other variables is going to cause that
02 one to become important.

03 In fact, the exercise we went through in the
04 effects of flow regulation paper, which we've been
05 talking about, was to do just that, to try to isolate
06 all of the other variables so that we could see,
07 correcting for all of those, we could see what affect
08 flow had. And, in fact, it was impossible to do that.

09 Q The Upper Owens and Rush and Lee Vining, they're
10 two different systems, and to do exactly what you just
11 said wouldn't show a correlation at all.

12 A Well, it didn't, so --

13 Q Yeah, it did. Okay. Thank you.

14 HEARING OFFICER DEL PIERO: Thank you very much,
15 sir. Mr. Frink?

16 MR. FRINK: Yes, Mr. Del Piero. I have a few, and
17 I believe Mr. Herrera and Mr. Canaday will have
18 substantially more.

19 CROSS-EXAMINATION BY THE STAFF

20 Q BY MR. FRINK: Dr. Hardy, I realize this is a
21 complicated subject, and a good bit of it is new to me,
22 so I'll try and keep my questions simple, and hopefully
23 the answers can be relatively simple as well.

24 On page 58 of your written testimony, you stated
25 that, "The flows which protect 80 to 85 percent of the

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01 maximum potential habitat are typically targeted under
02 multiple use considerations."

03 For purposes of my question, I'd ask that you
04 would assume that our goal isn't -- isn't any sort of

05 balancing between multiple use considerations, but
06 rather that our goal is to restore and maintain some
07 hypothetical pre-diversion fishery condition.

08 Now, assuming that you are under specific
09 directions to restore and maintain some hypothetical
10 pre-diversion fishery, would you first attempt to
11 assess the best available information on what type of
12 fishery existed under pre-diversion conditions?

13 A BY DR. HARDY: Yes, sir, and the conditions which
14 produced that fishery.

15 Q Okay. Once you've attempted to identify the type
16 of -- of fishery that existed and the conditions that
17 produced that fishery, is one of those conditions that
18 you would look closely at a determination of an
19 appropriate flow regime?

20 A Yes, sir.

21 Q And I assume in determining such a flow regime you
22 would look at the need for appropriate flushing flows;
23 is that correct?

24 A Yes, sir.Ô

you also attempt to specify a minimum

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01 flow rate which must always be present in order to
02 protect the fishery?

03 A Yes, sir.

04 Q Now, once you've determined an appropriate
05 flushing flow or series of flushing flows, and once
06 you've determined a minimum flow rate which must always
07 be met, would you establish any sort of other flow
08 requirements in order to reestablish and maintain the
09 pre-diversion fishery?

10 A I think the answer I would give to that is
11 perhaps, again, with the way you stated the question,
12 I'm not sure what you would -- what you were trying to
13 target as your -- your baseline fisheries condition,
14 what constituted -- I don't know -- I'm not sure I
15 understand what that target is.

16 If you have adequate flushing flows, and you've
17 established a minimum flow that you think would protect
18 the fisheries, then one answer I can give is that
19 you're already there. And I'm not sure then what
20 additional flows you might be referring to.

21 Q Okay. I believe the way that you defined the
22 minimum flow as you have used the term in the flow
23 recommendations that you've made in the past, and I
24 believe in this instance is a flow that will always be
25 present; is that correct?

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01 A Yes, sir.

02 Q Now, in the absence of a significant storage
03 reservoir upstream, how would you determine a flow that
04 would always be present in a given stream?

05 A Well, one of the first things you would do is look
06 at the flow hydrographs and look at what the flow
07 duration curves existed for that stream, and then if
08 you're looking at it, in my mind, from the issue of
09 fisheries, what is the types of habitats that are
10 there, and what flows, vis-a-vis, something like
11 weighted usable area --

12 Q My question is simpler than that. To determine

13 the flow that would always be present in the absence of
14 a reservoir that could provide storage releases,
15 wouldn't you look at the lowest recorded flow of
16 record?

17 A That would be one way to do it, yes. That one
18 lowest flow would be an observation for the existing
19 period of record of the simple one lowest flow you
20 have.

21 Q Okay. And in the absence of a storage reservoir,
22 the only way you could be relatively sure that your
23 minimum flow requirement would always be present would
24 be to set it at the lowest recorded flow; isn't that
25 correct?

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01 A In terms of the period of record, yes, sir.

02 Q So if all you were to do is to establish flushing
03 flows and a minimum flow, we could short circuit this
04 process considerably, couldn't we? We could look just
05 at flushing flows, and then look at the lowest recorded
06 flow of historic record?

07 A That would be one approach, yes, sir.

08 Q Do you think that would be an adequate approach to
09 reestablish and maintain a pre-diversion fishery?

10 A Probably not.

11 Q What more would you do?

12 A Well, I think -- I'm not advocating flows that
13 represent the simple one lowest flow that would have
14 existed.

15 I think that you would want flows someplace a bit
16 higher than that, especially if you had some inference
17 of what those flows may have done to protect your
18 fisheries.

19 Q So above and beyond establishing flushing flows
20 and a minimum flow rate that would always be present,
21 you would attempt to establish some other flow regime
22 aimed at protecting the fishery; is that correct?

23 A Right. If that minimum is as you state the single
24 one observed lowest flow from the period of record.

25 Q Now, you indicated, I believe in response to

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01 questions from Miss Cahill, that your understanding of
02 a minimum flow regime is the flow that will always be
03 present; is that correct?

04 A I think within the context of that answer my
05 testimony was that the minimum flow I was recommending
06 would constitute the minimum flow by which you would
07 not want to see flows go below, yes.

08 Q Thank you.

09 MR. HERRERA: Thank you, Mr. Frink. I'm not quite
10 sure where to start here.

11 Q BY MR. HERRERA: Dr. Hardy, would you say it's very
12 important to -- is it -- is one of the more major steps
13 in the IFIM process the scoping process?

14 A BY DR. HARDY: Yes, sir.

15 Q Could you describe the scoping process for me,
16 please?

17 A Briefly?

18 Q Very briefly, yes.

19 A I think in the scoping process, one needs to,
20 first of all, set the objectives of the study.
21 Secondly, I believe from a political arena, you need to
22 make sure that all the players involved are at the
23 table in the decision making process from the
24 beginning.

25 I think you then go to look at the conditions of
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01 the particular stream system you are dealing with,
02 identify the appropriate target organisms by which you
03 will evaluate your instream flows.

04 And then identify whether you suspect physical
05 habitat is limiting and/or other considerations, such
06 as water quality, temperature, other factors that need
07 to be considered.

08 And then proceed forward with the actual
09 on-the-ground study design in terms of the specific
10 delineation of reaches, and how many cross-sections,
11 for instance, you would want to target to collect, the
12 flow range anticipated to be in issue, so that you can
13 optimize your data collection within that area, because
14 we're always limited by time, personnel and budget
15 constraints. And then simply proceed forward with the
16 appropriate data collection methods.

17 Then the analytical methods, the review of those,
18 and then move forward with the interpretation of all of
19 the study elements in making up your flow
20 recommendation.

21 Q You mentioned earlier that -- I believe it was
22 1981, maybe it was 1983, that you reviewed some sort of
23 element of one of these studies, maybe the initial
24 scoping of one of these instream flow studies, and
25 provided comments to LA DWP; is that correct?

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01 A If I am thinking of the same thing you are, I
02 believe it was in reference in about 1989 or so to the
03 Rush Creek IFIM.

04 Q And that was in the preliminary phase of the Rush
05 Creek studies?

06 A No. I believe at that point, if my memory serves

07 me right, it was the initial draft report for the Rush
08 Creek IFIM.
09 Q Okay. And in other words, what you're saying is
10 you did not participate in any of the scoping of the
11 studies you were considering here today?
12 A No, sir.
13 Q Did you review the scoping process on these
14 studies?
15 A In a general sense, by asking primarily personnel
16 from the LA DWP questions such as, who was involved,
17 who was on-site, and at that level, in terms of going
18 through my checklist of the kind of issues and concerns
19 that were raised and who was involved.
20 Q Now, in your understanding of who was involved
21 from LA DWP staff, I understand that's somewhat
22 secondhand information, but your understanding of that,
23 is there anybody else you would have added to that
24 scoping process?
25 A Well, I think again, I would -- in terms of

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involved in the scoping

02 process?
03 Q That's correct, yes.
04 A Obviously the consultant that was doing the work,
05 the California Department of Fish and Game, if there
06 were issues of diversions or other things, you may
07 include the Army Corps of Engineers, if there were T
08 and E species or --
09 Q Specifically for these -- you know, and what --
10 some of these people that you've outlined here, or
11 agencies you've outlined were part of that scoping
12 process.
13 A Correct.
14 Q Was there anybody else you would have added to
15 that, that was not included in that process?
16 A I don't believe so.
17 Q And in the scoping process, would they have
18 addressed the argument we've seen here between the
19 different types of observations versus the use of Smith
20 and Acitunal (phonetic)?
21 A It is my understanding that there was not
22 unilateral agreement on the use and application of the
23 Smith and Acitunal (phonetic) curve.
24 Q Will was -- was there a resolve to that?
25 A Not to my knowledge, but I don't know

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01 specifically.

