PUBLIC HEARING

STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

STATE OF CALIFORNIA

---o0o---

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

---o0o---

Held in

Sacramento, California

Monday, Decmeber 13, 1993

VOLUME XXI

---o0o---

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

BOARD MEMBERS

JAMES STUBCHAER, Hearing Officer
JOHN W. BROWN
MARY JANE FORSTER

STAFF MEMBERS

DAN FRINK, Counsel
JAMES CANADAY, Environmental Specialist
STEVE HERRERA, Environmental Specialist
RICHARD SATKOWSKI, Engineer
HUGH SMITH, Engineer

0003

COUNSEL AND OTHERS

For the U.S. Fish and Wildlife Service:

ERIKA NIEBAUER
Assistant Regular Solicitor
Office of Solicitor
Pacific Southwest Region
2800 Cottage Way
Sacramento, California 95825

For the Sierra Club:

LARRY SILVER:

For California Department of Fish and Game:

HAL THOMAS
VIRGINIA CAHILL
McDonough, Holland & Allen
555 Capitol Mall, Suite 950
Sacramento, California 95814

For the U.S. Forest Service:

JACK GIPSMAN
Office of General Counsel
U.S. Department of Agriculture

For the National Audubon Society and Mono Lake Committee:

BRUCE DODGE
PATRICK FLINN
Attorneys at Law
755 Page Mill Road
Palo Alto, California 94304

For California Trout:

RICHARD ROOS-COLLINS
CYNTHIA KOEHLER
Attorneys at Law
114 Sansome Street, Suite 1200
San Francisco, California 94104

COUNSEL AND OTHERS

For the City of LA and LA DWP:

THOMAS W. BIRMINGHAM
JANET GOLDSMITH
Attorneys at Law
Kronick, Moskovitz, Tiedemann & Girard
400 Capitol Mall, 27th Floor
Sacramento, California 95814

For State Lands Commission, Department of Parks and Recreation:

MICHAEL VALENTINE
Assistant Attorney General
1515 K Street
Sacramento, California 95814

For Meter Water District of Southern California and LA MWD:

VICTOR GLEASON
Attorney at Law
1111 Sunset Boulevard
Los Angeles, California 90050-0153

FRANK HASELTON
Haselton Associates

JOHN ARCULARIUS

SACRAMENTO, CALIFORNIA

MONDAY, DECEMBER 13, 1993, 8:30 A.M.

---o0o---

HEARING OFFICER STUBCHAER: Good morning. Mr. Del Piero is not here, so I'm going to act as Hearing Officer in his absence. We're going to have a broken schedule today because of a prior commitment.

We're going to recess at 10:15 this morning. Also, there's a brief hearing on the Big Bear Lake issue from one to three this afternoon, so we will not be in session on Mono from 10:15 until 3:00 p.m. I apologize for that, but that's the way it is. And we plan on terminating no later than five this afternoon.

Any questions on that?

With that, Ms. Cahill, do you have your panel ready?

MS. CAHILL: Mr. Thomas is preparing this panel.

HEARING OFFICER STUBCHAER: Mr. Thomas. All right.

Mr. Thomas, are you ready?

MR. THOMAS: Just a second.

HEARING OFFICER STUBCHAER: Before you begin, if we could have a little order in the audience, please? If you have discussions, please go out in the hallway.

Before we begin, Mr. Thomas, if Mr. Del Piero does

0007

return from his other business, he may decide to go this evening. I don't know if that's the case, though. So when I said we're going to terminate at five, that's if I'm still the Hearing Officer.

Now, Mr. Thomas, have your witnesses been sworn?

MR. THOMAS: No, they haven't, Sir.

HEARING OFFICER STUBCHAER: Would the panel please rise? Do you promise to tell the truth in these proceedings?

(All say I do.)

HEARING OFFICER STUBCHAER: All right. Be seated.

MR. THOMAS: Good morning, Mr. Stubchaer. This morning we have three experts on our duck panel. We'll begin with Dr. Scott Stine followed by Ron Thomas, who's a biologist, a field biologist for the Department of Fish and Game, and ending with Dr. Frederic Reid with Ducks Unlimited.

DIRECT EXAMINATION BY MR. THOMAS

Q We'll start with Dr. Stine at this time.

Dr. Stine, is MLC -- NAS/MLC 141 a true and correct copy of your qualifications?

A DR. STINE: Yes, it is, and it was put in earlier and discussed.

Q And is MLC/NAS Exhibit 1-U a true and correct copy

0008

of your direct testimony?

A Yes, it is.

Q Could you summarize your direct testimony, or would you like to start with your qualifications?

A I would simply point out on the qualifications one thing beyond what I said last time and that is that there's one auxiliary report, one of the five that I wrote for the DEIR, that is particularly pertinent here, and it concerns historic and modern distribution of shore-fringing wetlands, Mono Lake, California.

Other than that, I think the qualifications stand as I discussed them last time, and if you'd like me to summarize, then, my Exhibit 1-U, I'm in a position to do that now.

Q Proceed. Thank you.

A This concerns ducks -- waterfowl, but ducks particularly on Mono Lake. The interest here has arisen because according to many historical witnesses who I consider to be reliable, Mono Lake and the surrounding areas were seasonally inhabited by large numbers of ducks during the period between the 1930s and the early to mid 1960s.

In the testimony that follows, I want to cover three elements of the duck environment there; first the environmental conditions that existed in these areas of

0009

duck abundance between the 1930s and the early 1960s.

Secondly, the changes in the environments that occurred around the early to mid 1960s and, Thirdly, the measures that can be taken to reestablish the environmental conditions that prevailed during the period of duck abundance.

I have here an exhibit that we have numbered Exhibit 159, that is --

HEARING OFFICER STUBCHAER: Mr. Stine, would you please take the mike for the purpose of the tape recorder? We can certainly hear you, but --

DR. STINE: This has been marked as Exhibit NAS/MLC 159. It's a photo composite showing --

Q BY MR. THOMAS: Dr. Stine, that's NASMLC --

A BY DR. STINE: NAS/MLC 159. Yes, that's right.

-- showing Mono Lake as it existed in 1930, and what I've done here is simply to piece together the photographs, the aerial photographs, from 1930 to create this photo mosaic.

There were four general areas of duck abundance on and around Mono Lake. The first of the areas was on Mono Lake itself, on and immediately adjacent to Mono Lake in areas that I'll be pointing out here in a little while.

The second was the lagoons that occurred along the

0010

north shore of Mono Lake, and you can see the large lagoons that existed right here along the northern shore. We call these the North Shore Lagoons and they, too, were an area of duck abundance.

The third area was the Rush Creek bottom lands, an area that I discussed last time, and you've seen photographs of that.

The fourth area is immediately above Grant Lake in an area that no one has discussed much yet. And this is exhibit -- unmarked, actually, so we'll need a number for this one.

Q Fish and Game 164.

A 164, did you say?

Q 164.

A What this photograph shows is, again, 1930. What the photophaph shows is --

MS. GOLDSMITH: Objection. I believe this goes beyond the scope of the direct examination.

MR. SMITH: I'd also like to make a point of order here, too. 164 is not -- is not this exhibit.

MR. THOMAS: Next in order Fish and Game 164.

HEARING OFFICER STUBCHAER: This is direct examination, I believe, it's not cross.

MS. GOLDSMITH: That's right, and I have an objection to this because I don't believe this was

0011

included in the direct testimony that was submitted to the Board. Nothing concerning Grant Lake was submitted.

MR. THOMAS: We've heard an extensive amount of testimony in the direct of Los Angeles Water and Power regarding waterfowl in the Mono Basin and on the Crowley, Upper Owens, and Grant Lake as it relates to waterfowl populations, and we were merely examining that issue in some detail as the issue was brought up before.

MS. GOLDSMITH: Mr. Chair.

HEARING OFFICER STUBCHAER: Yes.

MS. GOLDSMITH: Testimony concerning Crowley Lake waterfowl was submitted by L.A. DWP with its direct testimony.

HEARING OFFICER STUBCHAER: It appears to me that to introduce new testimony now is kind of a surprise to the other parties. They don't have an opportunity to prepare for cross-examination. I'm going to consult with Mr. Frink a moment.

MR. THOMAS: In addition, Fish and Game Exhibit, I think it's 195 was submitted showing 1940 duck kills. In our direct testimony, in those 1940 duck kills, there are ducks killed in this location, and I will show you --

0012

HEARING OFFICER STUBCHAER: That's all right. I'm going to rule. I'm going to sustain the objection, and you may introduce it during your rebuttal testimony.

MR. THOMAS: Sir, I'm -- I beg the Chair's understanding. We have introduced in our direct testimony information as to ducks killed at this location. I can show you on --

HEARING OFFICER STUBCHAER: Are you testifying?

MR. THOMAS: My point, Sir, is that this does not go beyond our direct because, in fact, in our direct we talked about ducks killed at this location in 1940. This is very pertinent to the pre-diversion conditions. All we're doing is showing you a map of what we showed you on DFG --

HEARING OFFICER STUBCHAER: I think you can introduce that map during rebuttal, but it's not appropriate to use it at this time.

MR. THOMAS: Whatever your ruling, Sir.

Proceed, Dr. Stine.

DR. STINE: I'll restrict myself, then, to the three areas of duck abundance; the first being, as I said, the lake on and immediately adjacent to the lake. The second area being the lagoons on the north shore of the lake here and here, and the third being, then, the

0013

Rush Creek bottom lands.

HEARING OFFICER STUBCHAER: Mr. Stine, would you please get the mike?

DR. STINE: Yes.

What I wanted to do here, then, is to discuss each

one of these in some amount of detail. The first, then, is the lake itself, the areas on and immediately adjacent to the lake. And I'll refer here to -- let's see, I think it is Fish and Game exhibit -- no, I believe it's the NAS/MLC Exhibit 176 which shows Mono Lake as drawn by Walter Dumbrowski in the mid 1940s, and what Mr. Dumbrowski, who was a Mono Basin resident, was doing here was showing the areas where -- excuse me a minute -- showing those areas where ducks were abundant on Mono Lake. Mr. Dumbrowski made duck counts on Mono Lake and then mapped as these arcs here the areas where the ducks were most abundant. The arcs are shown in the dashed lines, the arcs close on the shore of Mono Lake. He also then has a percentage of the total duck population that he was finding in these -- in these various -- various areas here.

Now, what struck me about this map was that -- what I found intriguing was that this was not only a map of duck abundance, but it was also a map of fresh water on Mono Lake. In all cases, the areas of duck

0014

abundance coincide with those very areas where fresh water enters Mono Lake. In a couple instances, this is obvious because we have Rush Creek flowing in here from the south, Lee Vining flowing in here from the south on the map and, in both cases, these terminate in a big arc that projects out into the water.

The other areas and their association with water are perhaps less obvious, but starting up here at the sort of eleven o'clock position, ten o'clock position on this map, we have the Monte Vista Springs area which is an area where Wilson Creek, Mill Creek, and the Monte Vista Springs put water into the lake.

Proceeding clockwise around the lake at about the eleven o'clock area, 15 percent of the ducks shown at the DeChambeau Ranch area, this is an area where an artificial branch of Wilson Creek together with some natural springs put water on to the lake.

The third area over here at approximately two o'clock proceeding around the lake is the Warm Spring area, Warm Springs area, it should be, that, too, is an area where water is coming in to Mono Lake. Likewise, down here at approximately four o'clock, it's called the Salmon Springs area, most people know that as the Simons Springs area, and then finally the Tufa area down here on the very south shore of the lake where

0015

South Tufa exists today, and that, too, was and, to a lesser extent, remains an area of spring activity on the lake.

Now, the remarkable thing about fresh water flowing into Mono Lake is that it doesn't flow into Mono Lake and immediately mix as, say, water in Lake Tahoe would flow into -- or streams would flow into Lake Tahoe and mix. Rather because Mono Lake is so very saline, the fresh water floats on the top of Mono Lake, a phenomenon that is referred to as hypopycnal flow, H-Y-P-O-P-Y-C-N-A-L, referring to the density difference between the upper fresh water layer, which tends to be light, and the lower salt water layer,

which tends to be very heavy.
Hypopycnal stratification is something that I've seen a number of times at Mono Lake. It occurs most abundantly, or most conspicuously at the mouths of the streams where large amounts of fresh water are going into the lake, but it occurs in other places as well under the proper conditions.
I'd like to go to slides, if I could, and show a couple of examples of hypopycnal stratification, if you can get those. This first slide --
HEARING OFFICER STUBCHAER: I hate to be sticky about this, but --

0016

DR. STINE: I'm sorry. This first slide is taken in 1986 at the mouth of Rush Creek, and what we're seeing here is a lens of fresh water moving out on to the lake at the stream mouth. One of the things that I like about this and that I think is particularly illustrative of the phenomenon is that you have a line of breakers, of white caps that are breaking, lake waves that are breaking on the lens of the fresh water illustrating the density difference there between the two waters.
Q BY MR. THOMAS: Dr. Stine, this is NAS 178?
A BY DR. STINE: This is NAS/MLC 178 and the subsequent slide here is NAS/MLC 177.
What I'm showing here is a rather unusual case of hypopycnal stratification at DeChambeau Creek. I point it out only as an example of how different the specific gravities, different the densities are of these two waters. What has happened here is that DeChambeau Creek has cut a trench because Mono Lake was low. Mono Lake then rose, and a tongue of the salt water made its way up into the ria, we call it, R-I-A, into the stream channel. This rather brownish-pinkish material right down through here in the lower and left portions of the slide are brine shrimp, and the brine shrimp are living in this layer of very salty water that is hugging the

0017

creek bottom.
Meanwhile, the fresh water is moving outward over and to the lakeward, but over the top of the salt water. It was a very interesting phenomenon to observe because the brine shrimp are going back and forth like this slowly driven by waves on the lake whereas the salt water is uni-directional. It's traveling at the same rate and in the same direction all the time. But again, just simply an example of the hypopycnal stratification. Thank you.
The -- I'll go to this one in a second. So just leave it on there, John, if you would. The ultimate fate of the fresh water that moves on to Mono Lake is to mix with the salt water. This mixing is achieved through the agency of wind-induced waves. The waves provide the energy that then mixes the fresh water with the salt water. The waves, of course, and therefore, the mixing is particularly pronounced in the open water of the lake particularly here off the Rush and the Lee Vining Creek deltas, and we would expect, then, this kind of mixing to go on more in the open water of the

lake. The reason that we could have these hypopycnal lenses persisting around the mouths of the streams is because we have a considerable amount of fresh water coming in at those places.

Well, what about in these areas where we have less fresh water coming in? How is it that the fresh water was able to persist, then, on the lake surface as a hypopycnal stratum? The answer, I think, is that in all cases, with the exception of the stream mouths themselves, in all cases, the fresh water was coming into the lake at areas of still-water coves. And here is an example of one of those still-water coves right here. This is the DeChambeau Ranch area, DeChambeau Ranch area as shown here at about the ten o'clock, eleven o'clock position on --

MR. THOMAS: Dr. Stine --

HEARING OFFICER STUBCHAER: You have to identify the exhibits that you --

DR. STINE: I'm sorry. Of course, I do, and some day I'll be good at this, perhaps.

This is Exhibit NAS/MLC 179, okay? And on Exhibit 179, as I say, we see a cove here that is protecting, in a sense, the water, the fresh water that enters Mono Lake by way of this diverted channel of Wilson Creek here, so that the water, the fresh water, can build up in the cove that sits immediately off shore, a cove that's been built by the erosion of -- easily erodible volcanic material from Black Point, the big blob shown just to the left of center in the photograph.

The next slide is NAS/MLC Exhibit 182. This shows Warm Springs in about 1956. The lake level here is just about 6404, 6405 feet, and one can even get a sense of the currents that are moving from left to right on here carrying sand as they go. You can see the coves, the embayments here that are protecting fresh water that's making its way into the lake from these marshlands right here. These are the sources of the fresh water, the dark-banded areas that we see here. The fresh water can then build up on the lake surface and persist in these coves with less chance of mixing due to waves.

The, let's see, next slide is MLC -- pardon me, NAS/MLC Exhibit 180. This is Simons Springs. This, now, is down at the four o'clock or so position of Mono Lake as shown on NAS/MLC 176 and once again, I would use this simply to point out the bays, the embayments, the coves, that existed here at Simons Springs as well that were then able to trap the water, protect the relatively small amount of fresh water that was going into the lake, keep it still for enough time to provide a fresh water lens on the lake at these sites. The message here, I think, is that anything floating on this lake, be it a stick, or a duck, or anything else, a piece of pumpice, was essentially

floating in fresh water at particular sites around the lake. We had a fresh water skim at numerous sites around the lake.

Now, another thing that characterized these various -- these various areas of duck abundance, in all cases -- we had hypopycnal stratification, but in all cases, it was adjacent to marshlands and that shows up well here on Exhibit 180, NAS/MLC 180. The dark band here at Simons Springs just to the right and to the left of the fault -- here's a fault, which is why that point is there. Faults are the reason why many of these coves exist. But the dark bands that exist to either side of the fault here are areas of marshland, and it seems to have been this combination of fresh water and -- floating on the lake surface and marshland that coincided with the duck abundance.

Can we go back one slide, please? We're going back now to Exhibit 182 where we were a moment ago, and I would simply, again, point out the marshlands that were adjacent to the coves here on this slide as well.

Okay. Now, let's see. If we can go forward two, John.

HEARING OFFICER STUBCHAER: Just pardon me a minute. When you say "point out marshlands here on this slide," in the written record, that doesn't read

0021

too well.

DR. STINE: If we can go back, John, here, then? One more? It is the dark areas here that lie immediately -- let's see. What are we looking at here? It would be immediately east of the fault that constitutes the reason for the embayment there. In other words, immediately down -- as we're viewing the slide here, immediately down from the coves themselves. This is the Warm Springs area -- excuse me. Yes. Okay. Let's then -- we'll hold it there for one moment, John.

Let's go to this concept of lagoons, and what I would like to do is discuss for a moment the lagoons that existed on the north shore of Mono Lake, the so-called North Shore Lagoons. I would point out several things. First of all, they were large -- John. I need a -- something to draw on here. They were large, constituting approximately 216 acres. They were brackish water --

MS. SOMACH: Excuse me, Dr. Stine. You're failing to give us the exhibits. I apologize for interrupting. Is that NAS 159?

DR. STINE: This is NAS/MLC 159, yes. Let's put it up on this one, yeah.

Great. I need something to write with, though.

0022

These lagoons constituted approximately 216 acres. They were brackish water. That is to say, they were a combination of fresh water that was coming in from the landward and salt water that was coming in -- thanks -- from the lake. They were also permanent features, and Dr. Jehl the other day correctly pointed out in the sense that the lagoons forming today at Mono Lake are temporary features. Indeed they are.

The lagoons that existed previously, though, the lagoons in the pre-DWP years, were permanent features. They were there week after week, month after month,

year after year. They're there on the 19 -- pardon me, the 18 -- the maps from the 1850s and sixties. They're there all the way up until Mono Lake drops below an elevation of about 6400 feet. That's when they -- that's when they disappear. So these lagoons, in any case, were permanent features.

