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January 27, 1987

Dr. Robert Behnke
Dept. of Fishery & Wildlife Biology
Fort Collins, CO 80523

RE: The Pueblo of Acoma v. City of Grants et al.,
CIV 82-1540 M

Dear Dr. Behnke:

Enclosed please find a copy of Neal Armstrong's deposition recently recieved by our office.

Please review this in preparation for trial in the above entitled case.

Thank you for your continued assistance.

Sincerely yours,

PAYNE & RANQUIST, P.C.

Stacey

Stacey A. Johnson

SAJ:cjw

Enclosure

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF NEW MEXICO

THE PUEBLO OF ACOMA, AND
THE PUEBLO OF LAGUNA, each on its own behalf and each on behalf of its repsective members,

Plaintiffs,

vs.

No. CV 82-1540-M
(VOLUME II)

THE CITY OF GRANTS, et al.,

Defendants.

DEPOSITION OF NEAL ARMSTONG

BE IT REMEMBERED that on Friday, the 5th day of December, 1986, at 9:30 a.m., this matter came on for the continuation of the taking of the deposition of NEAL ARMSTRONG on behalf of the Plaintiff Pueblo of Acoma; at the offices of Civerolo, Hansen & Wolf, PA, 500 Marquette, NW, Suite 1400, Albuquerque, New Mexico; before DONALD A. HILLAND, a Certified Shorthand Reporter and Notary Public.

A P P E A R A N C E S

FOR THE PLAINTIFF PUEBLO OF ACOMA:	PAYNE & RANQUIST, PC Attorneys at Law 200 Lomas Blvd., NW Suite 1020 Albuquerque, New Mexico 87102 BY: MR. HAROLD A. RANQUIST
FOR THE DEFENDANT NM WATER QUALITY COMMISSION:	CIVEROLO, HANSEN & WOLF, PA Attorneys at Law 500 Marquette, NW Suite 1400 Albuquerque, New Mexico BY: MR. PETER DOMENICI, JR.

(Continued)

FOR THE DEFENDANT CITY OF GRANTS:	POOLE, TINNIN & MARTIN, PC Attorneys at Law 219 Central Ave., NW Suite 700 Albuquerque, New Mexico BY: MS. KATHLEEN PRICE WATSON
ALSO PRESENT:	WALTER HINES

C O N T E N T S

E X H I B I T S

AFTERNOON SESSION

(Exhibit 3 marked for identification.)

NEAL ARMSTRONG

was called as a witness by the Plaintiff Pueblo of Acoma and, having been previously duly sworn, continued testifying upon his oath, as follows:

EXAMINATION

BY MR. RANQUIST:

Q. I hand you what's been marked Exhibit 3 to your deposition, and I would like to know: Where was the information obtained that's contained in that exhibit?

A. Where was it obtained?

Q. Yes, where was it obtained?

A. Where did I obtain it?

Q. Yes.

A. I obtained the document -- it was sent to me by the law firm.

Q. Do you know where it was obtained besides that?

A. No, sir. I believe this appears as an exhibit in Dr. Behnke's deposition, however.

Q. This one?

A. This information. Yes, I simply reversed the pages. It's Exhibit Number -- what is it? B-46?

Q. That's supposed to be on the front?

A. Well, the pages were in reverse order chronologically, and he simply, for my purposes, reversed them, chronological order.

Q. Have you analyzed the information contained in Exhibit Number 3?

A. I have looked through that and have processed some of the data in there, but I'm not through with it. There is an immense amount of information in those pages.

Q. And you say you're not through with it. What remains to be done?

A. I'm pulling out on a day-by-day basis the information on temperature, water discharge, water quality data, fishermen observed, fish catch, information of that nature, so I can get a better understanding of what's been done to the lake over the years.

Q. So you're cataloging all of the information --

A. Yes.

Q. -- in that?

A. Yes.

Q. Based upon the information you have analyzed to date, have you found anything in there that's pertinent to the fishery claim in this case?

A. A great deal.

Q. Like what?

A. Well, those are records of observations made by Fish & Wildlife Service personnel on the condition of the water at the time of observation, the fishermen, the fish being caught, the condition of the fish, information on creel census as being done, on gill netting, estimates of population in the lake, things of that nature. All of that is pertinent to the fisheries question.

Q. Now, have you found anything in there that in your opinion in any way would justify decreasing the fishery claim?

A. The economic claim?

Q. Yes.

A. Can you be more specific? Because the claim encompasses a number of things.

Q. I'm talking about the economic claim associated with the loss of the fishery.

A. Well, that claim, as I understand it, relates to loss of fishing opportunity in the lake, based on what is anticipated to be expected from the lake now and in the future. And what I have found, I believe, indicates that that claim is way overestimated.

Q. Why do you say that?

A. I think for fishing opportunity to exist in the lake, the lake has to be managed in such a way that that's possible. And it's not clear from that document and from others, from Mr. Halfmoon's document, for example, that there has been a consistent overall plan for managing the lake as a fishery, that it's been somewhat haphazard. Various things have been tried here and there. And it's just not, to me, something that's been done in a very organized fashion.

Q. Did you analyze by what percentage you believe this document, Mr. Halfmoon's document, would reduce the amount of any claim?

A. No, I'm not prepared to say at this point.

Q. Are there any particular parts of this document upon which you rely in order to come to your conclusion about the overstatement of the fishery claim?

A. Well, that's a general conclusion at this point. The information in there relates to how the lake was operated. For example, drawdown periods, how water was released from the lake, was it on a regular basis, on an as-needed basis, how much was released, stocking program, what was the basis for

the stocking being done?

There is a lot of miscellaneous pieces of information that, as you begin to pull those together, begin to paint a picture that just indicates that the management of the lake was not done, in my estimation, in a very coherent way and organized way.

Q. In your analysis, was the damage claim based upon the income that had been done, realized prior to the decline of the lake?

A. Well, I'm not that familiar with the damage claim and the details of how it was calculated. That's embodied, I believe, in Mr. Ward's deposition. And I have only had a cursory chance to review that.

But I do know from conversations with Dr. Snyder, who is looking at this, and discussing it with him, that the estimates of income from the fishery, in the future at least, appear to me to be beyond what the lake could possibly support.

And some analyses were looked at this morning on use of the lake for a fishery and its fishing rate. Fishing measure would indicate to me that that needs to be looked at very hard to see whether that would even be possible to fish the lake at the rate that he, Mr. Ward, estimates.

Q. I see. Do you know whether or not the damage claim is based upon the same management practices that occurred in the past?

A. Not exactly. I need to look at that further to be able to answer that question. I simply know it's based on historic data that was used to make a forecast into the future of revenues gained from operating the lake as a fishery and that supposedly being lost, lost revenues.

Q. Have you been able to identify any other data other than that that was provided by Dr. Behnke, Mr. Halfmoon, that reflects upon the fishery claim?

A. Well, there are several documents that Mr. Halfmoon has produced that relate to the lake. Besides those and Dr. Behnke's report, and this Exhibit Number 3, and, of course, everything we've talked about relative to eutrophication, which relates to fisheries, I don't know of any other data that's available.

Q. In your opinion, in Acomita Lake, is the controlling nutrient the phosphorus or the nitrogen?

A. At this point, I don't think either one of them is controlling. They are both at such high levels that biological processes dependent upon those nutrients are not limited by either one.

Q. Did you believe that was true prior to the time the lake was drained?

A. It's been true in my opinion since the lake was created. The nutrient level was high enough to produce, high enough to have been considered to phytoplankton in a lake system.

Q. Earlier, you testified that you had utilized the data provided by Mr. Tague concerning nutrients in the water in the stream of the Rio San Jose upstream from the sewage treatment plant.

A. Yes.

Q. Do you know what the dissolved orthophosphorous concentrations were in those samples?

A. I recall several milligrams per liter.

Q. No, is this design both the phosphorus or --

A. I'd have to look at the table and refresh my memory.

Q. Okay. To refresh your memory, was it 0.11 to 0.04 milligrams per liter?

A. Those numbers sound way too low, but, again, I would need to look at the table to refresh my memory.

Q. Will you please explain for us the difference between total phosphorus and

orthophosphorus in a water dam?

A. Total is an analysis that includes all forms of analysis in a water sample. It includes particulate phosphorus, or phosphorus attached to particulates or embodied in particulates, as well as dissolved forms.

It also include complex molecules of phosphorus. The orthophosphorus is a dissolved phosphate form. It's considered to be the form available to algae. The forms of phosphorus that are analyzed for the total phosphorus form do decompose to orthophosphorus.

Q. Over what period of time?

A. Well, it's the K-rate. The conversion rate is probably 20 percent per day. So, over a four- or five-day period, you would expect pretty much total conversion of one form to the other.

Q. Would you describe the biological availability of each form with respect to aqua growth?

A. Of phosphorus?

Q. Yes.

A. I just did that.

Q. If I understand you correctly at the moment, then, you're saying that it becomes biologically

available as orthophosphorus, regardless of its form in the beginning, over a four- or five-day period?

A. Yes. The orthophosphorus form is the form considered to be available to the algae.

Q. Do you believe that, in quotes, "dry flux," f-l-u-x, makes a significant impact on Acomita Lake in terms of nutrient loading as compared to other sources?

A. The nutrient budget that I have put together, which includes that flux, shows that the flux of nitrogen into the lake is but a small component of the total nutrient budget.

Q. How small?

A. But it cannot be ignored.

Q. How small?

A. Well, it's in the table that we looked at this morning.

Q. Okay. What is the potency factor utilized in calculating nutrient and phosphorus loading at the Acomita Lake?

A. The potency factor is a number that relates the nitrogen and phosphorus concentrations in runoff to the total suspended solids concentrations in runoff.

Q. Okay. We'd like for you now at present to

go through the description for us here of the Acomita Lake nutrient budget taken from Exhibit Number 2. And I know that you started on this earlier right before the benefit of our expert Mr. Hines. I would appreciate it if you would begin at the beginning and take us through the chart.

A. The nutrient budget that I put together is in two parts: One budget has been developed for the lake from the time it was created and began operating in 1938 up until 1954 and Ojo del Gallo stopped flowing into the river.

Q. And you calculated that as of 1954?

A. Well, through 19 -- it's calculated on a per-year basis, but the conditions that I have used for the budget were those that would exist from 1938 to 1954, or maybe a year or two before that when the flow from the spring stopped reaching the river. I simply used 54 as a cutoff date because that was the date I believe that's been agreed upon as the date the spring stopped flowing into the river.

Q. From what source did you gather that that was the date that was agreed upon?

A. From the Aquascience Report.

Q. Go ahead.

A. The other part of the budget is one

prepared for the present time without the Ojo del Gallo contribution but with the contribution from the Grants treatment plant. So we have two budgets to look at, the conditions at the time the lake was created to the present time.

Within that budget, I have looked at some of the same sources that Mr. Hines looked at; namely, runoff to the lake directly, the contribution coming from the diversion, and the contribution coming from atmospheric sources.

I've, however, divided the contribution of the diversion into the contribution from water diverted from the river directly to the lake as well as the runoff into the ditches as it moves from the river to the lake.

Q. How did you calculate that?

A. Again, I used a potency factor, the total suspended solids concentrations in runoff to the ditch that Mr. Hines used in his sedimentation balance for Lake Acomita. When he developed that budget for sediments in the lake, he estimated that so much reached the lake through the ditch from runoff in the hills into the ditch and then into the lake.

And so in trying to estimate the

contributing nutrients from that source, I used the potency factors, nitrogen, phosphorus, related those to the total suspended solids concentrations that he specified would exist in that runoff.

Q. Okay. What are the potency factors?

A. The definition again?

Q. Yes, I'm having trouble focusing on that.

A. The potency factor, again, is a way to relate nitrogen and phosphorus concentrations in runoff to the total suspended solids concentrations. Once you know the total suspended solids concentrations in the runoff then you apply the potency factor. It's simply a ratio of milligrams nitrogen to milligrams TSS or milligrams phosphorus to milligrams TSS, except you multiply the potency factor times the TSS factor to come up with the milligrams phosphorus or milligrams per liter. That's the general relationship.

There are other ways to express that. There are some log function relationships between TSS and nutrient concentrations. And these have been developed and compiled by contracts for the USEPA. And that's where I obtained the potency factors from that document.

Q. Does the source of the suspended solids

make any difference in the amount of the loading?

A. Oh, it would, yes.

Q. I see. How did you calculate what the loading was in the source? The nitrogen and phosphorus? Did you just take Mr. Hines' calculation, or did you develop your own?

A. Well, Mr. Hines didn't develop nitrogen and phosphorus content of the suspended sediments. He simply estimated the amount of sediments getting to the lake from runoff and to the Sandoval ditch and from it into the lake. But I used his TSS concentrations in these various sources and applied the potency factor to obtain the nutrient concentration.

Q. Tell me, are you familiar with the recent literature of G. Fred Lee in which he discounts the role of nutrient cycling from bottom sediments in terms of availability for later aqua growth?

A. I don't know the specific paper to which he refers.

MR. HINES: It was a series in Environmental Technology and Science a couple years ago.

THE WITNESS: I've seen that article, but I don't recall that it includes that discussion.

That's generally recognized as being an important source. I would think he wouldn't discount that.

Q. (BY MR. RANQUIST) Now, have you seen any data for the potency factors for rural New Mexico streams?

A. No, I have not.

Q. What potency factors did you use? Where did you acquire them?

A. I acquired them from a contractor's report to the USEPA. The individual's name is Z-i-s-o-n, and these were factors obtained from various parts of the US.

Q. And what part of the US factor did you use?

A. The ones I settled on using were from the Seattle area.

Q. Why Seattle?

A. They represented the rural environment. That's where the analyses were made. And they yielded the lowest concentrations of any of those in the tables to be conservative.

Q. Was there any part of those tables that applied to the southwest?

A. No.

Q. Is Mr. Zison an environmental chemist?

A. I do not know his background.

Q. Over what period of time did you use the runoff calculation in your budget?

A. Over what period of time?

Q. Yes.

A. The runoff to the lake directly?

Q. Yes.

A. The number I used for the flow is the one that was in Mr. Hines' report on the water budget.

Q. In your calculation, did you calculate that that runoff flow was a constant flow?

A. Well, in Mr. Hines' budget, it was expressed as so many acre-feet per year, as an average figure of acre-feet per year.

From other documents that I've seen, that figure is probably low. It's been estimated to be as much as 400 to 460 acre-feet per year. So, if anything, this number is low.

Q. So we're talking about the same thing, let's talk about the runoff factor contained under diversion --

A. Yes.

Q. -- in the Rio San Jose and your runoff factor at the 2.2 to the fourth?

A. To the sixth? Oh, that's for the superscript. It explains the footnote.

Q. Oh, I see. In calculating that factor, did you consider that to be a continuous flow?

A. Yes. Again, using the same flows that he used in the diversion and using the four milligrams per liter concentration storm water runoff that he used in his sedimentation survey.

Q. And you did consider that to be a continuous flow instead of an intermittent one that may have come --

A. Oh, no. This runoff is -- the value is one that is used in combination with the flow in the diversion. That is, the assumption is -- at least my assumption was -- that the total amount of runoff flow coming to the lake would be the runoff that reaches the ditch as it's flowing, as it's carrying irrigation water or diversion water into the lake. So the sediments that reach the lake, may reach the ditch, are going to be transported into the lake. The same assumption that he made.

Q. I see. Is it the same in amount?

A. I'm sorry?

Q. Is your calculation the same in amount as his?

A. I believe we used the same flows, yes.

Q. Are you aware that the mean suspended

sediment concentration during the irrigation season is less than 100 milligrams per year?

A. No, I'm not aware of that, if that's an average or -- I don't know what that number is. I don't know where it comes from.

Q. If that's true, would that make your calculation of this amount inaccurate?

A. No. It would simply say that the runoff that reaches the ditch has a TSS concentration of 400. What happens to the solids after they reach the ditch is, I assume, the same as he did, that they reach the lake being transported at a lower concentration, maybe at 100, but into the lake still. They still get there. We still made the same assumption, that the solids that come into the ditch reach the same point.

Q. Reach the lake?

A. If that's going to be true for the sedimentation budget, it's got to be true for the nutrient budget also.

Q. Let's go ahead with your explanation. Let's turn to page 2 of the Lake Acomita nutrient budget.

A. With the treatment plant?

Q. Would you explain that chart?

A. Well, the only thing that's changed on this chart compared to the previous chart is the contribution of nutrients from the Rio San Jose. That diversion now includes nutrients in the river contributed by the treatment plant.

What we did was to estimate the nutrient concentrations at the North McCartys diversion with contributions from the treatment plant, Horace Springs, and Anzac Springs.

We've, of course, omitted Ojo del Gallo. We assumed that based on the kind of decreases in concentration of nutrients that Mr. Hines observed in his study that the concentration of maximum phosphorus being discharged from the treatment plant would be approximately 50 percent at North McCartys diversion of what they were in the treatment plant. With that assumption, and using the concentration nitrogen phosphorus in the spring water again that appear in Mr. Hine's report, we estimated the nutrient concentration at North McCartys diversion and assumed that those nutrient concentrations would be in the water being diverted to the lake.

Q. The entry of the figures on that last paragraph where it says Grants STP --

A. Yes.

Q. -- the quality 1.7 CSF --

A. Yes.

Q. -- and total nitrogen equals 9 milligrams per liter, is that at Acomita Lake, or is that at the plant?

A. That's at the diversion. That's after it came from the plant. We assumed the concentrations are 18 for total nitrogen and 18 for total phosphorus.

Q. Okay. Now, over lunch I asked you to make the calculation as to what percent of the total --

A. Yes.

Q. -- nutrients had their source in the sewage treatment plant?

A. Yes.

Q. What is that?

A. For nitrogen, it's 10.8 percent. And for phosphorus, 35.8 percent. Those are preliminary estimates because, which I mentioned also this morning, this budget does not include some sources that are yet to be accounted for.

Q. Such as?

A. Such as the erosion of soil from the dam in the shores of the lake that Mr. Hines included in his sedimentation budget. Those will contribute

nutrients also. The storm water runoff that gets to the river as it makes its course from the treatment plant down North McCarty diversion. Those are at least two important sources that need to be added to this.

Q. Do you have that calculation? May I see that?

Is this calculation valid for the biologically available nutrients?

A. It's -- yes.

Q. Would that be the same as the total nutrient?

A. Well, it includes both.

Q. I see. Then --

A. One can be converted to the other, eventually.

Q. Eventually. Over four or five days?

A. Or faster in the summertime or slower in the wintertime. It just depends. It's a biological process, which means the rate is the function of temperature.

(Plaintiffs' Exhibit 4 marked for identification.)

Q. (BY MR. RANQUIST) Now, I show you what's been marked as Exhibit Number 4 to your deposition. That is the calculation of the total nutrient

loading that you've made for us?

A. Well, this is the calculation of the contribution from the Grants treatment plant --

Q. Yes.

A. -- to the lake following the format of this budget.

Q. Right. Okay. You have various charts that you have used and have attached to that Acomita Lake nutrient budgets?

A. Yes.

Q. We'd like for you to explain the charts.

A. All right. These are called nutrient loading diagrams. They have been developed over the years as an attempt to relate the nutrient loading to a lake to its trophic status, whether it's eutrophic or oligotrophic or whether a lake is in danger of becoming -- having that status.

The first diagram was compiled by a Dr. Vollenweider. This work was done or published in 1968 and relates a morphometric feature of the lake, meaning depth, on area loading phosphorus.

What he did was to examine a number of lakes in Europe and North America, primarily in Europe, based on water quality and biological characteristics of the lake and how they were

characterized by researchers working on those lakes as being oligotrophic, mesotrophic, or eutrophic; compiled or plotted those lakes as points on the graph; that is, based on their mean depth and nutrient loading rate, plotted them on the graph; and discovered that oligotrophic lakes tend to group in an area in the lower part of the photographic graph, eutrophic in the upper part of the graph, and there were some in the middle that were in a mesotrophic state. That is a change in productivity. Eutrophic means high productivity. Oligo means low productivity.

On that basis, he then estimated the lines in the graph which would indicate in one case permissible loading; that is, a lake could receive that much nutrient loading and still retain its oligotrophic state; another line that's called excessive loading, or in some cases dangerous loading, which means that lakes that fall above that line are experiencing a rate which will cause eutrophic symptoms and problems.

This first diagram is simply the same diagram that appears in Mr. Hines' report. And what I've done is to plot on the diagram the loading rates to Lake Acomita that I've calculated from the

past and the present. And the point PA here simply means that this is the historical loading before the treatment plant began discharging. And it indicates for Lake Acomita, with a mean depth of 3 meters, that the lake is in a very highly eutrophic state or loading rate on historic loading alone. Adding in the treatment plant, taking out Ojo del Gallo, boosts that rate for phosphorus a bit.

The other points on here relate to the areal loading that apply in the fertilizer we talked about this morning would have produced for those two years.

And then the last two points, the open circles, represent the nutrient loading from Hines' report. The upper point, the "H" with the with symbol indicates the Hines' budget with treatment plant. The lower points is the Hines budget without treatment plant.

And even his own budget indicates that at that loading rate with this diagram the lake would be experiencing a eutrophic loading, a eutrophic rate.