02 Q I'm assuming the resolve is Fish and Game
03 proceeding with Smith and Acitunal (phonetic)?
04 A Correct.
05 Q Do you know why -- or what the basis for the
06 argument was with Fish and Game at the time of why they
07 preferred Smith and Acitunal (phonetic) versus direct
08 observation, because, as you mentioned, was there time
09 constraints, monetary constraints of doing that, or do
10 you know?
11 A I believe that if I interpret the report
12 correctly, the best available information at the time
13 were the regional curves developed by Smith and

14 Acitunal (phonetic) for eastern Sierra trout streams.
15 And that as part of the study design, they attempted to
16 collect site-specific data. And because of data
17 limitations, were only able to develop some life
18 stages.

19 Q And what was -- what was LA DWP's comments on the
20 use of those? Were they suggesting the use of
21 observations, Smith and Acitunal (phonetic), or did
22 they have an opinion on it, or do you know?

23 A I'm not sure. My only recollections of that are
24 conversations with Dr. Randall Orton where he expressed
25 concern over the Smith and Acitunal (phonetic) curves.

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01 Q In your review of the various IFIM reports, did
02 you have occasion to contact the contractors that
03 actually prepared those studies and did the work?

04 A No, sir. My comments went specifically back to LA
05 DWP.

06 Q Did you contact, though -- did you discuss your
07 review of that document, or did you ask questions of
08 the contractors that actually prepared those documents?

09 A No, sir.

10 Q Is there any particular reason why you did not?

11 A I was asked -- the information was provided to me
12 in terms of the draft reports, and I was asked simply
13 to perform independent evaluation of what went on and
14 provide that directly back to LA DWP.

15 Q If you were to have contacted them, and you got
16 some clarification of the points that you've listed in
17 your direct testimony, would you think that there is
18 some reasons to change your conclusions?

19 A Well, that would really depend upon what the
20 consultants were able to articulate to me in terms of
21 resolving the issues that I have raised.

22 Q Let me kind of walk you through one -- one that
23 I'm a little more familiar with, and see if can I do
24 this. Middle Owens River IFIM. You went on quite
25 considerably about hydraulic simulations.

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01 Did you use all of the 99 transects in which you

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there

03 that you have on page 68?

04 A I scanned in the Appendix B of the velocity
05 adjustment factors and correct -- made sure those data
06 were scanned correctly, and then went through an
07 exercise of plotting up every velocity adjustment
08 factor.

09 Q So your answer to that is that you used all 99?

10 A Yes, sir.

11 Q Are you aware that Jones and Stokes did not use
12 all of the 99?

13 A I believe that there was a subset that were
14 excluded.

15 Q And why were they excluded?

16 A Because they felt for those few cross-sections in
17 particular, I believe that the hydraulics were not

18 supported by adequate analysis.
19 Q Would you agree with me if I told you that Jones
20 and Stokes omitted 17 various transects because they
21 did not match the hydrologic information?

22 A I'm sorry, sir. I'm not sure I caught the
23 question.

24 Q Let me reword that again. Jones and Stokes
25 developed their information on the 99 transects. And

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01 they found that between the normal year flows and the
02 high flows, that there was a combination of use
03 thereof, and at various points, that information that
04 was derived from all of the transects did not fit very
05 well. And subsequently they felt it was an aberration
06 there and disregarded 17 transects.

07 A Then that would simply reduce my percentages from
08 42 cross-sections at one flow and 40 at another by 17
09 cross-sections, instead of -- the 40 percent would
10 still represent some percentage where I did not agree
11 with the velocity adjustment factors.

12 Q And, in fact, you haven't discussed the velocity
13 adjustment factors at all with Jones and Stokes; is
14 that correct?

15 A No, sir.

16 Q Isn't it true that extremely low or high flows
17 beyond the flows that were -- where field data was
18 collected are the most difficult to model?

19 A Not necessarily.

20 Q Would you expand on that a bit?

21 A It is not uncommon in instream flow studies where
22 stage discharge relationships, for instance, are
23 nonlinear within the range of measured flows. And
24 making the assumption that they are linear, produces
25 spurious or erroneous results.

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01 And also that the velocity adjustment factors can
02 be influenced highly by the calibration procedures used
03 in the velocities as you move between your measurement
04 points. And there's no guarantee on how model
05 performance will perform even within the range of
06 measure discharges, let alone beyond the area of
07 extrapolation.

08 Q Would you agree with me that it appears that there
09 is some additional information required to come to the
10 conclusions that the hydrologic simulations are, as you
11 put them, flawed, and that they are not of any use?

12 A I'm not sure what additional information you would
13 be referring to. One has to understand that the
14 expected relationship between roughness in the channel
15 and discharge decreases as a function of discharge. If
16 I could draw a picture, I think it would help
17 articulate --

18 Q That's fine. The point I'm getting at here is
19 that it appears to me that without discussing some of
20 the particulars involved in these studies that the
21 consultants have actually developed, that it's
22 difficult to draw the kind of conclusions you've got.
23 I think there's some questions you have in there that
24 could be answered by these people directly that may
25 alter your conclusions. And I think the point I'm

01 trying to make is whether or not your analysis is
02 complete or not, by not having contacted these
people.ô

that from the standpoint

04 that if the report as presented indicates that the
05 range of velocity adjustment factors were within
06 accepted ranges of magnitude, and following generally
07 accepted relationships in terms of what they look like,
08 and in reviewing that information those velocity
09 adjustment factors do not, and that was the best
10 available simulation that they could produce, then I
11 would simply question what else can they tell me,
12 unless they have corrected those relationships prior to
13 utilizing them in the model.

14 HEARING OFFICER DEL PIERO: Mr. Herrera?

15 MR. HERRERA: Yes.

16 HEARING OFFICER DEL PIERO: I would point out that
17 the last soliloquy on your part came unbelievably close
18 to opinion, as opposed to question.

19 MR. HERRERA: This is difficult to deal with any
20 way, so I'll watch my opinions.

21 MR. BIRMINGHAM: Mr. Herrera isn't any different
22 than many of the well-qualified attorneys that have
23 been asking questions here this afternoon.

24 HEARING OFFICER DEL PIERO: I completely agree on
25 that point in terms of representation for all parties

01 here.

02 MR. FRINK: I haven't made the mistake of renaming
03 my esteemed colleague, Mr. Canaday, in some other
04 habitat form. I might get there yet.

05 HEARING OFFICER DEL PIERO: It must be getting
06 late.

07 MR. HERRERA: Yes, it's getting late. Let me get
08 back to a couple of quick questions here, and we'll see
09 if we can't rap this up from my perspective.

10 Q BY MR. HERRERA: You indicated, also, that you had
11 visited Rush Creek many times. Could you tell me in
12 what capacity you did that?

13 A BY DR. HARDY: Yes, sir. Starting I would guess as
14 early as 1967, I frequented most of the streams on the
15 eastern Sierra at least three times a year with my
16 uncle to do fishing. And during the three years I
17 lived in Reno, my avid pursuit of fly fishing often
18 took me down the eastern Sierra streams and spent time
19 on those creeks.

20 And for a number of years, a close colleague of
21 mine lived in Bishop that I would spend extended
22 periods of time stumping around those creeks.

23 Q How was the fishing on Rush Creek?

24 A My recollection from my youth and on is we didn't
25 spend a whole heck of a lot of time on Rush Creek, to

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01 be honest.

02 Q Didn't catch many fish?

03 A Not many. If we did, it wasn't worth the effort.

04 Q Did you look at -- going on to the IFIM studies,
05 did you look at the studies that were conducted on the
06 Upper Owens?