What I'd like to do here is draw a cross-section of these lagoons and make sure that people are aware of the composition of these features. They lie to the landward side of a large burm, and this burm is composed of material that has been eroded from here, from Black Point. The waves move along the shoreline in the clockwise direction in this portion of the lake eroding debris from Black Point, depositing it up here

0023

in the north shore of the lake as a big burm like this. And so what we get is a lagoon sitting to the landward dammed, in a sense, from the rest of the lake by that big -- by that big burm.

Water comes in from the landward this way, it's coming in from bringing fresh water, and we have salt water, then, from the lake itself moving through the burm and getting into the lagoon. Now, we know that these were brackish water features because, first of all, we have accounts from L.A. DWP personnel, most notely, Charles Lee (phonetic) from the 1930s, saying they were brackish. He was out there on site.

Secondly, we have diatoms taken from these -- taken from these areas. The diatoms indicate that this was indeed not a fresh-water species, not a salt-water species, but rather a brackish species, in other words, a brackish water environment there.

HEARING OFFICER STUBCHAER: Pardon me. Is this going to be an exhibit?

MR. THOMAS: Yes.

Dr. Stine, if you can mark that --

HEARING OFFICER STUBCHAER: And again, when you say "comes in here," it's not clear. It's not labeled. The water's coming in from the left, the fresh water's coming in from the left, the burm is in the middle.

0024

So we need to get things in the written record that will identify the exhibit.

DR. STINE: I tried there to say the landward versus the lakeward --

MR. THOMAS: Dr. Stine, that would be DFG 165.

HEARING OFFICER STUBCHAER: Why don't you just write "fresh" by that arrow, fresh water, something like that. And then lake.

DR. STINE: Okay. The third environment, the third and, I guess, last environment that I'll talk about here is the Rush Creek bottom lands, and I think that the next slide there shows the Rush Creek bottom lands as NAS/MLC Exhibit 192. This is the -- NAS/MLC 192. It's the Rush Creek bottom lands. I talked about it the other day. I won't say too much more except to point out that it is a rather unusual portion of Rush Creek in that where the stream doesn't occupy a V-shaped canyon bottom, it's a very wide canyon bottom, over a thousand feet wide. It's composed or

characterized by multiple channels. It's easily flooded so that we have marshlands standing around many areas of the Rush Creek bottom lands, and this was one of the areas reported to have been characterized by large numbers of ducks.

The springs -- that's off track. Excuse me. Note

0025

here on the very northern edge of this exhibit that right at the stream mouth, we have a burm that has formed there. This is a rather temporary feature, but we had a lagoon behind that burm, too, on the Rush Creek delta. And these kinds of features, these lagoons here, were common around Mono Lake, so it wasn't just the large lagoons. It was other more ephemeral lagoons as well that provided some habitat, according to these early witnesses.

The next slide is --

MR. HERRERA: Excuse me, Mr. Thomas. Your time has elapsed.

MR. THOMAS: We would petition for an additional -- 15 minutes?

DR. STINE: 15 minutes.

MR. THOMAS: 15, in light of the public trust importance -- the importance of the subject matter to the public trust balancing that the Board is conducting and the technical detail that the Board needs to understand.

HEARING OFFICER STUBCHAER: The purpose of the direct testimony, as you know, is to summarize the written testimony, and so I think that a good case is going to be made for granting more time in the case of cross-examination, but on direct testimony, I'd like to

0026

see the summaries more concise. And I'll give you another ten minutes, but please try and keep the subsequent witnesses to the allotted time.

MR. THOMAS: Sir, I will certainly take your instructions to heart. I would encourage you to be equitable in your view of this matter because we have sat through many, many overruns of the 20-minute time with Los Angeles Department of Water and Power has been generous in their petitioning. We will do our best to be brief, but this is an important part of the case. And we do not want to cut off the evidence --

HEARING OFFICER STUBCHAER: Well, the evidence is already submitted, isn't it?

MR. THOMAS: The evidence is submitted but to have these visual exhibits explained to you is important because these are highly technical issues that perhaps would not show up in a slide that just sits in the record without explanation.

Thank you.

DR. STINE: Next slide, please, is NAS/MLC Exhibit 205. It's been shown before. I put it in only to remind people of the amount of standing water, slowly moving and standing water that existed in the Rush Creek bottom lands.

The next slide is NAS/MLC Exhibit 207. Once

0027

again, just to emphasize the amount of slowly moving,

spread-out water with the cress beds and what not that characterize the Rush Creek bottom lands.

Now, briefly, what happened to these -- these environments? First of all, the lagoons -- why don't we turn that off and maybe the lights on there. The lagoons desiccated simply because Mono Lake fell, and as Mono Lake dropped to lower and lower elevations and dropped indeed below the elevation of the burm shown on DFG 165, the lagoon simply drained, so that they haven't existed since approximately 1960 or so when the lake dropped down below or approached 64 -- 6400 feet in elevation.

A second element here is that the -- the water was cut off from the streams. DWP diverted the water on both Rush and Lee Vining Creeks effectively, at least temporarily, doing away with the hypopycnal lenses that existed at the mouths of these streams. Over time, the lake withdrew from the marshlands as well, from the marshlands and from the coves, and so today, as the lake exists today, we no longer have the coves that characterized the area previously.

Q BY MR. THOMAS: Dr. Stine, that's NAS 142?

A BY DR. STINE: This is NAS/MLC --

Q I think it's 142.

0028

A I believe it's 152. Actually -- no. You're right. 142, excuse me.

This is an aerial photo mosaic that was produced from photos that were taken in 1982, and I would point out here that an embayment no longer exists here at Warm Springs such as occurred previously. The embayment no longer exists here at Simons Springs such as existed previously. Likewise, the embayment that existed here at the DeChambeau Ranch area is not gone as well.

Furthermore, it's important the point out that the water sources that gave rise to the marshes, the water sources themselves, are now distant from shore and rather than the fresh water coming basically out of the ground flowing a very short distance and going into Mono Lake as a concentrated stream, the fresh water is now diffused over a large area of the shore lands and it goes into -- enters Mono Lake in a large number of areas. The ability for water to build up, then, as hypopycnal stratum at these various areas is diminished for two reasons, first of all, water being more diffuse here on the lands. And, Secondly, a lack of coves, a lack of embayments for the water to -- to build up.

We've also lost marshlands at the Rush and the Lee Vining Creek deltas, and that's been because of

0029

incision of the deltas by the streams. Mono Lake has dropped in ways that I discussed last time. Mono Lake has dropped as a result. Rush, Lee Vining, Mill Creeks have in sites, they've lowered the water table, therefore, on the delta surfaces so that while today, we have fresh water going back into the lake at these sites, we no longer have it -- have the fresh water adjacent to the -- adjacent to the fresh water marshes that used to exist.

I should point out that there has been an increase in marsh area; marshlands themselves are today somewhat larger than they used to be, but that they are different. Different in that they're not immediately adjacent to the lake, different in that they're not associated with hypopycnal natural waters off shore. All right.

What would be required to give these -- get these environments back, to restore these conditions? First of all, the Rush Creek bottom lands, we could get water back into the bottom lands of Rush Creek, get it to flood again, get water spread out, return the marshlands if we rewatered abandoned channels similar to what we talked about in relation to fish last week.

Secondly, the brackish water lagoons, the big lagoons that used to exist up here on the north shore

0030

of Mono Lake and today are missing. As we can see here on NAS/MLC 142, the lagoons are gone. We would have to pull the lake back up to about 6405 feet to restore those environments.

The -- there's a -- well, let's look at one more slide here if we can. Here, I'll do it, John. I have a couple other -- this is the mouth of Rush Creek in 1985. Mono Lake has risen into the stream cut, itself, and --

Q Dr. Stine, NAS/MLC 184?

A Yes.

Mono Lake has risen into the stream cut there, and we've created a lagoon-like environment here. I point this out simply because the DEIR, Jones and Stokes, have referred to this as a lagoon. It isn't truly lagoonal, but this is what they have mind when they say that we would gain six acres of lagoon if Mono Lake rose to 6383.5 feet. 16 acres of this kind of habitat which they're calling lagoon would exist if the lake rose to 6390 feet. We're not talking about the hundreds of acres of lagoon that existed previously.

If you'll go back one slide, please?

Q Dr. Stine, I'm sorry. I may have misspoke. 185, is that your Exhibit 185?

A Fine, 185? What did you call that?

0031

Q I said 184.

A Okay. 184 is this slide here. This is a slide of -- that's NAS/MLC 184. This is a slide of the Simons Springs area. I would put it in to show how the embayments are gone, the lake used to be in these semicircles here. Also, the extent to which water is being now diffused over a large line of the shore and notice, if you would, please, this lagoon right here. This is the type of lagoon that Mr. Tillemans pointed out existing around the lake. This constitutes today approximately 12 to 16 acres. Once again, it's not the 216 acre totals that we were talking about when Mono Lake was high. Most of that 12 to 16 acres, by the way, is salt-water lagoon. This one here happens to be fresh water, but most of the small amount of lagoon that exists today is salt water -- salt-water lagoon.

Finally, to get Mono Lake up again to where it

actually embays the coves, puts the marshland immediately adjacent to the lake, and allows hypopycnal waters to persist in the coves, we would there, too, have to get Mono Lake up to between 6400 and 6405 feet. And, finally, to get Mono Lake up to the point where we have marshes on the deltas and so hypopycnal water in contact with marshes at the deltas, Mono Lake would have to be up at about 6400 to 6405 feet. In other

0032

words, roughly halfway between Judge Finney's 6377 order and where the lake would be today but for diversions.

Thank you.

Q Thank you very much, Dr. Stine.

Sir, have we made our ten minutes?

HEARING OFFICER STUBCHAER: I have to ask the timer.

MR. HERRERA: Yes, you did.

MR. THOMAS: Thank you.

Could we have a couple of minutes to rearrange slides so there's no confusion as to exhibits?

HEARING OFFICER STUBCHAER: Yes.

MR. THOMAS: Thank you.

MS. GOLDSMITH: While they are doing this, we would note that we don't have color copies of any of these slides, and we would ask that they be provided to us.

HEARING OFFICER STUBCHAER: Mr. Thomas?

MR. THOMAS: The NAS/MLC exhibits were not photocopies, so I don't have control of those.

HEARING OFFICER STUBCHAER: Most of the aerial photos were black and white.

MS. GOLDSMITH: But there were some color slides that were shown.

0033

HEARING OFFICER STUBCHAER: Could you provide copies of the color slides that were shown?

MR. THOMAS: Certainly. We'll make a note of that.

MR. BIRMINGHAM: May I confer with Mr. Thomas, Mr. Stubchaer?

HEARING OFFICER STUBCHAER: Yes.

MR. THOMAS: Mr. Birmingham's informed me that L.A. DWP does have color copies.

HEARING OFFICER STUBCHAER: Good.

MR. THOMAS: We have no additional slides.

MR. BIRMINGHAM: Would it help if you had a spare tray to arrange the slides in beforehand?

MR. THOMAS: I think he's almost done. We just had a few that we were sharing. Again, our reproduction ability is a little more limited than the other parties in this proceeding.

HEARING OFFICER STUBCHAER: Is there anything that could be done in the absence of the slides? You can go in the back room and sort them, if you like.

MR. THOMAS: That's a good suggestion, Sir.

Thank you for your patience, Mr. Stubchaer. Our next witness is Ron Thomas who's a field biologist for the Department of Fish and Game.

Q BY MR. THOMAS: Mr. Thomas, is DFG Exhibit 21 the

0034
true copy of your written testimony?
A BY MR. RONALD THOMAS: Yes, it is.
Q And is DFG Exhibit 2 a true copy of your qualifications?
A Yes, it is.
Q Do you have any corrections to your written testimony?
A Yes, I have.
HEARING OFFICER STUBCHAER: Pardon me, could you get the black mike and pull it close to you, please?
MR. RONALD THOMAS: Yes, I have several corrections to my written testimony.
Q BY MR. THOMAS: If you could read those corrections slowly into the record with the mike as close as possible so that the record accurately reflects your concerns.
A BY MR. RONALD THOMAS: The first correction I would like to make is on Page 2 in Paragraph 5 of my written testimony which now reads, quote, RD basis --
MS. GOLDSMITH: Excuse me. The paragraphs are not numbered, and if he could refer to it by full paragraphs and line, I can correct my copy as well.
HEARING OFFICER STUBCHAER: Do you have a written copy of your corrections or extra written copies of your corrections?
0035
MR. RONALD THOMAS: I believe I do.
MR. THOMAS: I can state that corrections A through -- the first four corrections are typographical in nature and shouldn't bother Counsel --
HEARING OFFICER STUBCHAER: If she could just refer to it, if there's a copy of it, just for ease of reference, not for content.
MR. THOMAS: I'll see if we've got an extra copy of the corrections.
HEARING OFFICER STUBCHAER: And Staff, do you have copies, or will we get it later?
MR. FRINK: We could get it later. If they're not too extensive, we can get them as you read them into the record.
MR. RONALD THOMAS: They're brief.
MR. THOMAS: Proceed, Mr. Thomas.
MR. RONALD THOMAS: Again, on Page 2, Paragraph 5, where it reads, "RD Bases," I would change that to a singular "a basis".
Q BY MR. THOMAS: Next?
A BY MR. RONALD THOMAS: On Page 3, Paragraph 1, I would delete the words "an open," which is hyphenated to read, quote, "nearby fresh water broading areas".
Q Okay.
A And on Page 4, Paragraph 5, I would delete the
0036
word "diversity" in the fourth line of that paragraph.
Q Next.
A On Page 9, Paragraph 7, change the word "ecology" to "ecosystem".
MR. CANADAY: Where is that?
MR. THOMAS: Page 9, Paragraph 7.
MR. RONALD THOMAS: And also on Page 9, Paragraph

7, I would correct the next to the last sentence to read, quote, it is my opinion that habitat capability can be restored to support 280 ducks per acre of fresh water habitat based on my analysis of the 1948 Pacific flyway surveys at Mono Lake."
Q BY MR. THOMAS: Does that conclude your corrections?
A BY MR. RONALD THOMAS: Yes, it does.
Q Could you summarize, now, your written testimony for us and in light of the time constraints, I would urge brevity when possible. I'm sorry. Please give us your qualifications. Same admonishment about brevity.
A I hold a Bachelor of Science degree in biological conservation. I've worked for the Department of Fish and Game since 1969. For the past 23 years of that period, I've been a field biologist in various areas of Central and Southern California.

In the years 1972 to 1979, I worked in the central -- southern part of the Central Valley, San

0037

Joaquin Valley, where my major responsibility was lead biologist in charge of the work we did on waterfowl and shore birds including leading the department's efforts in control of waterfowl botulism during those years. That work included a lot of aerial survey work, reading of aerial maps, directing the control efforts, as well as population and distribution surveys of waterfowl and shore birds.

During that same period, another major duty that I was involved with was the control and eradication of oil sumps in the San Joaquin oil fields that were killing thousands of water birds per year. That work also required extensive aerial surveys, use of aerial photos to determine waterfowl habitat areas as well as problem areas that were causing the loss of these large numbers of water birds.

Other work I performed over the years have been live captures and field research on big game species such as elk, deer, bear, antelope, mountain lion, bear. Much of that work also involved aerial work, using photos, helicopters, taking photos, as well as examining aerial photos.

I produced a number of technical reports including management plans for various wildlife species, and I published scientific papers on the status of the

0038

California elk population and on the techniques of helicopter capture of Great Basin mule deer.

In addition, I worked in Mono County since 1981. My work there has included a number of different areas but is concentrated to some extent on various land development proposals such as wetlands alterations, water rights, energy projects, recreation and housing, and a number of other environmental review projects. My routine duties in that area also include population surveys of deer and waterfowl, upland game, and other species.

In addition, I have hunted ducks for over 35 years now and have hunted ducks numerous times on Mono Lake over the past eight years.
Q Thank you. Could you now summarize your written

testimony?
A I'm before the Board today to bridge the information provided by Dr. Stine, which is physical in nature, and provide the Board with information on how that -- how those physical features of the lake benefit ducks, how ducks use those various habitats as described by Dr. Stine. I think I can be brief. I'll run briefly through our several points -- major points of our evidence.
First, I'll describe for you the qualities of

0039

these habitat providing for the pre-diversion high quality habitats that supported large numbers of ducks.
Dr. Stine has shown you the map by Walter Dumbrowski which was part of the waterfowl surveys he did in 1948 --
MR. THOMAS: Just a second, Mr. Thomas.
Mr. Stubchaer, should I move that around so you can see?
HEARING OFFICER STUBCHAER: Even standing, I can't see it, so --
MR. THOMAS: Let's put you right out front here so there's no question what it contains. I know those lines are hard to see.
MR. FRINK: Please identify the exhibit numbers as you can, too, Mr. Thomas.
MR. RONALD THOMAS: I'm sorry. This is DFG No. 96.
MR. THOMAS: And it's at the bottom right of the exhibit.
MR. RONALD THOMAS: As Dr. Stine has pointed out, there's dotted areas shown on the map are not only areas of duck concentration, but also areas of fresh water layers. I've flown the lake many times, hunted the lake a number of times and speak with particular

0040

knowledge on a couple of areas that I've hunted any number of times. The associations that exist even today at these areas, particularly Warm Springs in this area on the -- it would be kind of the northeast side and what we now call Simons Springs on the south side, are probably the major waterfowl concentration areas existing on the lake today. That's where the hunting occurs. The reason for this is that there's still remnants of the historic habitats that existed in the pre-diversion times. The areas -- although the fresh water area on the surface of the lake is lacking, we still have marsh features which are located near to, if not adjacent to, as they did, near to the lake shore. This provides a habitat association beneficial to ducks in that they can feed up in the marshes near the shore and yet without making long distance flights, they can go to the safety and security of the open water to rest and be safe from predators.
HEARING OFFICER STUBCHAER: Mr. Thomas, perhaps you could rotate that a little bit counter clockwise, clockwise, I guess it is, so the audience can see it. That's fine.
MR. RONALD THOMAS: I think I'll move on to our

next exhibit which is DFG No. 95. We may come back to this one after a bit. But DFG 95 is a blowup of the

0041

map of the 1940 duck kill. This was -- this map was produced as part of the statewide game take survey produced in 1942. It was, at that time, called the Division of Fish and Game and, at this time, they were producing bi-annual reports of wildlife conditions throughout the state.

This map depicts --

Q BY MR. THOMAS: Mr. Thomas, those dots are very hard to see, in fact, that blowup is not as accurate as I would have liked it, but we were reproducing it from an old document. Could you be very specific in pointing out the features that are there on the original?

A BY MR. RONALD THOMAS: Even our Xerox copies look better than this blowup.

I can bring this closer if need be.

HEARING OFFICER STUBCHAER: I can read it. It says, "One dot per thousand ducks."

MR. RONALD THOMAS: Each dot represents a thousand ducks, as you said. In the area of our concern in Mono County, I'll drew your attention to the north shore of Mono Lake which is somewhat distorted on this blowup, but there are three dots noting 3,000 ducks taken along the north and west shore of Mono Lake. The map shows two dots and only 2,000 ducks in the vicinity of Grant Lake and Upper Rush Creek. Other dots in the county

0042

are two at Bridgeport Reservoir up on the East Walker River, and we show two dots noting 2,000 ducks taken down at Crowley.