Q. And over what period would that reach such a point that it would be destructive of the fishery?

A. Well, if this is the loading rate without

the treatment plant and that represents, basically, present and historic conditions without the plant, that means even with his budget and this diagram that the lake would be experiencing eutrophication problems within a few years of its creation.

Q. Okay. I understand. You explained to us in the beginning that every lake suffers that?

A. Yes.

Q. So, apparently, it's just a question of differences in rate?

A. How long, and the rate at which nutrients are deposited in the lake as opposed to sediments. Does the lake fill up with sediments faster than it begins to experience its problems?

Q. So if Mr. Hines' calculation is correct, by what factor has that changed that eutrophic life?

A. Oh, that's very difficult to say. The diagram simply says for lakes that have been observed, whatever their age, that they're experiencing those problems. It's hard to know from the data that's used to support this how long that took. But based on nutrient loading to recent lakes, like reservoirs, it's very clear that it doesn't take very long for those symptoms to be felt. And I studied those lakes myself.

Q. When you say "very clear that it doesn't take very long," what are you talking about?

A. The first year.

Q. You mean to make them unusable?

A. No, not unusable. But they show some of the symptoms of eutrophication: high algal populations, lower concentrations of dissolved oxygen in the hypolimnion. So it does that. So in a new reservoir that we examined -- I examined or led a five-year research project in southeast Texas in the first year that the lake was in existence -- those kind of problems were evident. And they've been evident ever since. Because the nutrient loading to the lake was far in excess of what would be allowable, based on diagrams such as this.

Q. I understand. Now, what I'd like to get at is for you to explain for me how much this would shorten the life of a lake if the nutrient loading exceeded the standard that you have described by the amount shown.

A. Oh, that has to be addressed in another way.

Q. Yes.

A. That is, this loading may produce -- and that needs to be estimated, this loading, or the one I've estimated as a background, or without treatment

plant, for the lake will produce certain concentrations of nutrients in the lake. Those concentrations are going to be functions of flow through the lake. So the hydraulic balance is important.

It's going to be a function of nutrient sediment within the lake through the sediments and the biomass within the lake. And if the concentrations produced in the lake are high enough; that is, above what are considered critical nutrient levels to algae, then, the processes that depend on the nutrients, like growth of algae, will be growing as fast as they can grow; that is, nutrient concentrations are high enough for the plants to be growing at their maximum rate.

And it doesn't matter whether you add more nutrients, the plants are going as fast as they can go. When that happens, the processes that govern eutrophication problems and symptoms go at the same rate, basically. And it doesn't matter how much more you add. Once they're going as fast as they can go, they stay at that rate.

So there is not a linear relationship, or even nonlinear, between the life of the lake and the eutrophication problems.

Q. So is the rate of the lake at which it can detrophicate -- is that the proper word?

A. Eutrophy.

Q. Eutrophy. Has it reached its maximum at this point, as indicated by Mr. Hines' data?

A. Well, I don't know. That's why I've had -- I'll have to do the calculations based on Vollenweider's mass data and others to come up with nutrient concentrations in the lake to determine that. Generally, if we're above this line, then we're going to be at concentrations that will be at or above that level.

Now, we can go ahead and say that this diagram has been superseded by others. This is now obsolete, okay? And there have been other diagrams developed. The most recent ones in 1976 were in the literature when the work on this river -- when the lake was done. And I have used those to come up with a more realistic idea of the status of the lake at the present time, based on the past and present loading estimates that I have developed.

Q. Okay. And let's discuss those.

A. The second one is a Vollenweider's diagram that incorporates the hydrodynamic balance in the lake; that is, he recognized that water flow out of

the lake transporting nutrients out was an important mechanism to rid the lake of nutrients. And because of that, it's possible for the lake to not experience eutrophication problems with a given loading rate which on the previous diagram might have indicated that.

On the X axis we have the ratio of mean depth to hydrolic residence time. I used the water budget in Mr. Hines' report to estimate residence time for the lake and divided that into the mean depth of the lake, three feet, came up with the ratio of just over two for the ratio of mean depth to residence time.

Again, following up the graph, we see that the loading rates of phosphorus, in this case, past and present, are still well in the eutrophic zone.

So the bottom line hasn't changed. The picture is the same. It's just that this diagram represents a more realistic situation in the sense that not only is the shape of the lake taken into account but the hydraulic balance of the lake is taken into account.

Q. Okay. Now, have you ever been able to calculate with respect to that whether or not it has reached -- the nutrient loading has reached that

point at which it no longer increases the eutrophication problem?

A. No. It's the same calculation that would have to be done on that.

Q. Same way?

A. Yes.

Q. Okay. Next chart?

A. Next chart is Vollenweider's most recent diagram. And it now incorporates the loss of nutrients within the lake due to decay or uptake or sedimentation, whatever accounts for the loss of the phosphorus in the lake, and indicates that -- again, we have mean depth over residence time on the X axis, loading rate on the Y axis, and, again, here on this graph, the bottom line is still the past and present loadings are high enough to produce eutrophic conditions.

Q. And, again, the question of whether or not we've reached the maximum, you would have to do the other calculation on it?

A. Well, the equation I would be using in all of the cases is the one that represents this graph. It's the Vollenweider mass graphic equation that accounts for nutrients coming into the lake, leaving the lake, and lost in the system. It does not

account for internal loading, by the way.

Q. And internal loading is -- explain that.

A. Sediments release -- nutrients released from the sediment. The question that Mr. Hines was asking a minute ago, or alluding to a minute ago, from G. Fred Lee's article.

Q. So, tell me, from the creation of your chart, can you tell us whether or not the difference between Mr. Hines' calculation -- I notice that doesn't happen to appear on your last two charts?

A. No. It only did on the first. We can plot it very easily, though.

It's 1.2 and 2.2. 1.2 is about right here, and 2.2 is about right there.

So even with his budget --

Q. Okay. Would you put a circle around those so they can be identified?

A. I'll mark it the same way I marked the first draft.

So it indicates that with this loading -- and even the one without the plant -- the first one is in the eutrophic zone, definitely. The second one is the upper part of the mesotrophic zone, which means that this lake is being loaded at the other rate, which would put it into the eutrophic zone at

some point.

Q. At some point?

A. Yes. It's in the transition stage between oligotrophic and eutrophic.

Q. Is it possible for you, using the methods you're discussing, to determine the difference in time over which the useful life of the lake for a fishery would be as between the lowest point on Mr. Hines' calculation and his highest point?

A. Not from this analysis, no.

Q. Would it be possible for you to determine the difference in the useful life of the lake as a fishery between the points in your calculation between your historical loading, as you call it, and that loading in which the --

A. No, that's not possible.

Q. That's not possible?

A. Not with this kind of analysis, no.

Q. It is possible to do, though?

A. It's possible to get a handle on that using a time dependent nutrient model to lakes.

Q. And that's a rather involved --

A. It's a rather involved process, yes.

Q. Would you go on and let's discuss your next chart?

A. The next chart is one prepared by a worker named Dillon. Dillon was a student of Vollenweider, worked with the same data base that Vollenweider had. He felt, however, that nutrient retention in the lake was the important parameter that should be embodied in the analysis of the lake.

And so by looking at the phosphorus budgets for a number of the lakes that Vollenweider studied, he calculated the phosphorus retained in the lake, expressed that as retention coefficient R, related this loading parameter -- it's not the same loading rate as in the previous graphs, but it's a loading rate that incorporates the effects of retention and the flushing effects of water going through the lake -- related that to mean depth of the lake and found that by replotting Vollenweider's data on this graph he got much the same story represented by the previous graph but he simply incorporated a more realistic situation of what happens to phosphorus nutrients in the lake. The bottom line doesn't change.

And I have not plotted the data on this graph because it's not possible to construct or calculate a retention coefficient for phosphorus at Acomita Lake. We don't know enough about the

outflows from the lake, number one. And we don't know enough about the nutrient concentrations in the outflows to be able to do that.

A. So there are ways to estimate, based on experience from other lakes. I have not had a chance to decide whether Lake Acomita falls into the range of the data used to calculate those retention coefficients. I have not done that analysis and not plotted that point.

Q. All right. Let's --

A. My experience is, however, that plotting data on this graph does not change from this graph enough to worry about. I mean, it helps to corroborate the data and the final conclusion, but it's not different enough to think that that's going to tell a different story.

Q. All right. Now, let's take the next chart. And this is a graph chart? It says mean depth, in parentheses, "M," and then nutrient loading versus mean depth?

A. Well, this is nitrogen loading versus mean depth.

Q. Yes.

A. For many lakes --

Q. Excuse me. That's nitrogen loading, and

not nutrient.

A. Nitrogen loading, and not nutrient.

Q. Sure.

A. For many lakes in the southwest, and we have a number of these in Texas, in particular, and I should say reserviors, not lakes, we find that nitrogen is tending to be more limiting a nutrient than phosphorus. And as a result, the loading diagrams for phosphorus don't have any relevance in terms of using them to suggest treatment needs or whatever to limit nutrients reaching the lake and to reduce the loading so that we get down into the mesotrophic or especially oligotrophic part of the graph.

There was some work done in Florida in relationship to a nutrient evaluation of Lake Okeechobee to try to come up with relationships of nitrogen, relationship to the lake, and their relationship to eutrophic symptoms in the lake.

Q. Is what you've just explained indicating that nitrogen is the limiting nutrient?

A. No. I'm saying that what I've seen in Lake Acomita, that the concentrations are so high now that neither is limiting. I'm saying that -- I'm giving a paper in San Francisco next week on six

lakes that exhibit these conditions.

These kinds of loading diagrams enable us then to make some judgment about allowable nutrient nitrogen loading for those kinds of lakes.

To date, these diagrams have never appeared in press or any report. The equations that are used to describe them are contained in this report I've submitted to the State of Texas, the Texas Water Commission, that you've requested a copy of.

Q. Yes.

A. And the tables are, I believe, in the folder that you have labeled as one of the exhibits. So the information used to compile these graphs is already in a draft report form. And they're the same equations in the Lake Okeechobee report which has been in press -- available for the public for about six years.

Q. Okay. Now, in the nutrient loading, as demonstrated by Walter Hines' report, where would they fall with respect to this chart?

A. That, I don't know. I don't have those numbers calculated.

Q. You can't add that up just like you did on the --

A. Well, this is for nitrogen, and the other

is for phosphorus.

Q. Right.

A. And I don't have those calculated.

Q. You don't have the numbers calculated. All right. Let's go to the next chart.

A. Okay. The series of charts here are exactly the same as they were for phosphorus. Loading versus mean depth, loading versus mean depth over residence time. Loading versus mean depth over residence time but now modified, and then loading parameter of Dillon versus mean depth. So it's the same parallel graphs to the phosphorus graphs.

Q. All right. Now, would you explain for me, what is the pertinence of your calculations in your charts with respect to Acomita Lake and Acoma's fishery claim?

A. The purpose was to see whether the lake at the time it was created was experiencing a nutrient loading which would produce some of the eutrophication symptoms: high algal concentrations, low DO in the bottom waters, highly organic sediments, anaerobic sediments, things of that nature, whether those conditions would be produced by the loading to the lake, the nitrogen and phosphorus at the time it was created. If that was

the case, then the lake would have been in danger of exhibiting those symptoms soon after it was created and would have been doing so throughout its life.

Q. Do you know whether that was true?

A. No, I don't. I don't have the information on periods way back then to know.

Q. If that were true, why would the Fish and Wildlife be recommending to Acoma and actually applying that nutrient loading that was applied in the 60's?

A. Well, it was a nationally used process for fertilizing the lake. I mean, if this lake were exhibiting -- were showing algae in the lake, showing rooted plants along the shoreline, all of those are considered important attributes to a lake to support a fishery. The plants provide cover for the fishlings. The algae provides a food base for the food chain that eventually supports the sport fish. So my guess is the service would have seen the lake as being attractive from that point of view.

Q. But if they already had sufficient nutrient loading, wouldn't that have been apparent?

A. Well, it should have been apparent in the fact that there was the algal growth and the vegetation already there.

Q. Okay. Now, assuming that they know their business, then if your calculation is accurate, then would not an experienced Fish and Wildlife person have known that nutrient loading was not needed?

A. Well, the general practice was, in starting a fishery like this, since they didn't know what kind of fish were in there -- or maybe they did but didn't want those fish -- the general practice is to drain the lake and to poison the rest of the fish in the water that remains in the lake to get rid of all of the fish that are in the lake and to start over.

Q. Did they do that?

A. They drained the lake in 1961. The lake was filled up, fertilized in 64, 64 and 65. Stocking began about that time. Everything that was done at that time was following cookbook procedures for lake management for supporting of the fishery. So even though the water coming in had produced good conditions in the lake and those were expected to continue once the water came back into the lake, the practice was to drain, poison, and restock --

Q. And fertilize?

A. -- and fertilize to be sure --

Q. Fertilize?

A. -- to be sure that you had the food

organisms there to support the fishery.

Q. I see. And having done that in this case, what effect did that have on Lake Acomita for the period 61 to 65? Or 63 to 85? What effect did the nutrient loading applied in 63 have?

A. The fertilizer?

Q. Yes.

A. It would add to the nutrients already in the lake. But since the purpose was to produce large populations of algae to support the food chain, basically, the intent is to make the lake trophic to support the fishery. That's the general intent of that kind of activity.

And, in fact, if anything, the lake was underfertilized, based on recommendations in a Texas A & M publication on pond management. They recommend that application of nitrogen and phosphorus initially followed up in successive weeks by smaller applications. So, in essence, they didn't have enough.

Q. Okay. Now, once that's done, what would you anticipate the life of the lake would be? They make it eutrophic, and so that means that it's in a mode in which it's going to die someday.

A. Yes.

Q. What would be the life?

A. That's -- the life, if we're talking about how long until the lake fills up, that depends on the sedimentation rate, as well as the magnitude of organic biomass being produced and dying and contributing to the sediment. That's very hard to estimate.

Q. Well, let's assume at the moment that they're able to control the depth of the lake by controlling the sediment inflow. How long will the lake last under the conditions that actually occurred out there that you've analyzed? That includes everything that's gone in. How long would that last?

A. Again, it would require analysis of how rapidly the sediment builds up with the production of organic biomass.

Q. We're controlling the sediments so sediments no longer build up.

A. I understand you're controlling the sediments so sediments no longer builds up coming in with the inflow, but there is still sediment being generated by the death of plants and fish in the lake that contributes to the sediment.

Q. Okay. Then what's a range usually for a

lake like this? You know, is it three years or 20 years or 100 years or can you tell me?

A. No, I can't tell you offhand. It should be a long time, but I couldn't tell you offhand without knowing more about the magnitudes or productivity in the lake and rate of generation.

Q. Okay. Now, then, have you examined the lake to determine whether or not their statements by Mr. Halfmoon about the fish developing stress were accurate?

A. You mean have I sampled the lake for that purpose?

Q. No, have you looked at the data, all of the data that's available, to determine whether or not that is an accurate assessment?

A. I've looked at as much data as I could find in the periodic observations in Exhibit 3.

Q. Yes.

A. And from the special survey that he did, it's still not possible to relate exactly the water quality conditions that were present at the time that fish stress was noted here.

In some cases, there were some mitigating circumstances. For example, in some cases fish kills are reported, but it's due to known loading

that's been done along the shore of the lake or application of herbicides for root or plant control.

In other cases, kills have been reported when the lake is being drawn down and the water quality is naturally poor because of the mixing up of the bottom and the water there being poor quality simply because of the organic sediments being disturbed in the draining process.

Q. What is the significance of unionized ammonia concentrations as calculated in your exhibit?

A. I don't think I've calculated those in my exhibit.

MR. RANQUIST: Let's take a break for a moment.

(Recess taken.)

Q. (BY MR. RANQUIST) If the Acoma Pueblo were to construct a sediment pond that captured between 70 and 80 percent of the sediment load at Acomita Lake, how would that reduce the nutrient load you've calculated?

A. Reduce the sediment by how much?

Q. 70 to 80 percent.

A. It would reduce a nutrient load to the extent that nutrients were trapped with those sediments. I do not believe it would change the

nitrogen contribution much at all because nitrogen tends to stay in solution. It's not attached to the sediment. So even though the sediments drop out, they stay in the water that would pass on over a spillway into the lake. Because phosphorus tends to attach to solids, they would tend to settle out. But only a portion of those would stay with the sediments.

To the extent that the clays and silts did not settle out and passed on over the spillway, the phosphorus would tend to be attached to those particles and pass on into the reservoir.

So a sedimentation pond would capture the heavier particles, which would be the sands, and heavy silts would pass on, I believe, the clays and light silts which would contain most of the phosphorus.

So in terms of nutrient removal, I think it would be fairly small. Very small for the nitrogen, and only a small fraction of the phosphorus.

Q. You think the phosphorus would travel with the clays?

A. With the clays and very light particles that are typically the materials that cause the turbidity in the water. And those would pass, I

believe, right on out of the siltation pond.

Q. What is it that remains for you to do to be able to prepare your final conclusions with respect to the information contained in the Halfmoon and Behnke studies?

A. What remains is to complete the analysis of the Fish & Wildlife Service data, their periodic observations in the lake, to analyze --

Q. There you're talking about Exhibit Number 3?

A. Yes, that exhibit also, the special survey made of the lake by Mr. Halfmoon back in 1982 at the request of the pueblo.

Also to get explanations from Mr. Halfmoon of the extensive tables in the back of his report on catch rate, use of the lake by fishermen, other information that's contained back there.

It would also require my looking at the environmental requirements of the specific fish that have been stocked and make a judgment of whether the environment that's in Lake Acomita will continue to be one that would support that fishery as a put-and-take fishery.

Q. Over what period of time?

A. I'm sorry?

Q. Over what period of time?

A. Well, the future. There is no set period of time.

Q. Okay. Now, would you repeat your last sentence? I guess I'm not sure I followed you.

A. Well, in order to determine whether water quality conditions or environmental conditions are suitable for an organism, one has to look at the environmental requirements of the organism, temperature tolerances and preferences, dissolved oxygen tolerances and preferences, things of that nature, to make a determination whether or not things are suitable for that organism and its food organisms.

And for the specific species being stocked; that is, the various species of trout, catfish, I simply need to examine the literature to pull that information out; and then to make my judgment of the suitability of the Acomita Lake environment to support those fish.

Q. And when you do that, will you be able to put a time frame on it? Say it would be suitable for, you know, an estimated period of so many years? Is that possible?

A. Well, the assumption would be that the fishery could continue as long as the lake is

managed properly. And managed properly means managed in terms of hydraulic flow through the lake, to ensure that there is an exchange of water through the lake, to flush out nutrients in the bottom and the poor water quality conditions that occur in the bottom of any lake, to make sure that those are passed on through, to be sure that the stocking being done in the lake is in accordance with good fisheries management.

It's not clear to me from what I've seen that the Fish & Wildlife Service has a good plan for stocking. Numbers change from year to year, the proportion of efficiency changes from year to year. What's the Service's plan for that lake? What do they recommend should be done to keep that fishery best for those who are using that fishery? That's not clear to me that that kind of plan is available or has ever been available.

Q. All right. What impact would that have on Acoma's fishery claim?

A. Well, number one, again, with the information I've already mentioned earlier about fishing measure versus fishing catch, it would indicate whether or not the kinds of catch rates or success of fishermen catching fish out of that lake

would ever be achievable. I mean, there is just so many fish you can catch out of a lake like that. And yet you can't arbitrarily say if you put more fish in you're going to get more fish out. At some point, the lake cannot support that number of fish. The question is: How many is that?

There are good guidelines in lake management books on how many fish ought to be stocked per lake -- I mean per acre of lake surface. The stocking rates in this lake far exceed these numbers, but they're not the same species. I mean, they may be bass or catfish versus the trout. But I simply want to see for this kind of fishery for the Fish & Wildlife Service what their guidelines are for stocking fish in a put-and-take fishery, particularly trout. And that information is not evident.

Q. All right. Turning to Mr. Halfmoon's report, as contained in the back of the Hines' report, Mr. Halfmoon has stated on page 6 of his report in Appendix A -- Appendix B that angler success in Lake Acomita has decreased since the late 60's. Then he quotes figure 8 to establish that: "Catch rate peaked in 1966 and generally declined to a point where it took an angler 3.85 hours to catch

a trout in 1982." Do you have any information that causes you to disagree with that?

A. No.

Q. Do you have any information to disagree with his statement contained in the summary on paragraph -- or excuse me -- on page 8, second paragraph of the summary, in which he states --

A. Excuse me. That's page 7, is it not?

Q. Yes, page 7. I twisted my tongue. It's on page 7, second paragraph of the summary on page 7, of his report, in which he states, "Fluctuating water levels brought about by irrigation have extended aquatic vegetation zone to greater depths within the lake." Based upon your examination of the information, is that accurate?

A. The information that's in the records does not document that spreading of the plants. The drawdowns, however, would produce that effect.

Q. All right. Now, he said, "As a result, fish have less living stratum area available, and the fishermen had more difficulty reaching the areas containing the fish."

Then he states, "In recent years, however, the lake was no longer used for irrigation purposes and a more stable water level maintained."

Then he states, "But the nutrients in the water and in the sediments caused the nuisance vegetation to continue." Do you agree?

A. Well, the nutrients are coming from the sources we've talked about, the natural inflow to the lake, as well as being recycled from the sediments.

Q. Yes, I understand that you disagree as to the proportion that each of those contribute to the total involved in the lake.