07 A I did look at that study, yes, sir.
08 Q Did you draw any conclusions from that study?
09 A No, if my recollection serves me right, I thought
10 that in general the study on that particular site was
11 well done. And in terms of the ranges of flows that
12 were being discussed and other things, I felt that
13 there were no significant and pertinent issues to bring
14 before the Board that would extend the length of time
15 in my hearing here.
16 Q Did they use Smith and Acitunal (phonetic), or
17 direct observation?
18 A I believe they used a combination of Smith and
19 Acitunal (phonetic) and site-specific curves, if I
20 remember.
21 Q And on that subject, bear in mind that we're
22 evaluating all the evidence that's been brought forward
23 to us, and we have the controversy of both the E.A.
24 report and the Rush Creek report, using both types of
25 scenarios.

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01 What do you propose to do with that two different
02 types of information? Would you incorporate both or --
03 do you have some opinion on that?

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05 Q Yes.
06 A Again, I would draw the Board's attention to
07 Dr. Hanson's Exhibit figure number Two that's on the
08 board, and draw some comfort level that at discharges
09 above, oh, I'll just say 40 cubic feet per second, that
10 the relative change in magnitude of weighted usable
11 area, as you incrementally increase the discharge above
12 that, really doesn't matter which curve you pick. It's
13 simply a scaling of those curves and differences
14 between discharge. They don't buy you any more of the
15 farm in terms of weighted usable area predictions.
16 Clearly at discharges on the order of 25 cfs, the
17 relative difference or magnitude of changes in weighted
18 usable area are basically the same for either analysis
19 that you would do. And the only point that really
20 requires some gray matter controversy or discussion
21 really exists between those two ranges of discharge,
22 where the relative peaking of the curve with
23 Mr. Hanson's analysis through E.A. versus the
24 California Fish and Game previous preference curves are
25 really fundamentally different.

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01 So you can take the results from both and apply it
02 below the specified flow range of about 20 to 30 cfs,
03 and you could apply either result at flow ranges above
04 40. And if you wanted to average the two curves and go
05 to town on the intervening curve, you could.
06 Q You made one other comment that was kind of
07 puzzling to me. You indicated that you could use an
08 IFIM to somewhat reconstruct historic stream
09 conditions.
10 Could you explain that to me a little bit?
11 A Well, in a lot of instream flow projects, we're

12 evaluating potential changes in stream geometry through
13 habitat improvement. We will often go in and alter the
14 actual cross-section geometry to what we would consider
15 post-project conditions, or in a more simple case,
16 taking the existing cross-sections and deepen them a
17 bit, and add cover. For instance, if you were going to
18 run a cover dependent analysis and rerun those models
19 to get an idea of what those kind of changes may
20 actually produce.

21 Q I think I have one other request or -- could you
22 provide us a copy of your -- the reference that you
23 referred to, your lecture notes -- I'm not sure how you
24 referred to that. I think Mr. Roos-Collins was
25 discussing Fish and Wildlife Service policy with you,

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01 and you were referring to the information in that
02 document. Could you provide the Board a copy of that?

03 A Yes. I have a copy that's called, "Using The
04 Computer Based Physical Habitat Simulation System
05 PHABSIM." The most recent edited version is August 15,
06 1993, that I would be happy to provide to the Board.

07 I think if I may also volunteer, we have also
08 produced a lab tutorial that explains some of how the
09 models work, and how to interpret them, that may be of
10 benefit to the Board. If you would like, we could also
11 provide this information. It helps a lot in
12 interpreting what makes a difference and what doesn't.

13 Q I'm sure every bit will help in unraveling this
14 puzzle. Thank you.

15 I do have a couple of questions now for Mr.
16 Morhardt. And thank you, Dr. Hardy.

17 DR. HARDY: Certainly.

18 MR. BIRMINGHAM: For record, these are my copies,
19 and Dr. --

20 HEARING OFFICER DEL PIERO: We appreciate him
21 offering them to us.

22 MR. BIRMINGHAM: He will give you additional
23 copies.

24 DR. HARDY: Would it be permissible to send those
25 on diskette to legal counsel, and let him print the 400

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01 pages of double-spaced information?

02 HEARING OFFICER DEL PIERO: I'm sure he's more
03 than willing to do that.

04 MR. BIRMINGHAM: I'd be more than happy to do

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06 HEARING OFFICER DEL PIERO: Just so long as I
07 don't start hearing about rate payers any more.

08 MR. HERRERA: I'm trying to move it along here in
09 the interest of the rate payers, too.

10 Q BY MR. HERRERA: Quickly, Mr. Morhardt, I'm a little
11 bit curious in your plotting of flow relationships
12 versus fish populations that you used in Figure 1
13 annual flows. And we heard testimony that these
14 streams are dynamic with all kinds of fluctuations that
15 a single large event could alter the annual flows
16 significantly.

17 Would that change any of your analysis in -- if
18 you had daily flows that you plugged into that versus
19 average annual?

20 A BY DR. MORHARDT: I doubt it. The nine figures that
21 follow Figure 1 use three different flows. They use
22 the mean annual flow, the mean monthly low flow, and
23 the mean monthly high flow. And the data are
24 essentially the same. There's just no correlation.
25 I've also looked at some length to try to find other

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01 things that might be correlated in terms of flow
02 events, and I haven't found any yet.

03 The only thing that I think might happen is that
04 if you had large short-term flood flows, it might have
05 a strong short-term reduction in fish populations,
06 because it's clearly damaging to brown trout fry to
07 have large flows during emergence.

08 MR. HERRERA: I think that concludes my questions,
09 gentlemen. We've probably got more here, but I'll
10 concede to my colleague, Mr. Canaday.

11 HEARING OFFICER DEL PIERO: Mr. Canaday, before
12 you begin, would you like to take a break on this?

13 I'd like to point out that we've been joined by my
14 good friend and an excellent gentleman, the Director of
15 the California Department of Fish and Game,
16 Mr. Boyd Kibbons (phonetic) in the back of the room.
17 It's good to see you, Boyd.

18 Do you want to go now, Mr. Canaday?

19 MR. CANADAY: That's fine. A break would be fine.

20 HEARING OFFICER DEL PIERO: We'll take a break for
21 ten minutes.

22 (Whereupon a recess was taken at this time.)

23 HEARING OFFICER DEL PIERO: Ladies and Gentlemen,
24 we're going to begin again. Mr. Frink, you have a
25 quick announcement?

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01 MR. FRINK: Yes, just in order to meet any notice
02 requirements, we're going to hand out, as well as mail
03 out, a copy of a notice for another field orientation
04 tour for at least one of the Board members. I'll just
05 read it real quickly, because we're near the time of
06 the tour.

07 It's on November 22nd at 1:30, continuing on
08 November 23rd, meeting at the visitors' center, the
09 forest scenic area visitors' center in Lee
10 Vining. A number of you have been on these before, or
11 at least received the notices. It's one short
12 paragraph.

13 "A field orientation tour has been scheduled to
14 familiarize the State Water Resources Control Board and
15 Board members with Mono Lake and the Mono Basin
16 watershed and the diversions and uses of water in the
17 Mono Lake, Mono Basin and the Upper Owens River. The
18 Tour is for orientation purposes only."

19 I want to emphasize this part, since we're really
20 in the midst of the hearing now.

21 "All parties may be present during the tour, but
22 may not present testimony, evidence or arguments
23 related to the issues to be considered at the hearing.
24 If you wish to be present or accompany the Board on the
25 tour, you must arrange for your own transportation.

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01 And we'll get those in the mail. But because it's

02 on the 22nd, we're nearly there, we wanted to bring it
03 up today.
04 HEARING OFFICER DEL PIERO: This is a down park --
05 an optional event? Ô

have

07 been on two or maybe three of these by now. And, you
08 know, we're noticing it not because we expect anybody
09 to be there, but just because we're obligated to notice
10 it.

11 HEARING OFFICER DEL PIERO: It's my sense that Dr.
12 Stein is not going to be running around in shorts on
13 that one. That's not necessarily true.

14 Okay. Mr. Canaday, you're on.

15 MR. CANADAY: Thank you. Actually, before I start
16 with Dr. Morhardt or Dr. Hardy, and since I've now been
17 given a handle that will follow me through the rest of
18 my life, I was curious if that when he looked at me, he
19 was -- looked at and considered weighted usable area
20 when he arrived at --

21 MR. HERRERA: It was suggested that it be changed
22 to Captain Habitat.

23 MR. CANADAY: And I would like to insure my
24 colleague that it would take water of greater depths to
25 fully wet my perimeter.