I think the importance of this map primarily is to depict the relative importance of the historic habitats at Mono Lake and the Mono Basin. Here's 5,000 ducks reportedly taken in the basin and compared to a total of 2,000 down at Crowley and 2,000 up at Bridgeport.

Okay. I'll move on to our third exhibit, which is DFG 97. Fritz, would you hand me that -- in fact, I think I can sit back down now.

DFG 97 is a copy of the Pacific flyway report of 1949. This -- I draw the Board's attention to this document merely to denote the importance of the lake at that time to wintering Canada geese. This document shows the return of banded Canada geese taken on the lake which were banded in Alberta, Alaska, again just to demonstrate the importance of the lake at that time for migratory waterfowl from the northern part of flyway into the prairie provinces of Canada.

We can also infer the importance in the high-quality habitats and large numbers of ducks on the lake in the early years from some of the testimony the Board and Staff heard at Lee Vining. If you recall, there was testimony there at that time regarding the

0043

use of the Rush Creek marshes for hunting clubs. Apparently, there was testimony relative to the high success that those hunters experienced.

And I would like to emphasize, being familiar with duck hunters and hunting in general, that it's apparent

to me that those hunters in those days, especially in those days, were not going to travel the long difficult distances from the L.A. Basin to go to Mono Lake to hunt ducks and the costs involved if there wasn't some pretty good duck hunting there. So the numbers of ducks had to be there to support that kind of an effort. A commercial operation in those days would demand that there be large numbers of ducks in good habitats.

A little further discussion on the habitat elements that contributed to the high quality of duck habitats in the past. I'm convinced that the main factor that contributed to the high quality of the habitats on the lake were the higher lake levels. Those higher lake levels were highly beneficial in a number of ways. One of the major -- one of the major factors was, as Dr. Stine has talked about, was the close association of the marshes and the lake surface. As I pointed out on the Dumbrowski map, it's critical that the -- that the shore-land marshes be adjacent to

0044

or at least very close to those fresh water, open water resting and security areas.

I would like to show a slide now, John -- this is 178? I wanted to show this slide because I've seen this phenomenon myself many times on Mono Lake. There are two factors of importance here; the fresh water layer, which is graphically displayed with the line of waves, as Dr. Stine as pointed out. The fact -- the critical fact of this is that when this fresh water layer was close to the shore and when the pristine marshes existed up the stream nearby, these ducks had that association they needed. They could sit in fresh water, which ducks are tied to, which ducks require, sit in fresh water, rinse any salts from their feathers, drink, and be safe from predators, and have to only make very short, daily feeding flights up to the marshes where they were to forage and where they were also hunted during the early days.

Next slide, John? As you can see in the last slide, in this slide, and as I have seen many times over the years --

Q BY MR. THOMAS: This is NAS/MLC 185?

A BY MR. RONALD THOMAS: This is 185, right.

Many times I've seen this phenomenon where numbers of birds -- now, what we're seeing here --

0045

Q Mr. Thomas, could you describe the particular area which you're referring to?

A At the mouth of Rush Creek where the fresh water is concentrated, what we see here is a concentration of water birds. What are showing up at this distance are mostly gulls, but in my experience, there would be grebes, ducks, many other species of birds mixed in with the gulls as they concentrate on these fresh waters. These birds are tied to these fresh water areas on the lake, and I just used this slide to illustrate the importance. The previous slide also showed the same concentration.

I think we can have the lights back now for a

moment.
Q For the sake of time, let's skip 179, 180, and 181, and just refer --
A Okay. I'm going to want to show 184 in a minute, though.
Dr. Stine talked about the importance of the coves and bays. Well, for the sake of time, we'll skim over that. I just want to emphasize for the Board that the coves and bays were highly critical features for ducks for a very important biological reason. Ducks always tend to seek sheltered areas on large bodies of water. Some of us were over at the field trip a few days back

0046

and you know how the wind can blow in the Mono Basin. Ducks are always going to avoid getting out on that open water where there are coves for protection. Wind and waves are a terrible energy drain, so they're going to be seeking out those sheltered spots.
In addition, the coves and bays where there was fresh water inflow, as Dr. Stine pointed out, would tend to create a persistent area of that fresh water layer, so those coves and bays were very important and much more numerous at higher lake levels.
The lagoons at higher lake levels -- maybe we better --
Again, the pre-diversion lagoons that were -- that were available for waterfowl habitat at higher lake levels --
Q And you're pointing to --
A 159 on the north shore, the extensive lagoons. I would draw your attention to the close proximity of these brackish water lagoons to the lake shore. Again, the lagoons were very important because they provided shelter from wind and waves in an environment with lower salinity. These features now largely absent, very extensive, and in close proximity again to the open water.
Could we -- I keep jumping back and forth, but I'd

0047

like to show a slide which is NAS/MLC 184. It's upside down. If we could flip ourselves over, we can -- this is Simons Springs, a recent photo, although not current photo, it portrays a very similar lagoon situation to that existing today. I'm familiar with this area. I've hunted it. I've flown it. In fact, in September of this year, we flew a comprehensive survey, aerial survey of the lake to count ducks on the lake to see what was there at this time as compared the past years. It was interesting that over 50 percent of the ducks -- and we'll talk about numbers later, but over 50 percent of the ducks that were on the lake were in a position about right in here.
Dr. Stine, I believe, talked about fresh water. My guess would be that this is probably brackish and somewhat saline rather than fresh, but the point I want to make is --
HEARING OFFICER STUBCHAER: When you describe "right in here," you need to give a little better definition.
MR. RONALD THOMAS: This narrow and long lagoon

near the mouth of these diffuse inflows at Simons Springs.

What I want to emphasize that even though these lagoons are very much diminished, actually tiny

remnants of what once was, the importance of this habitat feature to me is clearly demonstrated by the fact that over half the ducks on the lake were sitting in this area right here on September 14th of this year.

Yeah. Let's have the lights back. One last point I'd like to make on the higher numbers of ducks on the higher quality habitat that existed in pre-diversion times. I'd like the Board and the Staff to keep in mind that with the greater productivity of the lake with these better habitats, these duck numbers would have provided prey for a number of other wildlife species, too. I'm especially thinking now of predators of all kinds, but particularly bald eagles and Perigrine falcon. These are two listed species that evidence indicates were abundant or at least common on the lake during pre-diversion times when duck numbers were much greater. Those two species, by the way, are specialists when it comes to preying on ducks and shore birds.

Okay. The next point I'd like to discuss is the pre-diversion habitats on the tributaries. I -- in the interest of time, I'll move quickly through this one because the Board has already seen and is familiar with the testimony of Vestal. His photo, which is our DFG

98, we won't bother to bring it up, showed the grassy marsh, the extensive marshlands and channels. His deposition talked about the bottom land morass describing extensive areas of marshy habitat and again graded channels with extensive -- extensive marshland qualities.

Q Mr. Thomas, you want to put that slide 205 up?

A We should show 205 and 207. Do you have those ready, John?

Q I understand this takes some time. Is it NAS 205 and 207?

A 205 and 207.

Q The historic conditions?

A Yeah. I would like just to draw the Board's attention -- I know you've seen these several times, but from a wildlife habitat, especially from a waterfowl habitat point of view, it just doesn't get any better than this. We've got the cress beds, fresh water inflow, there'd be scuds, fresh water shrimp and all kinds of other invertebrates in these beds. This would provide some nesting habitat but certainly in the fall and winter migratory period, we're looking at a piece of waterfowl habitat there that would provide food and shelter and cover for many, many ducks.

It would also be -- it would also be an excellent

hunting area because there would be places for hunters to hide on these edges. As testified by Mr. Hess in Lee Vining, the old timers walked these creek bottoms

and all these graded channels and jumped ducks and shot mallards, and that's excellent duck habitat.

207, NAS/MLC 207. Same thing. A little higher view, but of the same type of situation, just a variety of habitats, dense area. When I look at this, I think mallards, teal, and wood ducks and although wood ducks haven't been mentioned in the past in the Mono Basin, my guess is that there were probably wood ducks in addition to those other species. So these are the kind of habitats that used to exist and provided -- and tell me, as a water person experienced in waterfowl, that certainly that habitat existed to support thousands and tens of thousands and hundreds of thousands of waterfowl.

Q Let's move along, if we can.

A Okay. Let's talk for a minute about the impacts of the diversion, the diversion and export of water from the Mono Basin. I think we can -- I think that's the last of the slides now, so we can put that up for the last time.

We can look at the -- look at the composites. The draft document mentions -- mentions the impacts of --

0051

several impacts of diversion, physical impacts of diversion. I'd like to try to relate those to the Board and how they relate to waterfowl populations and habitats.

One of the first mentioned is that the lake level's fallen nearly 45 feet. We've discussed that and how that's affected these lagoons. The surface area -- this is something that hasn't been talked about much, but the surface area of the lake and the food that could have been produced in the lake has been reduced by almost one-third. These -- the draining of the marshes that Dr. Stine has talked about in the Rush Creek bottom lands, Lee Vining Creek, the loss of the lagoons, I believe that in about 1960, when the lake fell below about the 6400 foot level, this incision occurred that you heard discussed about the same time at the 6400 foot elevation these lagoons were drained. It's coincidental that --

Q Again, Mr. Thomas, when you say "these lagoons," identify --

A The north shore lagoons on exhibit number --

Q 142? No, I'm sorry, 159?

A Right. It's coincidental that these effects on the key habitats occurred very near the same time in all areas. It's also coincidental that their reports,

0052

the accounts of the long-time residents as documented in the DEIR as well as the reports of hunters that I have contacted during my surveys of the lake, the coincidental disappearance of the habitat features occurred at the same time that the ducks began to decline sharply in about the early sixties. Hunting held up, according to most -- the best reports, hunting held up pretty well through the fifties and began to taper off sharply in the early sixties, fell dramatically by the end of that decade.

Another aspect discussed in the draft document is

the decline in habitat quality at the -- at the remaining wetlands -- what we see is that -- in the document, and I concur, that the total acreage of wetlands around the lake shore have increased. As the lake level has fallen, under any classification we would call wetlands, all of this stuff around here which is, in fact, a lot of alkali flat --

HEARING OFFICER STUBCHAER: When you say "all that stuff around here -- "

MR. RONALD THOMAS: Again, now, this is exhibit --

Q BY MR. THOMAS: 142.

A BY MR. RONALD THOMAS: 142, NAS 142.

And this is a composite of the lake shore, the date of this exhibit was --

0053

Q 1983 -- '2. Sorry.

A The broad band between the historic lake shore here, which still contains the remnant fresh water marshes at the existing springs, that band between that higher lake level and the lake shore constitutes the vast acreages of areas now called the new wetlands on the lake, what I would call the new wetlands on the lake. Unfortunately, the habitat quality for wildlife of these new wetlands is very much diminished from what used to exist at these habitats that we've previously discussed.

The Auxiliary Report Number Three to the draft document talks about this -- the wildlife surveys on various habitats in the basin. What that report concludes is that these habitats on the lake shore, and I believe they were called lake shore willow and lake shore salt -- alkali meadow, I believe, these habitats had very much fewer numbers and species than other habitats in the basin. My experience and -- with -- during helicopter surveys of the lake shore, airplane surveys, hunts, and other visits to the lake, is that you see very few numbers, very low numbers of critters in this -- in these new wetlands, and very few species. So I believe that what the -- what the document says about the low quality of the habitat in

0054

those lake shores, I concur with that.

MR. HERRERA: Mr. Thomas, your 20 minutes are up.

MR. THOMAS: Could we --

HEARING OFFICER STUBCHAER: I think it's been actually more than 20 minutes, I think the time keeper's been generous.

MR. THOMAS: Could we petition for an additional ten minutes? Ten would do it. Again, we have a field biologist.

MR. RONALD THOMAS: I'm going to skip a couple of sections and talk about just a couple of thoughts on restoration of the pre-diversion habitats.

To my mind, with my experience of the lake, the bottom line really is that higher lake levels are what's needed to reestablish the waterfowl habitat. Dr. Stine has shown us the physical features. I'm convinced that the evidence is compelling that there were large numbers of ducks there under these pre-diversion conditions. I believe that due to the

levels needed, as described by Dr. Stine, for example, the rewatering of the north shore lagoons would require 6405 feet. I believe that naturally fluctuating lake levels at that level at 6405 and higher would restore the waterfowl populations that we've seen in the past.

Just one last thought. I'm convinced from my

0055

experience in other areas of the Central Valley, the marshes in Mexico that I've visited, I've seen newly flooded waterfowl habitats in those areas. When newly created waterfowl habitat exists, the ducks find it. They come there. If we recreate these habitats as the they used to exist on the lake, the ducks will be there.

MR. THOMAS: Thank you very much. That concludes your testimony, Mr. Thomas?

MR. RONALD THOMAS: That concludes my testimony.

MR. THOMAS: Next we have -- if you want us to proceed.

HEARING OFFICER STUBCHAER: Yes, Mr. Thomas, I have to state, though, that we're going adjourn promptly -- recess promptly at 10:15 whether we're in the middle of testimony or not.

MR. THOMAS: I understand. That's why I'm hurrying.

Dr. Reid is next.

Q BY MR. THOMAS: And Dr. Reid, is your testimony -- is your qualifications statement, which is DFG Exhibit 24, a true and correct copy?

A BY DR. REID: I believe it's DFG 23.

Q Is your qualifications statement? DFG 24 would be your qualifications and DFG --

0056

A Yes.

Q Is DFG 24 a true and correct copy of your qualifications?

A Yes.

Q And is DFG 23 a true and correct copy of your testimony?

A Yes. Except that my name is spelled wrong on the front page. It's spelled in the German style with the K. It's Frederic with a C.

Q My apologies for our clerical staff.

A That's quite all right.

Q Could you summarize your written testimony and qualifications for us starting with your qualifications?

A Um-hum. My name is Frederic Reed. I am the biological supervisor of the Pacific flyway for Ducks Unlimited. Ducks Unlimited, as many of you may know, is the largest wetland conservation organization in the world. Currently, we have restored, enhanced, or protected over six million acres of wetlands in North America.

In my capacity as a biological supervisor for Ducks Unlimited in the Pacific flyway --

HEARING OFFICER STUBCHAER: Would you get that mike just a little closer, please, or in front of you?

0057

DR. REID: How's that? In my capacity as a

biological supervisor of Pacific flyway, we are responsible for the ten western states including California, Alaska, Hawaii, including basically everything west of the Rockies. We've worked closely with our sister organizations in Canada and Mexico, and I have worked quite often in those locations as well.

My graduate degrees include a masters and Ph.D. in fisheries and wildlife from the University of Missouri. I also have a post-doc from the University of Missouri. These degrees were earned with a specialty in wetland ecology based on my work with water bird habitat management.

I have over 15 years experience with wetland and water bird management especially on migration and wintering areas of water birds, and my major research and extension efforts are in moist soil management and marsh management. I have extensive training and extensive experience throughout the west and Alaska down through the Sinaloa (phonetic) marshes of Mexico. I have international experience in several places, and I'll just avoid that and mention here it's in my vitae.

The results of my research have been published in over 40 papers presented at over 30 scientific

0058

meetings, over 60 wetland management workshops. I'm regularly asked to give a number of university lectures, I present somewhere between five and eight a year. I've spoken at about 20 universities in the United States.

Over the last 15 years, I've had the opportunity to visit the vast majority of this continent's wetlands and waterfowl habitats. I have directly consulted on over 80 national wildlife refusges, over 100 state wildlife areas in 38 states. I've worked on approximately 30 national forests, 36 other federal areas, and I've also advised approximately 75 private wetland areas on water wetland and invertebrate management techniques and restoration.

I'm formally a visiting assistant professor biology department of Southeast Missouri State and a post-doctoral fellow and lecture in wetland ecology at the University of Missouri, and as I said, I'm currently -- in my capacity as the biological supervisor for Ducks Unlimited. In that capacity, again, I oversee restoration projects. I help train wetland managers through on-site workshops, and I coordinate all our research efforts with western universities through our institute for wetland and waterfowl research.

0059

As I mentioned before, Ducks Unlimited is the largest wetland conservation organization in the world. We currently have approximately 500,000 members in the United States. Ducks Unlimited, since its founding, has invested more than $750 million towards waterfowl conservation in this continent.

I have read the Draft EIR for the Mono Basin, many of the relevant primary papers referenced in that document. I've investigated potential wetland

restoration projects in the basin, and we are currently undertaking a wetland project, which I'll talk about in a few minutes. I've walked the majority of the former deltas, much of the current and historic lake shores with Dr. Stine and Mr. Thomas here, and I've talked to several long-term residents of the basin.

What I'd like to do briefly is just frame where the Mono Basin fits in terms of continental U.S. for waterfowl. I'd like to talk about the specific habitats, why they're important for water foul, and then frame it as related to Dr. Stine's information on the geomorphology, why specifically these areas are important for waterfowl.

Historically, the intermountain region of the United States is composed of about 33 parks or wetland areas, and these have provided historically about 1.2

0060

to 1.6 million hectors of waterfowl habitat. And while much of the published waterfowl literature for this region concentrates on production, some of the best marshes and concentration areas in this region host millions of waterfowl in migration. And I think, as you'll see, the Mono Basin, like most of the wetlands in the Great Basin, is most important as a migrational habitat.

As an example, National Wildlife Refuge complex up at Klamath may attract greater than five million waterfowl during migration. It's often considered the single most important waterfowl refuge in the United States. The complex of marshes on the east side and north side of the Great Salt Lake in Utah also hold between one to two million waterfowl in migration, and I think the importance of these types of habitat in the Great Basin are best described in a paper that I cite by Cadillac (phonetic) and Smith who say that in contrast to the perception that the Great Basin is a desert of little value to waterfowl, the reality is that the marshes of these wetlands are of higher value to waterfowl than are many areas in wetter regions. In fact, the very rarety of marshes in a dry region adds to their value, and this as we look at migrational strategies of waterfowl who are concentrating their

0061

breeding activities in the prairie pothole regions of Canada where approximately 60 to 70 percent of waterfowl production in Northern California occurs. In Alaska where somewhere between 15 and 20 of waterfowl production occurs, as they are moving south, then, into the very important wintering regions, the wintering regions that we have here in the Central Valley, in the western coast of Mexico, in the delta, the Rio Hardy (phonetic), Rio Colorado, these are extremely important areas, and so the Great Basin wetlands are a major component of the migration habitat that these waterfowl use.

Now, you've talked about -- you've had other people talk about other birds and how they've used Mono Lake. I think it's important when we talk about waterfowl as a group, we recognize that this is the most diverse family of water birds that exist. There's

somewhere upwards of 62 species of waterfowl that use North America. Now, what we have in the Great Basin is we have one species of swan, four species of geese, and approximately 23, 24 species of ducks. So when we talk about waterfowl use of these habitats, you need to recognize that it's not a single species using these habitats, but it's variety of species, and they use them somewhat differently.