A. Yes.

Q. Now, Mr. Hines has estimated that only 30 percent of the adverse impact created by the nutrients is attributable to the sewage treatment plant. Do you disagree with that?

A. Yes, I would.

Q. In what way?

A. I don't think that there is a proper foundation been laid for that assumption. The assumption is, as I understand it, that is in proportion to the contribution of nutrients to the lake.

And as I've stated before, the natural loading of the nutrients to the lake from the time it was created have produced the kinds of water

quality conditions that are seen there now.

And the addition of nutrients from the treatment plant, or any other source, for that matter, would not have worsened those conditions, again, because the biology of the system, the plants in the system, are producing organic material at the maximum rate they can, based on nutrients available. And I don't see that adding more nutrients to the treatment plant or any other source could change that.

Q. Have you done a calculation to determine whether or not the nutrients in the lake are at present producing to their maximum?

A. Well, I've seen concentrations of nutrients in the lake, and they are for nitrogen phosphorus. My recollection is that they are above the levels considered critical for growth of the plants. There has been precious little of that work done, however.

Q. Now, we discussed orthophosphorous, and we discussed sediments. And you stated that over a four- or five-day period the nitrogen and phosphorus in -- or excuse me -- the phosphorus in the sediments converts to orthophosphorus?

A. Well, I'm sorry. You are not talking in reference to sediments at that point. My

understanding was it was simply phosphorus in the water, not in the sediments.

Q. Okay. The total phosphorus in the water.

A. Yes.

Q. Okay. If part of those total phosphorus are in the sediments, and if I understand correctly here at the moment, your calculation of total load for the phosphorus in the lake includes that? That's included in the sediments?

A. No, it does not.

Q. It does not include that. Then that's transported in with the sediment?

A. Oh, we're getting several things confused.

MR. DOMENICI: I'm going to object to the question, Harold. It's vague, overbroad, and it's compound.

Q. (BY MR. RANQUIST) Now, I understood you to say that the total phosphorus including that in the sediments converts to orthophosphorus; is that accurate?

A. Okay. You're talking about sediments that would be carried in with inflow as opposed to sediments in the bottom of the lake?

Q. Yes.

A. I thought you referred to the bottom of the

lake a minute ago, and I was still thinking about those sediments.

Q. Okay. So does the total phosphorus in the sediments convert to orthophosphorus over that four- or five-day period?

A. Well, the phosphorus that often attached to the sediments will be in basically one of two forms: It can be an organic particle that contains the phosphorus, a decaying piece of life or a dead fly or something. It's going to show up as a suspended solids particle in that analysis, but the phosphorus will be contained in the carcass or piece of organic material.

There could also be phosphorus attached to a sediment particle, like a piece of clay or a silt particle. That would tend to be in the ortho form and be transported with that sediment into the lake.

Q. I understand that. But then when you take the total phosphorus load that comes in with the sediment, there is a portion of that phosphorus then that is not in the ortho form, correct?

A. Yes. Oh, yes.

Q. And you were telling us that it takes four or five days to convert that to the ortho form?

A. At a decay rate of about ten percent per

day, 20 percent of the mass being converted per day, about five days.

Q. What happens to that rate if the sediment then settles to the bottom of the lake? Does the rate change?

A. Well, first, not all of those particles are going to settle to the bottom. Many of the organic particles will stay in suspension. And the conversion process occurs in the water column. Sediments that go into the bottom will immediately be on the water surface -- I mean, the settlement surface. There still is the opportunity for exchange of that phosphorus with the overlying water column.

Q. Have you done any study out there to determine at what rate that occurs?

A. No. No, I don't think at Lake Acomita, no.

Q. So with respect to the total phosphorus entering the lake, that's not all converted within four or five days to orthophosphorus, is it?

A. Not in the sediments, no. I mean, their anaerobic processes dominate, and it's a slower process.

Q. In the conclusion of his report, Mr. Halfmoon states, "In my opinion, discharges from the

Grants sewage treatment plant have contributed to rainbow trout habitat loss in Lake Acomita and the Rio San Jose stream. The stream system appears to be loaded to or near its carrying capacity with nutrients and sediments."

Now, taking the second statement first, "The stream system appears to be loaded to or near its carrying capacity with nutrients and sediments," do you agree with the statement?

A. I can't make a judgment. I don't know what he means by carrying capacity of the stream.

Q. Now, the statement concerning, "In my opinion, discharges from the Grants STP have contributed to the rainbow trout habitat loss in the Rio San Jose," do you agree or disagree with that statement?

A. I have to disagree with it until I complete my own analysis.

Q. Do you have anything at present that indicates that he is not accurate? Anything you know of?

A. No. As we discussed this morning, that's an area that I'm just getting into.

Q. Okay. Next he states, "In my opinion, discharges from the Grants STP have contributed to

rainbow trout habitat loss in Lake Acomita." Do you agree or disagree?

A. I don't disagree with the statement because certainly any nutrients coming in that have caused water quality problems that would effect the trout have contributed to any water quality, including the trout. Certainly the magnitude has to be weighed against all of the other things that affect rainbow trout habitat and the fishery. And by that, I mean, primarily, the way the lake has been managed as a fishery system.

Q. It's stated, "In 1983, Lake Acomita reached a point which required corrective action." Based upon your examination of the data, do you agree or disagree?

A. It's hard to tell from the data why 83 was any different from the other four or five drawdowns that have occurred in the history of the lake. The first one, of course, was done to prepare the lake for use as a fishery. Others have been done because the outer works failed. They had to be repaired. But others have been done correctively to improve conditions in the lake. But there is never enough documentation then or in 83 to indicate why the lake had to be drained to improve that habitat.

Q. If that decision were made by the pueblo with the advice of the Fish & Wildlife Service, do you have any information that indicates to you that that decision was improper or unnecessary?

MS. WATSON: Do you mean the decision to draw down the lake in 1983?

MR. RANQUIST: Yes, the decision that it required corrective action.

A. I have not seen information that would support that decision. The information I have seen on water quality in the lake, temperature, dissolved oxygen, and so forth, would indicate that the conditions in the lake for those parameters have not changed over a long time.

There is nothing about 83 that would have caused the lake to be drawn down that year as opposed to any other year. But the water quality conditions in the lake, temperature, and dissolved oxygen are very good. They're typical of that kind of a lake.

Q. (BY MR. RANQUIST) And that's up through 83 through the drainage?

A. Well, the lake data that we have from the field observations is 82.

Q. Yes.

A. And Mr. Halfmoon's special survey of the lake in 82 was done in October of 82, I believe, and that's the last data point we have. I can only presume the decision was made sometime soon after that to drain it the next year.

Q. You have already commented about the creation of the charts by Mr. Halfmoon?

A. Yes.

Q. And you have commented that you have some difficulty with respect to how the information was gathered and amassed for his particular purpose. Do you have any other problem with respect to those charts?

A. Well, it's not really a difficulty, it's just a need for explanation of how those numbers came about. To understand the data base that's been produced, there is a need for explanation of how the data were gathered, how the calculations were made to come up with the numbers that were there. That information is simply lacking in his report.

Q. Okay. So are you prepared to make any further comment with respect to those charts or that data?

A. I can comment on specific points, if asked. I'll try to do my best.

Q. Is there any other point in respect to Mr. Halfmoon's report with which you disagree that we haven't discussed?

A. I would have to go through it again to see. My general disagreement with the report is in the conclusion that the Grants plant has contributed to the decline of the fishery.

As I have stated several times, I think the management of the lake has produced perturbations and changes that affect that success as much or more -- probably more than any effects of the plant.

Q. I show you what is entitled the abstract, by Dr. Robert Behnke, "The Assessment of Potential Fishery Values in Relation to the Water Quality Value in Acomita Lake, Acomita, New Mexico." You've examined that report?

A. Yes, I have.

Q. In discussion of the fishery in the Rio San Jose on page 4 of Dr. Behnke's report, where he is discussing the transplanting of fish into the Rio San Jose of 3,500 fish, he said, "I would estimate that the 3,500 trout stocked in 1980 suffered greater than 95 percent mortality over the 17-month period, the most intense mortality probably coming soon after stocking before full acclimation to

degraded water quality was developed." If you have examined this report, do you agree or disagree with his assessment, as stated?

A. I disagree because there are other sources of mortality that he did not address, the primary one being the natural mortality that occurs to fish that are stocked. Any stocking program incurs the possible mechanical damage to fish from the time they're transported to the site and released to the site. And that mortality could occur simply because of the way they were handled. And he has not addressed that point in his document.

Q. Do you have any information that indicates that such was the case? That there was such damage to the fish?

A. No, I don't have any information about that. It's just a point that should have been addressed.

Q. Okay. If he didn't have any information that addressed it, could he address it any better than you can?

A. He could mention it in the report as a possible source of mortality. Any stocking program recognizes that that's one of the immediate sources of mortality that ought to be considered in any analysis of stocking.

Q. Do they have any figures that they calculate as an average?

A. I don't know of any for trout. I mean, I'm not familiar with any for trout. But I would guess those involved in stocking would have some estimate based on their own experience.

Q. Well, okay. Now, he states in here, "The question arises on the cause of this high mortality, habitat or food limitations, predation, chronic or acute manifestation of water quality problems," question mark.

"Now, my observations along the Rio San Jose revealed many sites with deep water and abundant cover. The invertebrates inhabiting this stream are low in diversity but high in numbers. Habitat and food can be ruled out as a cause of the high mortality."

A. Well, I think there is a characterization of high mortality that needs to be tempered with the realization that the sampling Mr. Halfmoon did to assess the population a year and a half later was on only 5 percent of the river in which the fish were stocked. And there is a real possibility that it was just inadequate sampling that failed to detect the bulk of the population. And that has not been

addressed either.

MR. DOMENICI: I want to stop for a second.

(Discussion held off the record.)

Q. (BY MR. RANQUIST) The basic question here in which I'm interested says, "Habitat and food limitations can be ruled out as a cause of the high mortality." Do you agree with that statement?

A. Since I have not looked at the river specifically as it is suitable as a habitat to the fish, I really can't comment one way or the other.

Q. Now, continuing on down two sentences later, after discussing the opaqueness of the water and cover for the fish he states, "The most likely cause of the high mortality is the water quality parameters to which the fish were exposed." Do you have any reason to disagree with that?

A. I do, because, as I recall, Dr. Behnke wrote that report with very little data in hand. He recognized that in his cover memorandum and indicated that his analysis had to be considered -- I'm not sure what the word is, but taken with caution because it's based on so little data he had on hand. So I don't see how he has the basis for that statement without examining the water quality data.

Q. Okay. Now, then, the next year, there were some more intensive studies done of the Rio San Jose after he finished his report. Are you acquainted with the data that came from that?

A. Well, if you can be more specific about what those studies were, it would be more help.

Q. The study by Mr. Halfmoon and the Fish & Wildlife Service --

A. The study --

Q. -- in which they were planted in the stream in enclosed cages?

A. Well, that's included in this report.

Q. Maybe my memory is tricking me as to date.

Let's go on. Turning to page 5 of his report, he states, "The Grants sewage effluent is highly chlorinated. This creates a sterile zone downstream from the outfall free from bacteria that would digest the organic matter." When you observed the stream, did you observe such condition?

A. No, I did not.

Q. Did you observe organic matter in that area below the outfall of the sewage treatment plant?

A. No. As I described this morning, the water was very clear and the sediment has a grayish appearance, indicating to me good quality water

flowing through that area.

Q. But if I recall correctly, you did not examine for chlorine content?

A. No, I did not.

Q. Do you have any basic disagreement with the analysis as to the amount of organic and inorganic phosphates and nitrogen that is demonstrated to occur in the Rio San Jose in the Hines' report?

A. The question I have about that data primarily is a quality-assurance question; that is, the analyses were done, as I recall, at the Assaigai Laboratory in Albuquerque.

Q. Yes.

A. And I did not personally have knowledge of how well that laboratory performs in analyzing water samples for phosphorus. That information always must be available before one makes a good analysis of water quality data. It has to be information available on how good those analyses are.

Q. I see. Do you have any information indicating that the analyses with respect to phosphorus may not be accurate at the Assaigai Laboratory?

A. No. I don't have any information at hand to that effect, not personally. Or that they're

good.

Q. All right. Then, do you have any basis at present for disagreeing with the figures as shown on phosphorus and nitrogen?

A. In this report? Dr. Behnke's report?

Q. In the Hines' report.

A. No. But I hope to see the quality-assurance data from Assaigai Labs soon. That would help make a judgment on that.

Q. Dr. Behnke makes various statements concerning the presence of extremely low levels of unionized ammonia and oxygen uptake, being inhibited in the gill filaments of the trout which magnify the harmful effects of low oxygen in the Rio San Jose. Do you have any disagreement with his statements in that regard?

A. Again, it would take a review of the available data on ammonia and unionized ammonia to make that evaluation. Again, my recollection is he's making his analyses in the absence of hard data and looking at possible causes. It certainly is known, unionized ammonia is toxic to fish, but whether those concentrations exist or exist in high enough concentrations to cause that kind of effect, as far as I know, that's not been done to the river.

I don't think he had information available when he did his analyses.

Q. Do you have any disagreement as to whether or not the source of the cause of that condition emanates from the sewage treatment plant?

A. Oh, it could emanate from any source where ammonia is generated. Decomposition of organic material in general produces ammonia as a first step, releases the nitrogen as ammonia from the proteins.

Q. Do you have any indication that any such thing is happening along the Rio San Jose? Any evidence to that effect?

A. That ammonia is being released in decomposition?

Q. Anyplace other than the sewage treatment plant.

A. It's a natural process that occurs whenever inorganic material is decomposed.

Q. In amounts that would cause toxic conditions to fish?

A. Under the right Ph conditions and temperatures, it's possible.

Q. Do you have any information that that was occurring at any place in the Rio San Jose?

A. Not yet. Again, there is a data analysis

I've not done yet with regard to the water quality issue in the river. And one of the areas I do plan to look at is water quality. It was by Dr. Behnke.

Q. And you are simply not prepared to testify to that at present?

A. Not today, no, sir.

Q. Dr. Behnke also states that, "I believe this same phenomenon of the effect of sublethal iodine is responsible for the problems of the Acomita Lake Fishery also." Have you done any study to have an opinion whether that's an accurate statement or not?

A. Well, I don't believe it is in terms of oxygen, because the major oxygen concentration levels in Lake Acomita are fairly high until you get down to the water just above the sediment, which you would expect in any lake receiving waste discharge or not to be low simply because of the cyst that occurs at that water interchange. But the measurements indicated otherwise, and Dr. Behnke assumed --

Q. These are the measurements you're talking about for 1983?

A. The ones for 82. There are also ones taken by the Service personnel reported in -- what is it,

Exhibit 2? Those notes from the field?

Q. Exhibit 3?

A. Exhibit 3. There are observations in those notes of oxygen levels at various depths.

Q. Does the time of year at which they were taken to turn over the water have any effect on that?

A. Well, I don't accept your term turnover in this case because turnover refers to the mixing of water in a lake following a cessation of stratification, temperature and density stratification.

Q. Yes.

A. The evidence in Lake Acomita is based on measurement that the lake does not stratify in terms of temperature or density. So turnover does not apply to Lake Acomita.

I've forgotten the rest of your question now. Can you restate it without the term turnover in it?

Q. I think you've answered it.

A. Okay.

Q. Is there anything else that's contained in either the Hines' report, the Halfmoon report, or Dr. Behnke's report on which you have presently reached your final decision that we haven't

discussed?

A. Well, my conclusion about Dr. Behnke's report is that he was asked to prepare an analysis of water quality effects in the river and the lake without the benefit of having adequate data on which to base his analysis. And he says that himself. And I think because of that, the conclusions he's come to are ill-founded, certainly ill-based, and, in the light of hard data from the field, prove that many of the conclusions he's come to are in fact not the case.

Q. Okay. Now, what hard data do you refer to?

A. The temperature and dissolved oxygen data we've just talked about, he assumed stratification in the lake of temperature and density. And when turnovers would occur, it would bring low DO water up to the upper layers and cause fish mortality. That kind of stratification does not occur in the lake. Thus, conclusions based upon that kind of phenomenon are not applicable here.

MS. WATSON: I didn't get a chance to object, but I'll object to that question because it's overbroad. You need to ask him some specific things about those reports. He may disagree with a lot of things in the reports.

MR. RANQUIST: Okay. We're on the record.

Q. (BY MR. RANQUIST) Is there any other thing that you can recall at present that you've reached a final conclusion on that we haven't discussed?

A. Well, maybe if we can discuss some specifics, I can tell you.

Q. Well, at the moment, you see, I don't know what you've reached final conclusions on and what you haven't. But are you going to be writing a report?

A. Probably not. Most of my material will be tables, such as this, figures, graphs, that kind of thing, that would support my analyses.

MR. RANQUIST: Off the record.

(Discussion held off the record.)

MR. RANQUIST: So with the understanding that I have at the moment, that I believe I have with your counsel, that I believe I have the right to submit a list of those witnesses that we may wish to depose at a later date, we will terminate at this point with the understanding that we will receive your information as part of a supplement of our answers to interrogatories, following which, if we need to undertake further deposing, we'll give

notice.

MR. DOMENICI: My position on that, Harold, at this time is, as I stated earlier, we are going to supplement any work product which Mr. Armstrong does.

And with respect to continuing the deposition, that is subject to the agreement you and Mr. Stein have worked out, and also subject to approval by the court.

MR. RANQUIST: Yes.

(Deposition proceedings concluded at 4:30 p.m.)

PAGE	LINE	CORRECTION	REASON

SIGNATURE OF WITNESS

I have read the foregoing transcript of my deposition taken on the 5th day of December, 1986, and it is a true and correct record of my testimony given at that time and place, except as to any corrections I have listed on Page 162 herein.

_____
NEAL ARMSTRONG

STATE OF NEW MEXICO :

: SS. REPORTER'S CERTIFICATE

COUNTY OF BERNALILLO :

I, the undersigned Court Reporter and Notary Public, HEREBY CERTIFY that prior to the taking of the foregoing deposition, I administered the oath to the witness; that I later caused my notes to be transcribed under my personal supervision; and that the foregoing is a true and accurate record, to the best of my ability, of the deposition of said witness.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

I FURTHER CERTIFY that the cost of the original of this deposition is $ _____ to the Plaintiff Pueblo of Acoma.

DATED this 11th day of December, 1986.

DONALD A. HILLAND, CSR

Donald A. Hilland

MY COMMISSION EXPIRES: February 22, 1989.

Jan. 14, 1962 - Ice 5" thick, no snow on ice. Water level at the top of the spillway. Secchi disc 10'. pH8.7 Ec^3 1.60.
Zooplankton, good, mostly small forms.

Jan. 26, 1962 - Lake partly open. Water clear. Ice on lake rotten. Small forms of zooplankton abundant.
N.E. pH 8.7 Ec^3 1.60 S.E. under the ice, pH 8.6, Ec^3 1.22

March 9, 1962 - Lake ice free.

March 20, 1962 - Water level 6" below the spillway. Surface temp 44.
Water greenish color. Zooplankton abundant. Ducks present.

March 26, 1962 - Surface temp 54. 3 fishermen at 5:00 p.m. no fish.
100's of ducks on the lake. Water greenish color.
Zooplankton abundant. Lake to open to fishing May.1
Permits at San Fidèl P.O., Rays at ? and Governor.

April 27, 1962 - Surface temp 57, Secchidisc 11'(water clear) Zooplankton good.
Water level 1' below the spillway. Set a 200' gill net at 10:15 a.m. out at 2:30 p.m. Assited by Bluford Thorton.

May 10, 1962 - Three Indians fishing at 6:00 p.m. No fish. Surface temp 67.
Water clear, weeds beginning to grow.

May 14, 1962 - Surface temp 64. No fishermen at 6;30 p.m.
Water clear, water milfoil beginning to grow in isolated plants.

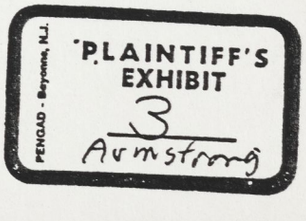
July 31, 1962 - Surface temp 73. Seepage temp 64. No water being discharged.
Sago and chara abundant along shore. Water level 10' below the spillway. Frogs and minnows abundant. Lots of coontail in the lake.
21 fishermen at 1:00 p.m. Secchi disc 15'. Zooplankton good.
Set a 125' gill net at 3:45 p.m. Treated a small area on the W. shore with 5 gals. of aquathol and Triton B. Mostly chara and sago.
Treated the lake with 3 lbsl of toxaphene to kill the minnows.
At 15' pH 9.4 and Ec^3 1.60.
Report fishing started going strong in mid May, heavy in June and started tapering off in mid July. Trout have pink meat.

August 1, 1962 - 12 fishermen at 6:00 p.m. Pulled net at 7:00 p.m.
Minnows still present along shore. Applied 2 lbs. of toxaphene to the storm run-off going inbb the north end of the lake.

October 4, 1962 - Surface temp 63. Water clear. pH 8.9, Ec^3 1.64.
Water level 11-12' below the spillway. Zoopalnkton abundant.
1 fishermen at 11:30 a.m. Water going into the lake.
Weeds beginning to die.

Nov. 19, 1962 - Surface temp 44. pH 8.4, Ec^3 1.55. Water clear.
Zooplankton good. Water level 5' below the spillway..
No fishermen at 5:00 p.m.