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01 HEARING OFFICER DEL PIERO: I figured it out.

02 After 5:00 o'clock you get to be funny, right?

03 Q BY MR. CANADAY: Dr. Hardy, one of the premises of
04 IFIM is that the channel remains stable; is that
05 correct?

06 A BY DR. HARDY: Yes, sir the hydraulics assume a rigid
07 bed.

08 Q And in what years were these, just for my
09 recollection, what years were these studies done that
10 are being presented to the Board today for Rush Creek?

11 A When were the cross-sections collected?

12 Q Um-hum.

13 A I'd have to go back and look. I believe it was in
14 1987.

15 Q That would be for both of the studies?

16 A My independent recollection is that would be
17 true. Although Lee Vining Creek may have been later.
18 I don't recall specifically --

19 Q I'm more concerned about Rush Creek. I believe it
20 was at least 1987 for the E.A. report. I'm not sure
21 about Fish and Game.

22 Since those cross-channel sections have been
23 collected, certainly after 1989, there's been
24 significant additional flow in those channels.

25 Would you agree that the stream geometry has

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01 changed since 1989, or since those studies?

02 A It is my impression from observing Rush Creek and
03 hearing other testimony that that would indeed be the
04 case.

05 Q Would that affect the applicability of the
06 recommendations from either one of those studies if the
07 stream is significantly different today than it was
08 when those studies were put on?

09 A It definitely has that potential, sir.
10 Q Earlier in your testimony, you spoke of something
11 that's near and dear to me, and that's biological
12 sense, and that we don't get caught up in these
13 mathematical representations of what a stream is, but
14 we look at more of what a stream could be.
15 Is it your sense that if for reasons other than
16 weighted usable area that instream flows had to be
17 higher than the recommendations -- the lowest
18 recommendation that's before the Board now, that flows
19 were necessary in those channels for other reasons than
20 for biological sense, that this would cause an impact
21 on the fisheries?
22 A I believe there would be a potential for that as
23 broadly asked, yes.
24 Q What would those, in a broad perspective then,
25 what would those impacts be?

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01 A Well, for instance, one can -- as Dr. Morhardt
02 expressed in his example, very, very high flows at the
03 wrong period of time, for instance, can eliminate
04 successful spawning by way of taking out young of the
05 year, or fry, out of the system, because the timing or
06 magnitude of the flows would be too high at a specific

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08 One can also experience problems on the other
09 side, for instance, with too low a flow during the
10 winter period. You know, one of a number of infinite
11 reasons where that would be possible.

12 Q Do you have a professional opinion of what the
13 magnitude would be of too much flow at any particular
14 time? Let's say for spawning or emergence?

15 A Not at this point, sir.

16 Q Dr. Morhardt, I believe on your testimony, in
17 fact, the very first sentence on the top of page 73,
18 again, that you -- you have said -- and I'm quoting, in
19 quotes, The principal question in deciding on new
20 instream flow regimes is whether or not fish
21 populations will benefit from the increased flows.

22 Again, I would ask you the question: If the
23 Board, for reasons of biological sense, chose or
24 required instream flows greater than what you've
25 identified, that it's certainly not that they didn't

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01 benefit, but they would be detrimental to the stream or
02 the fisheries for lake levels higher than what the
03 19 cfs or 20 cfs were resulting.

04 A What was the question? I just didn't get the
05 question.

06 Q If -- if, because of a decision that the Board
07 would make choosing a lake level alternative, and to
08 achieve that lake level alternative, it required flows
09 greater than the 20 or 30 cfs that you indicate -- that
10 the E.A. studies indicate that we can't predict
11 whether -- what the actual benefits would be to the
12 fishery, but is it your opinion that it wouldn't be
13 detrimental to the fishery?

14 A I think it would have to get fairly high to be
15 detrimental.

16 Q And that if these flows were necessary, again, for

17 biological reasons other than just the maintenance of a
18 fishery, such as riparian recovery, either in extent or
19 in diversity, or for allowing natural channel
20 configuration changes to occur, rather than what some
21 people have claimed as intrusive or heavy-handed for
22 engineering solutions, that that would not be
23 detrimental to the fishery?

24 A It's kind of a broad question, but I think in
25 general, Rush Creek and the fishery in Rush Creek can
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01 withstand flows considerably higher than the 19 cfs
02 that were in it when I made these measurements.

03 MR. CANADAY: That's all I have. Thank you.

04 HEARING OFFICER DEL PIERO: Thank you very much.
05 Mr. Birmingham?

06 MR. BIRMINGHAM: Mr. Dodge and I have an agreement
07 that if I keep it brief, he'll keep it at three
08 minutes, so I'm going try to keep it as brief as
09 possible.

10 HEARING OFFICER DEL PIERO: You actually agreed to
11 that? I'm not asking him. I'm asking you. I don't
12 expect him to keep his promise on that.

13 MR. BIRMINGHAM: Actually, you've known him long
14 enough.

15 REDIRECT EXAMINATION BY MR. BIRMINGHAM

16 Q BY MR. BIRMINGHAM: Dr. Morhardt, I'm going to ask
17 you the easiest question you've ever been asked.

18 Where were you born?

19 A BY DR. MORHARDT: In Bishop.

20 Q And how long did you reside in the eastern Sierra?

21 A I lived there through high school, and then I came
22 back summers for a while after that.

23 Q Is your familiarity with some of the streams that
24 you have testified about this afternoon based upon your
25 having been a resident of the eastern Sierra?

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01 A Well, in part. But of course I also worked for
02 the Department of Fish and Game for a while doing just
03 that, surveying streams.

04 Q Dr. Hardy, I might have some questions for you.

05 Mr. Herrera asked you a question about the velocity
06 adjustment factors that were used in the Middle Owens

07 IFIM; is that correct?

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sir.

09 Q Would you explain for us what velocity adjustment
10 factors are?

11 A I finally get to draw my graph.

12 Q If -- if it would help you in your explanation of
13 velocity adjustment factors and with the permission of
14 the hearing officer --

15 DR. HARDY: It would only take a few minutes, and
16 I think it's a critical point, to clean up the issue
17 that was raised and the question that was asked me.

18 If I can have your permission, Mr. Del Piero?

19 HEARING OFFICER DEL PIERO: Go ahead.

20 DR. HARDY: I think there's also something about
21 being a university professor, you can't talk without
22 standing up and drawing on something. Again, just in
23 25 words or less, if you --

24 HEARING OFFICER DEL PIERO: I'm counting.
25 DR. HARDY: Can you read sign?

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01 If you'll look at roughness, and I'll just put
02 down N to indicate roughness in a stream versus
03 discharge, basically in an open channel you'd expect a
04 relationship from a lot of empirical observations that
05 that should do the following:
06 If I have measured out a cross section and
07 calibration discharge, and let's call it 100 cubic feet
08 per second --

09 Q BY MR. BIRMINGHAM: And you've identified as Q-2?

10 A Q sub C for calibration. We in essence will get
11 back in the hydraulic models a calibration roughness
12 indicated as N sub C on this figure.

13 Q Which you've marked on the vertical axis of the
14 graph you're drawing?

15 A Yes, sir. I will be more explicit for the
16 record. What happens in these models in PHABSIM or
17 other hydraulic models is if I were to simulate a flow
18 less than the calibration flow, and in this instance
19 100 cfs, and I will designate it as Q-50, indicating 50
20 cfs, then if one were to come up and intersect the
21 relationship between roughness and discharge, one
22 should get a value of roughness indicated as N sub 50,
23 which, in fact, is greater than the roughness that you
24 got from the model based on your initial calibration
25 data of N sub C, and that's indicated by N sub 50 being

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01 higher on this graph.

02 Therefore, in the model, when it takes this
03 calibration roughness, and you tell it, I want you to
04 simulate a discharge of 50 cfs, it takes the roughness
05 from the calibration data, at the calibration flow, and
06 predicts the velocities in the stream. But because
07 this N value is too low in reality, the computation of
08 the discharge at a cross section, in fact, is too
09 large, because the roughness is really in the model too
10 low.

11 Therefore, the velocity adjustment factor, which
12 is this ratio between the simulated discharge and the
13 computational trial in the model, will be a value in
14 the computational velocities that gives you a discharge
15 greater than 50. And therefore, at flows below your
16 calibration flow, and I've indicated on the second
17 figure velocity adjustment factor as a function of
18 discharge, that at flows less than the calibration
19 discharge, a VAF of one being unity at a Q of 50, which
20 is lower than the calibration discharge of 100, you
21 would expect the VAF to be less than one.