0062

In addition to some of the marshes I talked about, I think, as we look at the Great Salt Lake, the marshes that are most important along the Great Salt Lake are those that we see in the deltas of the Bear and the Jordon Rivers, the Ruby Lake marshes, which are spring fed in Nevada, Carson Sink, which is a closed basin that includes Still Water National Wildlife refuge, Humboldt Wildlife Area, the Montier (phonetic) Basin, which is a stream-fed, closed basin, the Warner Basin in eastern Oregon, the Klamath Basin, which I mentioned before, and Mono Lake in the Owens Valley and eastern California.

Now, Klamath, Mono, and Owens Valley have been especially impacted by man's activities including drains for agriculture, diversion of water, and water quality degradation. Within the Mono Basin, some waterfowl were present during breeding season. I think you've had some testimony to that. Mallards, green-winged teal gadwall, and northern chubbler (phonetic) were the species that were probably the most common breeders. However, the evidence suggests that these breeding numbers were tiny as compared to the vast concentrations of waterfowl in migrations, and this is representative of all the marshes we see in the Great Basin, that their importance is really in

0063

migration rather than in breeding.

And in general, we see three major flight corridors from the breeding grounds to the wintering grounds in the Pacific flyway. We see a coastal route. We see an interior coastal route that includes the Willamette Valley of Oregon, the Central Valley of California, and we see an interior route which includes the Great Basin wetlands. It's this interior route which is so important, I believe, to what historically existed in the Mono Basin.

To complicate the fall migration patterns over the Great Basin, we know that many prairie nesting species migrate southwest across this intermountain region on route to California wintering areas. As an example, we know, for example, that the San Joaquin Valley historically has played an extremely important region for wintering habitat. As an example, in recent times 43 percent of the northern shovelers in the Pacific flyway, 53 percent of all the gadwall, and 68 percent of all our green-winged teal in the Pacific flyway use the San Joaquin Valley as a wintering ground.

Other birds tend to concentrate at the Great Salt Lake and funnel through Ruby Lake, Carson Sink, and Mono Basin before wintering in either California, Rio Colorado, the Hardy Delta, or to the Sinaloa (phonetic)

0064
marshes of western Mexico. A much smaller fraction of birds tends to shift to the east and winters in the middle Rio Grande or even to the Texas Gulf coast, and with huge concentrations of migrant birds in the Great Basin in few stopover spots, the spectacular concentrations often are found on suitable areas.

I believe -- excuse me, I'd also, at that time time, like to thank the Board for allowing me to speak and say that I think as you look at the Draft EIR, it is very well prepared, and I think your Staff and Jones and Stokes deserves a good salutation over the amount of effort that they've had. I'd especially commend Mr. Canaday, Mr. Herrera, and Dr. Ted Beatty (phonetic) who worked on the Draft EIR because overall, this is an excellent document.

There are, however, I believe, some other informations related to how important the Great Basin is in a broader sense that I'm trying to provide here, and that's what my testimony is about.

The Draft EIR and other evidence suggests that the Mono Basin had such suitable migrational habitat prior to stream diversion from the early 1940s. I think the Draft EIR provides countless pieces of evidence to pre-1940 conditions or those even in the early years of diversion, were conducive to the kinds of Great Basin

0065
habitats that support substantially more waterfowl than exist in the Mono Basin today. The Draft EIR states that prior to DWP diversions, the Mono Basin, quote, supported a diversity of ponds, lagoons, and other fresh water and brackish water habitats that were fed by creeks and springs, unquote. And that, quote, dense, continuous stands of riparian forest dominated by cottonwoods and willows grew along the major tributary streams to the lake store, unquote.

These descriptions, along with references from early naturalists, quantify counts by waterfowl biologists and descriptions from long-term basin residents and waterfowl hunters, support the evidence that the Mono Basin was an important migrational habitat for waterfowl.

We need to understand that as we look at pre-1955 data for waterfowl in any place of North America, there's not a lot of quantifyable data. We see a lot of information that says the sky's turned black, et cetera. In this particular case, we are actually blessed with couple of pieces of evidence which do suggest that we had substantial populations. For instance, I believe -- while I'm over here -- I believe -- and Ron Thomas talked about this particular item which is entitled -- which is number --

0066
Q That's DFG 95.

A -- DFG 95, which shows, as Ron had talked about earlier, that duck kills in 1940, each dot representing a thousand birds, there are five in Mono Basin. And what's interesting about this particular information is that we know that much of the actual kill was by people that lived in the L.A. area, and many of these people

may have reported their ducks in the L.A. area. So it may actually be a low count, but even if we use 5,000 ducks killed, killed in 1940, and you consider the current harvest rates at a particular area, which are about 5 percent, that puts the population in 1940 at about 100,000 or over of birds that were in that particular area.

Statements by long-term residents of the Mono Basin which are in the Draft EIR including Banta (phonetic), Vestal, McPherson (phonetic), DeChambeau, describe populations that numbered in the hundreds of thousands to million of waterfowl. Accounts of waterfowl in the Owens River Valley pre-diversion also describe over a million ducks during fall migration. As we look at the strategies that birds are using here, we need to recognize that the Mono Basin is important in migration, and it's most important in wintering. It probably is not going to be a real critical spring

0067

migrational habitat because of where it sits at its high altitude. Most of the waterfowl are going to move through the Central Valley, through the coastal routes as they move north because they're trying to get to the prairies of Canada, to the flood plain basins in Alaska, just as those areas are iced out or snowed out. And so what we find is that the areas around the deltas of the streams, which are probably the most important habitats for waterfowl in the Mono Basin, are not readily available in the spring for spring usage. So when I talk about migrational use, I'm really going to emphasize fall migration.

The statements that these people made in the DEIR are from waterfowl hunters who spent many days, many weeks, many years observing ducks and geese that they hunted. The statements indicate that population levels stayed high until early 1960s when populations crashed. A recent fall 1993 California Fish and Game aerial survey, which was conducted by Dan Paragar (phonetic) and Ron Thomas, counted less than 900 total ducks on Mono Lake or related tributaries. And this contrasts greatly with the kinds of populations that were documented in the forties and even into -- even into the late forties. Two California Fish and Game employees, Vestal and Dumbrowski, are in agreement with

0068

local hunters over Mono Lake waterfowl population levels prior to water diversions and during the early periods of stream diversions.

Dumbrowski's waterfowl population estimates in fall 1948, and we have a map --

Q It's DFG 96, and then the blowup from that exhibit.

MR. HERRERA: Just to note, Mr. Thomas, there's five minutes remaining.

HEARING OFFICER STUBCHAER: I'll give you until 10:15.

MR. THOMAS: Thank you, Sir.

DR. REID: In his estimates in fall 1948, they indicate substantial waterfowl numbers in the hundreds of thousands to a million waterfowl, the peak count

that he had at an instantaneous time was approximately a million birds. By far, the dominant species in these counts were northern shoveler, and this is very interesting because northern shoveler is mainly a carnivore, it's a spatulate feeder. It has a very spatulate bill, and it feeds almost exclusively on invertebrates. Based on current waterfowl corridors, population levels of migrating waterfowl in the Great Basin Pacific flyway, and the aerial photos depicting the former lagoon and marsh habitats along the Mono

0069

Lake shores and deltas, I believe that pre-diversion lake conditions supported orders of magnitude of more waterfowl than exist today.

References in the Draft EIR cite visits with these two gentlemen here, Stine and Thomas, and descriptions of physical conditions from Stine that he has presented here this morning in his written testimony, indicate that prior to 1941, the most important waterfowl habitat consisted of the near shore localities including the lagoons of the north shore, deltas of the mouths of Rush Creek, Lee Vining Creek, Wilson Creek, Mill Creek, DeChambeau Creek, and the springs entering the lake, Monte Vista Springs, South Tufa, Warm Springs, and Simons Springs. According to the Draft EIR, in 1940, the Mono Lake water elevation level stood at 6417 feet. The lagoons shown in pre-diversion aerial photos -- and this -- this evidence is number --

Q BY MR. THOMAS: 142?

A BY DR. REID: 142, you see these lagoons located in the northern areas. And I would point out that if you look at satellite information --

Q I'm sorry. I keep inverting that. I'm sorry, that's NAS 159.

A This is NAS 159. Okay. But if you look at these lagoons located at this time frame, these are very

0070

similar to the kinds of habitat that you see today in the Sinaloa Marshes of western Mexico where about 1.5 million pentells tend to winter. It's very similar to habitats we see along the lake shores in the Great Salt Lake, and these kinds of habitats, from an aerial point of view, tend to look like those that are readily used today.

These lagoons covered, as Dr. Stine mentioned, over 200 acres in size. These lagoons are formed by spring water inputs blocked be beach burms, of which you had a wonderful drawing made for you. According to Dr. Stine, when the Mono Lake elevation falls below 6400 to 6405 feet, the lagoons vanish to desiccation.

Now, the hypopycnal stratification --

Q Dr. Reid, that wonderful drawing was DFG 165?

A The wonderful drawing was DFG 165. Yes.

The hypopycnal stratification which just has recently been described by Stine and Thomas for you here this morning, is characteristics of zones most important to waterfowl depicted in Dumbrowski's 1948 map which again was --

Q DFG 96?

A -- DFG 96. Okay. So those areas here as Simons

Springs, Rush Creek, Lee Vining Creek, DeChambeau area, Warm Springs area. This stratification would greatly

0071

increase the zone of important waterfowl habitats at the mouths of the creek.

Where Mono Lake -- where Mono Lake levels dropped below 6400 feet, the streams incised to historic deltas and the quality waterfowl habitats were greatly degraded. While Stine and Thomas conclude that hypopycnal stratification still occurs in the mouth of Rush and Lee Vining Creeks, the fresh water lenses are substantially reduced and not occurring with marshlands.

Now, if we look at other areas in North America that have this kind of interaction with fresh water and salt water, we can, of course, turn to tidal actions. And a classic example is at Chesapeake Bay where -- when you look at the tidal actions and the fresh water running across the denser salt water, for a long time, we thought that waterfowl were actually concentrating in saline conditions and, in fact, they were following this line of the movements of the tidal action of the fresh water. And, in fact, for many years we tried to reintroduce saline plants in these areas and were unsuccessful. Only in the last ten years where they looked at this stratification in Chesapeake Bay had they realized that they had to re-introduce brackish rather than saline vegetation in order to be

0072

successful.

I mentioned before that Ducks Unlimited is involved in the Mono Basin. We are currently working to restore some 30 acres of waterfowl habitat at the DeChambeau Ponds, and this is at a cost of more than $400,000. This price is substantially greater than the normal restoration projects with which we've become involved, but reflects the expensive nature of groundwater pumped restoration projects which would be necessary in this basin.

At the current lake level or below, realistic waterfowl habitat restoration will be both expensive and marginal in impact. Any current waterfowl restoration projects will be mere postage stamp-size wetlands in a huge alkaline sink. Most of the existing wetlands today are alkaline meadow or dry emergent flats which provide little or no waterfowl habitat. While individual restoration projects could have waterfowl respond with the micro-habitat conditions provided, substantial improvements in migrating waterfowl populations can only be achieved by increasing water levels.

Reduction of stream diversions which will allow lake levels to rise to 6390 feet or above should improve the hypopycnal wetland association of both Warm

0073

and Simons Springs. According to -- allowing the lake levels to rise to 6400 feet or above would restore marsh conditions in the Rush, Lee Vining, and Mill Creek deltas, and lagoon complex at the DeChambeau embayment. Allowing the lake to rise to 6405 or above

would restore the north shore lagoons. Allowing the lake levels to reach 6405 feet and then fluctuate between that level and 6400 feet, will result in habitat that can provide substantially greater populations of waterfowl than exist today. And certainly, we know that there were substantial populations of waterfowl that did use that habitat when the lake levels were at that level.

In addition to lake level changes, specific riparian restorations of Rush Creek and Lee Vining Creek, Wilson Creek, and Mill Creek will benefit species such as mallard, green teal, and gadwall, which are basically riparian species in nature. Emergent vegetation restoration of the lake shore associated with tributary deltas and springs would improve waterfowl habitats at the higher lake levels. During the period when lake levels should rise from 6377 to 6405, interim restoration projects may include small strait modifications at the north shore or groundwater pump restoration sites of the north and west shores.

0074

And I can go into that a little later perhaps.

Currently, there's a continental effort called the North American Waterfowl Plan which is attempting to partner state, federal, and provincial governmental agencies with private conservation organizations to restore North American wetland habitats such that continental waterfowl population levels will be restored to the levels of the 1970s, which included 62 million breeding population and 100 million birds full flight. Currently, we have about 49 million in the breeding population.

There are substantial efforts to improve waterfowl habitats in the Sacramento Delta, San Joaquin Valleys of California. Ducks Unlimited has recently announced that we are going invest $16 million in the Central Valley of California over the next five years. The Rio Colorado and Rio Hardy Deltas are in need of restoration activities. Ducks Unlimited Mexico is currently embarking on a project there, and the wetlands of the Great Basin where we have a number of projects there with our partners. Efforts to restore Pacific flyway populations can be reached only if quality habitats are restored in critical breeding, in critical migration, and critical wintering habitats. These are species which have adapted to a migrational

0075

life cycle. You can't pull out one of these major areas and expect these species to exist. It's not going to happen. You're going to have a great decline in populations. Only as we bring back these real critical staging areas along their flight lines, are we going to be able to have substantial population. We can't simply invest dollars on the wintering grounds in the Central Valley and invest dollars in the breeding grounds in Canada and expect these birds to come back.

I think there's some strong evidence to suggest on the Rio Grand Valley where they have put a number of different restoration projects at the historic areas, such as the Basci-Dela Patchi (phonetic) National

Wildlife Refuge, that they have, in fact, brought back a number of birds such as pintail, such as snow geese, such as Ross' geese, and other species including sand hill cranes, to numbers that are actually increasing.

Thank you very much.

MR. THOMAS: Thank you very much and particularly for your effort to reach the magic appointed hour.

We have no further questions on --

HEARING OFFICER STUBCHAER: We'll offer the exhibits at the conclusion of cross-examination for acceptance?

MR. THOMAS: Yes. Well, perhaps, I think Fish and

0076

Game's offering all of its exhibits at the end of its case.

HEARING OFFICER STUBCHAER: Thank you. And this hearing will recess until 3:00 p.m.

(Whereupon a recess was taken.)

HEARING OFFICER STUBCHAER: Good afternoon. We're going to reconvene the Mono Lake water rights hearing. We're going to proceed with the cross-examination of the panel which testified this morning and ordinarily, cross-examination would start with Los Angeles Department of Water and Power. In this case, however, two of the witnesses presented by the Department of Fish and Game are appearing jointly on behalf of Fish and Game and the National Audubon Society and the Mono Lake Committee. Therefore, in accordance with Mr. Del Piero's previous rulings, the order of cross-examination will start with the National Audubon Society and the Mono Lake Committee and then Los Angeles Department of Water and Power and down the list.

But before we get into that, I want to announce that Mr. Del Piero's plane was delayed, and this is bad news for all of you. There will be no night session tonight.

(Whereupon a cry of anguish arose in unison from

0077

all participants.)

HEARING OFFICER STUBCHAER: So we will conclude no later than 5:00 p.m.

MR. CANADAY: Mr. Stubchaer, we might advise the parties that I'm willing to bet Steve's pay -- month's pay -- that tomorrow night we will be going late. So I would prepare in that event for tomorrow.

HEARING OFFICER STUBCHAER: I wouldn't bet against that.

Is the panel ready? All right. Mr. Dodge?

MR. DODGE: I have a preliminary matter. Mr. Birmingham reminded me that last Friday we decided to add Dr. Herbst (phonetic) to Wednesday's panel, which consists of Dr. Winkler (phonetic) and Mr. Shuford (phonetic). So I wanted to advise everyone else of that fact, also. I previously advised Mr. Birmingham of that or someone in my office had.

MR. BIRMINGHAM: Actually, we received a letter by facsimile today from Morrison and Forester advising us that Mr. Herbst was going to be added to a panel with Dr. Winkler (phonetic) and Mr. Shuford (phonetic) for

Wednesday. I have expressed some concern to Mr. Dodge that Mr. Herbst's testimony is really unrelated to that of Dr. Winkler (phonetic) and Mr. Shuford (phonetic), but Mr. Dodge and I have briefly discussed the way in

0078

which that panel would be cross-examined, and I think we'll be able to reach some kind of an agreement so that there will not be a need to object to Mr. Herbst appearing with that.

HEARING OFFICER STUBCHAER: Thank you.

MR. DODGE: I would also add that Dr. Stine's written testimony that we've been here discussing this morning, National Audubon Society Exhibit 1-U, has, at the end of it, some analysis relating to habitat for nesting gulls starting on Page 7. It's entitled "Peninsularization and Near Peninsularization of Neggit, Twain, and Java," and Dr. Stine will be giving very brief -- a matter of a couple or five minutes, very brief direct testimony summarizing that on Wednesday with the gull panel.

HEARING OFFICER STUBCHAER: Does a couple of five minutes mean ten minutes?

MR. DODGE: No. It means two to five. He's promised to take a low profile on this.

DR. STINE: Mr. Dodge?

MR. DODGE: I just have a few questions of this panel.

CROSS-EXAMINATION BY MR. DODGE

Q Dr. Reid, there was testimony about historically there being some 216 acres of brackish lagoons, and

0079

there currently being some 12 to 16 acres of mostly saline lagoons. Do you recall that testimony?

A BY DR. REID: I do.

Q Now, let me ask you to assume that the saline lagoons that exist today are -- the salinity is approximately 100 grams per liter and that the salinity of the historical lagoons was between 50 -- excuse me, 15 and 50 grams per liter. Do you have that assumption in mind?

A Okay.

Q My question to you is on a per-acre basis, can you compare the historical habitat for ducks as compared to the present habitat for ducks?

A Based on habitat for both breeding and migration, when you get salinities of, say, 15 to 50 grams per liter, brackish waters, you have the highest diversity of waterfowl species using these kinds of habitats. As an example, the prairie potholes of Canada, much of that is somewhat brackish in nature in the boundaries of that salinity. Yukon Flats in Alaska, one of the most important migration breeding grounds in Alaska, over a million birds annually, that has similar salinities to the fresh brackish that you've described as being historic.

So with that in mind, and knowing -- well, there

0080

are certain species of waterfowl that readily use, say, saline waters, marine environments in the winter for migration and for breeding, if it's not -- the saline

lagoons that you described would not be used to the degree that the fresh water or brackish lagoons would be.
Q You say the highest diversity was at what salinity, Sir?
A I would say that you'd find between 15 to 50 grams per liter.
Q And implicit in your answer is that there would be a falloff at 100 grams per liter; is that right?
A I'm not saying that there is a definitive threshold between there, but certainly, if you were to estimate both the diversity and number, it would be greater in the fresh water to brackish.
Q And again, diversity and numbers of what?
A Of waterfowl, of ducks, specifically.
Q I just have one question for you, Dr. Stine, and that is your testimony this morning related to a variety of physical changes, and I'm not sure I listed them all, but one was coves and bays. Another was lagoons on the north shore. A third was the -- help me with that term where the fresh water comes out over the salt water, hypopycnal layer, correct?