Nov. 20, 1962 - 2 fishermen at 2:00 p.m.



Acomita Reservoir

April 27, 1962 - 200' gill net set for 4.25 hours.

Species	Number	Av. Length	Av. Weight	Total Weight	"C"	Length Range
Rainbow	1	9.7"	0.38	0.38	41.6	
Rainbow	1	8.0	0.21	0.21	41.1	
Rainbow	7	6.1"	0.09	0.63	39.7	5.8 - 6.3"
Total	9	6.6"	0.14	1.22 lbs.	40.0	

Gill net ratio 21.6 trout and 2.93 lbs. of trout.
Trout per acre 65 and lbs. per acre 8.8.

Believed gill net catch only 1/4thx of actual population.

Revised estimate:

Legals 4,128, fingerlings 14,520, total 18,648 trout in the lake.

260 trout per acre for 72 acres. and 35 lbs per acre.

Estimated fingerling growth: Nov. 27 to April 27 is 3.4" or 0.7" per month.

Nov. 27	Dec. 27	Jan. 27	Feb. 27	Mar. 27	Apr. 27	May 27.
2.7"	3.2"	3.7"	4.3"	5.2"	6.1	7.0"
	0.5"	0.5"	0.6"	0.9"	0.9"	0.9"

July 31, 1962 set a 125' gill net for 27 hours.

Species	Number	Av. Length	Av. Weight	Total Weigth	"e"	Length Range
Raibow	8	5.9"	0.099	0.79	48.2	5.2 - 7.5"
Rainbow	3	9.8	0.40	1.21	43.1	9.5 - 10.0"
Rainbow	3	11.0	0.57	1.70	43.0	10.9 - 11.0"
Rainbow	1	12.1	0.74	0.74	41.8	12.1
Total	15	8.1	0.30	4.44 lbs.	45.7	

Gill net ratio 18.4 trout and ~~XXXXXX~~ 3.06 lbs.
Trout per acre 31 and 9.2 lbs. of trout per acre.

May fingerlings now 5.9" long, that is growth at 1.5" per month. About 16 per acre or 700 in the lake.

Took 4 water dogs in the gill net. Some trout feeding on snails.

August 1, 1962

Temps.		
	0'	73
	3'	71
	6'	70
	9'	70
	12'	68
	15'	68
	17'	68

March 29, 1963 - Surface temp 48, water clear, trout active. Excellent zooplankton present. No fishermen at 1 p.m. Water level to the spillway. Food items very poor. Several hundred snails present. No weeds yet, only filamentous algae. Big fat rainbows available, the shoreline like a giant hatchery. Fish wouldn't bite. Tribe made 29,000 a sky city in 1962.
1963 fees: $4.00 season $1.00 day.

April 18, 1963 - Surface temp 54, windy today. Water clear. Zooplankton outstanding. Filamentous algae covering the bottom. Water level 1.5' below the spillway. 3 fishermen at 5 p.m. Reported 45 fishermen on Tuesday, April 16 a windy day.

April 29, 1963 - Surface temp 58, pH 8.8. Water clear, zooplankton fair. 15 fishermen at 2:30 p.m. Fishing fair. Water level 1.5' below the spillway. Jerome Ortiz attendant. 1,350 trout caught so far this year. 120 trout caught on Sudnay, April 28. Reported about 75 fishermen on Sudnay April 28. State Warden Baylis here today. Tribe has trash cans in place.

May 22, 1963 - Surface temp 64, discharge temp 61, pH 9.1. Water clear. Zooplankton excellent, all large white forms. 31 fishermen at 11:30 a.m. Water level 3' below the spillway. Jerome Ortiz estimates 30 fishermen every weekday, 150 every Sat. and 200 on Sunday. Frogs are abundant, crayfish are present, scuds are present. Weeds growing rapidly, will be a problem soon. Fingerling rainbow now 5 - 6 inches long. Fatheads are spwaning. Fishing better in May than in April. Milfoil, coontail and filamentous algae.

Rainbow	11	11.6"	0.70 lbs.	"C"	41.5	7.5" - 14.3"

May 23, 1963 - 36 fishermen at noon.

May 29, 1963 - 30 fishermen.

June 3, 1963 - Surface temp 66, dishcarge temp 64, Surface pH 9.3, discharge pH 9.1. Water clear. Zooplankton good. 33 fishermen at 10 a.m. 38 fishermen at 10:30 a.m. Water level 4' below the spillway. Recent hatch of minnows about 0.5" long.

Rainbow	12	8.3"	0.26 lbs.	"C"	41.1	7.0" - 11.9"

June 26, 1963 - 17 fishermen and 13 cars at 1 p.m.

June 30, 1963 - Tribe has sold $5,800 worth of fishing permits so far.this year.

July 15, 1963 - Discharge temp 68, Surface pH 9.6, discharge pH 8.9. Water clear. 3 fishermen at 5 p.m. 11 fishermen at 4 p.m. Water level 8' below the spillway. Discharge water smalles, possibly low in O². Weeds abundant. Treated the weeds with 5 gals. of aquathol and 5 gals. of Hydrothal. Treated minnows with 0.5 gallons of toxaphene.
Set a 125' gill net at 7:15 p.m.

July 16, 1963 - Pulled gill net at 8:45 a.m.

Rainbow	8	12.9"	0.34 lbs.	"C2	38.6	11.7 - 14.2"
Rio Chub	4	5.5	0.09	"C"	60.8	5.3 - 5.8"
Waterdogs	17					

Trout 48 per acre and 2,100 in the lake. 35 lbs. per acre.
Chubs 835 in the lake and 1.5 lbs. per acre.

Trout have pink meat.

August [illegible], 1963 - [illegible] noon.
[illegible] Water level [illegible] below the spillway. [illegible] the bottom. No [illegible] of tomaphos. About a [illegible] Francisco Chino, Lake is a mess from trash.

August 9, 1963 - Surface temp 77, discharge temp 72. Surface pH 9.[illegible], discharge pH 9.4 Water clear. Zooplankton fair. No fishermen at noon. Water level 12' below the spillway. Weeds abundant. No evidence of any kill from the Aquathol plus. Weeds and algae brown from Hydrothol but have not broken down. Discharge water smells slightly of H_2S. Lots of trash around the lake. No minnows along the West shore. Some minnows along the E. shore.

August 14, 1963 - Surface temp 80, dischearge temp 74. 4 fishermen at 5:30 p.m. Fishing poor, fish jumping. Lots of frogs.

August 4, 1963 - Surface temp 72, dischcarge temp 70, Surface pH 9.8, discharge ph 9.3 Water clear, 8 fishermen at 5 p.m. A few minnows still present.

Sept. 10, 1963 - Surface temp 70, discharge temp 65, water smells.
Surface pH 8.9 Ec^3 1.29
Discharge pH 8.5 Ec^3 1.23
Water clear, zooplankton excellent. 6 fishermen at 11 a.m. 5 fishermen at 5 p.m. Water lvel 9' below the spillway. Weeds no problem. Frogs are abundant. Water level up 7' from heavy rains during August. Treated S.E. side of the lake w/ 0.25 gallson of tomaphen Minnows seen only along the S.E. side.

Rainbow	6	9.1"	Spring fingerlings. Av. growth 1.1" per month.	
Rainbow	2	14.9"	1.19 lbs.	"c" 36.3

Sept. 13, 1963 - No discharge. 2 fishermen at 10 a.m. Dam has 6' of freeboard.

Oct, 31, 1963 - Surface temp 54, pH 8.9, Ec^3 1.02. Secchi disc 3 - 4', water green. 5 fishermen at 2 p.m. Water level 7' below the spillway. No weeds. Water coming in. Trout appear to be in normal condition.

Nov. 7, 1963 - Surface temp 50, pH 8.5, water level 6' below the spillway. 8 fishermen in the p.m. Fishing slow. One 18" trout caught today. fireplaces and approach roads under construction.

Nov. 21, 1963 - Surface temp 46, Secchi disc about 4 - 5', zooplankton fair. 3 fishermen at 10:30 a.m. Cold and windy. Water level 3.5' below spillway. Water going in. Headgate leaks a little.

March 17 - Surface temp 40, Secchi disc about 6', water greenish. Zooplankton excellent. No fishermen at 3 p.m. Lake closed until April 1. Water level 10" below the spillway. A little filamentous algae. Saw a few fathead minnows. Saw 1 large crayfish. 15 picnic tables in plac. Daily permit $1.00, Season $4.50 Also charge Laguna's. Several hundred ducks present. Rio San Jose at W. Boundry 60°F.

March 20 - Surface temp 45, water clear, zooplankton excellent. No fishermen at 2 p.m. Water level 10" below the spillway. Filamentous algae covering the bottom.

April 1 - Surface temp 45, pH 8.7, Ec^3 1.20, windy, water clear. Zooplankton excellent. 120 fishermen at 10:30 a.m. 73 cars (# 32 on W. side, 22 in lot). Water level 1' below the spillway. Some filamentous algae. Fishing slow. Car counter 22.

Rainbow	3	9.0"	0.28 lbs.	38.5 "C"	8.6 - 9.6"
Rainbow	5	12.5"	0.88 lbs.	45.0 "C"	11.8 - 13.3"
Av.	8	11.2	0.65	42.6	

April 16 - Surface temp 56 on W. shore and 54 on E. shore. pH 8.7, Ec^3 1.15. Car counter 221. Secchi disc about 9', water clear. Zooplankton excellent. 24 fishermen at 10 a.m. and 24 fishermen at noon. Fishing slow, fingerlings present. Water level 16" below spillway. No water going in yet. Some filamentous algae. At noon 10 cars on E. Shore and 9 cars on W. shore. Fishing was good about 5 th day. Jerome Ortiz, Albert Lowden, Mrs. Chavez.
Added 1,200 lbs. 0-45-0 and 2,800 lbs. 33-0-0.

April 29,- Surface temp 53, pH 9.0. Secchi disc 12', water clear. Zooplankotn best Iv'e seen, mostly large white forms. 6 fishermen at 6 p.m. (2 cars) Water level 1.5' below the spillway. No weeds yet. A few small channel catfish being taken. A 23" and 24" rainbow caught last week. Jerome Ortiz, Box 507, San Fidel, New Mexico.

May 1 - Surface temp 54, pH 9.0, water clear. Zooplankton best I've seen. 9 fishermen at 11 a.m. (6 cars). Fishing poor. Water level 1.4' below the spillway. Filamentous algae becoing abund. along W. shore. 35,000 2" rainbow stocked yesterday. Added 1,200 lbs. 0-46-0 and 2,800 lbs. 33-0-0.

May 5 - Surface temp 52, discharge temp 52, started irrigating May 2. Sedchi disc 6', light bloom. Zooplankton outstanding - mostly large white forms, some cyclops. 9 fishermen at 6:30 p.m. Cold and windy. Water level 1.6' below spillway. Filamentous algae mod. abund. along W. shore and dam.

May 7 - Surface temp 53, pH 9.2, light bloom, zooplankton fairly good. 5 fishermen at 7 p.m. Cold windy. Filamentous algae becoming troublesome. Stocked today.

May 22 - Surface temp 65, discharge temp 57, pH surface 9.0, pH bottom 8.8. Secchi disc 8' light bloom. Zooplankton excellent, mostly large white forms. 23 fishermen at 9:30 a.m. Water level 3.5' below the spillway. Weeds growing, fair am't or filamentous algae.

June 3 - Surface temp 61 W. shore, 64 E. shore. No water being discharged. pH 9.2, secchi disc 6 - 8', light bloom. Zooplankton excellent, all large white forms. 40 fishermen at 1 p.m. Water level 6' below the spillway. Coontail only in water 4 - 5' deep. Filamentous algae abund. keeping weeds under control. Fair am't of coontail plants floating along shore. Fishing excellent, most fish 8 - 11", in average cond. Every fishermen has 6 - 8 trout. Recent hatch of minnows, about 0.6" long. Lake has an alkaline odor.

June 24 - Surface temp 68 E. shore and 72 W. shore. Discharge temp 62. Ph 9.7 on W. shore, pH 9.5 E. shore and Ph 9.6 bottom. Secchi disc 6 - 7', light bloom. Zooplankton fair - aquatic insects abundant. Tribe has sold about $8,000 in permits so far this year. 30 fishermen at 4 p.m. Fishermen complainingg about moss. Water level 6' below the spillway. Coontail, filamentous algae, higher aquatcis not near at bad as last year. Weeds bad at N. end. Minnows extremely abund. recent reproduction. Daily $1.50, season $5.00. Minnow dealer taking minnows, 320 for 5 months. Albert Lowden, P.O. Box 278, San Fidel, New Mexico

Rainbow	6	10.3"	0.45 lbs.	"C" 41.3	8.6 - 11.7"

June 25 - 40 fishermen at 5 p.m.

July 8 - Surface temp 72 W. shore and 69 E. shore. Discharge temp 65. PH 9.7 on E. shore, 9.4 on Botton and 9.6 on E. shore. Light bloom, water clear. Zooplankton good. 30 fishermen at 10 a.m. Water level 8' below the spillway. Weeds abund. at N. end, Not near as bad along dam. Fishing has been poor since my last visit. Minnows abundant. Boys have cleaned weeds along part of the shoreline last week.

Rainbow	6	9.9"	0.37 lbs.	"C" 36.7	8.9 - 11.5"

July 20 - Surfeac temp 77, no water being discharged, rained past 3 days. pH 9.5 on W. shore. Zooplankton excellent near weeds, fairly good over deep water. Secchi disc 15'plus, water clear. 12 fishermen at 8 a.m. and 16 at 10 a.m. Water level 8' below spillway. Lots of coontail, some filamentous algae. Set a 250' gill net for 3.5 hrs. nothing. Treated the weedy end of lake with 0.6 gals. Young of year crayfish 0.6 - 1.0" long. Snails and insects abund. in weeds at N. end of lake. Fishing slow Frogs abund. Bullfrogs present in small numbers. Minnow worse than last year.

0'	75
3'	72
6'	72
9'	70
12'	68
15'	67
18'	67

Aug. 14 - Surface temp 74 on E. shore and 73 on W. shore. Discharge temp 66. Discharge water smells, probably low in O^2. pH surface 9.4 on bottom 9.1. Water clear. Added 0.6 gals. at S. end of lake. Water level 9.5' below spillway. Some rain water has gone in. Adding water from diversion today. Weeds going down - probably from crawdads. Small crayfish abund. about 1.3" long. Trout in below av. cond. Minnows extremely abund. Fishing poor.

Sept. 24 - Surface temp 65, no water being discharged. pH 9.1, Ec^3 1.40. Secchi disc about 2 -3', water murky. 10 fishermen at 10 a.m. Weeds decreasing. Fathead minnows scarse. 29 trout and 2 12-14" c. cats killed after treatment. Also killed crayfish. Some water going in. A few 6 - 7" chubs being taken.
Albert Lowden, P.O. Box 278, San Fidel, New Mexico

Nov. 30, 1964 - Surface temp 43, Secchi 0', heavy bloom, started 3 days ago. Zooplankton fair. 6 fishermen at 4 p.m. Water 6' below the spillway, being filled. Some floating coontail around the shore. Trout in av. or slightly better than av. condition. Fishing good today. Fingerling trout entering creels, now 6 - 7" long.

Dec. 14, 1964 - Frozen, Secchi 2', No fishermen at 10 a.m. Water 5' below spillway. Water going in. Grass fire at N. end. James Vallo.

Dec. 30, 1964 - Surface temp 39, ice around edges. Secchi 33", good bloom. Zooplankton fair, all very small white forms. 4 fishermen at 12 a.m. Fishing excellent. Water 3' below spillway, water going in. Ducks still present. Jerry H. Vallo, Box 594, San Fidel, N. Mex.

				"C"	
Rainbow	3	7.5"	0.16 lbs.	38.0	7.2 - 7.8" fingerling plant
Rainbow	4	10.8"	0.50 lbs.	39.6	10.1 - 12.0" legal plants.

Jan. 31, 1965 - Surface temp 38, Secchi 3 - 4' light bloom. Zooplankton good, small white forms. No fishermen at 5 p.m. Water 2" below spillway, no water going in. No weeds. Lots of ducks.

Feb. 5, 1965 - Surfade temp 40, Secchi 4 - 5', light bloom. Zooplankton excellent, all small white forms. No fishermen at 5 p.m. Water 3" below spillway. Saw one large school of small minnows at spillway.

March 23, 1965 - Surface temp 46, Secchi 30" greenish. Zooplankton good, mostly small white forms, few large white ones. No fishermen at noon. Water 1' below spillway - no water going in. No weeds. Lots of snow on S. Slope of Mt. Taylor. Saw many minnows at spillway. Lots of diving ducks.

April 1, 1965 - Surface temp 52, pH 8.6, Secchi 4.5' bloom. Zooplankton excellent, all small forms. 105 fishermen at 11:30 a.m. and 106 fishermen at 1:45 p.m. Water 1' below spillway. No weeds. Jerry Vallo and Simon Juancio. Ditch to lake being repaired.

Rainbow fingerling plant:

9"	3	9.5"	0.32 lbs.	"C" 37.3	Fingerlings are 16% of
11"	1	11.3"	0.44	30.3	trout caught today.

Rainbow legals

8"	1	8.3	0.27	47.2
9"	-	-	-	-
10"	3	10.5	0.45	38.8
11"	7	11.4	0.56	37.8
12"	4	12.1	0.72	40.6
Av.	19	10.3"	0.52	38.6

April 16, 1965 - Surface temp 55, pH 8.6, Ec^3 1.37. Secchi 5' light bloom. Zooplankton excellent, all small white forms. 65 fishermen at 4:30 p.m. Water 1' below spillway. No weeds. Fingerlings make up 40% of catch.

Rainbow:				"C"	
8"	2	8.7"	0.23 lbs.	35.0	Fingerlings:
9"	5	9.2"	0.30	38.5	9.2" Sept. 64
10"	1	10.7"	0.48	39.2	9.2 Sept. 64
11"	3	11.9"	0.59	35.1	11.9
12"	2	12.4"	0.80	31.6	11.9
13"	2	13.3"	0.86	36.6	12.7
Av.	15	10.7"	0.48	36.2	13.0

Hermits Lake

April 20, 1965 - Fertilized

April 29, 1965 - Surface temp 61. Secchi about 3.5' good bloom. Zooplankton good, all small forms. 22 fishermen at 6:30 p.m. Water 1.2' below spillway. Weeds starting to grow in shallow water. Catching a few crawdads. Crawdads not biting yet. Channel cats not biting. Lots of minnows in shallow water. Still snow on S. slopes of Mt. Taylor.
Rainbow 9 8.8" 0.26 lbs. 37.9 "C" 8.0 - 11.9"

May 2, 1965 - Surface temp 60, pH 8.8, Discharge temp 53. Secchi 4 - 5' bloom decreasing. 65 fishermen at 9:30 a.m. Water 1.8' below spillway. Coontail starting to grow. Irrigation season started yesterday. Fishing good today. Lots of minnows.

June 1, 1965 - 1965 Income $5,290, 1964 on same date - $5,044.

June 3, 1965 - Surface temp 63, discharge temp 59, pH 9.3 on surface, pH 8.7 on bottom. Zooplankton fair, all small white forms. 35 fishermen at 4 p.m. Water 3.5' below spillway. Have been adding water at night. Milfoil and coontail growing as scattered plants. Weeds no problem yet. Trout in below av. cond. Fishing excellent today. Crayfish no problem. Fishermen catching lots of 5" chubs on cheese. Catching a few small catfish. Fatheads abund. spawning under ~~MMM~~ rocks.

June 22, 1965 - Added 1,360# 0-46-0.

June 24, 1965 - Surface temp 69, discharge temp 61. pH 9.5 on surface, pH 8.9 on bottom, pH 9.5 on surface in evening. Secchi 24", good bloom. Zooplankt poor. 20 fishermen at 10:30 a.m. Water 5' below spillway. Chara, milfoil, spike rush in water only 2' deep around dam. Deeper at N. end. Fishing fair, 18.5" - 3 lb. rainbow taken last week. Crayfish 1/2" long A few crawdads being taken by fishermen. Shrimp and damselfly larvae common in milfoil. Quite a few Rio Grande Chubs 6 - 7" being caught. Trout in below av. condition.

July 2, 1965 - Surface temp 68, discharge temp 61. Secchi 15" good bloom. Zooplankton fairly good, all small forms. 33 fishermen at 10:30 a.m. Water 5' below spillway. Not much weeds at dam, abund. at N. end. 1 pelican present. Fishing fair. Good No's of 6 - 7" chubs being taken. Large trout in good cond. - 10" trout in below av. cond.

July 22, 1965 - Surface temp 75, discharge temp 64, smalls. pH 9.9 on surface and pH 8.9 on bottom. Secchi 30" good bloom. Zooplankton fairly good - all small forms. 14 fishermen at 4:30 p.m. Water 6' be low spillway, Water going in at night again this week. A little coontail along dam, no problem. Y of y crawdads 0.6 - 0.9" long. Fishing poor past three weeks. 1 trout in distress along shore, probably from high pH.