22 Conversely, at discharges higher than the
23 calibration flow, the corresponding roughness in the
24 channel is, in fact, too high. Therefore this ratio is
25 expected to be greater than one, just from pure

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01 hydraulic theory.

02 If the VAF's generally do not follow this
03 relationship, it is indicative of either an error in
04 the water surface elevation modeling, because the
05 hydraulic radius of the stream is wrong and therefore

06 it affects the computational velocities, or you have
07 the wrong roughness indicated for the channel.
08 Q Now, you testified, I believe --

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You can't imagine how

10 grateful I am that you waited until after Mr. Stubchaer
11 left to give us that presentation.

12 MR. DODGE: Which slightly exceeded 25 words.

13 DR. HARDY: I was being articulate for the benefit
14 of legal counsel.

15 HEARING OFFICER DEL PIERO: Everybody's funny
16 after 5:00 o'clock.

17 Q BY MR. BIRMINGHAM: Dr. Hardy, I believe that you
18 testified that in connection with the middle Owens
19 IFIM, you had questions about 40 percent of the VAF
20 calculations that were prepared in connection with that
21 IFIM; is that correct?

22 A BY DR. HARDY: Yes, sir.

23 Q Could you please explain how or what caused you to
24 question the 40 percent of those velocity adjustment
25 factor calculations?

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01 A For many of the velocity adjustment factors that I
02 reviewed in the report -- I am drawing a graph of VAF
03 versus discharge. On many of the cross-sections, the
04 velocity adjustment factors would have relationships
05 that look like that. There were others which goes up,
06 goes down, and goes back up --

07 Q For purposes of the record, can you please
08 identify the graph that you are now working on as
09 Number 3?

10 A Yes. I have indicated the initial graph of
11 roughness versus discharge as Number 1. VAF versus
12 discharge theoretical relationship as Number 2, and
13 examples of VAF versus discharge for the study under
14 discussion as Number 3.

15 Other VAF relationships in that study, in fact,
16 went the opposite direction as what would be expected
17 from hydraulic theory.

18 Q Explain to me in as simple terms as you can why
19 that would cause you to be suspect of the calculations?

20 A Well, when I teach this course, the first thing we
21 attempt to do in teaching our students is that one of
22 the critical things you examine in your hydraulic
23 simulations to evaluate the adequacies of those, is to
24 examine these relationships. And if they don't follow,
25 generally, this theoretical relationship as indicated

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01 in number -- Figure Number 2 on the easel, and they
02 look like these relationships as indicated in Number 3,
03 you have some potential problem with your water surface
04 elevations and/or your velocity calibrations and
05 simulations in the model.

06 MR. BIRMINGHAM: Mr. Del Piero, may we have the
07 piece of butcher paper that Dr. Hardy has been writing
08 on marked next in order for LA DWP. And I believe that
09 it would be LA DWP Number 78.

10 HEARING OFFICER DEL PIERO: Objection? No
11 objections. So ordered.

12 (LA DWP Exhibit Number 78

13 was marked for identification.)
14 MR. SMITH: Mr. Birmingham, actually, I think it's
15 77.
16 MR. BIRMINGHAM: We have marked one other --
17 MR. SMITH: One other?
18 MR. BIRMINGHAM: Yes.
19 MR. SMITH: Okay.
20 HEARING OFFICE DEL PIERO: Does that conclude your
21 questions?
22 MR. BIRMINGHAM: No, it does not.
23 HEARING OFFICER DEL PIERO: It does not. Okay.
24 Q BY MR. BIRMINGHAM: With that explanation in mind,
25 the explanation you've given us in connection with your

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01 preparation of LA DWP 78, is there anything that anyone
02 could tell you about how the velocity adjustment
03 factors were calculated that would satisfy the concerns
04 that you've expressed about those calculations?
05 A I don't think so. If the velocity adjustment
06 factors in that report that I've articulated look like
07 examples as indicated on LA DWP, Exhibit 78, in Figure
08 Number 3, it's simply indicative of either errors in
09 the water surface and/or the velocities. And if they

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t corrected or analyzed, or if there is nothing
11 you can do, then relying upon those will produce
12 erroneous results when you go forward, in particular,
13 with the habitat model.
14 Q Now, I'll address this question to either of you,
15 or both of you. You were asked, both of you, questions
16 about the pre-diversion fishery that existed in Rush
17 Creek and in Lee Vining Creek.

18 I don't know if both of you were present, but I
19 will ask both of you to assume that there has been
20 evidence that -- it has been suggested that in Rush
21 Creek, below -- Rush Creek prior to diversions, there
22 were .75 adult fish per linear foot in Rush Creek.
23 Dr. Hardy, do you have an opinion as to whether or
24 not that is a reasonable estimate of the number of
25 adult brown trout that existed in Lee Vining or --

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01 excuse me, in Rush Creek prior to DWP's diversions?
02 A BY DR. HARDY: My opinion on that is I find it just
03 impossible to believe.
04 Q Would you explain the basis of that opinion?
05 A I'm an avid fisherman and have made my life doing
06 instream flow studies and stumping around most of the
07 intermountain west and great basin areas of California,
08 Arizona, Nevada, Utah.
09 And I'm just not aware of streams like Rush Creek
10 or Lee Vining Creek that just sustain that number of
11 fish per linear foot of stream. I just find it
12 incomprehensible.
13 Q Dr. Morhardt do you have an opinion on that
14 question?
15 A BY DR. MORHARDT: I think it's extremely unlikely.
16 The highest number of fish per mile in the eastern
17 Sierra by far is in the section of the Owens gorge,
18 just downstream from Lake Crowley. And that's about
19 4500 fish per mile, which maybe is in the range of .75

20 per linear foot.

21 But that's so far removed from any other stream,
22 including all the other streams, that -- except for Hot
23 Creek, which I think is a very special case, which is
24 somewhat less, that the -- I just think it's basically
25 impossible.

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01 Q Dr. Morhardt, how do eastern Sierra streams or --
02 let me restate the question. Are eastern Sierra
03 streams comparatively productive or unproductive
04 compared to streams in other parts of the western
05 United States?

06 A I'll have to have Dr. Hardy answer that, because
07 I'm only familiar with streams in the eastern Sierra.

08 Q Dr. Hardy, do you have an opinion on that
09 question?

10 A BY DR. HARDY: Yeah. My basic impression from my
11 knowledge of the fisheries information is that the
12 eastern Sierra streams to me are most typical to the
13 south slope streams in Utah, which are typically lower
14 productive streams than any other streams in the
15 intermountain west that I've dealt with.

16 Q Have you dealt with streams in Montana?

17 A On occasion.

18 Q Dr. -- excuse me. Mr. Dodge asked, I believe,
19 Dr. Morhardt a question about a method used to
20 calculate minimum flows for streams. He referred to it
21 as the Tenant Method, and also asked whether it's known
22 as the Montana Method.

23 Do you recall those questions either of you?

24 A BY DR. MORHARDT: I do, sure.

25 A BY DR. HARDY: Yes.

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01 Q I'll direct this question again to both of you.
02 Do you have an opinion concerning the applicability of
03 the Montana Method or the Tenant Method to eastern
04 Sierra streams?

05 A BY DR. HARDY: Well, I'll take a shot at that first.
06 My one issue, I guess, with the application of the
07 Tenant or Montana Method to eastern Sierra streams is
08 that the type of stream systems from which that
09 relationship was developed are very different than the
10 type of stream that exists in the eastern

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anyway, I have not seen any

12 attempt to validate that methodology as being
13 applicable or appropriate to eastern Sierra streams.

14 Q Dr. Morhardt, Mr. Dodge asked you a question which
15 elicited a response that you had actually used the
16 Montana or Tenant Method to calculate or estimate
17 minimum flows for Parker and Walker Creeks in the Mono
18 Basin; is that correct?

19 A BY DR. MORHARDT: That's correct.

20 Q Would you please explain why you used the Tenant
21 or Montana Method to calculate those minimum flows?

22 A Because we had no information at all that we could
23 use other than just what the flow regime had been.
24 That method, I think most people would agree, one would
25 only use in the absence of data. It's regarded as an

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01 office sort of a method.

02 Q Again in response to a question by Mr. Dodge,
03 Dr. Morhardt, you started to talk about an analysis
04 that you had done comparing the population of what you
05 termed bigger fish, fish in excess of, I believe you
06 said 12 inches, in Rush Creek to other creeks.