0081

A BY DR. STINE: Hypopycnal stratification, yes.
Q And you also talked about wetlands at the deltas of various creeks, correct?
A That is correct. And I would add that I also talked about the bottom lands environment of Rush Creek.
Q Okay. Now, I want to exclude, for purposes of this question, the bottom lands environment of Rush Creek, and let me ask you for each of the other matters that you discussed that existed historically, if Mono -- and you were talking about elevations between 6400 and 6405, correct?
A That's correct.
Q Now, my question is a simple one. If Mono Lake were today ordered back by this Board to 6400 to 6405, that range, would all of those conditions that you described historically, would they naturally recreate themselves?
A They would, and they would approximate in most cases their former aerial distribution. They would occur in the same places, and they would be approximately the same size with one exception; that is, I think that we could -- because the deltas are now incised, we could probably expect the fresh water marshlands on the deltas to be smaller than they

0082

formerly were by maybe a factor of two, something like that.
Q So the fresh water deltas on the marshland upon return to 6400 or 6405 feet would be smaller?
A The fresh water marshes on the deltas would be somewhat smaller than they were before. That's right. I think everything -- there's no reason to think that everything else wouldn't be as it was.
Q Would that be a temporary situation or a permanent situation?
A Temporary, though long -- in the long-term sense.

I think it would take awhile, probably centuries scale, to fill those delta trenches to the point where the -- where the delta plains would once again have -- be characterized by marshes the size that those existed.
Q Now, Dr. Reid, back to you. You mentioned three routes. The one I understood related to Mono Lake was the, quote, interior route, end quote. Is that correct?
A BY DR. REID: The interior Pacific flyway route, yes.
Q The interior Pacific flyway route. Okay. Can you elaborate on that and explain how Mono Lake fits into the interior Pacific flyway route?
A As I mentioned before, with a majority of the duck species, breeding, and prairie pothole in Canada and

0083

the Boreal (phonetic) forest zones of Alaska and Canada, one would see a funneling of birds out of these northern regions and concentrating in areas around the Great Salt Lake. The Great Salt Lake is a real pivotal complex of wetlands for migration of this route, and where we find the most important wetlands for waterfowl in the Great Salt Lake are along the deltas of the Bear River, the Jordon River, the Weber River, not necessarily asimilar from what we might see at Mono.
As you look at the Great Salt Lake overall, it's fairly a desert in terms of waterfowl use. Annual volume, for instance, gets about five inches of rainfall, But overall, waterfowl are concentrating in the deltas. From the area of the Great Salt Lake, there'll be funneling, then, either to the east over to the Texas coast, some even to the Louisiana coast. Others will funnel down through Rio Grand Valley, the main wetlands there, Basci-Dela Patchi, Bernardo, et cetera, along the middle Rio Grande. Some of these birds, especially pin tail and white fronted geese will funnel down to the highlands or the Chihuahua Basin, and then birds that are making their way to the west from the Great Salt Lake can either funnel through the Ruby Marshes down into the Mono Basin. Most likely historically they use the Owens River Valley. They

0084

could have funnelled either from Mono directly across to the Central Valley, the grasslands area, which still holds large numbers of waterfowl.
They also could funnel down the Owens Valley into the Colorado River delta, and some birds most likely funnel down to western Mexico into the marshes of Sonora and Sinaloa. Sinaloa, today the marshes there, which are basically pristine, still can hold vast numbers of waterfowl.
Q Do you have an opinion as to whether the loss of Mono Lake in the past few years as a part of the interior Pacific flyway has affected the rest of the flyway?
A Well, as I think Dr. Scott -- Dr. Stine described, most likely, when diversions began on the lake at the lake, the response by ducks was not immediate because you did not see immediate decline in those lagoons. It was probably into the sixties that you saw a response by waterfowl, a decline by waterfowl --

Q I'm asking you to assume for purposes of my question that the decline in waterfowl at Mono Lake took place in the early sixties.
A Right.
Q My question is simply did that decline likely have an effect on the rest of the interior Pacific flyway?

A There is, as I mentioned earlier this morning, very strong evidence which suggests that the quality of the breeding habitat, quality of the migration habitat, quality of the wintering habitat, all directly impact the survival and the population status of waterfowl, therefore, when you take out and measure migrational habitat, you break a link in a chain, so to speak, and you can have a collapse of the population. Remembering, too, that we've got many species that are present dominated by northern shoveler, but there would be a collapse of the population.
MR. BIRMINGHAM: Can the Reporter mark that, please?
THE REPORTER: Sure.
Q BY MR. DODGE: Let me move to your work on the DeChambeau Ponds,and I think you skipped over it pretty quickly this morning. I have a couple of questions on that.
You mentioned that that involved 30 acres at a cost of $400,000, correct?
A That's correct.
Q Now, the DeChambeau Ponds are well above any lake level that we're talking about in this proceeding, aren't they?
A About 6435.

Q And so your work on DeChambeau was unrelated to this particular fight over lake levels, correct?
A It was.
Q And, in fact, your work on the DeChambeau Ponds allowed us to find you for this lake level hearing; isn't that correct?
A That's true as well, yes.
Q Did -- your work on DeChambeau preceded any interest you had in the level of Mono Lake; is that correct?
A Absolutely. We were very interested in restoring wetlands in the Mono Basin as indication of how possible it was, the fact that restoration of quality waterfowl habitat was feasible. We recognized that it was going to be an expensive proposition, that we were probably going to run into a pretty small project. We traditionally don't do projects under 100, even under 500 acres in the west. Most of our projects are several thousand acres. 4,000 acres in one project. We work on big projects because that's how we can economically put back major habitats in the west.
In this particular case, we wanted to demonstrate that it was feasible to do this. I don't think any of us in the office recognized just how expensive it probably was going to be.

Q Let me just ask you one final question, and that

is, hypothetically, if this Board were to restore Mono Lake to 6405 feet, do you have -- and you talked about Mono Lake being a -- historically being primarily for migratory ducks as opposed to breeding ducks, correct?
A Correct.
Q Hypothetically, if Mono Lake were restored to 6405 feet, do you have an opinion as to whether the migratory duck populations would return?
A Yes. Our projects that we've conducted in the west, even over the last five years, have shown some substantial returns of birds in very short order. For instance, we completed a project at Yano Seco Rancho (phonetic) in the Sacramento Valley this last year in the summer. By fall -- this is a 270 acre seasonally flooded wetland. By fall when it was flooded up, we had over 300,000 ducks utilizing this habitat on the one 270-acre plot. So we had over a thousand ducks per acre using the habitat which was graded farmland up until was it was recreated into historic wetlands.

We can see the same thing happening in the Great Basin. We can see at Basci-Dela Patchi down in New Mexico. This is an area that was degraded, the water had been channeled. The water had been kept strictly to the channel and was not allowed to flow into the

0088

flood plain. What we did was we recreated the natural flooding and, in fact, then had germination of seed and bud roots that existed in the former flood plain, and now we're getting a whole series of returning water birds in Basci-Dela Patchi. That's an area which had lost a lot of birds, now we see increasing numbers of a number of waterfowl species including northern pin tail, including shovelers, including gadwall, et cetera.

At Deleva (phonetic) National Wildlife Refuge in Sac Valley, we have seven new projects in the Sacramento complex, Deleva is one of them. In the last three years, we've seen not only large numbers of birds returning to these sites which, again, with degraded farmlands, they were historic wetlands. We put them back. We recreated the hydrology, and the birds responded. What's interesting about the Deleva case is we are now seeing family groups of swans returning to the same marsh. So there -- you know, the site fidelity seems to have recreated some of those same senses.

So my feeling is that again, this is a chain, and we can't simply hope to put back an individual wetland and the birds will return. There has to be a corridor, but we are doing work in the Rio Grande delta. We are

0089

doing work and hope to do more work along the Colorado River. We've done a lot of work -- we can hope to expand our efforts in the Great Salt Lake. We have a major effort going on in Elverta. $4.0 million this last year to restore wetlands in the upland habitats there. Clearly one of the breaks in the chain in this corridor down through here is the Mono Basin and Owens Valley.

MR. DODGE: I have no further questions. Thank

you. All of you.
HEARING OFFICER STUBCHAER: All right. Department of Water and Power. Pardon me. Mr. Dodge, were you speaking for both the Audubon Society and the Mono Lake Committee?
MR. DODGE: Yes.
HEARING OFFICER STUBCHAER: All right. Water and power? Ms. Goldsmith?

CROSS-EXAMINATION BY MS. GOLDSMITH

Q Just a very few questions for you, Dr. Stine. You've testified that a hypopycnal layer is present at the current time, and you've shown us some photographs dating throughout the past decade which you've characterized as providing demonstrative evidence that such a layer exists. Is that right?
A Yes.

0090

Q And that hypopycnal layer of stratification has caused -- hypopycnal?
A Yes.
Q -- stratification is caused by the difference in salinity between the inflowing fresh water from whatever source, springs or streams, and the salinity of the lake's water; is that right?
A That's correct.
Q Did you take measurements documenting the depth and extent of the stratification at the historic sites around the lake?
A Not at all the sites around the lake, but I was able to do that at both the DeChambeau Creek site that I showed as well as at the mouth of Rush Creek.
Q What was the aerial extent of the layer at DeChambeau Creek?
A The aerial extent meaning depth, again? Or --
Q Can you describe the physical size of what you characterize as the hypopycnal layer?
A Well, it was confined, as I showed in the slide, to a stream channel where the water column in the stream channel was in its lower half, approximately, depending upon where you were, how far upstream you were in the channel, the lower half roughly was saline water and the upper half was fresh water.

0091

Q What was the difference in salinities?
A Salinity or the -- salinity would have been very close to zero in the fresh water. It would have been approximately, at that time, 90 grams per liter in the -- in the salt water. I think a more instructive way of looking at this would be in terms of specific gravity or specific gravity of the salt water or the difference in specific gravity between salt water and the fresh water would have been approximately .05, .04 to .05.
To put this in perspective, the difference in the specific gravity of the top water and the bottom water that characterized the monomixtic condition -- meromixic condition at Mono Lake during the 1980s and which caused things to not overturn was approximately .01. So at the present day salinities of Mono Lake, the difference between the fresh water and the salt

water is approximately five times what existed during the period of meromixis during the 1980s. It's a very, very large density difference that's hard to break down.
Q What date was it when you took these measurements at DeChambeau Creek?
A This would have been in 19 -- 1983 and '84.
Q What was the other site that you mentioned you had

0092

taken measurements?
A That was again the site that I showed in the slide, and that was -- and these are not measurements now on salinity. These are measurements on the thickness of the water, which I believe was your first question.
Q That's right.
A This was in -- I believe it was June of 1986.
Q June of 1986. And that was at the mouth of Rush Creek?
A Mouth of Rush Creek, yes.
Q And what was the aerial extent at that time?
A Aerial extent meaning depth or aerial extent in terms of acreages?
Q Aerial extent in terms of feet, radius?
A Aerial extent of the --
Q Horizontally.
A Okay. I would estimate it to be approximately 200 to 300 acres, something like that.
Q And what was the depth?
A Well, it varied. The depth of this thing, I haven't looked at it in its middle, but typically, it feathers out to a more or less feather edge, so it's probably -- my guess is that it may be as much as six inches or so deep at the center of the pile of water

0093

and then moving out to more or less a feather edge on the edges of the pile. And that could be affected by current, it could be affected by the amount of waves, or the wind, et cetera.
Q Now, I'd prefer it if you could express it in differences in salinity because differences in specific gravity mean very little to me, and I'm used to thinking of the lake in terms of salinities. What was the salinity of Mono Lake -- what was the difference in salinity at the mouth of Rush Creek in 1986?
MR. DODGE: Objection. Vague and ambiguous.
HEARING OFFICER STUBCHAER: She said what was the salinity at the mouth of the creek in 1986? Are you talking about the lake salinity or the stream -- or the mixing zone salinity?
MS. GOLDSMITH: What was the salinity of the lake --
HEARING OFFICER STUBCHAER: Unmodified by the --
MS. GOLDSMITH: In June of 1986.
MR. DODGE: That's a new question. I have no objection to that question. The first question asked for a difference and --
HEARING OFFICER STUBCHAER: I'm just trying to clarify the question.
MR. BIRMINGHAM: He's sustaining your objection,

0094
Mr. Dodge.
DR. STINE: I'm confused as to exactly what the question is. Shall I ignore the first question and go to some second question?
Q BY MS. GOLDSMITH: Yes. The second question is what was the salinity of the lake in June of 1986.
A 1986, the level of the lake was approximately 6380.9 feet, and the salinity would have been approximately, give or take a little bit, right around 85 grams per liter.
Q Now, isn't it true that the persistence of a hypopycnal layer will increase as the difference in specific gravity, if that's the term, between the lake's water and the inflow increases?
A It will, yes.
Q And isn't it true that under all currently proposed lake levels and areas even including the one that's proposed by Los Angeles Department of Water and Power, that there will continue to be inflows at Rush and Lee Vining Creeks into the lake?
A That is correct, yes. I would simply clarify that that would not be the case under the no-change alternative for the -- what did we call that? The all-diversion alternative, or whatever we called it.
Q And nobody is proposing that as an alternative
0095
adopted by this Board; isn't that right?
A It was one entertained in the DEIR.
Q And isn't it true that that's not an alternative that is legally available to this Board?
A I'm sorry.
MR. THOMAS: Objection. The witness isn't qualified to make a legal conclusion.
HEARING OFFICER STUBCHAER: Sustained.
MR. BIRMINGHAM: Could the Reporter mark that, please, because I'm going to quote that later?
(Laughter.)
MR. THOMAS: Out of context, I'm sure.
MR. BIRMINGHAM: No.
Q BY MS. GOLDSMITH: I want to ask you about your testimony in -- your written testimony which you didn't mention this morning concerning the loss of wetlands in Long Valley as the result of the construction of Crowley Reservoir.
A Yes.
Q Your testimony states that you estimate 2400 acres of wetlands were lost as a result of the construction of Crowley; is that right?
A That's correct.
Q Do you continue to hold that opinion?
A Yes. I think that there was a lot of wetlands --
0096
in fact, I think there was probably more than 2400 acres of wetlands lost by the construction of Crowley Lake, and I would take it one step farther and say that DWP is incorrect in contending that their creation of Crowley Lake created wetlands. The wetlands that are there today and that apparently do provide very good bird habitat were wetlands that were there prior to

Crowley.
Q On what do you base your estimate that 2400 acres of wetlands were lost?
A There was a -- I base it on examination of a number of different maps and descriptions of the basin, of the Crowley Lake Basin. And the -- the number would include a large amount of marshland which is marked on the lands to which Mr. -- marked on the maps that Mr. Tillemans testified to. Then in addition to that marshland, which is actually standing water with emergent vegetation, as U.S.G.S. uses the symbol, in addition to that there would have been wetlands extending for some unknown distance beyond the edge of the actual marsh.
Q Is that shown on any maps that you have?
A Is which, now?
Q The extension of wetlands beyond those delineation on the U.S.G.S. maps?

0097

A No. U.S.G.S. simply shows marshland. They don't show other types of wetland.
Q My question, however, was do you have other maps that illustrate further extent of wetlands beyond those shown on the U.S.G.S. map which, for clarification, is L.A. DWP Exhibit 79?
A Can I see that map? I believe I did answer your question. I do not have other maps that show it. U.S.G.S. simply shows marshland. They do not show wetlands extending beyond actual standing water.
Q So your testimony is that you do not have any maps or area photographs that allow you to extend the existence of marshlands beyond those depicted in L.A. DWP 79 except by inference; is that correct?
A That is correct, yes. I would, however, point out that there is, even on L.A. DWP Exhibit 79, a fair amount of marshland that has been lost -- roughly what, a thousand acres, something like that, that was lost to DWP. This is just marshland that was lost to DWP's creation of Crowley Lake.
In addition, the marshlands that are shown on L.A. DWP Exhibit 79 that were there prior to Crowley Lake are the very marshlands that Mr. Tillemans is attributing to the creation of -- to the production of or creation of Crowley Lake. Those marshlands were

0098

there prior to Crowley Lake being created.
MR. THOMAS: Could we look at that? We don't have a copy to use. Do you have an extra copy?
MS. GOLDSMITH: We have a set of copies which I believe were brought over this morning.
I'd like to turn now to --
MR. THOMAS: If you could, just a second -- a question for a matter of foundation. Is this the exhibit that was introduced --
HEARING OFFICER STUBCHAER: We can't hear you.
MR. THOMAS: I'm sorry. I was asking if this was the exhibit introduced for Mr. Tillemans.
MR. SMITH: Yes. It was during Brian Tillemans' testimony. It is No. 79, and we do not have copies of it yet.

MS. GOLDSMITH: If we have a break, I will telephone my paralegal and have her get them over here. I had thought she had brought them over this morning.
HEARING OFFICER STUBCHAER: We're not having a break this afternoon until we break.
MS. GOLDSMITH: Then they'll be here tomorrow. I promise.
MR. THOMAS: I might add also that I thought what we saw with Mr. Tillemans was an original and not a

0099

reprint, so we would want to make sure that we're dealing with apples and apples here. I don't know -- I'm not going to introduce a foundational objection, but we will want to see the original.
MS. GOLDSMITH: Well, this is a reproduction of the exhibit that Mr. Tillemans testified about. And I can bring the original copy for you to verify, if you like. I will note that the note at the bottom says that was surveyed in 1911 to 1912.
MR. THOMAS: In order to expedite things, go ahead. I just -- there may be some foundation --
Q BY MS. GOLDSMITH: Turning to Department of Fish and Game Exhibit -- 96? Is that right?
A BY DR. STINE: 96 which is also MLC/NAS 176.
Q And comparing it with NAS/MLC 159, which is the -- the pre-diversion mosaic of Mono Lake. I notice that Mr. Dumrowski's map, which is DFG 96, does not show any north shore lagoons nor does it report any waterfowl for those lagoons.
A Yes. I think Mr. Dumbrowski was interested in the lake itself. He did not show lagoons.
HEARING OFFICER STUBCHAER: Microphone, please? You have to a good loud voice --
Q BY MS. GOLDSMITH: That is speculation on your part; is it not?

0100

HEARING OFFICER STUBCHAER: Excuse me. I interrupted his answer.
Q BY MS. GOLDSMITH: It does not show any waterfowl concentrations in the north shore lagoons; is that right?
A It does not show north shore lagoons.
Q Thank you.
A I would like to point out, however, that I was quoting a number of people. I never interviewed Mr. Dumbrowski, but I did interview Mr. Vestal, Mr. Banta (phonetic), both Messrs. Banta (phonetic), as a matter of fact, one of whom is pushing 100 years old, as well as a number of other people who did say there were large numbers of ducks at the lagoon. My point that there were ducks there was not simply based on the Dumbrowski map and, indeed, you're right. If you were to just simply go on the Dumbrowski map, one would infer no lagoons nor any ducks there.
Q At the risk of violating a rule of cross-examination, I'm going to ask you a question that I don't know the answer to. You testified on your direct examination -- Mr. Birmingham is having a fit -- that many of these coves are adjacent to faults that

extend out and presumably have some -- have some role in forming the lagoons.