August 9, 1965 - Surface temp 76, not irrigating. Secchi 20" good bloom. 3 fishermen at 5 p.m. Water 5.5' below spillway - water going in every night. No weeds at S. end of lake. Minnow dealer collecting fish now. Y of y crawdads 0.8 - 1.3" long. Fishing poor, lots of crawdads. Catfish still only 6 - 7" long.

Aug. 12, 1965 - Surface temp 81, discharge temp 64, water stinks. pH 9.8 on surface, pH 8.7 on bottom. Still a good bloom. Fair no. aquatic insects along shore. Weeds being pushed back at N. end of lake by crawdads. Water going in. 7 fishermen at 4 p.m.

Temperature Data - by Jerome Ortiz

Date - 1965	Surface Temp
April 19	40
May 1	45
May 15	53
June 1	60
June 15	65
July 1	65
July 15	70
August 1	77
August 2	80
August 15	77
September 1	70
September 15	68
October 1	61
October 15	58
November 1	58
November 15	50
December 1	40
December 15	40
December 20	Frozen
December 29	Frozen
December 31	40

Jermita Lake

Sept. 13, 1965 - Surface temp 60, pH 9.3 on surface. Secchi 12" @ 11 a.m. 2 fishermen at 5 p.m. Water 7" below spillway, water [illegible]. Weed beds at N. end of lake getting smaller. A few fish trout [illegible]. Fair no. of insects along shore. Minnow dealer has quit because of a lack of minnows. Crawdads still moving up into outlet in small no's - only large ones. Crawdads 1.2", 1.3", 1.4", 1.8" and 2.7".

Sept. 24, 1965 - Surface temp 65, pH 9.6 on E. shore. 2 fishermen at 6 p.m. Lots of ducks present. Fishing poor. Trout rising over most of the lake.

Sept. 28, 1965 - Surface temp 62 on W. Shore and 61 on E. shore. pH 9.5 on W. shore and pH 9.6 on E. shore. Secchi 21" on W. shore and 24" on E. shore. 10 fishermen at 9 a.m. (5 cars). Water ~~XXXX~~ going in. No evidence of crawdads burrowing under rip - rap.

Nov. 16, 1965 - Surface temp 49, pH 8.7, Ec^3 1.39. Secchi 3 - 4'. Zooplankton good, small white forms. 5 fishermen at 11 a.m and 7 fishermen at 4 p.m. Water 3' below spillway. A little milfoil floating along shore. Fishing fair, trout in below av. cond. Insects fairly abund. along shore. No water going in.
HCO^3 164 ppm, CO^3 40 ppm, Cl 122 ppm.

Dec. 3, 1965 - Surface temp 42, Secchi about 4' light bloom. Zooplankton fair. 7 fishermen at 10:30 p.m. Water 1.5' below spillway.- water going in. No weeds seen. Fishing fair. Jerome reports that best fishing is with spinners and flies. 19.5" trout taken last week.

Dec. 7, 1965 - Surface temp 41, pH 8.7, Ec^3 1.25. Secchi 3 - 4', good bloom. Zooplankton fairly good. 4 fishermen at noon. Water 1' below spillway - water going in. No weeds. Fishing slow.

Jan. 13, 1966 - 70% of lake frozen. Ice 1/2" thick. Water level 0.1' below spillway. No water going in.

Feb. 8, 1966 - Surface temp 38. Secchi 34", good bloom, looks rich. Zooplankton good, all small forms. pH 9.3. 80% of lake ice free. Snowing today.

Feb. 28, 1966 - Secchi 4-5' light bloom. Zooplankton excellent, mostly small forms. Surface temp 40. pH 8.7, Ec^3 1.48. No fishermen at 10 a.m. Water level 5" below the spillway, no water going in. Algae covering everything under the water. A little ice along shore.

March 15, 66 - Secchi 5-6' light bloom. Zooplankton excellent, all small forms. Surface temp 49. pH 8.9. 24 fishermen at 10 a.m. and 16 fishermen at 4 p.m. Water level 0.7' below spillway, ditch being repaired. A few coontail pieces floating along shore. Adult frogs and fathead minnows under rip-rap. Fishing good, trout 9-11" av. or below av. #C". Picked up 3 male crayfish on rip-rap and 3 yearlings in mud in seepage area below dam.

Mesa Hill Lake

April 4, 1966 - Water clear, Zooplankton good, all small forms. Surface temp 54. 12 fishermen at 11:30 a.m. (8 cars) fishing fair. Cold & windy today. Water level 10" below the spillway. Some filamentous algae. No water coming in. People complaining about high permit prices and limit. Picked up 5 crayfish on rip-rap.

April 15, 1966 - Secchi 30", good bloom. Zooplankton good, small white forms. Surface temp 57. 9 fishermen at 5 p.m. Water level 1' below spillway. Some filamentous algae. State Game Warden Present. No water has been added this spring. Largesttrout this spring 20" long, chubs starting to bite. 2 - 7" C. Cats taken last week. ph 8.7.
Rainbow 10 9.7" 0.31 lbs. "C" 34.1 8.4 - 10.5"

May 18, 1966 - Secchi about 3', good bloom, Zooplankton good, all small forms. Surface temp 64, discharge temp 56. pH 8.7. 11 fishermen at 10:30 a.m. Water level 2.5' below spillway, tribe adding water about 3 days a week. A little filamentous algae, weeds no problem. Fishing excellent. Fathead minnows spawning along dam. Chubs abund. at N.E. end of lake.

May 19, 1966 - pH 8.9, Weeds no problem. Fishing excellent. Largesttrout caught recently was 18.5" long. Crayfish not bothering fishermen.

June 2, 1966 - Secchi 30" good bloom, pH 9.0. Surface temp 66 on E. shore and 67 on W. shore. Discharge temp 60, smells of rotten eggs. 20 fishermen at 10 a.m. fishing good, but trout small mostly recent stockers. Water level 4' below spillway. Filamentous algae mod.abund, Sagg and milfoil growing in shallow water. 3 seine hauls - several 100 adult fathead minnows and 1 crayfish. Picked up 2 crayfish with young just ready to leave. Unable to find any small crayfish. Fathead minnows spawning under the rocks. A few adult male fathead minnows have sores on their bodies.

June 18, 1966 - Secchi 26" good bloom. Zooplankton good, all small forms. pH 8.9. Disvharge temp 63. 30 fishermen at 10:30 a.m. Don Garcia reports that crayfish are abund. in shallow water on the dam about 4:45 a.m. each morning. Water level 5.3' below spillway. Fishing excellent. Weeds becoming abundant in shallow water at N. end of lake. No weeds at S. end of lake. Quite a few shed crayfish skins found, all except 1 from an adult female. Lots of young of year crayfish under rocks in shallow water. Opened 8 stomachs of angler caught fish, no food only a little corn in one stomach.

August 16, 66 - Secchi 24" good bloom. Surface temp 70, discharge temp 66. 5 fishermen at 4 p.m. Surface pH 9.4, Discharge pH 8.8. About a month ago fish and crayfish reportedly came to shore following heavy winds - fish appeared in distress. Water level 7' below spillway. Lake had been lower 2-3 ~~XXX~~ weeks ago. No weeds at S. end of lake. Some in N. end but getting smaller. Adult fathead minnow under every rock.

MESA HILL LAKE (ACOMITA)

Aug. 18, 1966 - Secchi disc 32", good bloom. Surf. temp 74. Discharge temp--yes. 1 fishermen at 6 p.m. Some sago at N. end. Set 250' gill net at 6:40 p.m. in water 8' deep.

Aug. 19, 1966 - Dan Garcia, Secchi disc 30", good bloom. Zooplankton fair, all small form. Surf. temp 72. 5 fishermen at 8-10 a.m. Water level 7' below spillway. Sago being cut down by crayfish. 2 seine hauls--fair number of fathead minnows. Minnow dealer has been taking fathead minnows since July. Fee $10.00. Pulled gill net at 8:30 a.m:
Channel cats - 12, Chubs 86, Rainbow - 49 = 147 fishes.

Aug. 19, 1966 - 250' gill net for 13.83 hours.

Species	NO	AV.L	AV. WT.	"C"	LENGTH RANGE
Rainbow	49	9.5"	0.31	33.1	6.7 - 12.5"
Channel catfish	12	12.2	0.73	37.3	10.7 - 15.0"
Rio Grande Chubs	86	----	0.14	----	6.2 - 8.2"
Waterdog	1	----	----	----	-----
Crayfish	2	4.0	-----	----	3.8 - 4.2"

Largest chubs are all females with eggs in various stages of development. Must have a long spawning season. One large chub had eaten a fathead minnow.

Per acre	- trout	101	32 lbs.
	- Channel cat	33	24 lbs.
	-Chubs	178	25 lbs.
		81	

Per 50 acre lake there were 5,050 trout, 1,650 Channel cats and 8,900 chubs.

Trout 3.0, Perch 12,6, Sucker 8.5, Chubs 3.0, Channel cats 4.0

Sept. 20, 1966- Secchi disc 14" heavy unicelluler bloom. Surf. temp 69. Discharge temp. 62. 2 fishermen at 1 p.m. Water level 7' below spillway. Some water still coming in. A few sago plants taking root in shallow water. Evidence of heavy rain past few days. Crayfish 5, 1.8", Range 1.7 - 2.

Oct. 19, 1966 - Secchi disc 12" heavy bloom. Surf. temp. 63. Discharge temp 49. Heavy outflow 10 c.f.s. Heavy bloom. No small forms. 4 fishermen at 4 p.m. Fishing excellent, mostly trout, small. Water level 8' below spillway. None coming in. No aquatic weeds seen, except a little milfoil in N. pool. Treated N. pools with 1 gal. rotenone. Rip-rap honey-combed with crayfish burrows--Young and adult. Quite a few crayfish burrows in N. pools, but no crayfish found. Soil heavy. Treated watershed with 14 gals. rotenone.

Oct. 25, 1966 - Secchi disc heavy algae bloom. (Donald Garcia, Joe Sanchez). 1 fishermen at 9 a.m. Water level 11' below spillway(10 c.f.s. approximately going out, shows 2.10 on gage.) No aquatic weeds. Treated watershed with 11 gals rotenone.

Nov. 2, 1966 - Secchi disc heavy bloom. Discharge temp. 49. Release 2.10 on gage. 1 fishermen at 2 p.m.(fishing good, trout small, skinny). Water level about 18' below spillway. No aquatic weeds. Dug crayfish from burrows under rip-rap up to 10' above water line. Dug 9 crayfish out from under 1 rock. Leopard frogs, 3 also in burrows with crayfish.

Nov. 3, 1966 - Secchi disc. heavy bloom. Surf. temp 54. 3 fishermen at 3 p.m. Water level 21' below spillway. Outflow 2.12 on gage. No aquatic weeds. Lots of surface activity of fish. Lake has bottom soils black with organic matter.

Nov. 9, 1966 - Sonny Tuttle, Don Garcia - Secchi disc turbid. Picked up 1,724 crayfish below on outlet. Plenty more left behind. No fishermen all afternoon. Water level only 1-2' feet deep. No aquatic weeds. Pool covered about 5-6 acres. Treated with 3 gals. rotenone. Killed 1,000 of fathead minnows. Treated pool and stream at N. end of lake with 1 gal rotenone. Killed a few fatheads. A few trout and fatheads dead before treatment. Old dead trees need to be removed, covered up lots fishing line. A few large crayfish crawling about in water 1/2 inch deep at N. end of lake. Below dam fatheads, crayfish, large waterdogs. Stocked 334 crayfish from outletin pool at N. end of lake. Small crayfish still in burrows on dam 20' above water line.

Nov. 21, 1966 - Secchi disc moderate clear. 1 fishermen at 1 p.m. Water level rising--water coming in. No aquatic weeds. Cut dead trees that had been flooded on E. side of lake. Picked up 160 crayfish below outlet. Fatheads and a few waterdogs still alive. Several hundred dead catfish, some to 5-6 lbs.,dead ½ mi. S. of lake in ditch.

Nov. 23, 1966 - Jerome Ortiz - Secchi disc moderate clear. Surf. temp 44. No fishermen at 11 - 4 p.m. Water level rising. Water coming in. No aquatic weeds. Cut trees with chain saw on E. side of lake. Picked up 100 crayfish below outlet. A few dead trout and catfish in lake. Moderate number dead crayfish killed from rotenone. Crayfish still alive in burrows, 10' above present water line.

Jan. 13, 1967 - Secchi disc. frozen. Water level 7' below spillway. No water going in.

Jan. 25, 1967 - Water goingin.

Mar. 6, 1967 - Secchi disc clear. Surf. temp open. No fishermen at 11 a.m. Water level 1" below spillway. Water going in. No aquatic weeds. Will open March 15.

April 12, 1967-Secchi disc moderate clear. Zooplankton fair, mostly tiny forms. Surf. temp 52. Discharge temp--yes. No fishermen at 4 p.m. Water level 6" below spillway. No water going in. No aquatic weeds.
Irvin Quanico, Box 180, San Fidel
Elmer Chino
Joe C. Ray, Qubero

April 14,1967- 6 fishermen at 6 p.m.

May 2, 1967 - Secchi disc moderate clear. Zooplankton fair. Surf. temp 60. Discharge temp 49. 2 fishermen at 10:30 a.m. Water level 1.7' below spillway. No water going in. No aquatic weeds seen. A few trout rising.

May 18, 1967 - Irvin--Secchi disc clear. Zooplankton good, mostly small, white forms. Surf. temp 60. Discharge temp 56(gage- 1.64)Ten fishermen at noon. Water level 4.5 below spillway. Water going in. Weeds starting to grow, only 3-4" high. Fishing excellent.

	L	WT	C"	L. RANGE
Rainbow(12)	9.1"	0.25	34.2	8.1 - 10.1"

May 19, 1967 - Secchi disc moderate clear. 15 fishermen at 6 p.m. Water level--no water coming in.

June 6, 1967 - Elmer Chino -- Secchi disc 6-8' clear. Zooplankton good, mostly small forms. Surf. temp 65. Discharge temp--No. 14 fishermen at 6 p.m. Ph 9.1 Water level 6' below spillway. Shoreline fringe of sago.

		NO	AVG.L.	AVG. WT.	C"
Rainbow	7"	5	7.3"	0.17	38.7
	8"	8	8.6"	0.225	35.4
	9"	1	9.8"	0.28	29.7
Average totals		15	8.3"		36.3"

Elmer Chino, Box 297, San Fidel, New Mexico

Dam clear.of weeds. No irrigation for two days. No sign of young crayfish. Some rain water entered the lake yesterday. Entrance road on W. side needs fixing. Need more toilets. 250 fishermen reported on Memorial Day.

July 18, 1967 -Elmer Chino -- Secchi disc 32", good bloom. Zooplankton poor, all small form. Surface Ph9.6, Bottom ph 9.2 Surf. temp 73. Discharge temp 70.(Seems low in O^2). 20 fishermen at 3 p.m. Water level 8' below spillway. Heavy growth of sago at N. end. Only a light fringe of chara, filamentous algae and sago at S. end. No weeds on dam.

MESA HILL LAKE (Acomita)

July 18, 1967 (Continued) Crayfish keeping weeds at S. end under control. Good reproduction of crayfish. Also good reproduction of fathead minnows.

	NO	L	WT.	"C"
Rainbow	1	7.9	0.18	36.6
	7	8.3	0.21	36.7
	2	9.3	0.265	33.0
	1	10.3	0.37	33.9
AVG total	11	8.7"	0.23 lbs.	35.8

Aug. 10, 1967 - PH 8.8 next day. Secchi disc 40" light tea colored. Zooplankton fairly good, all small forms. Surf. temp 69. EC 0.90. Five fishermen at 2 p.m. (Fishing poor). Water level 4" below spillway, heavy flood Friday. A few sago plants floating on the surface. This is the first time since I've been in Gallup that summer rains have filled the lake.

Sept. 27, 1967 - Secchi disc about 5' light bloom long algae. Ph 8.6 Surf. temp 67. No fishermen at 4 p.m. Water level 2" below spillway. Lake filled Aug. 4 and refilled and spilled about 2 weeks ago. No aquatic weeds. Young of year crayfish commong under rocks on dam.

Sept. 30, 1967 - Secchi disc clear. 20 fishermen at 10 a.m. Water level 3" below spillway. No aquatic weeds. Ray Histie, Tribal Treasurer. $3,400 turned in from fishing program sofar.

	L	WT.	"C"
Rainbow--5	9.6	0.39	44.1
	9.4	0.32	38.5
	11.6	0.57	36.5
	11.8	0.62	37.8
	10.3	0.38	34.9
AVG. Totals	10.5"	0.46#	38.4

Oct. 11, 1967 - Secchi clear, light bloom. Surf. temp 65. 3 fishermen at 3 p.m. Water level full, trickling out spillway, water coming in. No aquatic weeds. Lots of organic debris and bluegreen algae floating on surface. Young crayfish are extremely abundant under rip-rap. Collected 150 young crayfish on rip-rap.

Rainbow:	11.9	0.64	37.9
Fingerling	10.3	0.44	40.4
"	10.1	0.43	41.7
"	10.0	0.42	42.0
	10.6	0.48	40.5

Nov. 30, 1967 - Secchi disc clear. Zooplankton fairly good, mostly medium sized cladocerans. Surf. temp 44. 1 fishermen at 4 p.m. Water level 4' below spillway, no water going in. Some fowl smelling bluegreen algae.

	L	WT.	"C"	(Continued)		
7 Rainbow	12.3	0.75	40.3	12.1	0.69	38.9
	11.4	0.64	43.3	11.3	0.62	43.1
	12.0	0.73	43.3	12.0	0.73	42.2
	11.3	0.66	45.8	11.8	0.69	42.4

LEJA HILL LAKE (ACOMITA)

Jan. 19, 1968 - Surf. temp frozen, little snow on the ice. No fishermen at 1:30 p.m. Water level 6" below spillway. No water going in. from San Jose. A little run-off going in from wash from Roche Baca's pond.

Mar. 12, 1968 - Secchi disc clear, 6-8' greenish. Zooplankton fair. Surf temp 46. No fishermen at 11 a.m. Water level 1' below spillway. No aquatic weeds. Some trees on the E. side knocked down by ice this winter.

Mar. 18, 1968 - The lake opened March 15. Reports indicate that 1,000 people fished from Friday thru. Sunday. Fishing reported fairly good. Daily fee - $1.50, Season fee - $5.00.

Mar. 22, 1968 - Irvin Juanico, Alfred Poncho--Secchi disc moderate clear. About43 fishermen at 5 p.m.(21 cars). Water level 1.1below spillway. Small trout, soft; large trout, hard. Permit fees 1.50 a day. $5.00 season. Fishers: 275 Friday, Mar. 15; 385 Sat., Mar. 16; 396 Sun., Mar. 17.

		NO	L	WT	"C"
Rainbow	- large	3	11.9	0.73	43.6
	- small	4	8.4	0.23	38.4

Largest trout caught thisspring 16.5" long.

May 1, 1968 - Secchi disc clear. Zooplankton good, white medium sized form. Surf. temp 59. 36 fishermen at 11 a.m.(18 cars). Water level 1.5' below spillway. No irrigation yet. Moderate amount of filamentous algae on the bottom. Still some snow on Mt. Taylor.

	NO	L	WT.	"C"
Rainbow	3	9.4	0.33	39.8
	4	10.4	0.46	41.0
	3	13.4	0.97	40.3
AVG Total	10	11.0	0.57	40.4

May 8, 1968 - Secchi disc clear. Zooplankton excellent, medium-sized cladocerans with eggs. Surf. temp 63. 25 fishermen at noon(fishing fair). Water level 1.5' below spillway, water going in. Bottom covered with filamentous algae. Also, a scum type algae floating along shore. Haven't started irrigating yet. Irvin Juanico reported 185 fishermen Sunday. Observed one school of minnows at the dam.

May 24, 1968 - Secchi disc clear. Zooplankton good. Surf. temp 64. Discharge temp 61(fishing good). 20 fishermen at 4 p.m. Water level 3' below spillway. Moderate shoreline fringe of filamentous algae. Troute are in good condition and average 11-12" long.

May 25, 1968 - Secchi clear. 115 fishermen at 11 a.m. Tribe has collected $5,745.50 in fishing permits so far.with $1,500 still out.

LOG HILL LAKE (CONTD.)

June 6, 1968 - Secchi disc clear. Zooplankton good. Ph9.0 Surf. temp 66. Discharge temp. 62. 50 fishermen at noon. Water level 3.5' below spillway. A little filamentous algae along dam. Crayfish are out and active. Recent hatch of fathead minnows. Fishing slow since last Saturday. Aquatic insects common. Female crayfish hatched eggs. Need rocks at N. end to control weeds.

	AVG. L	AVG. WT.	AVG "C"
9 Rainbow	11.5"	0.58	38.2

July 22, 1968 - Secchi disc about 4' good bloom. Zooplankton fair. Surf. temp 74. Discharge temp 69. Surface pH 9.0, bottom pH 8.6. Eleven fishermen at 11 a.m. Water level about 7' below spillway. No aquatic weeds along dam. Some reported at W. end. Fathead minnows abundant.

Rainbow	9.2	0.32	41.2
	7.7	0.20	43.3
	9.0	0.34	46.7
	11.3	0.63	43.7

July 26, 1968 - 24 fishermen at 5 p.m. Fishing fair. Tribe has reported $10,300 income sofar.--This year from fishing program.