07 Do you recall that statement you began to make?

08 A Yes, I do.

09 Q And Mr. Dodge stopped you. What was the result
10 when you looked at how fish 12 inches or bigger in Rush
11 Creek compared to other streams?

12 A Well, there seems to be a threshold -- the reason
13 we didn't include them in the analysis in the first
14 place is that two-thirds of the streams in the eastern
15 Sierra don't have any fish that size. So it's a small
16 population of streams you're left with.

17 Of streams in the 10 to 20 cfs range, in which
18 Rush Creek lies at present, Rush Creek has as many or
19 more than any other stream. The only streams that have
20 more fish that are 12 inches long are Mammoth Creek,
21 just adjacent to the Hot Creek fish hatchery. And
22 Deinstadt stated in his reports here that he thought
23 many of those fish might have escaped from the fish
24 hatchery.

25 Hot Creek has them as well. And the Bishop Creek
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01 canal, which I think had flows of about 19 cfs, that
02 was the mean monthly flow for the month when Deinstadt
03 sampled it, had quite a few more, also.

04 Q There were questions about, I believe from
05 doctor -- excuse me, Mr. Herrera, that were answered by
06 Dr. Hardy, about the use of Smith and Acitunal
07 (phonetic) curves. And in fact, they were used in the
08 Department of Fish and Game IFIM.

09 Notwithstanding the controversy over their use as
10 opposed to habitat specific -- or site-specific
11 curves. The name Smith and Acitunal (phonetic), where
12 does that come from, Dr. Hardy?

13 A BY DR. HARDY: I believe it is the authors of the
14 Habitat Suitability Curves in the Eastern Sierra Trout
15 Streams.

16 Q Do you know the Smith in that Smith and Acitunal
17 (phonetic)? Who is that Smith?

18 A My distinguished colleague, Gary Smith, who is
19 here at the back of the room.

20 Q You say your distinguished colleague? For whom
21 does Gary Smith work?

22 A California Department of Fish and Game.

23 Q And did Mr. Smith have any connection with the
24 IFIM's that were being prepared in connection with the
25 Rush Creek study for Department of Fish and Game?

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01 MR. DODGE: Objection. This goes well beyond any
02 cross-examination.

03 HEARING OFFICER DEL PIERO: It does. I know
04 you're allowed to examine beyond what has taken place
05 in terms of direct or cross-examination.

06 The question I have, beyond attempting to comment
07 on the credibility of the witnesses that may be called
08 by the Department of Fish and Game, is what the

09 relevance of the question is?

10 MR. BIRMINGHAM: I'm not trying to comment on

11 Mr. Smith's credibility, Mr. Del
Piero.

HEARING OFFICER DEL PIERO: Are we establishing
13 authorship of the study?

14 MR. BIRMINGHAM: Actually, this relates to -- not
15 credibility --

16 MR. DODGE: In the interest of time, I'd like to
17 withdraw the objection.

18 HEARING OFFICER DEL PIERO: Okay. What was the
19 last question?

20 (Whereupon the record was read as requested.)

21 MR. BIRMINGHAM: That was a terrible question.
22 Let me just ask it again.

23 HEARING OFFICER DEL PIERO: You want to withdraw
24 the question, or rephrase it?

25 MR. BIRMINGHAM: I will withdraw the question.

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01 Q BY MR. BIRMINGHAM: Isn't it correct that Mr. Smith
02 was, in fact, the Department of Fish and Game

03 administrator responsible for the preparation of the
04 Rush Creek IFIM for the Department of Fish and Game?

05 A BY DR. HARDY: I believe his name is stated as such
06 on the report.

07 Q Dr. Morhardt, Mr. Dodge at the conclusion of his
08 cross-examination of you asked a question about
09 population data on Rush Creek at higher flows, higher
10 than 19 cfs. And I believe you responded that you had
11 no fish population data from Rush Creek at flows higher
12 than 19 cfs.

13 Was that your testimony?

14 A BY DR. MORHARDT: Yes, it was.

15 Q Was that correct?

16 A Well, I was referring to data that we had
17 collected at E.A. I subsequently recall that the
18 testimony of Dr. Carl Meesic, which will be upcoming,
19 does, in fact, include population estimates through
20 1993, so there are data at higher flows.

21 Q What do those data show in terms of fish
22 population changes with higher flows that were
23 instituted in 1989?

24 A It appears to me that the populations are varying
25 in the same way they did prior to that, and they're

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01 about of the same magnitude.

02 HEARING OFFICER DEL PIERO: Excuse me. Just for
03 my own clarifications. Is that data, or are those
04 estimates?

05 DR. MORHARDT: These are population estimates that
06 are derived from -- they're derived the same way the
07 earlier ones were, from electrofishing data.

08 HEARING OFFICER DEL PIERO: Okay. But they are
09 estimates, not hard numbers at this point in terms of
10 1993 population?

11 DR. MORHARDT: I believe they are hard numbers.
12 They're called estimates, because the data that are
13 collected from a small section of stream are then --

14 HEARING OFFICER DEL PIERO: Extrapolated?

15 DR. MORHARDT: Yeah, extrapolated from the rest of

16 the stream. But that's been the case all along.
17 HEARING OFFICER DEL PIERO: Okay.
18 I need to point out to you, Mr. Birmingham,
19 that --
20 MR. BIRMINGHAM: That if I'm going to hold
21 Mr. Dodge to his representation, I probably better sit
22 down.
23 HEARING OFFICER DEL PIERO: I think so.
24 MR. BIRMINGHAM: I have just one further question
25 that I'd like to ask Dr. Hardy. And this relates to a

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01 question that was asked by Mr. Dodge.
02 Q BY MR. BIRMINGHAM: Mr. Dodge -- and I want to make
03 sure I understand it, because you testified in response
04 to a hypothetical question, Dr. Hardy, by Mr. Dodge
05 about how the 80 percent of maximum habitat in the
06 stream as it exists today would relate to a stream as
07 it existed pre-diversion.
08 And Mr. Dodge made a whole series of
09 representations to you about how pre-diversion the
10 stream was narrower and had been widened by the
11 destruction of riparian vegetation.
12 Do you remember the series of assumptions that

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14 A BY DR. HARDY: Yes, sir.
15 Q Would you explain your answer to him that -- what
16 was your answer to him?
17 A My answer, basically, was that the conditions that
18 exist now, that cross-section data was dependent upon,
19 and I will use the example of 20 cubic feet per second,
20 existing in a channel that is broad and denuded of
21 vegetation and very shallow at a specific location.
22 If you were to take that same 20 cubic feet per
23 second and put it into a channel that would be
24 indicative of conditions prior to that, this would be
25 the assumption of what it looked like pre-1941, the

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01 habitat values you would get for that same unit amount
02 of discharge would be higher.
03 And the idea there is that if you take 80 percent
04 of the habitat value based on a crummy looking stream
05 and set it, and then you take that same flow amount and
06 put it down a stream that has now good structural
07 diversity and integrity, you wind up with more habitat
08 per unit discharge.

09 MR. BIRMINGHAM: Thank you. I have no further
10 questions.

11 HEARING OFFICER DEL PIERO: Thank you very much.
12 Mr. -- I'm sorry. Miss Cahill.

13 MS. CAHILL: This will be brief.

14 RE-CROSS-EXAMINATION BY MS. CAHILL

15 Q Dr. Hardy, I recall you discussing with
16 Mr. Roos-Collins Table 3A-3 from the EIR. I assume you
17 remember it.

18 A BY DR. HARDY: Yes, ma'am.

19 Q If you were to develop on-site criteria curves,
20 would you take all your data at a flow that was lower
21 than the zero percentile flow for that stream?

22 A No. If I were to go out and attempt to develop
23 site-specific curves, I would want to collect

24 observations from a wider range of flows as I could
25 physically collect the data in the stream.

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01 Q So would you then have a criticism of the E.A.
02 study based on the fact that they took all of their
03 observations at 19 cfs?

04 A From that viewpoint, it would be a criticism.

05 Q Thank you.

06 Dr. Morhardt, we've now seen the Deinstadt studies
07 that were provided to us by California Trout. And I
08 believe you've testified that you used information from
09 these studies in your analysis; is that correct?

10 A BY DR. MORHARDT: That's correct.

11 Q And did you incorporate the biological and
12 physical characteristics of the streams in your
13 analysis?

14 A Yes, I did.

15 Q And which ones.

16 A Most of them. We made some synthetic variables
17 using a variety of them. We tried to -- I think
18 basically almost all of them.