MR. BIRMINGHAM: We don't joke about Mr. Birmingham having fits.

(Laughter.)

MS. GOLDSMITH: Well --

MR. THOMAS: Weighted usable area make way.

Q BY MS. GOLDSMITH: Are those faults still there at the lower lake level?

A BY DR. STINE: I'd just like to correct you. I did not say that the faults created lagoons. I said that the faults created the coves.

Q The coves, right.

A And there is a difference there. And your question, then, was what, excuse me?

Q Do those faults continue out into the lake at the current lake levels?

A Yes, they do. And we can see actually these -- the fault displacement on the bathymetry, so we can trace them out into the lake.

Q Is it likely that those faults would have some future role in creating coves given a stable lake level for some period of time?

A I would say no, that they would not. That for the same reason that those same faults are not making coves at the present day lake level, they will not make coves if the lake goes -- either goes lower or stays stationary. The coves do occur along faults but only at the higher lake levels. I explained why in this Historic and Modern Distribution of Shore Fringing Wetlands, Mono Lake, California, which is one of the auxiliary reports.

Q Now, turning to you, Dr. Reid. The Draft EIR cites you as one of the authorities in support of its statement, and I quote, its possible that duck populations that formerly stopped at Mono Lake no longer exist or have shifted their fall migrations to other Great Basin lakes or the Central Valley." Do you agree with that statement?

A Yes, I do. I believe that you will eliminate certain stock of birds and other birds can shift over to some degree. However, if we are to regain population levels of 100 million waterfowl in fall migration, we will need to restore some wetlands along these corridors.

Q I don't mean to cut you off, but my time is limited and perhaps you could expand on those answers, unless it's really necessary, on questions by other parties. I'm sure you'll be given the opportunity.

MR. HERRERA: Regarding your time, Ms. Goldsmith, you have four minutes.

Q BY MS. GOLDSMITH: Now, isn't it true that many of the species that are reported to have migrated through the Mono Basin breed in the northern prairies of the United States and Canada?

A BY DR. REID: That's absolutely true.

Q That's an area known as the prairie pothole

region?
A That's true. They also breed in what's called the boreal forest zone which is north of the prairie pothole region in Canada and Alaska.
Q And there have been enormous changes in the breeding habitat in the prairie pothole region since the 1960s; isn't that true?
A Absolutely. That's why Ducks Unlimited has spent millions of dollars in that region.
Q In fact, a Ducks Unlimited publication on pin tail recovery recently characterized it as, quote, extensive loss and degradation of wetland and upland habitats on the prairie breeding grounds resulting from agricultural intense if I occasion over the past 20 years." Are you familiar with that publication?
A Yes.
Q And the expansion of agriculture in that area has replaced natural vegetation with wheat fields, largely?
A They're a variety of crops that are grown there.

Wheat is predominant in Alberta and Saskatchewan.
Q And has resulted in filling of potholes and leveling of land?
A Well, one of the real problems is that for a species like pin tail, it tends to breed in the uplands, and it tends to breed a fairly long distance from any pothole. So it's not necessarily that the potholes have been lost, but what's happened is that the upland habitat has been so degraded that there's virtually no place for a duck to put a nest that won't be easily predated by a mammalian predator. It's not so much the potholes themselves as the upland constituents with it, so the whole landscape has been modified, absolutely.
Q And have these changes had the effect of concentrating the waterfowl population into smaller breeding habitats than they had historically?
A Certainly. If you eliminate certain areas for them to breed, it's going to be smaller.
Q Now, I recently viewed a video that was produced which featured the chief biologist for Ducks Unlimited in Canada. Are you familiar with that video that was produced by Turner Broadcasting?
A We've got a lot of them. I don't know. Terry Neuranson (phonetic) is our chief biologist up there.

Go ahead.
Q And if I were to tell you that I heard him say on that broadcast that 90 percent of the waterfowl nests in the prairie pothole region are impacted by predation, would that surprise you?
A They are impacted by predation from one degree or another. They may -- some of them may be predated. Some of them may have nests predated. Some of them may merely shift their foraging strategies to feed at a time when they don't expose their nests to a great degree. So the impacts for the 90 percent really varied. Some of them are severe. Some of them are not as severe.

Q Now, in addition to the impacts due to land use changes in the prairie pothole region, it's true, isn't it, that the region has experienced an extended severe drought during most of the last decade in the 1980s?
A That is very true.
Q And that --
MR. HERRERA: Excuse me. Your 20 minutes is up.
MS. GOLDSMITH: I would apply for additional time in light of the length of some answers that we've gotten.
HEARING OFFICER STUBCHAER: How much more time?
MS. GOLDSMITH: I'd say another 20 minutes.

0106

HEARING OFFICER STUBCHAER: All right. I'll grant it.
MS. GOLDSMITH: And I will -- with the cooperation of the witnesses, I will try to whiz on through.
Q BY MS. GOLDSMITH: In fact, the waterfowl populations breeding in the prairie pothole region have declined dramatically over those that were there historically; isn't that right?
A BY DR. REID: It's shown much greater importance for the boreal forest and for Alaska, and we are very fortunate in the Pacific flyway that we have areas that have not been so modified. Those areas in the central flyway and Mississippi flyway have been greatly impacted and it's really impacted the continental population.
Q Now, you testified that when you're looking at waterfowl populations, you can't look just at one segment of their -- basically, their annual cycle, you have to look at the breeding habitat and the migration habitat and the wintering habitat. Is that right?
A That's right. And that's, as I said, that's why we are investing time and dollars in the Central Valley of California, in the Sinaloa Marshes in Mexico, in the delta of the Colorado River, in the breeding grounds of Alberta, Saskatchewan, et cetera.

0107

Q And if there were a drastic reduction in the breeding areas, that would affect the numbers you would see both in the wintering areas and the migration; isn't that right?
A Absolutely.
Q And one of the -- now, you mentioned that in the Pacific flyway there are three routes.
A Um-hum.
Q And the central -- three corridors. One was the Great Basin corridor or the interior corridor. One was the coastal corridor, and the other one -- I forget the name --
A Interior coastal
Q -- interior coastal corridor. Where did the birds from the interior coastal corridor come from?
A Interior coastal? It's a variety. They'll be birds from the YK Delta in Alaska. There'll be birds from the north slope. They'll be birds from interior Alaska. There'll be birds from the Yukon, MacKenzie Delta. There'll be birds from northwest territories. There'll be birds from Alberta, from Saskatchewan as

far away as Manitoba, British Columbia. There'll be birds from the Great Basin funneling down through -- in these particular cases, those wetlands that are so important for the interior coastal area, Willamette

0108

Valley, Klamath Basin, Malheur, et cetera.
Q So the birds that nest further north, say, in Alaska or the Yukon territories or in the far northwest are more likely use the interior coastal corridor rather than this Great Basin interior route; is that right?
A As a real gross generalization, yes.
Q Thank you. I realize it's a gross generalization.
And those areas have been less affected than the prairie pothole region by an intensification of agriculture and by the drought in Canada; is that right?
A Not the Klamath Basin nor the Malacure Basin nor the Willamette Valley, but areas in Alaska, areas in British Columbia, yes.
Q And if one were to compare the numbers of waterfowl seen in the Central Valley, for example, with the numbers of waterfowl seen at Mono Lake, for example, the numbers in the Central Valley could show a little bit more stability because of this additional more stable component of that migration. Isn't that right?
A Not necessarily because you've lost 93 percent of the wetlands in the Central Valley or more. The estimates now actually put it at 96 percent, and that

0109

kind of devastation like we just talked about, you're impacting on the wintering grounds and on the migration grounds, and it's not necessarily that you could have the same type of -- a more stable system.
Q And the degradation in the Central Valley on the wintering grounds would also show up in the migration route along Mono Lake; isn't that right?
A The degradation? Yeah. One would assume that the San Joaquin Valley would have an impact, yes.
Q Now, turning to the maximum counts during the pre-diversion period that have been talked about. In your testimony, you estimate that the pre-diversion waterfowl populations numbered in the hundreds of thousands to million waterfowl and you cite statements of long-time residents Banta, Vestal, McPherson, DeChambeau.
Isn't it true that the only systematic attempts to count migrating waterfowl during the 19forties was done by Mr. Dumbrowski?
A That's true.
Q And this was during the 19forties, isn't that right? A That's right.
Q And during the 1940's, there was a dramatic increase in the waterfowl population in the Canadian prairies, isn't that true, due to wetlands?

0110

A We're really not sure about that. There was a dramatic decline in the late thirties. We're absolutely convinced of that, and that's one of reasons

why Ducks Unlimited was started. There was an increase in the population in the fifties when we began sampling that. I'm not aware of data from the forties. Um-hum.
Q Well, you rely on a paper called "The Great Basin Marshes" by Cadillac (phonetic) and Smith (phonetic); isn't that right?
A Right. I have that here. Um-hum.
Q Let's to go Heightmire (phonetic) because I have the page reference on that one. That's another one that's DFG 122 that you rely on and at --
MR. BIRMINGHAM: Excuse me. Can the witness be instructed to answer the questions affirmatively as opposed to saying "um-hum"?
HEARING OFFICER STUBCHAER: Yes. It's hard for the Court Reporter to get uh-huh.
MR. BIRMINGHAM: Could the record reflect that the last two answers were yes positive answers?
HEARING OFFICER STUBCHAER: The record can reflect that if that's what he said.
Q BY MS. GOLDSMITH: Is that correct, your last two responses were affirmative, Sir?
A BY DR. REID: Right, yes.

Q Now, at Page 487, doesn't Heightmire (phonetic) say in the late 1930s and early 19forties Canadian prairies became wet again and waterfowl populations increased dramatically?
A Yes, it does.
Q And didn't crop degradation become a problem with an increase in waterfowl populations?
A In the fifties, yes, it became a problem.
Q And so is it possible that the populations that Mr. Dumbrowski was reporting reflected that upsurge in continental, if you will, waterfowl populations?
MR. DODGE: Can I have that question back, please?
(Whereupon the record was read as requested.)
MR. DODGE: I'm going to object to it. It's ambiguous. Upsurge as compared to what prior time period?
HEARING OFFICER STUBCHAER: You want to clarify the question?
MS. GOLDSMITH: In the context of the previous question in which we cited Mr. Heightmire (phonetic) in DFG 122, Mr. Heightmire (phonetic) said in the late 1930s and early 19forties Canadian prairies became wet again and waterfowl populations increased dramatically.
The question to Dr. Reid is might not

Mr. Dumbrowski's counts in the 19forties reflect an unnaturally high population count due to that upsurge?
MR. DODGE: Excuse me. I have the same objection. With all due respect to the author of that article, whose name I've forgotten already, he or she doesn't tell us compared to what either. If the question is as compared to the early 1930s, then that's fine. If the question is as compared to some natural level that was not measured, I think we're entitled to know that.
HEARING OFFICER STUBCHAER: Ms. Goldsmith?
MS. GOLDSMITH: This article discusses the

history, basically from the beginning of the century, of waterfowl populations. The discussion immediately proceeding the question discussed drought in the Canadian prairies during the 1920s and early 1930s.

HEARING OFFICER STUBCHAER: And so the upsurge was -- well, you can't answer the question. Would you read the pertinent portion again so I can make a ruling?

MS. GOLDSMITH: In the late 1930s and early 19forties, Canadian prairies became wet again and waterfowl populations increased dramatically.

HEARING OFFICER STUBCHAER: All right. I'll overrule the objection.

DR. REID: Can I have the Court Reporter read back exactly what the -- could you read --

0113

Q BY MS. GOLDSMITH: The question is can Mr. Dumbrowski's counts have reflected this dramatic increase and be unrepresentative of the level of waterfowl production or migration numbers generally during the period -- pre-diversion times?

A BY DR. REID: No. Because what -- as I understand, you're asking me is this an unnatural event which causes, and it's no. That we know that there are cyclical aspects of both the wintering grounds, the breeding grounds, the migration grounds in relation to the natural hydrology and that -- the -- any fluctuations we could see would be natural in nature. I don't see that they're unnatural or un -- or, you know, one would suspect that there would be some changes among years based on wet and dry years in the prairies.

Q Let me rephrase it. Is it likely that Mr. Dumbrowski's count would be at the high range of the natural fluctuations?

A If there were wet conditions in Canadian prairies during those time periods, we would expect to see higher numbers of birds during those migrations.

Q Are you familiar with Mr. Dumbrowski's duck census?

A Yes, I've read them.

0114

Q I believe they are NAS/MLC Exhibit 103. Isn't it true this million dollar -- million dollar -- million duck count is referred to in his population data dated November 1st, 1948, where he says, "The ducks at present are rafted up near the center of the lake where it is difficult to make an estimate of the numbers, however, including ruddies, there are now well over a million ducks on the lake, 80 percent of which are ruddies and shovelers." And that's the only place where he mentions a million ducks; isn't that right?

A Yes, that's true.

Q Now, you'd agree, wouldn't you, that it's difficult to count very large numbers of birds accurately?

A When you get into larger numbers of ducks, you run into a greater variances. That's absolutely true.

Q And would you agree that identifying species at a distance of about a mile and a half is pretty difficult?

A It's difficult, but it can be done.
Q Identifying species can be done?
A Identifying waterfowl, whether they're waterfowl or non-waterfowl. Like flight patterns, et cetera. It can be done.
HEARING OFFICER STUBCHAER: Will you get the mike

0115

a little closer to you? Your voice is trailing off.
Q BY MS. GOLDSMITH: Now, if ducks are rafted up, that means they're sitting there and not flying; isn't that right?
A They've got to move in and out of a raft, and if one observed them for a time --
Q Assuming one could see them fly, one might know what they are.
A That's true.
Q If one did not see them moving, they would be dots on the lake. Isn't that right?
A If you've observed waterfowl for any number of times, you can perceive them as waterfowl. I think you're correct in saying that it is difficult in determining differences among duck species. It would be very difficult to say that that is a widgeon at that distance versus that is a shoveler or that is an pin tail.
Q So your testimony is that at a distance of about a mile and a half, you could tell numbers and species of birds on a lake?
A You could estimate numbers of birds on a lake. You could not estimate a species breakdown at that distance, and I don't believe if you look at his data that that's what he did. When he estimated as species,

0116

he took subcounts of species at closer levels, and I think those are his estimates, which is very similar to how we count ducks today.
Q At that distance, would it be relatively easy or relatively difficult to distinguish grebes from ducks?
A Grebes would be fairly easy to distinguish over ducks.
Q Would you be surprised at the testimony of experienced ornithologists that it is difficult, even impossible to make such distinctions at that distance?
A There are some ornithologists that would make that statement. I believe that.
Q And in 1940 when the lake was higher -- in 1948 when the lake was higher, the diameter would have been larger than it is today. Isn't that right?
A That's correct.
Q Are you aware that Mr. Dumbrowski ran a hunting club?
A I am.
Q And have you seen Cal-Trout Exhibit 5-C, which is a local chamber of commerce map?
A I'm not sure. No. I have not seen this map.
MR. THOMAS: Is this exhibit --
Q BY MS. GOLDSMITH: This is Cal-Trout Exhibit 5-C. And drawing your attention to -- I believe it's labeled

0117

Mono Creek Ranch; is that right?

A Um-hum.
Q Walter Dumbrowski, proprietor?
A Um-hum. Yes.
Q He's advertised his duck hunting is unsurpassed anywhere; isn't that right?
A That's correct. It says, "Our duck shooting is unsurpassed anywhere."
Q Do you have an opinion as to whether or not it would have been in Mr. Dumbrowski's financial interests to maximize the number of ducks he counted? Particularly near his land?
A It would be conjecture on my part, but -- if you see more ducks, it might interest more people in coming there. That's conjecture.
MS. GOLDSMITH: I hear a beep. I have about four more minutes of questions.
MR. HERRERA: You have seven minutes remaining.
HEARING OFFICER STUBCHAER: I couldn't hear you.
MR. HERRERA: Seven minutes remaining.
Q BY MS. GOLDSMITH: Now, in your testimony, you talk about the importance of marshland associated with fresh water habitats.
A Um-hum. Yes, I do.
Q For duck migration. And your opinion is that the

0118

proximity of wetlands to open water is important to migrating waterfowl; is that right?
A Yes.
Q How close, in your opinion, must that association be?
A Well, there are different distances which would be important. Most ducks on a foraging flight will fly -- for dabbling ducks will fly up to ten miles in a radius for a foraging flight. Most ducks, if they are going to maximize their energetic requirements, which is really essential during migration, will move much closer between loafing areas and migrational areas and foraging areas. So --
Q Would an area of a mile and a half to two miles be unduly burdensome to migrating waterfowl?
A No, it would not. It causes greater energetic demands on the birds. Flight is the most energetically expensive activity that birds have. For waterfowl, flight is 15 times the basal metabolic rate for energetics.
Q Now, you saw the pictures, the slides that Dr. Stine showed of wetlands in the Rush Creek bottom lands; is that right?
A Yes, I did.
Q And if I were to tell you that those wetlands were

0119

approximately one and three-quarters mile from the lake shore, would that strike you as suitable migrating duck habitat?
A It strikes me as suitable migrating duck habitat especially if the birds could use a flight corridor of a stream, of a riparian zone, to get to those sites. That -- photographs that he showed were classic examples of really important habitat for mallards, for green-winged teal, for widgeon, and some for shoveler.

Q Now, Dr. Stine, I do have another question for you. Those -- the location of those photographs that you showed, and I believe you know which ones I'm talking about, the ones -- I don't have the numbers. The ones that were of the Rush Creek bottom lands that showed wet land habitats. How far are those from the mouth of Rush Creek?
A BY DR. STINE: Today or in 1930 and '40?
Q Today.
A Probably a mile and a half or so today, much less in 1940.
Q And those locations are above the area that you identified in your testimony the other day as being -- they're within the area that you testified the other day as being capable of regeneration; is that right?
A I'm sorry. They are --

0120

Q Within the area that you testified the other day would be capable of regeneration. That is, not subject to incision?
A I think maybe we're confusing a couple of concepts here. I'm -- I'm not sure exactly what you're trying to get at. Are you asking whether or not these can be rewatered?
Q Yes.
A Yes. They can be rewatered, yes.
Q Thank you.
Mr. Thomas -- one more question and this is to either Mr. Thomas or to Dr. Reid. Have you visited Lake Crowley?
A BY MR. RONALD THOMAS: Oh, yes.
Q And does Lake Crowley have lake fringing wetlands?
A Yes, it does. It has lake -- the lake fringing wetlands that exist at Crowley are extensive but, in my opinion, they are certainly much less extensive and of lower quality than those that existed there prior to the filling of Crowley.
Q Do you know whether or not there was open water prior to the filling of Crowley?
A I -- my impression of the -- from the historic reports is that the extent of open water was much less

0121

at certain periods of the -- during the annual cycles. However, the open water that would have existed at the edge of the perennial marsh would be open water and intermittently flooded marshlands, wetlands, which are very, very high quality waterfowl habitats.
In fact, if I could expand just for a second on that. On our waterfowl areas throughout the State of California, our emphasis these days is on the creation and management of ephemeral wetlands rather than the permanent and stagnant wetlands as exist at Crowley today.
Q Did you read the report of sanitary investigation that is DFG Exhibit either 137 or 142, I'm not sure which, it may be both?
A I saw that report. I haven't reviewed it in detail.
Q And are you familiar with its account of dead

cattle in the marshland areas?
A I don't think I saw that part of the report.
Q And are you familiar with the fact that the investigating group as report -- I'll read you a portion. "Near the stopping place of the automobile, we found the carcass of a beef which had recently died, and we were able to secure dried hairs and a bits of soil below the surface with which a guinea pig was

0122

inoculated subcutaneously. This animal died 34 hours later about midnight on our return trip to Little Lake."
The report -- assume that I'm correct in telling you that the report is replete with very disgusting details about animals dying and unsuitability of water for drinking. Would that make good waterfowl habitat?
A Those descriptions don't sound very appetizing, but I don't think they would markedly affect the quality of the marshland as waterfowl habitat. I would like to emphasize that the long-term and standing water in the wetlands, itself, in the marshlands and those bogs would be good waterfowl habitat as are some of the areas around Crowley today.
However, the primary value of those marshlands would have been based on the annual fluctuation in water level which would seasonally flood new areas which provide greater nutrients and nesting and feed for migrating waterfowl.
Q Dr. Reid, have you been down to the delta of Lee Vining Creek?
A BY DR. REID: Yes, I have.
Q And have you seen the ponds that are flowing there?
A Yes.