Aug. 1, 1968 - Secchi disc moderate clear. 7 fishermen at noon. Water level about 8' below spillway. A few clumps of weeds at N. end. Fishing poor Shoreline alive with fathead minnows. Need to partially poison minnows.

Aug. 29, 1968 - Water level 3-3.5' below spillway. Lake level came up from a heavy rain 2 weeks ago. 17 fishermen at 10 a.m. Fishing fair. Fathead minnows becoming extremely abundant. Water going in and flowing out the outlet. Many adult crayfish have moved up the inlet. Some over 50 yards from the lake. Water clear at N. shore, but algae common and water green at E. shore.

Sept. 27-68 water level about 3' below spillway - water coming in 14 fishermen at 1 p.m. Good algal bloom

MESA HILL LAKE (ACOMITA)

Feb. 11, 1969 - At 3:45 there were 7 fishermen at the lake. No ice on the lake.

April 18, 1969- On the south side of the lake there were 11 fishermen at 6 p. m.

June 11, 1969 - Secchi disc 23 inches. Zooplankton outstanding. - Surface temp. 68. Water level 3½ - 4 ft. below spillway.
A fisherman caught a brown trout 16.0 inches long, weighing 1.90 lbs.. Its stomach contained crayfish remains. "C"= 46.4

July 18, 1969 - Ervin Juanico, Water level 5½ ft. below spillway. Surface temp. 76 on east side and 73 on west side. Discharge temp. 65° (H_2S odor). At 4 p. m., 8 fishermen on east side and 14 fishermen on west side.

July 25, 1969 - Ervin Juanico and Alfred Pancho, Surface temp. 78 on west side of lake near dam. At 1 p. m., 18 fishermen on east side of lake, 4 fishermen on the dam, and 4 fishermen on west side of Lake. Discharge temp. 69, strong smell of H_2S. Lots of cyprinds present. Crayfish young-of-year observed.

Aug. 20, 1969 - Surface temp. 76 on w. shore. Discharge temp. 70. At 3 p. m. there were 10 fishermen E. of dam and 9 fishermen W. of Dam. Water level 6 ft. below spillway. Discharge est. less than 1 c.f.s.. No odor of H_2S. Crayfish young of year observed. The following rainbow trout were caught by fishermen:

"C"	Lenght (in.)	Weight (lbs.)
32.3	9.3	0.26
29.2	9.5	0.25
32.5	9.4	0.27
31.9	8.7	0.21
33.6	9.3	0.27
35.1	9.7	0.32

Sept. 9, 1969 - Ervin Juanico, Surface temp. 75. Aphanizomenon present. 3 fishermen each fished 5 hrs. and caught the following rainbow trout:

"C"	Lenght (in.)	Weight (lbs.)
36.2	11.5	0.55
33.9	10.2	0.36
38.8	10.1	0.40
30.2	10.4	0.34
35.0	9.9	0.34
16.8	10.6	0.20
39.1	8.0	0.20
28.7	9.8	0.27

MESA HILL LAKE (ACOMITA)

Sept. 25, 1969 - Ervin Juanico, Surface temp. was 70 on east shore near dam and 65 on west shore near dam. Discharge temp. was 62. pH was 8.5 and EC was 1970 in the Lab. The following rainbow trout were caught by fishermen:

Lenght (in.)	Weight (lbs.)	"C"
11.0	0.49	36.8
11.0	0.46	34.6
10.7	0.47	38.4
10.0	0.30	30.0
8.4	0.20	33.7

Jan. 10, 1970- Lake covered with ice. According to Ervin Juanico, the ice is about 8 inches thick near shore but only about 2 inches thick in the middle of the lake.

May 14, 1970 - Surf. temp. 64 at west side of dam and at east side of dam. 13 of more fishermen at 5:30 p. m. Water level 2 ft. below spillway. Water being released for irrigation.

May 21, 1970 - On west side 12 vehicles and 30 fishermen at 6 p. m.. At least as many fishermen on east side.

June 4, 1970 - Secchi disc fairly clear. 25-30 fishermen at 4:40 p. m. and 35 at 5:35 p. m. Water level 2-3 ft. below spillway. The following rainbow trout were caught by fishermen from Albuquerque:

Length (in.)	Weight (lbs.)	"C"
15.0	1.28	37.9
13.7	1.15	44.7

Plenty of the recently stocked rainbows were being taken. Quite a few large fathead minnows under rocks near shore apparently spawning.

June 6, 1970 - 2:15 p. m. 31 fishermen west of dam. 2:25 p. m. 20 fishermen along the dam. 2:35 p. m. 38 fishermen east of the dam. Total count of fishermen was 89. The following rainbow trout were caught by fishermen today:

Length (in.)	Weight (lbs.)	"C"
13.1	0.98	43.6
13.2	0.80	34.8

MESA HILL LAKE (ACOMITA)

June 23, 1970 - At 3:50 p. m. talked with 2 little Indian boys who had caught a total of 9 channel catfish and 2 rainbow trout. They said that they caught them on worms.

August 18, 1970 - Assisted by Jerome Ortiz and Ervin Juanico. Secchi disc good bloom. Surface temp. 74½. Discharge temp. 72½. About 17 fishermen at 5:45 p.m. Water level about 5 feet below spillway. Observed 1 dying rainbow trout. Was informed that another one was also seen. Trout rising. Water running into lake. Staff gauge at discharge 1.40. Discharge has no H_2S odor. Was informed that there was an H_2S odor several weeks ago during the hottest weather. Minnows numerous in the shallows. Area around lake greatly improved: Dead trees all cut down; many rocks in parking area east of dam have been removed; additional work being done on "concession stand"; and plenty of trash cans available. Shelter west of dam still not finished. Toilets still in terrible shape. Still no shade trees planted.

August 20, 1970 - Assisted by Dave Foster. Collected water smaples near spillway and from northeast shore and obtained a pH of 9.1 at both places. According to the Tribal game wardens, 30 rainbow trout and 4 brown trout were found dead along the shore this morning. The largest brown trout was said to be 23 inches long.

Dec. 2, 1970 - 5 fishermen at 2:50 p.m. Water level 1-1½ feet below spillway. On the west side of the lake 4 new concrete picnic tables have been installed, 2 shelters and fireplaces built, and road improvement made. On east side of lake road improvements have been made and the toilets are being rebuilt. Terry Merkel

Dec. 30, 1970 - Water level about 1½ ft. below spillway. More than ¾ of lake frozen over. Some of the trees on the west side of lake have recently been but down. Terry Merkel

March 20, 1971 - (Sat) Weather partly cloudy and mild. Surf. Temp 52 at spillway. no discharge. 100 fishermen at 1:30 p.m. (¼ on east side, ¼ on dam, ½ on west side). Water level about 3 ft. below spillway. Fairly good bloom. Fishermen catching plenty of fish. Most of them about 9 inches but occasionlly one 6 or 7 inches.
Terry Merkel

April 21, 1971- 4:15 p.m. partly cloudy windy and cold. 4 hardy fishermen. Water level 3 or 4 ft. below spillway. Terry Merkel

Aug. 23, 1971 - Water level relatively stable. Fishing very slow.
Charlie Sanchez

ACOMITA LAKE -

Oct. 27, 1971 - Water running into lake from ditch. About 8 fishermen at 5:00 p.m. Water level about 4 ft. below spillway. Surface temp. 52°. Lake still not being drained. Terry Merkel

Jan. 6, 1972 - No fishermen at 2:00 p.m. Water level 31 ft. below spillway. Surf. Temp. ice cover. Fall and winter H_2O runs into lake until it fills up. Around May 1 they divert water upstream for irrigation. Many people selvished trout & catfish downstream along ditch when headgate was opened. B.I.A. had apparently worked on the headgate this morning, largest catfish caught was 22½" - largest trout caught was 24". Limited stream flow below headgate. Found many dead and alive fat-head minnows in ditch downstream. Also noticed many dead crayfish along the lake shoreline. According to Jerome, all fish in lake are dead. There is an estimated 3 surface acres of water in lake at present. Assisted by Jerome Ortiz. Charlie Sanchez

Jan. 31, 1972 - No fishermen at 10:00 a.m. Water level 12½ ft. below spillway. Very thin ice cover. Lake approximately ½ full. Water being deverted into lake. Charlie Sanchez

March 3, 1972 - 2 fishermen at 10:30 a.m. and 5 fishermen at 2:00 p.m. No fish caught. "Windy day." Crayfish being caught out of lake. Water level 6 ft. below spillway. Assisted by Jerome Ortiz. Charlie Sanchez

March 7, 1972 - According to Ray Histia, Bonded Treasurer of Acoma Pueblo, total income from permit sales at Acomita Lake during 1972 amounted to $14,903.25. Terry Merkel

April 3, 1972 - Water level 1½-2ft. below spillway. Water being discharged from lake. According to Jerome Ortiz, this has been going on since May 1. No water being run into lake. About 12 or 15 fishermen at 6 p.m. Terry Merkel

June 15, 1972 - Collected water sample at about noon; took it to Soils Lab and had it analyzed: pH = 9.0 E.C.X 10^6 = 1460. There was an obvious blue-green algae bloom but it did not look serious. Fred Garcia said people have complained about the fish having soft flesh and tasting "funny".

July 20, 1972 - Assisted by Jerome Ortiz. Surf. Temp. 72. Water level approximately 6 or 7 feet below spillway. Aquatic weeds numerous in upper end of lake. No water being discharged. Water being run into lake from ditch. Young-of-year crayfish observed in lake. Day before yesterday 40 dead RBT were picked up by Jerome Ortiz. Blue green algae bloom was gone. Terry Merkel

[illegible] - [illegible]

Sept. 11, 1972 - Second disc reading. [illegible]. Temp. 71°F. [illegible]. Discharge [illegible] at 2:00 p.m. Aquatic weeds now visible. Water [illegible] into lake from [illegible]. Heavy rains [illegible] last 2 to 3 days have brought the water level up to 3 feet below spillway. [illegible] debris floating on surface. Road to west side of dam is being repaired and trash is being picked up. Fishing slow.

Jerry Henkel

Oct. 17, 1972 - Secchi disc murky. Lake was receiving runoff from [illegible] showers. [illegible] lake at

Oct. 30, 1972 - Secchi disc murky. Water level is full. Heavy [illegible] with excellent runoff. [illegible] dam at

Dec. 7, 1972 - Ice along shore, ice cutting starting out into lake from north and west shores. Water level 3 or 4 inches below spillway, the highest it has been in several years. Learned from [illegible] that lake was closed to fishing on November 15 and will remain closed until March 1, 1973.

Jerry Henkel

March 1, 1973 - Secchi disc 40". Surf. Temp. 48°F. Discharge [illegible] cfs. 137 fishermen at 9:15 a.m. Water level 17" below spillway level. Lot of filamentous green algae along shoreline in shallow areas.

March 1, 1973 - Fish from Acomita Lake caught by fishermen on opening day:

Length (inches)	Weight (lbs.)	%	Length (inches)	Weight (lbs.)	%	Length (inches)	Weight	%
10.3	.75	31.3	11.0	.80	37.0	[illegible]	.81	[illegible]
10.3	.41	37.7	10.3	.84	[illegible]	18.4	2.31	34.1
11.3	.65	41.3	10.2	.36	35.3	17.3	2.34	36.1
10.4	.46	40.3	10.4	2.10	36.7	19.6	2.30	37.1
10.2	.34	32.0	9.9	.30	33.1	21.3	3.30	34.3
9.6	.34	38.4	10.2	.40	37.3	18.4	.70	31.7
9.3	.40	45.3	10.1	.38	38.3	9.1	.30	36.3
10.1	.42	40.7	9.0	.31	42.5	20.6	3.30	37.7
10.2	.42	38.5	9.7	.34	37.2	20.1	2.30	35.7
10.2	.43	42.4	10.7	.45	38.7			
10.3	.44	34.9	10.0	2.40	34.3			
9.3	.35	38.1	10.6	2.10	38.1			
9.5	.30	34.3	11.5	.40	38.2			
11.3	.50	34.3	10.3	.37	41.2			
9.7	.38	42.7	14.3	1.42	40.6			
9.3	.33	38.1	10.1	.70	38.5			
9.6	.33	34.3	20.2	2.80	35.1			
11.7	.50	38.3	23.3	5.50	35.1			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			

Judy Tanner

March 1, 1973 - [illegible]

April 12, 1973 - Secchi disc 30'. Surf. Temp. 58°F. 21 fishermen at 1:00 p.m. Water level 12' below spillway. Aquatic weeds none. Visibility unknown. Fish Plant: 2,000 Rbow 7-9/12" = 200 lbs.
Buddy Jansen

May 10, 1973 - Water level 18' below spillway. Surf. Temp. 80°F. Visibility 62' w/secchi disc w/sunshining. No aquatic weeds. 27 fishermen at 12:45 p.m. Williams Creek stocked on 5-9-73. Hacollers will stock today: 5-10-73. All fishermen complaining about crawdads. Fathead minnows appeared to be spawning in shallow, rocky areas.
Buddy Jansen

June 13, 1973 - Water level 8' below spillway. Surf. Temp. 84°F. Visibility 8' w/secchi disc w/sunshining. Aquatic weeds none. 17 fishermen at 12:45 p.m. Water being released for irrigation.
Buddy Jansen

Aug. 31, 1973 - Water level 8' below spillway. Surf. Temp. 80°F. Visibility estimate 30'. Aquatic weeds none. 8 fishermen at 9:00 a.m. 10 fishermen at 11:00 a.m. Wind blowing - partly overcast - quite chilly! (9:00 a.m.) (11:00 a.m.) Weather nice. Fishermen still complaining about crawdads! There is an algae bloom - appears to be green although it might be blue-green.
Buddy Jansen

Oct. 3, 1973 - Assisted by Sanchez. Water level low. Surf. Temp. 80°F. Visibility 24' w/secchi disc. Aquatic weeds none. 12 fishermen at 1:00 p.m. Some kind of algae bloom.

Length	Weight	"CL
10.5	0.38	30.0
11.5	0.38	37.0
9.8	0.30	34.0
10.8	0.38	31.0
10.3	0.26	24.0
10.8	0.39	33.0
12.2	0.60	30.0
11.0	0.42	31.5
10.9	0.35	27.0
9.0	0.24	33.0
10.2	0.30	28.5

Buddy Jansen

Dec. 20, 1973 - Water level 4" below spillway. Surf. Temp. ice cover. Visibility clear - ice cover. Aquatic weeds none. Closed to fishing. The lake is full - looks good.
Buddy Jansen

[illegible]

Feb. 11, 1974 - [illegible] fishermen waiting [illegible] for opening day [illegible] warm weather [illegible] for opening day [illegible] March.

March 1, 1974 - Water level 0" below spillway. Surf. Temp. 41°F at 12:00 noon. Visibility 60+ inches. Aquatic weeds none/some filamentous green algae. (Estimate) 400 fishermen at 10:00 a.m. Weather is moderate; air temperature about 50°F. - but quite windy. Fish are not biting real well - those that are being caught are real nice rainbows. Most 10-12". Some up to 20".

March 1, 1974 - Fish caught at opening day of fishing season:

Length	Weight	[illegible]
[illegible]	[illegible]	[illegible]
11.3	.72	41.0
11.0	.80	38.0
11.0	.78	39.0
11.5	.64	42.0
11.0	.58	44.0
10.1	.65	37.0
11.8	.62	41.0
11.4	.74	43.0
11.4	.64	46.0
11.3	.64	44.0
10.1	.40	39.0
10.0	.40	40.0
14.1	1.20	43.0
10.8	.54	41.5
11.2	.38	40.0
10.2	.42	38.5
10.2	.44	41.0
10.2	.38	38.0
11.2	.52	45.0
9.7	.40	44.0
9.7	.38	41.5
11.0	.58	43.5
11.5	.62	41.0
10.5	.44	38.0
9.8	.42	43.5
10.3	.42	38.5
10.0	.32	41.5
11.0	.32	43.0
10.0	.52	41.5
12.3	.72	38.5
9.7	.38	41.5
11.1	.35	42.5
8.3	.28	43.0

Buddy Jensen

ACOMITA LAKE

May 23, 1974 - Secchi disc clear. Surf. Temp. 62°F. Discharge Temp. 58°F. Est. 30 fishermen at 2:00 p.m. Water level 60" below spillway. Aquatic weeds none. Lots of fathead minnows spawning in the shallows and rocky areas. Lots of dead crayfish. Buddy Jensen

June 25, 1974 - Water level 80" below spillway. Surf. Temp. 80°F. Discharge Temp. 60°F. Visibility moderately clear. Aquatic weeds none. 44 fishermen at 2 P.M. Fishermen doing well during the cool part of the day. Catching fish up to 19". Buddy Jensen

Aug. 27, 1974 - Water level 95" below spillway. Surf. Temp. 68°F. Visibility 48" - bluegreen algae bloom. Aquatic weeds none. 10 fishermen at 9:30 a.m. Wardens say that fishermen are still doing pretty good and catching some real nice fish. Buddy Jensen

Sept. 13, 1974- Water level 98" below spillway. Surf. Temp. 64°F. Visibility clear. Aquatic weeds none. Two fishermen at 9:00 a.m. Sparse blue-green algae bloom (rod shaped)? pH = 8.5 No water entering or being released. Buddy Jensen

Oct. 10, 1974 - Water level 79" below spillway. Surf. Temp. 65°F. Aquatic weeds none. 33 fishermen at 11:45 p.m. Quite a bit of runoff entered lake from the recent rains. No other water entering lake. Heavy bloom of rod-shaped green or blue-green algae. Buddy Jensen

Jan. 28, 1975 - Water level 30" below spillway. Surf. Temp. 40°F. Visibility clear. Aquatic weeds none. Fishing closed. Lake had about 1/3 ice cover. Could use about 2 more feet of water in the lake before fishing season opens on March 1. Buddy Jensen

March 1, 1975 - Assisted by Ervin Juanico & Byron Wanye. Water level 30" below spillway. Surf. Temp. 44°F. Visibility clear. Aquatic weeds none. 250 fishermen at 10 A.M. Opening day of fishing season. Have a new Tribal Ranger this year - Byron Wanye. He replaced Robert Vicinte. At 10 A.M. the Acomas had sold 250 1-day permits and 75 season permits. Buddy Jensen

Rainbow Trout caught by anglers at Acomita Lake

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
11.2	.56	40.0	10.3	.44	40.5	11.9	.68	40.0
13.0	.80	36.5	11.6	.64	41.0	11.3	.62	43.0
11.3	.63	43.5	12.9	.85	39.5	10.9	.54	41.5
11.5	.60	39.5	10.7	.47	38.5	11.8	.71	43.0
11.8	.68	41.0	11.3	.66	46.0	13.8	1.25	47.5
11.5	.54	35.5	13.3	1.00	42.5	11.1	.59	43.0
15.3	1.38	38.5	11.8	.66	40.0	11.6	.62	39.5
11.3	.55	38.0	12.5	.81	41.5	12.5	.73	37.5
10.3	.42	38.5	13.6	.93	37.0	11.9	.66	39.0
10.3	.45	41.0	12.5	.82	42.0	12.3	.72	38.5
12.0	.70	40.5	13.2	.94	41.0	11.1	.55	41.0
11.5	.64	42.0	13.0	.87	39.5	12.2	.68	37.5
12.2	.77	42.0	12.7	.75	36.5	13.9	1.06	39.5
12.5	.82	42.0	11.4	.66	44.0	10.5	.48	41.5

(Continued)

ACOMITA LAKE

March 1, 1975 - (Continued)

Length	Weight	"C"	Length	Weight	"C"
12.8	.85	40.5	14.6	1.25	40.0
13.2	.90	39.0	12.4	.78	41.0
12.6	.72	36.0	11.8	.72	44.0
11.5	.66	43.5	12.4	.78	41.0
11.2	.62	44.0	12.3	.70	37.5
13.0	.82	37.5	12.9	.89	41.5

Buddy Jensen

April 29, 1975 - Assisted by Laweka, Sanchez. Water level 37" below spillway. Surf. Temp. 56°F. Visibility clear. Aquatic weeds none. 35 fishermen at 11:30 a.m. Fishing has been quite slow this spring with all the cool weather. Ray Concho said fishing permit sales are running behind sales during previous years. Buddy Jensen

June 18, 1975 - Assisted by Alex Laweka. Water level 50" below spillway. Surf. Temp. 68°F. Visibility moderately clear. Aquatic weeds none. 30 fishermen at 9:20 a.m. Fishing is fair. Many large fathead minnows along the shallow areas - many smaller ones also.

Buddy Jensen

Aug. 28, 1975 - Water level 60" below spillway. Surf. Temp. 72°F. Visibility quite clear. Aquatic weeds none. 2 fishermen at 10:30 a.m. A small algae bloom of some type. Need to get water running into lake.

Buddy Jensen

Oct. 10, 1975 - Assisted by Alex Laweka. Water level 1' below spillway. Surf. Temp. 74°F. Visibility quite clear (but extensive algae bloom). Aquatic weeds none. 10 fishermen at 3:50 p.m. Quite an extensive algae bloom. Water entering lake. pH = 9.78 Buddy Jensen

March 6, 1976 - Water level 30" below spillway. Surf. Temp. 51°F. Water clear.