19 Q And did you use food abundance as a factor that
20 was included in your analysis for these streams?

21 A No, I think not. We didn't have food abundance
22 from a very large percentage of the streams, so we
23 weren't able to produce that.

24 Q Can food abundance effect the size of the trout
25 population?

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01 A Oh, yes.

02 Q So would you agree that you were not able to
03 consider a major factor other than flow that can effect
04 the size of trout populations in the eastern Sierra
05 streams?

06 A That's correct.

07 MS. CAHILL: Thank you. That's all I have.

08 HEARING OFFICER DEL PIERO: Thank you very much.
09 Mr. Dodge? I won't hold you to the three minutes,
10 Mr. Dodge.

11 MR. BIRMINGHAM: Nor will I.

12 MR. DODGE: Unfortunately, I'm going ask Dr. Hardy
13 a question, so I don't think I can guarantee --

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R. HARDY: The answer's yes.

15 MR. DODGE: It's a why question, Dr. Hardy.

16 HEARING OFFICER DEL PIERO: Don't go too fast,
17 guys, I'm writing this down.

18 RE-CROSS-EXAMINATION BY MR. DODGE

19 Q In response to Miss Cahill's question that you
20 would want a broader range of flows than
21 19 cfs in order to get site-specific utilization
22 curves, you said, yes, you would. And if that was a
23 criticism of E.A.'s approach, why would you want a
24 broader range of flows?

25 A BY DR. HARDY: Well, basically the idea there is you

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01 would want to try to maximize conditions under which
02 your observation data was taken. Primarily, the
03 fundamental problem with suitability curves is that
04 they are surrogate for what we know to be true fish

05 behavior on selection of stream locations. They really
06 select energetically favorable positions.
07 Q And, in fact, at 19 cfs E.A. was able to sample
08 very little deep water habitat, correct?
09 A That in one sense is true. The other thing to --
10 Q I said yes or no, sir.
11 A Yes, if I can explain.
12 HEARING OFFICER DEL PIERO: The answer is yes.
13 MR. DODGE: Thank you. Just a couple more
14 questions. A question for Dr. Morhardt.
15 Q BY MR. DODGE: Mr. Birmingham asked you about .75
16 fish per linear feet. And you related that to the
17 Owens Gorge at 4500 fish per mile.
18 Would you agree with me that 4500 fish per mile is
19 more than .75 fish per linear foot?
20 A BY DR. MORHARDT: Would you care to tell me exactly
21 what it is, if you know?
22 Q I'm trying to elicit from you that 4500 divided by
23 5,280 is greater than three fourths.
24 A That's probably correct.
25 Q Now, the last line of questions, again, for you,

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01 Dr. Morhardt, and this relates to the questions that
02 Mr. Roos-Collins was asking. And he pulled out
03 Cal-Trout Exhibit 23 and Cal-Trout Exhibit 24. And he
04 was trying to elicit from you as to whether the various
05 streams described in that were comparable to Rush
06 Creek.
07 And you testified that they must be -- they must
08 be the most comparable to Rush Creek, because you had
09 all the streams along the eastern Sierra.
10 Do you recall that testimony?
11 A Yes.
12 Q Now, in fact, that's not quite true, is it?
13 Because there are a couple of streams along the eastern
14 Sierra that are not included?
15 A It's true. There are a couple that are not.
16 Q And one of them is the Upper Owens River.
17 A That's correct.
18 Q And Mr. -- I've forgotten his name. Who is the
19 representative of the -- Mr. Haselton and you
20 established that the Upper Owens River was spring fed.
21 Do you recall that?
22 A I do.
23 Q And it was low gradient; do you recall that?
24 A Well, it's low gradient down at Arcularius Ranch,
25 yes.

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01 Q Now, would you agree with me that pre-diversion
02 Rush Creek, below the narrows, was low gradient and
03 spring fed?
04 A I don't think it's as low gradient as the Owens
05 River at that location, but I haven't checked it out on
06 a topo sheet, and I believe that it had some spring
07 flow into it, but I doubt that had anything like the
08 magnitude that the Owens River has.
09 Q But would you agree with me that the great bulk of
10 to other streams in the eastern Sierra are much higher
11 gradient than Rush Creek below the narrows?
12 A Yes. That's correct.

13 Q And would you agree with me that compared to Rush
14 Creek below the narrows, they have little spring
\lù,ù,ú ú

16 A I don't really know the magnitude of the spring's
17 feeding. But I would agree that they probably have
18 very little in general.

19 Q So that would you agree that one could make an
20 argument that the most comparable section,
21 pre-diversion to Rush Creek below the narrows, is in
22 fact the Upper Owens River?

23 A It's not impossible. I might have been tempted to
24 use the data from it, had it not been collected at a
25 time the spawning run was there.

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01 MR. DODGE: Thank you, sir. I have no more
02 questions.

03 HEARING OFFICER DEL PIERO: Thank you very much,
04 Mr. Dodge. Mr. Roos-Collins?

05 MR. ROOS-COLLINS: No further questions. Although
06 I do have a request of Dr. Hardy. I request that you
07 forward the compilation of lecture notes, and also the
08 Orange Paper to me so that I can evaluate whether to
09 introduce them as exhibits.

10 MR. BIRMINGHAM: I will provide Mr. Roos-Collins
11 with a copy at the same time that I provide a copy of
12 the lecture notes to the State Board. And I will also
13 provide to Mr. Roos-Collins and the State Board, if it
14 so desires, a copy of what we referred to as the Orange
15 Paper.

16 HEARING OFFICER DEL PIERO: Is that acceptable,
17 Mr. Roos-Collins?

18 MR. ROOS-COLLINS: I thank Mr. Birmingham.

19 HEARING OFFICER DEL PIERO: Can we get those by
20 say Monday?

21 MR. BIRMINGHAM: By Monday. That's a question
22 we'll have to ask Dr. Hardy.

23 HEARING OFFICER DEL PIERO: The reason I ask that
24 is because that's when our next day is that we're
25 scheduled for hearing.

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01 MS. CAHILL: We would request a copy of those
02 documents, also.

03 HEARING OFFICER DEL PIERO: If originals are
04 made -- if there's a problem in terms of making that
05 information available, although tomorrow is a state
06 holiday, Friday is not. And given my wonderful working
07 relationship with our reproduction staff, I can
08 probably get copies made.

09 Although I don't want to make that request unless
10 I absolutely have to. If you can get them for us by
11 Friday, fine, if you can't, if we can get the originals
12 by Friday --

13 MR. BIRMINGHAM: I think given the fact that it is
14 a federal holiday tomorrow, it would be impossible to
15 get them by Friday, because the only way we could get
16 them by Friday would be to have Dr. Hardy return to
17 Utah and express mail them to us.

18 HEARING OFFICER DEL PIERO: How many pages are
19 they, Dr. Hardy? That's them?

20 DR. HARDY: These are them. Mine is the Orange

21 Paper. This is the most current version, which is
22 probably 240 pages.
23 HEARING OFFICER DEL PIERO: I don't want any work
24 product in this, but can we get those and give them to
25 our duplication folks?

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01 MR. BIRMINGHAM: There is work product in this --
02 in this document.
03 HEARING OFFICER DEL PIERO: And how long will it
04 take you to go through and white it out if you --
05 MR. BIRMINGHAM: I can have that to you by
06 Friday.
07 MR. FRINK: Mr. Del Piero, I don't believe our
08 staff is in a big hurry to get it. I don't know about
09 everybody else.
10 HEARING OFFICER DEL PIERO: Mr. Frink, I don't
11 know if our staff's in a big hurry or not, but the
12 consideration is that I'm sure there are some other
13 people who would like a chance to see it as
14 expeditiously as possible particularly since we've got
15 hearings starting on

Monday.Ø

I normally wouldn't go to this effort in terms of
17 documentation, but since no one's seen this material
18 before, it's appropriate to get it copied as quickly as
19 possible.

20 If for nothing else, we'll make eight copies for
21 our own staff, and Mr. Birmingham can follow up with
22 the regular ten copies to us later on.