0123

Q In your opinion, will that provide suitable waterfowl habitat once it is completely developed?
A Yes, that will. It's very small in size, but there is -- there will be waterfowl use in that area.
Q Is it your opinion, Dr. Reid, that if Mono Lake is raised to elevation 6405, the duck population which feed and rest in the wetland areas will, in fact, approximate the historic pre-diversion levels given the changes in population that have occurred since 1960?
A I believe that we will see an increase in usage along the lake, and that depending on what else happens in relation to restoration along the corridors, we will potentially see increased populations potentially to those levels that were recorded in '48.
Q I can't resist Mr. Taylor -- Mr. Thomas, in -- you cite historic accounts by Fisher (phonetic), probably the condor article, quoting the fact that there is a belt of flies 100 miles long around the lake. Now, that's a quotation within that article, isn't it?
A BY MR. RONALD THOMAS: Yes. That's where that quotation comes from.
Q And it's attributed to a different writer, isn't it?
A I believe it is.
Q Do you know who that writer was?

0124
A I think I recall.
Q Can you tell us?
A I think Mark Twain said that.
Q He was never known to exaggerate, was he?
A No. But I would like to point out the picture that accompanied that photograph, and I think this is one of our exhibits. It shows a band of flies. Of course, you can't see 100 miles long in this picture, but you can certainly see a dark, very dense band of flies on the shore of the lake.
MR. HERRERA: Ms. Goldsmith, your time has elapsed.
MS. GOLDSMITH: I have three more questions.
HEARING OFFICER STUBCHAER: Are they compound?
MS. GOLDSMITH: They are not.
HEARING OFFICER STUBCHAER: Okay.
Q BY MS. GOLDSMITH: In your testimony you talk about Mr. Dumbrowski as -- you identify him as a DFG seasonal aide. Mr. Dumbrowski was hired to do creel checks for the Rush Creek test stream, wasn't he?
A BY MR. RONALD THOMAS: I'm not clear on that. I never was sure the history of his employment status. I really can't answer that.
Q To your knowledge, was he ever employed to do any duck censuses or waterfowl censuses?
0125
A I'm not sure.
MS. GOLDSMITH: Thank you.
HEARING OFFICER STUBCHAER: Okay. Thank you.
Cal-Trout?
MR. ROOS-COLLINS: No questions for this panel.
HEARING OFFICER STUBCHAER: State lands?
MR. VALENTINE: I have just a very few questions.
MR. SMITH: Mr. Stubchaer, could we have a point of order here? Mr. Thomas said this was a DFG numbered exhibit. We haven't got a number on it yet.
MR. THOMAS: It comes in from DFG 99. It's an excerpt from DFG 99.
HEARING OFFICER STUBCHAER: I'm sorry. I don't have your name?
MR. VALENTINE: I'm Michael Valentine, Staff Counsel from the State Lands Commission.
CROSS-EXAMINATION BY MR. VALENTINE
Q I have just a question or two for you, Dr. Stine.
Ms. Goldsmith asked you that -- wasn't it true that under all the alternatives under active consideration by the Board, that they all include some fresh water flow which will result in hypopycnal stratification to some degree. Do you recall that?
A BY DR. STINE: I do.
Q And you said basically, yes, as I recall.
0126
A Yes, I did.
Q Do you have an opinion as to whether or not the wetland association with that hypopycnal layer which we have talked about will be recreated under some of the plans but not under some of the others?
A Yes. We will only be seeing fresh water marshlands such as existed in the pre-1940 times when

Mono Lake gets up onto the delta plain, gets up on to its delta plain. In other words, above 6400 to 6405 feet.
Q Thank you. And in your opinion, Dr. Reid, would hypopycnal stratification by itself be extremely beneficial to waterfowl or would the associated wetlands be necessary?
A BY DR. REID: I believe --
MS. GOLDSMITH: Objection. Compound.
MR. VALENTINE: She's probably right about that.
HEARING OFFICER STUBCHAER: All right.
DR. REID: Thank you.
Q BY MR. VALENTINE: Dr. Reid, to what extent do you believe that waterfowl numbers will respond to their historic levels by hypopycnal stratification of Mono?
A BY DR. REID: I believe the hypopycnal stratification is extremely important in creating a feather edge of foraging habitat that is very typical of what you see

0127

dabbling ducks feed in. However, I also believe that the lagoons and some of the marsh habitats, especially along the deltas up the corridors of the stream are really going to be critical in bringing back any viable population.
Q Thank you. I'm referring now to Dumbrowski's numbers in the forties, and I'll -- Mr. Thomas, either you or Dr. Reid, feel free to answer this. The numbers were characterized as substantially higher than some other numbers that had been made there. Isn't it fair to say that the Dumbrowski numbers were probably substantially higher than the severely depressed numbers of the 1930s?
A Yes. I think that would be safe to say. At the same time, I think it's important to remember that while the quantitative data for Dumbrowski is quite unique for that time period, across the nation there were very few quantified waterfowl censuses done prior to 1955. However, the historical information from a lot of duck hunters who were there indicate numbers up to a million birds.
A BY MR. RONALD THOMAS: If I could add to that just a bit. Not only does the DEIR state, but in my personal interviews with some of the old-time residents, observers in the area, these accounts very strongly

0128

substantiate Dumbrowski's counts, not only in the one year of his counts, but, as I believe they have said, in the -- throughout the period of the late forties. So I think there's other evidence supporting those numbers in addition to just Dumbrowski's counts.
Q Would it be fair to conclude, Dr. Reid, that the numbers that Dumbrowski counted in the forties would be representative of the numbers that would have been at the lake prior to the dust bowl? In other words, that this represented a rebound of the population from the dust bowl drought?
A BY DR. REID: That's really conjecture because we have no idea what previously existed prior to the dust bowl. We know that there was a decline in population during the thirties on a continental basis because of

the devastation throughout the continent, the western U.S. If we have returning quality wetlands on the breeding grounds, on migration grounds, on the wintering grounds, one would suspect then that you would have higher populations.
Q Do you have any information on the techniques that Dumbrowski used to view and identify the birds on the lake or around the lake?
A It's my understanding that he had binoculars. He used fixed locations to observe the birds from the lake

0129

shore, and what he did in terms of his species accounts was he sub-sampled a small group of birds in a location near the deltas to give him an estimate of what the specific species of the ducks were and that -- the sub-sampling to then give you an indication of what the species occurrence is is a very common technique that is still employed today.
Q And even at a mile or so with the aid of powerful binoculars, identification of individual species is not impossible, is it?
A It may not be impossible. Again, I would say that when you are able to also use the way birds fly, you can identify individual species of ducks by flight patterns. And if he's standing at a set location for a while and looks out at a raft and sees birds moving around, moving in and out of the raft, he certainly could identify some species.
MR. VALENTINE: Thank you. I have no further questions.
HEARING OFFICER STUBCHAER: Does anyone else other than Staff wish to ask -- wish to cross-examine? I see none.
Mr. Thomas, are you going raise a point of order?
MR. THOMAS: No. I'm waiting for redirect.
HEARING OFFICER STUBCHAER: Staff have questions?

0130

Who's first? Mr. Herrera.
MR. HERRERA: Thank you, Mr. Stubchaer.
CROSS-EXAMINATION BY THE STAFF
Q BY MR. HERRERA: Mr. Thomas, how familiar are you with the Dumbrowski hunting operations?
A BY MR. RONALD THOMAS: I've only heard -- in addition to the information in the DEIR, I've only heard some accounts from local, long-time residents. I'm really not very familiar with the operation.
Q Would you know if they hunted the north shore at all? If his operations hunted the north shore?
A My impression is that some of the people that -- I'll back up a second. I don't think they were in a position to actually have fee hunting on the north shore. Some of the people that hunted with Dumbrowski, especially some of the locals that were his friends that hunted there without paying, certainly went to the north shore and hunted frequently and very successfully.
Q What I'm getting at a little bit here is the map depicts areas for hunting. I'm assuming those are areas in which he would take clients or his people to hunt in those areas as is it a possibility to explain

why the north shore not depicted there?
MS. GOLDSMITH: Objection. Calls for
0131
speculation.
MR. DODGE: Also assumes that he took the clients to other areas for a fee, and I think there's no evidence of that.
MR. HERRERA: I'll withdraw the question.
HEARING OFFICER STUBCHAER: Sustained.
Q BY MR. HERRERA: Either of you, Dr. Reid or Mr. Thomas, are irrigated pastures important for migrating waterfowl?
A BY DR. REID: Irrigated pastures could be very important for migrating geese. It's not so important as we look at ducks. Some for widgeon, but certainly not as important unless we start to get so much irrigation that we're actually filling up pools within the irrigated pasture and then we have more mosaic of fresh water areas.
Q Again, you would say then geese would primarily be using these pastures?
A Yes, I would.
Q Now, regarding Simons Springs, Dr. Reid, or possibly Dr. Stine, you indicated that at lake levels, pre-diversion lake levels, that these provided waterfowl habitat in the form of lagoons and fresh water interfaces with Mono Lake; is that correct?
A BY DR. STINE: Actually, I wasn't talking so much
0132
about lagoons at -- Simons Springs, did you mention?
Q Yes.
A Not so much lagoons but these embayments. The coves, the still-water coves, rather than lagoons. Though there were minor ephemeral lagoons associated with that as well.
Q On the exhibit, the aerial photograph --
A I'm sorry. Can I make one other minor correction? You said that this was going to be in pre-DWP times and, indeed, it persisted for some time post-DWP times as well until the lake got down below about 6400 feet or so.
Q Okay. And you had an aerial photo that depicted 1982 conditions. What was the lake level at that time?
A 1982 -- the lake got as low as 6372.0 feet in December of '81, January of '82. At the time these photographs here are taken, I'm pointing now at the photo mosaic of October 1982, the lake level was 6372.67.
Q Earlier in your testimony previously you indicated that you could construct burms to aid in the development of deltas primarily on Rush Creek. Is that true?
A Yes. Although, if indeed the word "burm" was used, it was not in the littoral since,
0133
L-I-T-T-O-R-A-L. It was more in the artificial dike sense rather than long-shore burms.
Q Could that same kind of concept be used in the aid or development of waterfowl -- or wetlands below Simons Springs between the '72 lake level or various lake

levels in between the historic 6400 scenario? Could that -- could you do the same thing with those type of dams?
A It wouldn't be the same thing. Obviously -- or I shouldn't say obviously, maybe it isn't quite so obvious -- one can manipulate water flow at these areas, either digging trenches to move water from point A to point B or building dikes or some kind of embankments to hold back water and create ponds. But that would not -- I'm not sure how that could be used to create this sort of triumvirate of coves and marshes and hypopycnal water there. Maybe it could be engineered. You asked if it could be done. Perhaps it can be engineered. Whether it can be done politically with the Forest Service and the state holding sway over land development is another question that I'm not capable of answering.
Perhaps Dr. Reid can talk about whether or not this would then improve duck habitat. I'm not capable of making that jump.

0134

Q Let me pursue that a little bit with Dr. Reid. If this Board was to select a lake level of somewhat below the recommended -- that you're recommending of 6405, are there various levels of restoration activities that may compensate for some of that alleged loss of wetlands that you have depicted below 6405?
A BY DR. REID: I believe that you could look at some potential interim restoration activities like that, either if you selected a lake level, say, at 6405 as an interim basis, or if you selected a lower level site, but if you selected a lower alternate lake level site, would it -- would those kinds of created wetlands provide the kinds of water fowl resources that you would get at 6405? I do not think so. I think you would get some waterfowl habitat. I believe you would back up some fresh water small lagoons in those areas, but I do not believe it would be to the same quality habitat.
What we have not investigated and what I cannot tell you is if you start moving that alkali material around in that basin, if you are going to be able to substantially hold a burm with water in those locations, I have not had a soil scientist down there looking at that yet.
Q If you were to look at the areas of interface

0135

between fresh water and salt water and the shoreline that's been depicted by Dr. Stine and yourself a little bit in here, is that habitat more important for waterfowl than the areas in the springs above the lake level? Simons Springs particularly? Which one of the two would you consider a better waterfowl habitat?
A Okay. I understand the first one. Can you describe the second one a little bit more?
Q The spring areas, let's say if we did create fresh water wetlands above the lake level itself.
A Um-hum.
Q At whatever lake level was selected.
A Um-hum.

Q Would that be of higher quality than those shoreline areas, or would it be more desirable for water quality?
A I think the shoreline areas probably would be more desirable as you got that fresh water input, but equally as important are those deltas, and the corridors of the tributaries that are coming into the lake. And I think what's important here is it's not that you're simply providing one type of habitat, but now you provided the mosaic of habitats which was present when we had the large duck populations, and those are the kinds of resources in group that are

0136

necessary to fulfill the various needs of that part of the annual cycle.
Q Okay. Thank you. One other question. We heard that in the Dumbrowski reports you were talking about a large number of ducks rafted up in the middle of the lake. Is there a particular species of ducks that you would think would be more susceptible of rafting in the middle of a large saline lake like this than other types?
A Absolutely. One would think that you would have large groups, say, of gadwall or diving ducks that would raft up. It also is most likely a situation with wind. And where you have large winds on the lake, there can be great thermal loss by the birds, which is very energetically expensive. And so where you get major wind action, the birds may, in fact, raft up away from some of the -- some of the delta areas and may be getting beat up on the shoreline or they may move to the lagoons, like you don't see there.
And what I would say is going on on that Dumbrowski map right there, is that's a clear day. That's a clear day. There's no wind. The birds are out in the deltas. There's no reason for them to go back to that lagoon. That lagoon habitat's going to be extremely important on a windy day. They're going to

0137

move into that and get protection behind the burms.
A BY MR. RONALD THOMAS: Before we leave that, if I could add just a bit. I've flown the lake a number of times over the year and including this September to do a comprehensive duck count. I've never seen grebe raft up. Ducks certainly do for the reasons Dr. Reid has mentioned, but in my experience on the lake over the years, I've never known the grebes to raft up in the tight bunches that the ducks commonly do. So I think with that in mind, it would be very easy to tell the rafts of ducks from grebes out on the lake at great distances.
Q Thank you. One last question for either of you again, Dr. Reid or Mr. Thomas. What effect do you believe that waterfowl hunting had on the use of migrating waterfowl in Mono Lake? Either pre-1940 or post-1940?
A BY DR. REID: If we have -- if we have substantial hunting around the entire ring of the lake, if we have continual human disturbance at the deltas of the streams, it's going to tend the push the birds either

interior into the middle part of the lake to get away from the hunters, or they'll push out. If we have some areas which are not hunted or are hunted only in the early morning and then are let go, then the birds will

use those habitats. But if they're continually harassed and shot at, they'll move away from those areas like the delta if that's where they're being hunted.

Q And do you think that occurred in pre-diversion times, the hunting that heavy, to your knowledge?

A I don't know.

Q Mr. Thomas?

A BY MR. RONALD THOMAS: I can't answer that question either. I wasn't there in those years. I would say over the years, my experience as a duck hunter is that when there's a large body of water like Mono Lake nearby where the birds can raft safely up in the middle and be protected. I've seen many times over the years ducks seem to know when shooting time is over and as soon as that magic moment comes, they'll lift up off of the middle of that lake, fly to the marsh where they can't be hunted any longer, and they'll settle around in an area the size of this room and duck season might as well be closed, as far as they're concerned.

A BY DR. REID: And in that vein, Gray Lodge Wildlife Area, which is a state-owned area, is one of the best hunting areas we can find in the state and yet they hold upwards of a million birds this time of year. So depending on individual inviolate sanctuaries within

the larger complex, you can have birds using the area.

MR. HERRERA: Thank you very much. That concludes my questions, Gentlemen.

Mr. Canaday?

MR. CANADAY: Mr. Smith had a question he wanted to ask.

HEARING OFFICER STUBCHAER: Mr. Smith?

MR. SMITH: Thank you.

Q BY MR. SMITH: Mr. Thomas, your former testimony was that eagles and Peregrine falcons were known to hunt ducks in the pre-40 time period.

A BY MR. RONALD THOMAS: I hope I wasn't misunderstood. I meant to say and I think I said that it was my opinion that large waterfowl and shore bird populations that existed pre-diversion, that those populations certainly would have supported -- as prey would have supported populations of bald eagles, golden eagles, as well, and Peregrine falcons. In fact, there are a couple of references in some of our exhibits that refer to the presence of duck hocks which are Peregrine falcons.

It's my opinion that there certainly would have been those two species as well as other species of predators in those days.

Q But do you mean to testify that the golden eagles

or the bald eagles would be hunting the ducks?