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
13.3	1.11	48	12.1	.67	38	11.3	.61	42
12.8	.93	45	11.2	.55	39	13.7	1.05	43
11.7	.59	37	19.8	3.00	39	10.3	.54	50
10.8	.53	42	11.8	.74	45	11.2	.55	40
11.6	.60	39	10.7	.54	44	10.5	.54	48
12.0	.76	44	12.7	.79	39	9.5	.36	42
11.3	.62	43	11.3	.58	41	13.4	1.01	42
12.0	.63	37	11.9	.72	43	12.3	.69	37
11.9	.77	46	12.6	.73	37	13.3	.95	41
11.0	.60	45	13.9	1.08	43			

CHANNEL CATFISH

Length	Weight	"C"
14.7	.92	29

Alex Laweka

ACOMITA LAKE

March 23, 1976 - Assist ed by Ervin Juanico. Water level 30" below spillway. Surf. Temp. 52°F. Visibility clear. Aquatic weeds very little. 26 fishermen at 1:45 p.m. The tribal ranger advised that fishing has really been very slow. Alex Laweka

May 12, 1976 - Assisted by Laweka. Water level 4' below spillway. Surf. Temp. 62°F. Visibility moderately clear. Aquatic weeds none. 25 fishermen at 11:35 p.m. Observed fisherman taking trout - 15" T.L. Ranger requested browns on public request. Ben Robertson

June 22, 1976 - Surf. Temp. 71°F. Discharge Temp. 66°F. More than 20 fishermen were counted at 4:40 p.m. According to one fishermen, there were lots more earlier in the day. Fishing slow. Discharge water had strong odor of H_2S. Spawning fathead minnows were observed. Terry Merkel

July 1, 1976 - Assisted by Ervin Juanico. Water level 101" below spillway. Surf. Temp. 70°F. Visibility 1½ ft. Aquatic weeds filamentous algae. 35 fishermen at 5 p.m. Water level real low. Might keep a close eye on the algae bloom. pH = 9.32 Alex Laweka

July 29, 1976 - Water level 79" below spillway. Surf. Temp. 74°F. Visibility murky Aquatic weeds - none visible. 28 fishermen at 3 p.m. Water real brown in color. Fishermen report that fishing is real slow. pH = 9.35 Alex Laweka

Aug. 25, 1976 - Assisted by Ben and Arnold. Water level 75" below spillway. Surf. Temp. 80°F. Visibility clear. No aquatic weeds. 12 fishermen at 3:30 p.m. Fishing reported poor. Alex Laweka

Oct. 4, 1976 - Water level 65" below spillway. Surf. Temp. 56°F. Visibility clear. Filamentous algae on bottom of lake. 4 fishermen at 1 p.m. Alex Laweka

Nov. 24, 1976 - Water level 63" below spillway. Surf. Temp. 44°F. Visibility clear No aquatic weeds visible. 15 fishermen at 1:30 p.m. Observed a lot of plankton in the water around the shoreline. Alex Laweka

March 1, 1977 - Assisted by Andy Antonio. Water level 18" below spillway. Surf. Temp. 41°F. Visibility 2'. No aquatic weeds. No fishermen at 11 a.m. - 4 p.m. Gill netting - 1 hour set on each net. 2 were deep set where most of the fish were caught. 3 shallow water sets- very few fish caught from these sets. Approximately 300 waterfowl observed.

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C
12.6	.67	33	10.7	.45	37	11.2	.50	36
10.3	.38	35	12.3	.66	36	8.9	.23	33
10.7	.41	33	10.2	.37	35	9.7	.34	37
8.5	.22	36	10.6	.40	34	10.2	.43	41
10.1	.36	35	10.8	.44	35	9.9	.37	38
10.9	.50	39	11.2	.52	37	11.6	.47	30
11.2	.55	39	10.2	.42	40	11.3	.53	37
12.0	.58	34	11.5	.54	35	10.3	.38	33

CONTINUED

March 1, 1977 - Continued

Length	Weight	"C"
13.0	.78	36
10.5	.48	42
9.1	.29	39
10.8	.45	36
11.4	.52	35
12.3	.58	31
10.1	.40	39
13.1	.68	30
10.6	.39	33
9.7	.29	32
8.5	.23	38
9.4	.33	40
10.5	.46	40

Alex Laweka

March 5, 1977 - Assisted by NYC kids. Water level 18" below spillway. Surf. Temp. 45°F. Visibility 1½ ft. No aquatic weeds. 115 fishermen at 12 noon. Opening day of the 1977 season. Fishing real slow early part of the day but improved later in the day. I took weight and length of fishermen's catch and also took pictures of fishermen.

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
9.2	.29	38	11.7	.64	40	10.8	.55	44
12.7	.74	36	12.8	.69	33	8.2	.22	40
13.1	.74	33	11.1	.56	41	9.0	.23	32
11.5	.68	45	11.2	.57	41	8.7	.25	38
10.4	.38	34	8.0	.19	38	9.1	.25	33
8.6	.22	35	11.9	.64	38	9.3	.28	35
10.1	.36	35	12.8	.57	27	11.0	.48	36
8.5	.20	33	12.0	.65	38	8.9	.25	35
11.8	.62	38	11.9	.69	41	9.8	.40	43
19.9	2.85	36	12.3	.75	40			

CHANNEL CATFISH

Length	Weight	"C"
17.1	1.75	35

Alex Laweka

April 21, 1977 - Assisted by B. Robertson. Water level 18" below spillway. Surf. Temp. 64°F. Visibility clear. Aquatic weeds sparse. 20 fishermen at 3:30 p.m. Fathead minnows extremely abundant in shallows.

Alex Laweka

May 3, 1977 - Water level 38" below spillway. Surf. Temp. 65°F. Visibility clear. Submerged vegetation starting to grow in shallow areas. 20 fishermen at 3:30 p.m. The Governor and his council met with Chief o Police, Rangers, Ray Concho and I on their new rules and regulations for the lake. No water is running into the lake but there is water running out.

Alex Laweka

ACOMITA LAKE

May 18, 1977 - Ray Concho from Acoma Pueblo called to inform us on some catfish dying at Acomita Lake. The rangers have counted up to 27 dead catfish. Alex Laweka

May 19, 1977 - Assisted by Robert Vicente. Water level 44" below spillway. Surf. Temp. 63°F. Visibility clear. Submerged vegetation abundant throughout shallow areas. 22 fishermen at 11:05 a.m. pH = 8.50: D.O.=10ppm. Partial kill of channel catfish occurred last week but Pueblo did not inform this office about it until this week. Reasons for kill unknow TRout were not affected. Alex Laweka

June 13, 1977 - Water level 67" below spillway. Surf. Temp. 68°F. Visibility clear. Submerged vegetation growing in shallow areas and blue-green bloom just starting. 20 fishermen at 5 p.m. Also blue-green algae along banks of dam area. Water being discharged has odor of H_2S. So far about 100 channel catfish have died since they were planted at the end of May. They are still being picked up at the rate of 2 or 3 per day. pH = 8.60 Alex Laweka

June 28, 1977 - Water level 75" below spillway. Surf. Temp. 19°C. Visibility clear. Aquatic weeds abundant with submerged vegetation on the North side. 35 fishermen at 12 noon. Ranger Martinez advised that about 100-150 RBT died when they were planted last Thrusday. pH = 8.8; D.O.= 14ppm. No more catfish died since our last visit. Alex Laweka

July 22, 1977 - Water level 6½' below spillway. Surf. Temp. 18°C. Visibility clear. Blue-green algae starting to bloom. 23 fishermen at 1:30 p.m. Alex Laweka

August 2, 1977 - Water level 7' below spillway. Surf. Temp. 71°F. Visibility clear. Blue-green algae blooming and submerged vegetation abundant on shallow area on north side. 30 fishermen at 1 p.m. pH = 9.56 No water being discharged, Ranger said there is water being diverted from river. Alex Laweka

Aug. 24, 1977 - Water level 8'1" below spillway. Surf. Temp. 77°F. Visibility clear Submerged vegetation abundant on north side of lake. 6 fishermen at 3:15 p.m. Tribal rangers were saying that some of the fishermen have been catching chubs and suckers during the summer months. pH = 8.90 Alex Laweka

Sept. 21, 1977 - Surf. Temp. 15°C (60°F). Visibility 3'2" secchi disc. Blue-green algae abundant. 18 fishermen at 12 noon. pH = 9.05(?). Alex Laweka

ACOMITA LAKE

Dec. 8, 1977 - Assisted by J. Jojola. Water level 7½ below spillway. Surf. Temp. below 0°C. Visibility clear. No aquatic weeds visible. 12 fisherme at 4 p.m. Alex Laweka

March 23, 1978 - Assisted by Mackel. Water level 42" below spillway. Surf. Temp. 12° (54°F). Visibility clear blue-green. No aquatic weeds. No fisherme at 4:40 p.m. 20 waterfowl seen. Alex Laweka

March 29, 1978 - Assisted by Mackel and Robert Vicenti. Water level 35" below the spillway. Surf. Temp. 58°F. Visibility clear. No aquatic weeds visible. No fishermen at 9:15 a.m. About 200 waterfowl observed. We met with Mr. Ray Concho and Bob Vicenti on their creel census and notified them that we will be working with them closely throughout their fishing season. Alex Laweka

April 1, 1978 - Assisted by Jim Mackel. Water level 30" below spillway. Surf. Temp. 56.5°F. Visibility clear (blue-green). Submerged vegetation in shallow areas. 225 fishermen at 10:30 a.m. From 10:30 a.m. to 12:30 p.m. we measured angler-caught fish for condition factors and observed for marked fish. 80% of the fishermen had been fishing for at least 3 hours. We measured about 80% of the fishermen's catch. The fishermen on the east and northeast side of the lake were catchin more fish than the other fishermen fishing from the dam and on the west side.

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
13.4	.90	37	Holdover	10.0	.40	40	Marked
12.1	.89	50	Holdover	13.9	1.20	45	Holdove
13.0	1.02	46	Holdover	9.1	.30	40	Marked
12.5	.89	45	Holdover	10.9	.48	37	Marked
14.3	1.24	42	Holdover	15.3	1.33	37	Holdove
11.3	.64	45	Holdover	10.1	.40	39	Marked
13.3	.90	38	Holdover	9.2	.25	32	Unmarke
10.5	.50	43	Unmarked	11.0	.58	44	Holdove
12.4	.79	41	Unmarked	11.3	.60	42	Holdove
12.8	.98	47	Holdover	13.9	1.17	43	Holdove
12.8	.95	45	Holdover	12.1	.68	38	Holdove
15.2	1.46	41	Holdover	13.9	1.12	42	Holdove
16.8	2.00	42	Holdover	10.7	.60	49	Holdove
8.0	.20	39	Marked	11.8	.50	31	Holdove
12.3	7.4	40	Holdover	12.9	.84	39	Holdove
11.6	.64	41	Holdover	10.5	.50	43	Holdove
11.4	.72	49	Holdover	12.3	.80	43	Holdove
9.9	.40	41	Holdover	10.1	1.39		Marked
10.8	.58	46	Holdover	10.5	.50	43	Unmarke
12.7	.80	41	Marked	12.1	.80	45	Marked
11.1	.52	38	Holdover	11.5	.75	49	Holdove
10.6	.50	41	Marked	12.6	.84	42	Holdove
10.7	.52	42	Holdover	11.7	.72	45	Holdove

(CONTINUED)

April 1, 1978 - (Continued)

RBT Length	RBT Weight	RBT "C"	RBT Remark	CCF Length	CCF Weight	CCF "C"	CCF Remark
10.4	.44	39	Marked	14.6	1.08	36	
10.7	.58	47	Holdover	17.0	1.83	37	
11.0	.54	41	Marked	15.4	1.08	30	
11.2	.56	40	Holdover	17.3	1.80	35	
15.3	1.62	45	Holdover	17.8	1.88	33	
13.1	1.24	55	Holdover	21.8	3.56	35?	
11.6	.68	43	Holdover	15.9	1.33	33	
10.6	.56	47	Holdover	17.3	1.66	32	
10.7	.52	42	Marked	15.8	1.50	38	
12.0	.70	40	Holdover				

BNT Length	BNT Weight	BNT "C"
12.6	.82	41
11.8	.68	41
13.8	1.10	42
14.0	1.16	42
15.4	1.76	48
13.0	.82	37

Alex Laweka

April 7, 1978 - Assisted by Barton Martza. Water level 2' below spillway. Surf. Temp. 15°C (58°F). Visibility clear. Submerged vegetation starting to grow in shallow areas. 18 fishermen at 4 p.m. Alex Laweka

April 11, 1978 - Assisted by Bob Vicenti. Water level 25 3/4" below spillway. Surf. Temp. 58°F. Visibility clear green - 18" approx. No aquatic weeds visible. 93 fishermen at 4 p.m. Took creel census from 1:30 p.m. t 4 p.m. Counted 17 marked RBT; 19 unmarked RBT; 7 holdovers RBT: 8 holdovers CCF; 26 holdovers BRN; 13 RBT-unsure. Jim Mackel

April 15, 1978 - Assisted by Ed Seymour. Water level 20" below spillway. Surf. Temp 59°F. Visibility clear. Submerged vegetation growing in shallow areas. 123 fishermen at 11 a.m. We sampled some angler-caught fish for stomach contents and 90% of the trout contained blackfly larvae. Only a couple of fish had plankton in their stomach. No catfish wer sampled. The fishermen fishing on the dam were catching brown trout using worms. There were about a hundred waterfowl observed.

Alex Laweka

April 25, 1978 - Water level 17" below spillway. Surf. Temp. 58°F. Visibility clear green. No aquatic weeds visible. 78 fishermen at 12:15 to 2:15 p.m. At 2 p.m. Hatchery truck from Mescalero stocked 3,000 RBT, half of them marked, half unmarked.

Results of Creel Census from 12:15 to 2:15 p.m.

No.	Sp.	
47	RBT	Marked
15	RBT	Unmarked (recently stocked)
30	RBT	Holdovers (est. 12" to 18" long)
3	RBT	(Either recently stocked or holdovers) Unsure

(Continued)

April 25, 1978 - Continued from previous page

No.	Sp.	
3	BNT	8 caught by one person using Peacock nymph with red tail one caught with worm (est. length 12" to 18")
1	CCF	Est. length 18"

Bait used on all fish was: corn (whole kernel), fireballs, worms, flys - mostly blackknat and peacock nymph with red tail.

Jim Mackel

May 9, 1978 - Assisted by Ed Seymour. Water level 11 3/4" below spillway. Surf. Temp. 64°F. Visibility clear blue-green. Aquatic weeds present alo shore. 80 fishermen from 12:15 a.m. to 2:15 p.m. An abundant amoun of minnows schooling up, est. 200 to 300 in schools. Stomach sample revealed aquatic insects larvae and minnows-algae. Took creel censu from 12:15 a.m. to 2:15 p.m.

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
13.3	.80	34	Holdover	12.0	.74	43	Marked
15.3	1.33	37	Holdover	11.7	.62	39	Marked
13.1	.95	42	Holdover	12.0	.69	40	Marked
13.6	1.08	43	Holdover	12.1	.68	38	Marked
12.3	.81	44	Holdover	11.4	.57	38	Marked
11.0	.50	38	Holdover	10.6	.49	41	Marked
13.5	1.03	42	Holdover	9.5	.36	42	Marked
10.1	.42	41	Marked	9.7	.34	37	Marked
10.2	.42	40	Marked	9.3	.28	35	Unmarked
7.7	.18	40	Marked	9.3	.29	36	Unmarked
11.4	.56	38	Marked	9.3	.58	72?	Unmarked
11.3	.54	38	Marked	9.2	.34	42	Unmarked
11.2	.58	41	Marked	9.0	.34	47	Unmarked
9.9	.43	44	Marked	8.8	.30	44	Unmarked

BROWN TROUT

Length	Weight	"C"	Remark
14.1	1.20	43	Holdover
14.2	1.19	41	Holdover
14.2	1.23	43	Holdover
14.7	1.27	40	Holdover
13.5	1.10	44	Holdover
14.2	1.08	38	Holdover

CHANNEL CATFISH

Length	Weight	"C"	Remark
18.5	2.58	46	Holdover
12.7	.76	37	Holdover
15.6	1.40	37	Holdover

Jim Mackel

May 13, 1978 - Assisted by Ejay Lorenzo. Water level 10" below spillway. Surf. Te 70°F. Incoming Temp. 72°F. Visibility clear blue-green. No aquati weeds visible. 85 fishermen from 3:30 p.m. to 6:15 p.m. Took creel census from 3:30 p.m. to 6:15 p.m.

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May 13, 1978 - Continued from previous page

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
14.8	1.93	61	Holdover	11.7	.52	32	Marked
15.9	1.92	47	Holdover	9.7	.33	36	Marked
13.5	1.52	61	Holdover	10.8	.50	40	Marked
13.4	.99	41	Holdover	11.0	.59	44	Marked
14.5	1.16	33	Holdover	10.9	.53	40	Marked
12.7	.76	37	Holdover	9.1	.76	100	Unmarked
12.1	dressed		Holdover	8.8	.72	98	Unmarked
12.2	.75	41	Holdover	11.7	.72	44	Unmarked
13.1	1.09	41	Holdover	9.5	.36	41	Unmarked
11.7	.65	40	Holdover	11.9	.71	42	Unmarked
10.7	.55	44	Holdover	9.3	.32	39	Unmarked
10.5	.94	80	Marked	9.3	.32	39	Unmarked
10.6	.98	81	Marked	9.6	.32	36	Unmarked
9.8	.83	87	Marked	9.5	.36	41	Unmarked
11.1	1.02	75	Marked	9.5	.34	34	Unmarked
12.3	.77	41	Marked	9.1	.28	37	Unmarked
11.9	.62	35	Marked	9.3	.30	37	Unmarked
11.0	.53	39	Marked	9.3	.28	34	Unmarked
11.9	.67	39	Marked	9.2	.38	48	Unmarked
9.2	.32	41	Marked	10.2	.48	45	Unmarked
10.5	.47	40	Marked	9.6	.40	45	Unmarked
10.6	.50	41	Marked	9.5	.39	45	Unmarked
11.3	dressed		Marked	9.6	.40	45	Unmarked
11.7	.57	36	Marked				

BROWN TROUT

Length	Weight	"C"	Remark
14.5	1.80	58	Holdover
16.1	1.64	45	Holdover
13.4	1.04	43	Holdover
14.5	1.17	38	Holdover

CHANNEL CATFISH

Length	Weight	"C"	Remark
16.6	2.07	59	Holdover
16.3	1.50	34	Holdover
14.5	1.15	37	Holdover
14.7	1.26	39	Holdover

Jim Mackel

May 26, 1978 - Water level 16" below spillway. Surf. Temp. 70°F. Visibility clear. Submerged vegetation growing in shallow areas. 26 fishermen at 1:50 p.m.

Alex Laweka

May 29, 1978 - Water level 20" below spillway (est.). Surf. Temp. 65°F. Visibility clear. Submerged vegetation starting to grow in shallow areas. 75 fishermen from 10:30 a.m. to 2:30 p. m. I conducted creel census and took pictures of some fishermen and fish caught. The rangers said that this day has had the least number of fishermen for the weekend.

Alex Laweka

ACOMITA LAKE

June 3, 1973 - Assisted by Ejay Lorenzo. Visibility clear blue-green. Heavy filamentous algae along eastern shore, north of rocky edge. Water not being released for irrigation. 75 fishermen from 12 noon to 2:50 p.m.

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
11.5	.58	38	Marked	10.0	dressed		Unmarked
10.5	.41	35	Marked	9.4	dressed		Unmarked
9.5	.28	33	Marked	9.2	dressed		Unmarked
11.3	.56	38	Marked	11.1	.56	41	Unmarked
12.4	dressed		Marked	9.9	.43	44	Unmarked
10.5	dressed		Marked	10.9	.53	41	Unmarked
11.3	dressed		Marked	10.4	.48	43	Unmarked
12.1	dressed		Marked	9.8	.31	33	Unmarked
11.0	dressed		Marked	9.8	.26	28	Unmarked
10.8	.48	38	Marked	12.5	.85	43	Unmarked
12.0	.68	39	Marked	8.8	.30	44	Unmarked
12.2	dressed		Marked	10.0	.40	40	Unmarked
10.8	.46	37	Marked	8.6	.26	41	Unmarked
10.3	.44	40	Marked	8.2	.20	36	Unmarked
12.2	.72	40	Marked	8.6	.20	32	Unmarked
11.6	.63	40	Marked	9.2	.36	46	Unmarked
11.9	.66	39	Marked	8.7	.26	40	Unmarked
10.3	.36	33	Marked	8.6	.26	41	Unmarked
10.9	.55	42	Marked	8.4	.24	41	Unmarked
11.5	.54	36	Marked	8.1	.22	41	Unmarked
12.8	.84	40	Marked	9.4	.30	36	Unmarked
11.2	.52	37	Marked	8.6	.26	41	Unmarked
11.1	.55	40	Marked	14.2	dressed		Holdover
10.4	.42	37	Marked	12.4	dressed		Holdover
10.5	.46	40	Marked	13.2	.86	37	Holdover
11.5	.68	45	Marked	12.0	.70	40	Holdover
10.1	dressed		Marked	10.9	.58	44	Holdover
10.2	.46	43	Unmarked	12.2	.68	38	Holdover
8.5	dressed		Unmarked				

BROWN TROUT

Length	Weight	"C"	Remark
15.3	.45	13	Holdover

CHANNEL CATFISH

Length	Weight	"C"	Remark
20.3	3.38	39	Holdover

Jim Mackel

June 10, 1978 - Assisted by Rick Brown. Water level 22" below spillway. Surf. Temp. 66°F. Discharge Temp. 62°F. Visibility clear blue-green. Filamentous algae on sandy shores, water milfoil on ricky shores with algae. Submerged vegetation present but not yet to surface. Water being released for irrigation , Temp. 62°F. Water coming in from irrigation overflow Temp. 72°F. Due to heavy winds, fishermen turnout was low. 40 fishermen at 6 p.m.