23 MR. BIRMINGHAM: While we're talking about
24 exchanging documents, we have been after some documents
25 for some time --

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01 HEARING OFFICER DEL PIERO: Let's focus on this
02 one first so we can get that out of the way. I still
03 have to ask Ms. Scoonover if she's got any recross.
04 Can you get us a reworked version of that minus
05 work product by Friday morning?
06 MR. BIRMINGHAM: Yes.
07 HEARING OFFICER DEL PIERO: Fine. Are you working
08 on Friday, Mr. Canaday?
09 MR. CANADAY: Always.
10 MR. BIRMINGHAM: We would request a copy also.
11 HEARING OFFICER DEL PIERO: Mr. Canaday, can you
12 impose on our reproduction staff to at least make
13 copies for each party. And then Mr. Birmingham, after
14 we make at least one copy for each party, you can then
15 follow up with the regular copies that we require for
16 our record; is that okay?
17 MR. BIRMINGHAM: That would be fine.
18 DR. HARDY: Mr. Del Piero, I have a question. We
19 still have not resolved the issue of the Orange Paper.
20 HEARING OFFICER DEL PIERO: I understand. I
21 haven't forgotten about it. Tell me how many pages the
22 Orange Paper is.
23 DR. HARDY: It's 200 and plus pages. I believe
24 that there's a copy in the -- perhaps here in
25 Sacramento with California Department of Fish and Game.

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01 HEARING OFFICER DEL PIERO: Is that true?

02 MR. LEE: I think I've got a copy. I believe it's
03 250 pages. I have one at my office.
04 HEARING OFFICER DEL PIERO: Do you -- would it be
05 beyond --
06 MR. THOMAS: Dr. Hardy is one of the consultants
07 from the Department of Fish and Game.
08 HEARING OFFICER DEL PIERO: I understand that. Do
09 you have work product in there.
10 MR. LEE: No.
11 HEARING OFFICER DEL PIERO: It's a clean copy?
12 MR. LEE: As I recall.
13 DR. HARDY: I think it would be best if I, upon my
14 return tomorrow morning, Fed Ex a copy to
15 Mr. Birmingham of the document I am referring to.
16 HEARING OFFICER DEL PIERO: Can you arrange to
17 have copies of that made available to everyone by --
18 how many pages is it -- 200?
19 DR. HARDY: The two potentially could be all over
20 200 pages, Mr. Del Piero.
21 MR. LEE: A social studies report.
22 HEARING OFFICER DEL PIERO: Federal Express it,
23 Dr. Hardy, okay?
24 DR. HARDY: Yes, sir.
25 HEARING OFFICER DEL PIERO: Mr. Birmingham, if you

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01 can arrange to have copies of that document for
02 everyone on Monday.
03 MR. BIRMINGHAM: I will try to have copies to
04 everyone by Monday.
05 HEARING OFFICER DEL PIERO: Okay.
06 Mr. Roos-Collins is that acceptable, sir?
07 MR. ROOS-COLLINS: That's acceptable. And I thank
08 Mr. Birmingham. No questions.
09 HEARING OFFICER DEL PIERO: What haven't you got,
10 Mr. Birmingham?
11 MR. BIRMINGHAM: We've been trying for quite some
12 time to get some information from Mr. Trihey concerning
13 some habitat studies that were conducted by his staff.
14 HEARING OFFICER DEL PIERO: Yeah, but he hasn't
15 been called as a witness yet, has he?
16 MR. BIRMINGHAM: Not that I'm aware

of.ô

Since he hasn't

18 introduced evidence not in the record yet, it's going
19 to be impossible for me to demand that ahead of time.
20 At the appropriate time, however, Mr. Birmingham,
21 I'll be happy to make the same arrangements as we're
22 making here today.
23 MR. BIRMINGHAM: Okay.
24 HEARING OFFICE DEL PIERO: Okay. Miss Scoonover,
25 do you have any questions on recross?

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01 MS. SCOONOVER: I have no questions.
02 HEARING OFFICER DEL PIERO: You have no
03 questions. Okay. Anyone else? Mr. Haselton's gone,
04 again. Okay.
05 Any further questions? Mr. Frink? Does staff
06 have anything?
07 MR. FRINK: I don't believe so. I did have one
08 other announcement, and this one's real short.

09 HEARING OFFICER DEL PIERO: Let me just express my
10 appreciation to Dr. Morhardt and Dr. Hardy.

11 Thank you very much gentlemen for your time and
12 patience. We appreciate it.

13 Mr. Frink?

14 MR. FRINK: Yes, the other announcement is for
15 planning purposes on getting various witnesses or
16 consultants here.

17 The first witness scheduled for Monday morning is
18 Mr. Calkins of the EPA. And I believe that's their
19 only witness.

20 And following that, we'll proceed with the
21 Department of Water and Power presentation, I believe.

22 HEARING OFFICER DEL PIERO: Yes, sir.

23 MR. THOMAS: From the Department of Water and
24 Power, does Mr. Collins then follow --

25 HEARING OFFICER DEL PIERO: Can we get a listing
0303

01 of who you plan on calling next, Mr. Birmingham, so
02 everyone can be prepared?

03 MR. BIRMINGHAM: Yes.

04 HEARING OFFICER DEL PIERO: And maximize our
05 opportunities in terms of getting things out of the
06 way.

07 MR. BIRMINGHAM: Our next witness will be
08 Dr. Joseph Gel (phonetic), and at the request of
09 Mr. Canaday we will present Mr. Tilliman with Dr. Gel
10 (phonetic) as a panel.

11 After, that we will present the testimony of --
12 excuse me. Of -- the return of Dr. Beschta probably.
13 Then we will have John Pincino (phonetic) and
14 Dr. Joseph Vadoric (phonetic) who will testify on the
15 subject of air quality.

16 HEARING OFFICER DEL PIERO: And we all know that
17 Monday and Tuesday nights. We're going into nighttime
18 sessions. I'd do it on Wednesday, but I have to get in
19 an airplane and fly to San Bernardino for a Thursday
20 morning hearing on Big Bear.

21 So Monday and Tuesday nights, plan on enjoying the
22 evening with us, Ladies and Gentlemen.

23 Unless I hear something more -- Mr. Birmingham?

24 MR. BIRMINGHAM: Are we starting at 8:30 on
25 Monday?

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01 HEARING OFFICER DEL PIERO: Monday morning -- wait
02 a second. Do we have a notice problem in terms of
03 starting at 8:30?

04 MR. FRINK: The only day that we noticed a time
05 for was the first day of hearing.

06 HEARING OFFICER DEL PIERO: Fine. Ladies and
07 Gentlemen, we're going to start at 8:30 on Monday
08 morning, okay?

09 MR. LEE: Have we resolved that we're going to
10 meet on December 1st or not?

11 HEARING OFFICER DEL PIERO: December 1st is a day
12 that we're going meet, unless I hear something
13 otherwise. I talked to Mr. Petit last night, and
14 December 1st is a day we're going to meet.

15 MR. DODGE: Could we address that on Monday,
16 Mr. Chairman? I want the check my schedule.

17 MR. FRINK: Although we don't have a noticing
0
m starting at 8:30 Monday morning, we would have
19 a problem with Mr. Calkins of the EPA, who had
20 expressly requested and had been given the time of
21 9:00 a.m. Monday morning.
22 HEARING OFFICER DEL PIERO: Then it will be
23 9:00 o'clock, Ladies and Gentlemen.
24 MR. BIRMINGHAM: Now, where are Mr. Dodge and I to
25 meet you and Mr. Stubchaer tomorrow?

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01 HEARING OFFICER DEL PIERO: Out by a flagpole and
02 we're going to practice the pledge of allegiance.
03 Ladies and Gentlemen, thank you very much for your
04 kindness and consideration. We'll see you next week.
05 (Whereupon the proceedings were adjourned
06 at 5:57 p.m.)

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01 REPORTER'S CERTIFICATE

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02

03 STATE OF CALIFORNIA)

03) ss.

04 COUNTY OF SACRAMENTO)

04

05 I, KELSEY DAVENPORT ANGLIN, certify that I was the
06 official court reporter for the proceedings named
07 herein; and that as such reporter, I reported, in
08 verbatim shorthand writing, those proceedings, that I
09 thereafter caused my shorthand writing to be reduced to
10 typewriting, and the pages numbered 1 through 304
11 herein constitute a complete, true and correct record
12 of the proceedings:

13

14 PRESIDING OFFICER: Marc Del Piero

15 JURISDICTION: State Water Resources Control Board

16 CAUSE: Mono Lake

17 DATE OF PROCEEDINGS: November 10, 1993

18

19 IN WITNESS WHEREOF, I have subscribed this

20 certificate at Sacramento, California, on this 18th day
21 of November, 1993.

22

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Kelsey Davenport Anglin, RPR
CM, CSR No. 8553