A Certainly. In fact, I just picked up a road kill golden eagle last week and found duck parts in its

crop. They certainly do eat ducks.
Q Thank you.
For Dr. Reid, my question was we had some testimony that there was large rafts composed of -- of your -- what are those, the northern shovelers. I was trying to remember their other colloquial name. It would be gadwall and northern shovelers?
A BY DR. REID: It could be a mix. It could be a single species, a flock as well.
Q Just a question about your membership in Ducks Unlimited. Did you ever have a hunter by the name of Jack? If so, would you please give us his last name?
A BY MR. RONALD THOMAS: That was Hungry Jack.
HEARING OFFICER STUBCHAER: Mr. Canaday.
Q BY MR. CANADAY: Dr. Stine, we've talked about various different sites along the lake, but you haven't been -- no one's inquired too much about the Mill Creek wetlands area. Briefly describe the kinds of changes that have taken place at Mill Creek since the 19forties.
A BY DR. STINE: Mill Creek has an interesting history and it's actually, if that's possible, somewhat more

0141

complex than the other streams. Without going into the morbid details, pre-1940 water had been taken out of Mill Creek by Southern California Edison to generate power, and that water was then put -- returned from the tail race of the Southern California Edison power plant, or its predecessor power plant, into Wilson Creek. So Mill Creek early on was deprived of some of its water.
But throughout the 1930s, apparently, the -- with the exception of some logging operations, the vegetation actually stayed pretty much intact on Mill Creek. By 1940, of course, DWP was taking Mono Basin water south to Los Angeles. They didn't take Mill Creek water but, of course, they forced a drop in lake level, and so Mill Creek incised roughly the same amount as Lee Vining Creek has incised, about 12 to 14 feet maximum, something like that. And as a result, the wetlands adjacent to Mill Creek disappeared, and they drained and, therefore, disappeared.
The riparian vegetation along Mill Creek, likewise desiccated. Again, this isn't in direct response to Mill Creek use by Los Angeles, it's in response to Los Angeles drawing down the lake causing the incision of the stream.
Q If the lake were to rise to 6390 or higher, what

0142

do you believe would occur in that Mill Creek bottom lands as far as the -- any wetlands restoration that could occur there?
A There is some seepage that continues to go on along Mill Creek, at several sites along Mill Creek. So I think if one was to bring the lake up to 6390, one would find shoreline seeps in the vicinity of Mill Creek. However, the wetland distribution there would not approximate what it did in -- in the pre-DWP time unless one put pre-DWP amounts of water back into Mill Creek. So to get a substantial amount of wetlands back

on Mill Creek would involve not only bringing the lake up, but also putting water back in the stream, and it would create a lot of shore fringing wetlands at the mouth of Mill Creek and presumably a lot of the riparian vegetation that used to be there on Mill Creek would come back as well.

It would be -- you know, it's the one area in the Mono Basin that hasn't been discussed all that much. It's the one area where probably dollar for dollar you could do the most amount of restoration work for the least cost. No one is taking that water out of the basin, so its value is not nearly as great as if it's being used domestically. And so the restoration potential per dollar is, I think, huge on Mill Creek.

0143

Q The hypopycnal stratification is based on the differential density of the fresh water versus the salt water?

A Correct.

Q As -- let's assume a hypothetical. As the lake would rise at some level, 6390 or higher, that differential gets smaller and smaller, correct?

A Yes. It's not a threshold phenomenon. It gets smaller and smaller whether the rise is ten feet or ten centimeters.

Q But does the -- do you believe that the aerial extent of that will decrease?

A The aerial extent of the hypopycnal stratum?

Q Yes.

A No, I don't at all. I think it will actually increase once the lake gets up above about 6400 feet because all of a sudden, there are these coves for the fresh water to build up in and persist as a stratum for some period of time. I should point out that even if the lake was at 6417 feet, which is 12 vertical feet above what we're suggesting here would be required to restore the duck habitat out there or the environmental conditions that accompanied the ducks, even at 6417 feet, the specific gravity differential between bottom water and top water would be approximately three to

0144

four times the density difference that caused miramixis to set up during the 1980s. So it's -- the water is going to stay stratified. Light stuff floats on heavy stuff, and that's going to remain to be the case even at 6417 or for that matter, even at 6430 feet, there's going to be light water floating on heavy water at Mono Lake.

Q You mentioned earlier about near shore seeps. Do you believe as the lake rises we'll see an increase in this near shore seepage that was there historically?

A Well, I think it would -- yeah. It will perhaps increase. I think what's happening now is that the lake, for some reasons that I've discussed in what I've written, the lake is now -- the lake margin is now abutting very, very gently sloping lands, and so the seeps that we're seeing around the lake today are actually coming out at a considerable -- in other words, they're emerging at a considerable distance from the shoreline. If Mono Lake rises, it rises up against

first very generally sloping shore lands, and then at higher and higher elevations, more steeply inclined shore lands. And as the lake gets up on to those more steeply inclined shore lands, the tendency is for the springs to emerge much, much closer to the shoreline itself rather than a considerable distance from the

0145

shoreline.
Q I'm trying to get a clarification in my notes on something you said about the Rush Creek bottom lands with the wide canyon bottom near the delta. Was it your testimony that there isn't going to be much emergent marsh or marsh developed in the Rush Creek delta unless the lake is at 6405 or higher?
A I think that's -- that will be the case. At least up on the delta plain. The delta plain is this big broad area that lies to both the north and -- pardon me, the east and the west of the incised Rush Creek Channel, and that used to be marshland. It is today upland scrub, chrysothamnus nauseosus and artemesia tridentata, primarily. In other words, the more --
HEARING OFFICER STUBCHAER: Could you spell that?
DR. STINE: Should I just give it to you later?
THE REPORTER: That's fine.
DR. STINE: In other words, it's desert scrub vegetation whereas it used to be marshland. If the lake were to rise to, say, 6383.5 or even 6390, those lands would still remain dry; that is to say, the water table would still be low, well below the surface of the delta plain. So it won't be until the lake gets up to 6400, 6405 feet that you can actually raise the water table on those approximately 180 acres of land up there

0146

on the Rush Creek delta.
Q BY MR. CANADAY: But there will be additional lands below that that are exposed now that as the lake comes up that there will be opportunities for wetlands and marsh creation. Is that true?
A I'm not sure exactly where your -- what you're talking about. There are -- exactly the locale you're talking about. As Mono Lake rises up to 6400 feet at the deltas, it's rising against a very, very steep delta front, and you don't typically find marshland on steeply inclined lands. The steeply inclined lands just drain too rapidly. They don't hold the water.
You would get some wetland vegetation to be sure down in the trench where -- close to where Mono -- Rush Creek meets Mono Lake in the trench, but not along the front of the delta and not up on that gently sloping delta plain.
Q How wide is that trench?
A It's -- it's triangular. Width at the mouth would be approximately -- the present day mouth would be approximately a thousand feet. Let's say 800 feet plus or minus 100 feet, something like that. By the time we get upstream to about 6400 feet, the trench is considerably narrower, probably 200 feet, something like that, as a top width. There's a terrace in there,

0147

so that as a bottom width, it's probably less than 100

feet.
Q Mr. Thomas, you testified that you conducted an aerial survey this September for waterfowl in the Mono Basin?
A BY MR. RONALD THOMAS: That's correct.
Q Did you also survey either on the ground or in the air at Grant Lake?
A Not at that time, although I've been to Grant Lake a number of times this fall.
Q Do you have any population estimates that are using Grant Lake currently?
A I don't have numbers, but I can give you an impression or an opinion. The numbers are very low. They're usually a small number of mallards at the mouth. Sometimes a few Canadian geese scattered around the lake. Do you want a number estimate?
Q What I'm getting at is that -- I'm kind of curious of what the numbers were for Crowley, Bridgeport Reservoir, and Topaz, so I'll get an idea of the kinds of bird use we're getting there, at least this present year, as it compares to Mono Lake.
Q I live very close to Topaz. I haven't been to Crowley this fall, but there have been hundreds of Canadian geese on Topaz this fall, and that's a common

0148

occurrence.
The other areas, Bridgeport -- I wasn't able to be there on the hunting opener. Just prior to the opener in early October, there were a few thousand ducks and probably some hundreds of Canadian geese on Bridgeport. So at about that same time, then, when I flew to Mono Lake when we had less than a thousand birds, there were -- there were greater numbers than at each of those other two habitats. And by the way, which are much smaller areas, water areas, also. This suggests to me the relative value of the quality of habitat on those different areas. Even though Bridgeport and Topaz are much smaller, the quality of the habitat must be much greater because there's a much greater number of birds that are using those areas.
Q Those reservoirs are both linked -- or have linkages to wetlands near open water, don't they?
A That's true. At the upper end of both of those reservoirs are extensive areas of -- again, this seasonally flooded ground that's of such value because you get the emergent vegetation that's highly nutritious. You get the increased nutrient cycling, so that forage there is much more nutritious. And then the open water, fresh water, resting area which is not only nearby, but actually adjacent.

0149

Q Dr. Reid, we heard last week some testimony -- recently heard testimony over in the Mono Basin from some long-time residents, and I asked them some questions about waterfowl. And their recollections were that they call them spoonies or shovelers, so we'll assume it's the northern shoveler, but their recollection of the use of where the birds were, that the shovelers were typically found in large numbers on the lake and that the mallards were typically found

along the -- in the deltas or in the stream corridors of particularly Rush Creek. And --
A BY DR. REID: That would certainly make sense. As I mentioned earlier and in my testimony that mallards and green-winged teal are really riparian species and just as we see in the Central Valley, the real movement of mallards in the Butte Sink area where you have the highest riparian corridors in the Central Valley, mallard is really a species that is oriented to that kind of habitat versus spoonies or northern shovelers which are zooplankton feeders. They're sweepers, and they're foraging in the open water.
Q We also heard testimony that -- by one of the gentlemen that if you wanted to hunt geese, you went to the Warm Springs area where the geese were feeding out in the grass and that would be consistent, too, with

0150

the biology of that bird as well?
A Absolutely.
Q So based on, however, this is anecdotal by long-term residents, you would -- if I said -- if I asked you -- I'm going to ask you the question this anecdotal testimony is fairly consistent with what you would believe to be use by waterfowl in the basin?
A Absolutely.
Q The Dumbrowski report discusses some of the rafting numbers on the lake, and they talk about ruddies and shovelers being roughly about 80 percent. Now, the ruddy duck suffered a significant population decline in what time period in the west, do you recall?
A I can't tell you for ruddies specifically. Ruddy ducks are unique in that they have a breeding strategy much more like a goose. They tend to lay very few eggs. Whereas a mallard or a shoveler or a gadwall will lay somewhere about eight to nine eggs, ruddy ducks lay about five, and they're huge. You can't believe that a female ruddy duck's going to lay that egg, and their strategy is to have fewer eggs but more reserves put into each individual egg. And so what we tend to see is we see that the survival of ruddy ducks on the breeding areas per broad, they have four to five young always survive in any kind of successful nest

0151

whatsoever. Whereas in dabbling ducks, we can oftentimes lose very large numbers.
A BY MR. RONALD THOMAS: If I could add something there just very briefly on ruddy ducks. I think it's pertinent that we see a very high percentage of ruddy ducks on the lake even today and probably more so today. It should be noted that the ruddy duck is -- probably the duck that is most adapted to highly saline conditions. And this would help to explain the preponderance of ruddy ducks on the lake as salinity has increased over the years.
Q Mr. Thomas, are you aware of much nesting by either ducks or geese in the Mono Basin? And if they do nest, where?
A No. I expect there's some Canadian geese nesting here and there. I've seen Canadian geese nesting in places such as the rock piles on the way to Bodie up in

the Bodie Hills, so they're very adaptable. Today, I expect that there are very few, almost no ducks nesting in the basin, and I want to be clear that even in historic times, the importance of the Mono Basin was not as a nesting habitat but as a migratory habitat.
Q It was your testimony, Mr. Thomas, that while there are more lake shore associated wetlands, that these wetlands as they occur today are of less value

0152

per acre than the kinds of historical wetlands that were there?
A That was my impression from being on the lake many times and flying low-level helicopter surveys of the lake shore. We were trying to look at the micro-habitats in detail from the helicopter a number of times over the years, and you find -- you flush with a helicopter almost no critters in those -- those alkali meadows, as you call them.
I was just recently -- just within the last few days, looked at the auxiliary report Number Three, I believe it was, that described the wildlife surveys conducted as part of the document. And the same information came out of that report, that the lake shore habitats had very low species. I believe two of the -- there was a lake shore willow habitat that had three species, as I recall. There was the -- the alkali meadow and alkali wetland, I believe were two categories that had only one species each, as I recall. At any rate, the other habitats in the basin had as many as 12 to 14 species, and those newly created alkali wetlands around the lake had very low numbers and species.
A BY DR. REID: One of the things related to that question is -- one of the things related to that

0153

question was again the importance of this habitat is for fall waterfowl migration, and many of these habitats are flushed with water on a vernal basis but then are dry as you go out there in the fall, and so are virtually unavailable for waterfowl and so don't serve any waterfowl basis in fall migration.
Q Dr. Reid, your -- reading your resume, your vitae, you have tremendous experience in the marsh and wetland restoration or creation. You realize that there's going to be -- whatever lake level -- at many lake levels the Board could choose, there's going to be a transition period of a decade or longer?
A Yes. I recognize that.
Q What kinds of interim, if one of the goals was to acknowledge that in some future date there was going to be naturally occurring or naturally self-restoring wetlands, but in the interim, what kinds of things would you suggest that the Board should consider?
A Well -- and certainly as we looked at the basin, one of the reasons we selected the DeChambeau site was because of that elevation, it would be a viable habitat no matter how small it was, irregardless of the elevational changes. So one can look at some of these higher areas and look at the potential creation or restoration of some of these sites.

0154

Where I think the greatest potential for some of the interim measures will be is looking at the Warm Springs area, looking at the Simons Springs area, and looking at the potential for very low-level, earth-moving activities, rather than like putting up large burms, et cetera, rather putting in very, very small scrapes that will fill in with spring waters, et cetera, hold water through the summer periods and into fall. These have some -- I think some potential both for providing habitat -- it's not cheap, but it will be relatively inexpensive as compared with a lot of what can be done out in the basin.

There certainly is a potential, like we see at DeChambeau, to do some restoration with regard to groundwater. That's very expensive. As we get into groundwater work, that's a major investiture of dollars. Certainly one of the greatest areas, if there is some increase in the water levels and during that interim period, would be the areas in the stream corridors, most especially Rush Creek delta area, the Lee Vining Creek area, and in flood plains along those areas. As the lake levels rise, as water backs up in some of those tributaries, there will be a number of small back water sloughs created, and these will be very exciting habitats.

0155

I think the fact that you're bringing this up, I think this could be a very exciting venture and exciting time for all the parties involved, and I would hope that regardless of what happens in this situation here, that all the parties might come together at some time and look at those investitures.

Q Would DU be willing to participate as a technical adviser in that propers?

A Absolutely.

MR. CANADAY: Thank you. That's all I have.

HEARING OFFICER STUBCHAER: Any other questions of Staff?

CROSS-EXAMINATION BY THE BOARD

Q BY HEARING OFFICER STUBCHAER: I just have one question regarding the slide that was shown to us where -- the fresh water fan out in the lake, the breaking waves around it in a semicircular fashion. It seemed to me that the color of that fresh water indicated the presence of silt. Was that an optical illusion or was that the case?

A BY DR. STINE: That is indeed the case. That silt is particularly evident on Rush Creek because the lower approximately one mile of Rush Creek cuts through very easily erodible, pumiceous, volcanic sediments, and so this stuff -- in fact, some of it floats. And so it's

0156

very, very easily erodible, and there's quite a load of silt by the time we get down to the Rush Creek marsh.

On Lee Vining Creek, we don't cut through that very easily erodible material, and I have observed this same phenomenon, white caps -- or actually not white caps, but breakers around the edge of the hypopycnal lens at the mouth of Rush Creek and there, it's really

only the area of breakers that lets you know that this lens is even there because there the color is not different enough to actually be able to distinguish the two waters that way.
Q Doesn't the silt affect the density as well as the salinity?
A Certainly. The silt, though, would tend to make the fresh water denser than would otherwise be the case, so it's actually working against hypopycnal stratification. Nevertheless, hypopycnal stratification persists despite the difference.
Q I may have said this before but how deep is the water in the middle of that area in that slide?
A I didn't go out into the middle of the area. I could see that -- I waded out a little ways into it, and it's actually fascinating to play around with this thing because where I was standing, the water was approximately, I would say, three to four inches thick,

0157

the layer of fresh water. The way you could tell this is to put your hand very slowly down through fresh water, and when your hand all of a sudden encounters the salt water at depth, you get this schlieren phenomenon where it starts to look right around the edges of your fingers as though oil and water are mixing. And you get this beautiful sort of rainbow, three-in-one-oil-in-a-can-of-water-as-a-kid kind of effect where you can actually see the two waters mixing. So you can, in this rather crude way, check the depth of the water.

How deep that water was out in the middle or immediately off the stream mouth but close to the stream, I don't know. I wasn't able to get there. I suspect it was six inches, something like that perhaps.
Q All right. I've observed sediment plumes in the ocean going -- after major floods, going out 30 miles, and you can see them from space. And those sediment plumes are dense enough to not be on the surface until they get mixed. And so it seems to me that some of these sediment plumes would be between Mono Lake density and ocean density. I don't know if that applies. The sediment, as you said, might be lighter, but isn't that how the deltas are formed is by the settling out of that sediment?

0158

A It's how the bottom set beds of the deltas are formed. That's right.
Q Is that bed load movement or is it settling sediment that forms the deltas?
A The deltas are formed at top set beds, forward set beds, and bottom set beds, and it's really a combination of the three. The top set beds are the coarse material, pebble. The forward set beds would be the combination of the two. The bottom set beds, the material that's getting out into the lake which the delta is then building out over would be the very fine material. And I've always wanted to do a study on how far out into the lake you could get these -- get the suspended sediment, how far --
Q And how does the suspended sediment settle through

the saline layer underneath it?
A The differential between the settling rate in the fresh water versus the settling -- you're an engineer, Sir? Maybe we could talk about this another time because I have some questions for you.
HEARING OFFICE STUBCHAER: All right. We have to stop now. It's five o'clock. Interesting. We're not going to get the redirect today, so that will be in the morning. I understand that -- 8:30, Mr. Canaday?
MR. CANADAY: Yes, 8:30. Sharp.

HEARING OFFICER STUBCHAER: And regarding tomorrow night.
MR. CANADAY: Sharp 8:30.
HEARING OFFICER STUBCHAER: I wouldn't take Mr. Canaday's bet on tomorrow night because there may be another function going that would stop it. It's uncertain. You'll have to find out tomorrow.
MR. CANADAY: It's his money. I never worry about his money.
HEARING OFFICER STUBCHAER: And with that -- Okay. After you make another announcement, we'll recess.
MR. CANADAY: The particular function that you're talking about is only a two-hour function. If it starts at 5:30 and ends at 7:30, we still could be in evening session.
HEARING OFFICER STUBCHAER: We'll recess until 8:30 tomorrow morning.
(Whereupon the hearing was adjourned at 5:02 p.m.)
---o0o---

REPORTER'S CERTIFICATE

---o0o---

STATE OF CALIFORNIA)
) ss.
COUNTY OF SACRAMENTO)

I, KELSEY DAVENPORT ANGLIN, certify that I was the official court reporter for the proceedings named herein; and that as such reporter, I reported, in verbatim shorthand writing, those proceedings, that I thereafter caused my shorthand writing to be reduced to typewriting, and the pages numbered 1 through 160 herein constitute a complete, true and correct record of the proceedings:

PRESIDING OFFICER: James Stubchaer
JURISDICTION: State Water Resources Control Board
CAUSE: Mono Lake Diversion
DATE OF PROCEEDINGS: December 13, 1993

IN WITNESS WHEREOF, I have subscribed this

certificate at Sacramento, California, on this 22nd day of December 1993.

_____

Kelsey Davenport Anglin, RPR, CM, CSR No. 8553