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June 10, 1978 - Continued from previous page

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
11.9	.67	40	Marked	9.6	.38	43	Unmarked
12.0	.67	39	Marked	9.2	dressed		Unmarked
12.3	.73	39	Marked	10.7	.51	42	Unmarked
9.8	.36	38	Marked	8.0	.20	39	Unmarked
11.3	dressed		Marked	10.7	.56	46	Unmarked
12.1	.69	39	Marked	8.7	.27	41	Unmarked
12.5	.83	42	Marked	14.2	1.17	41	Holdover
12.2	dressed		Marked	14.4	1.30	43	Holdover
12.3	dressed		Marked	15.2	1.51	43	Holdover

CHANNEL CATFISH

Length	Weight	"C"	Remark
16.4	1.62	37	Holdover

Jim Mackel

June 18, 1978 - Assisted by Ejay Lorenzo. Water level 26" below spillway. Surf. Temp. 76°F. Visibility clear blue-green. Filamentous algae 3/4 around lake shore - medium to heavy. 41 fishermen at 3:15 p.m.

Jim Mackel

July 18, 1978 - Assisted by Ed Seymour and Brian Hepting. Surf. Temp. 75°F. Discharge Temp. 72°F. Visibility green clear. Submerged vegetation growing from bottom but not yet to surface. Filamentous algae - water milfoil. Water being released for irrigation. Baby crayfish and minnow fry abundant. 40 fishermen at 7:15 p.m. Three Rio Grande chubs caught:

Length	Weight	"C"
7.8	.25	53
7.9	.24	49
7.6	.23	53

CREEL CENSUS RESULT FROM 5 p.m. TO 7:15 p.m.

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
12.0	.69	40	Marked	11.3	.54	38	Marked
11.3	.58	40	Marked	12.0	.69	40	Marked
11.0	.55	41	Marked	10.7	.47	38	Marked
12.2	.70	39	Marked	12.4	.79	42	Marked
11.0	.49	37	Marked	13.6	.92	37	Marked
12.2	.75	41	Marked	12.2	.67	37	Marked
12.2	.75	41	Marked	12.4	.70	37	Marked
9.6	.38	43	Marked	12.5	.70	36	Marked
12.5	.72	37	Marked	10.8	.49	39	Marked
11.4	.60	40	Marked	10.0	.41	41	Marked
12.2	.70	39	Marked	11.6	.60	39	Marked
10.7	.48	39	Marked	12.1	.67	38	Marked
13.8	.77	29	Marked	12.5	.73	38	Marked
12.3	.63	34	Marked	10.2	.42	40	Marked
12.9	.82	38	Marked	11.3	.54	38	Marked

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July 18, 1978 - Continued from previous page

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
10.1	.38	37	Marked	11.7	.56	41	Unmarked
11.3	.58	40	Marked	9.0	.28	39	Unmarked
11.1	dressed		Marked	11.6	.68	44	Unmarked
12.0	dressed		Marked	9.7	.39	43	Unmarked
12.0	.68	40	Unmarked	9.7	.38	42	Unmarked
10.3	.39	36	Unmarked	13.1	.79	35	Unmarked
10.0	.43	43	Unmarked	11.3	.54	38	Unmarked
9.3	.31	39	Unmarked	10.0	.39	39	Unmarked
10.2	.42	40	Unmarked	9.7	.38	42	Unmarked
9.5	.35	41	Unmarked	9.7	.38	42	Unmarked
9.8	.41	44	Unmarked	11.7	.65	41	Unmarked
11.4	.62	42	Unmarked	10.5	dressed		Unmarked
10.4	.50	45	Unmarked	10.6	dressed		Unmarked
10.9	.49	38	Unmarked	9.7	dressed		Unmarked
10.5	.45	39	Unmarked	11.1	dressed		Unmarked
9.5	.36	42	Unmarked	12.7	.86	42	Holdover
10.2	.48	45	Unmarked	15.4	1.51	41	Holdover
9.5	.20	24	Unmarked	14.5	dressed		Holdover
9.7	.33	36	Unmarked	14.7	dressed		Holdover
9.5	.33	39	Unmarked	13.2	dressed		Holdover
10.0	.41	41	Unmarked				
9.6	.39	44	Unmarked				

CHANNEL CATFISH

Length	Weight	"C"
17.6	1.73	32
16.0	1.62	40

Jim Mackel

July 19, 1978 - Assisted by Bryan Hepting and Ejay Lorenzo. Surf. Temp. 76°F. Discharge Temp. 71°F. Visibility green clear. Blue-green algae present along southwest shore. Water milfoil present along northeast shore. Filamentous algae along north and northeast shore. Submerged vegetation along north and northeast shore not yet to surface. Thousands of minnows along entire shoreline. Incoming trickle 86°F. 36 fishermen at 11:30 a.m.

CREEL CENSUS RESULT FROM 10 A.M. TO 11:15 A.M.

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
10.4	.48	43	Marked	9.1	.32	43	Unmarked
10.5	.40	35	Marked	10.1	.48	47	Unmarked
11.7	.69	43	Marked	13.1	.92	41	Unmarked
10.3	.44	40	Marked	9.3	.32	40	Unmarked
11.0	.54	41	Marked	9.3	.34	43	Unmarked
11.7	.69	43	Marked				

CHANNEL CATFISH

Length	Weight	"C"
20.3	2.99	34
12.9	.77	36
20.8	3.73	37

Jim Mackel

ADDITIONAL LAKE

July 25, 1973 - Assisted by Bryan Hepting and Ejay Lorenzo. Water level 48" below spillway. Surf. Temp. 75°F. Discharge Temp. 72°F. Visibility turbid along shore, secchi disc reading 3'8" - green murky. Aquatic weeds surfaced and submerged. Filamentous algae on surface on north side of lake; a patch 200 yds. x 15 yds. in horseshoe shape from east to west. Also along sandy shores of lake. Water milfoil along southern shoreline. Round blue-green algae present. Submerged vegetation also on north end, northwest, and northeast sides of lake. Water being released for irrigation. 23 fishermen at 4 p.m. Minnow fry, adult and baby crayfish abundant. Wind from northwest and cloudy (dark clouds).

CREEL CENSUS RESULT FROM 3:30 P.M. TO 5:30 P.M.

RAINBOW TROUT

Length	Weight	"C"	Remark	Length	Weight	"C"	Remark
10.9	.51	39	Marked	10.3	.45	44	Unmarked
10.7	.50	41	Marked	10.2	.47	45	Unmarked
11.8	.60	36	Marked	11.9	.64	38	Unmarked
11.5	.61	40	Marked	9.3	.33	41	Unmarked
10.0	.40	40	Marked	12.7	.86	42	Unmarked
13.1	.85	38	Marked	9.8	.47	50	Unmarked
11.3	.52	36	Marked	8.8	.31	46	Unmarked
11.0	.56	42	Marked	9.6	.36	41	Unmarked
11.6	.61	39	Marked	10.5	.46	40	Unmarked
11.8	dressed		Marked	9.7	.36	40	Unmarked
9.4	.33	40	Unmarked	10.2	.44	42	Unmarked

CHANNEL CATFISH

Length	Weight	"C"
13.2	.80	35
13.0	.80	36
12.9	.80	37
13.8	.94	36
16.2	1.50	35

Jim Mackel

July 26, 1978 - Assisted by Joe Leno. Water level 53" below spillway. Surf. Temp. 77 to 78°F. Discharge Temp. 72°F. Visibility green murky, 3'2" secchi disc reading. Filamentous algae 100 yds. out from northern shore. Also along east and west shore with water milfoil and narrow-leaf pondweed. Submerged vegetation present - few surfaced 75 to 100 yards from northeast shore. Blue-green algae clustering up and abundant. Saw 2 fish jump. Abundance of crayfish and minnows. 50 water fowl present with young. Temp. at south side by spillway is 78°F. T.T. 23°C - 71.5°F, pH = 9.09. Temp. at north side was 77°F. T.T. 23°C - 71.5°F, pH=9.16. pH sample taken at 1:30 p.m., tested at 5:15 p.m. for north side. pH sample taken at 3 p.m., tested at 5:25 for south side.

CREEL CENSUS RESULT FROM 1:45 P.M. TO 3 P.M.

RAINBOW TROUT

Length	Weight	"C"	REMARK	Length	Weight	"C"
9.8	.38	40	Unmarked	7.2	dressed	
9.4	dressed		Unmarked			

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CHANNEL CATFISH

Length	Weight	"C"
17.7	2.40	43
20.0	3.29	41
14.5	1.01	32

Jim Mackel

Aug. 15, 1978 - Assisted by G. Ortiz and E. Seymour. Water level 4' below lip of spillway. Surf. Temp. 72°F. Visibility 4'10" secchi disc reading. Submerged vegetation abundant in shallows, heavy blue-green algae bloom in deep waters. 22 fishermen at 1 p.m. pH = 9.11

Depth	Temp.	D.O.
Surface	72°F	8ppm
2'	71°F	
4'	70°F	
6'	70°F	
8'	70°F	7ppm
10'	70°F	
12'	69°F	
14'	69°F	
16'	69°F	6ppm
(Bottom)		

Alex Laweka

Dec. 29, 1978 - Water level almost full - 4' from spillway. Some ice around shore. Geese in the center of lake.

Ken Harper

Feb. 27, 1979 - Assisted by 4 Manpower employees. Water level 1' below spillway. Visibility clear. Filamentous algae along most of the shoreline and submerged vegetation growing to the surface in the shallow areas on the north side of the lake. No fishermen from 12:30 p.m. to 4:30 p. We observed about 300 waterfowl: canvasbacks, pintails, buffleheads cadwalls, common mergansers, and ruddy ducks. Gill net set from 1 p.m. to 3:15 p.m.

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"
18.3	2.26	38	10.7	.52	43	10.9	.53	
14.7	1.27	40	11.0	.52	39	10.5	.50	
13.9	1.08	40	11.2	.58	41	10.4	.47	
15.5	1.52	41	9.8	.37	39	10.3	.47	
17.5	2.28	42	10.5	.47	41	9.3	.36	
14.5	1.24	41	9.3	.36	45	10.2	.46	
11.5	.56	37	9.9	.42	43	9.6	.32	
12.1	.74	42	11.0	.61	46	9.7	.35	
13.0	.96	44	13.8	1.14	43	9.6	.35	
14.7	1.25	39	10.4	.44	39	9.7	.42	
10.7	.54	44						

BROWN TROUT

Length	Weight	"C"
16.7	1.88	40
16.3	1.73	40
15.7	1.48	38

Alex Laweka

ACOMITA LAKE

April 1, 1979 - Assisted by Dusty Laweka. Water level 1' below lip of spillway. Surf. Temp. 48°F. Visibility clear. No aquatic weeds visible. 110 fishermen at 3 p.m. We weighed and measured for total length fish caught by anglers in the afternoon on opening day. Channel 7 KOAT TV Sports Program had been out here in the morning to report on opening day fishing on this lake and to interview fishermen on the Tribe's raising the cost of the fishing permits. A lot of fishermen will not consider coming back if the fishing permit remains at $4.00 per day.

RAINBOW TROUT								
Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
13.1	.97	43	9.5	.31	36	11.0	.64	48
11.5	.68	45	12.8	.90	43	11.3	.53	37
11.2	.49	35	12.5	.84	43	10.7	.50	41
13.8	1.08	41	11.8	.68	41	12.5	.90	46
10.9	.52	40	10.9	.52	40	14.1	1.08	38
14.0	1.00	36	10.8	.45	36			
11.5	.68	45	10.8	.46	37			

BROWN TROUT			CHANNEL CATFISH		
Length	Weight	"C"	Length	Weight	"C"
16.2	1.61	38	15.3	1.24	35

Alex Laweka

June 1, 1979 - Assisted by Bob Vicenti. Water level 4'4" below spillway. Surf. Temp. 62°F. Visibility clear. Submerged vegetation abundant in shallows. 25 fishermen at 11:30 a.m. Water running into lake and being discharged. Discharge smells of H_2S. Alex Laweka

June 3, 1979 - Assisted by Dusty. Water level 4½' below spillway (estimated). Visibility clear. Submerged vegetation growing in shallow areas. 149 fishermen at 2 p.m. Water running into lake and being discharged. Discharge smells of H_2S.

RAINBOW TROUT						CHANNEL CATFISH		
Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
13.4	.87	36	10.4	.50	45	16.9	1.77	36
15.6	1.40	37	10.6	.49	41	15.0	1.25	37
11.7	.65	41	11.9	.68	40	16.8	1.68	35
15.4	1.44	39	9.3	.30	37	18.2	2.46	40
11.6	.61	39	13.4	.90	37	18.0	1.96	33
11.3	.60	42	11.0	.57	43			

Alex Laweka

Aug. 23, 1979 - Water level 8' below spillway. Surf. Temp. 16°C. Lots of aquatic weeds at upper end - slight bloom. 10 fishermen at 6:45 p.m. pH = 9.2 Ken Harper

Sept. 7, 1979 - Water level 6' below spillway (estimated). Surf. Temp. 75°F. Visibility murky. Submerged vegetation abundant in the north shallow waters and a moderate blue-green algae bloom. No fishermen from 12 noon to 6 p.m. pH = 9.1 by the spillway. Alex Laweka

ACOMITA LAKE

Feb. 16, 1980 - Assisted by Darrel Felipe and Nacio. Water level 8" below spillway. Surf. Temp. 41°F. Visibility clear. No aquatic weeds visible. No fishermen at 10 a.m. to 3:30 p.m. We set 4 gill nets starting 10 a.m. and pulled the two shallow sets at 1:30 p.m. and resetted for overnight.

RAINBOW TROUT						CHANNEL CATFISH		
Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
14.3	1.05	36	12.9	.75	35	23.4	5.64	44?
12.8	.92	44	14.5	1.08	35			
9.6	.35	40	10.1	.37	36			
14.1	.94	33	13.9	.88	33			
9.7	.36	40	11.2	.52	37			
14.8	1.22	38	13.9	.96	36			
9.9	.38	39	9.7	.30	33			
10.7	.46	38	9.8	.33	35			
14.0	1.18	43	9.5	.38	45			
10.5	.46	40	10.2	.43	40			

Alex Laweka

Feb. 17, 1980 - Assisted by Darrel Felipe and Nacio. Water level 8" below spillway. Surf. Temp. 48°F. Visibility clear. No aquatic weeds visible. 2 fishermen at 10 a.m. to 3 p.m. 4 gill nets set overnight - 2 from 10 a.m. 2/16/80 to 10 a.m. 2/17/80 - 2 from 2 p.m. 2/16/80 to 10 a.m. 2/17/80.

RAINBOW TROUT								
Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
14.4	1.35	45	9.9	.38	39	8.7	.24	37
14.5	1.44	47	8.3	.26	46	7.6	.20	46
18.5	3.20	50	10.0	.44	44	9.1	.36	48
14.5	1.55	50	9.0	.37	51	9.3	.36	45
13.8	1.05	40	10.1	.38	37	8.5	.30	49
12.5	.85	44	9.0	.34	47	9.7	.34	37
15.1	1.30	38	9.1	.33	44	8.5	.28	46
12.1	.78	44	9.2	.32	41	9.1	.40	53
13.3	1.02	43	9.7	.44	48	9.7	.34	37
13.1	.98	44	9.4	.32	39	8.0	.26	51
12.5	.72	37	9.8	.36	38	8.5	.24	39
10.7	.50	41	8.9	.34	48	9.7	.34	37
9.0	.32	44	9.3	.32	40	10.1	.44	43
9.0	.33	45	9.0	.32	44	9.3	.36	45
8.7	.27	41	9.5	.34	42	8.1	.26	49
9.0	.26	36	9.8	.38	40	9.1	.38	51
9.4	.34	41	10.3	.48	44	9.5	.36	42
10.7	.50	41	9.0	.32	44	8.5	.28	46
10.9	.48	37	9.6	.38	43	9.0	.34	47
9.6	.35	40	9.2	.32	41	8.1	.27	51
9.3	.38	47	9.5	.27	31	9.1	.30	40
9.2	.34	44	8.9	.34	48	9.8	.38	40
10.2	.48	45	10.3	.48	44	8.7	.30	46

CHANNEL CATFISH						BROWN TROUT		
LENGTH	WEIGHT	"C"	LENGTH	WEIGHT	"C"	LENGTH	WEIGHT	"C"
18.2	2.30	38	17.7	2.06	37	18.2	2.80	46
20.5	4.00	43	19.3	2.54	35	15.0	1.62	48
14.8	1.60	49	22.0	4.08	48	18.0	2.48	42
17.3	2.12	41	22.3	4.30	49	19.2	3.30	47
19.2	2.30	32	19.8	4.45	57			
19.4	2.44	33	24.5	5.64	36			
20.2	2.98	35						

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Feb. 17, 1980 - (CONTINUED FROM PREVIOUS PAGE)

LENGTH	WEIGHT	LENGTH	WEIGHT
5.7	.10	5.4	.09
7.5	.22	5.3	.11
5.7	.11	5.3	.10
9.8	.42	5.2	.08
8.7	.36	5.9	.11
7.7	.22	6.5	.14
8.1	.30	5.7	.12
7.5	.22	5.6	.10
5.5	.11		

Alex Laweka

April 2, 1980 - Water level 1 ft. below spillway. Surf. Temp. 44°F. Visibility clear. No inflow. Presented to the crew that will be selling permits for the lake on the use of creel census and the monthly permit sales reports that will be prepared by them. It's a cold windy day. The lake will open for fishing Monday, April 7, 1980 but they will not advertise opening day unt the 12th, which is on a Saturday. This will give the new crew a chance t get the hang of selling permits and get used to taking creel census by th time the weekend fishing pressure starts. Alex Laweka

April 13, 1980 - Assisted by Bob Vicenti. Water level 1' below spillway. Surf. Temp. 52° Visibility clear. Rooted vegetation starting to grow in the shallow wate 106 fishermen at 11 a.m. We weighed and measured for total length on som of the fish caught by anglers. Fishing was good today considering the co weather and snow. This was the first weekend the lake is open since it opened on Monday, 4/7/80.

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
11.5	.60	40	11.3	.43	30	9.6	.32	36
10.6	.46	39	10.5	.44	38	10.6	.50	42
11.3	.52	36	9.0	.26	36	8.5	.22	36
12.0	.64	37	8.0	.20	39	8.1	.26	49
12.5	.72	37	8.8	.26	38	8.6	.29	46
10.7	.52	42	10.5	.62	54	8.0	.19	37
11.8	.60	36	8.8	.26	38	14.1	.92	33
11.0	.50	38	11.5	.64	42	9.2	.28	36
11.5	.56	37	11.0	.54	41	11.5	.35	23
10.3	.40	37	10.8	.50	40	9.8	.32	34
9.1	.38	51	10.7	.56	46	8.9	.32	45
9.4	.30	336	11.8	.64	39	8.8	.29	43
11.0	.50	38	11.4	.62	42	8.3	.22	38
8.8	.26	38	10.0	.44	44	8.1	.22	41
11.0	.52	39	11.2	.60	43	9.3	.29	36
8.2	.20	36	10.3	.42	39	9.5	.23	27
11.4	.60	41	10.0	.36	36	8.8	.29	43
9.2	.32	41	9.5	.38	45	7.4	.15	37
8.5	.26	42	8.4	.26	44	9.6	.29	33
11.5	.60	40	9.0	.32	44	11.8	.58	35
11.5	.58	37	11.4	.60	41	10.4	.48	43
9.0	.30	41	8.0	.22	43	10.9	.51	47
11.4	.48	32	9.3	.32	40	12.3	.72	39

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April 13, 1980 - (CONTINUED FROM PREVIOUS PAGE)

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
11.2	.52	37	9.0	.32	44	14.1	1.14	40
10.7	.48	39	8.8	.28	41	8.7	.28	43
11.5	.54	36	11.5	.62	41	9.3	.34	42
9.3	.30	37	10.6	.54	45	10.8	.47	37
12.1	.70	40	9.0	.26	36	15.3	1.24	34
14.9	1.25	38	8.6	.28	44	14.7	1.05	33
10.3	.50	46	9.3	.33	41	11.4	.45	30
10.2	.42	40	7.8	.20	42	11.3	.53	37
9.3	.40	50	8.7	.25	38	12.0	.58	34
10.7	.50	41	10.8	.54	43			
10.1	.40	39	10.6	.47	40			

CHANNEL CATFISH

Length	Weight	"C"
23.6	4.96	38
26.5	5.28	28? (I picked up this dead fish on east shoreline)

Alex Laweka

April 4, 1981 - Weight and measurements of angler fish caught at Acomita Lake. Data taken by Carl Valley and Fred Antonio. 60 fishermen at 2 p.m.

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
8.7	.30	46	9.1	.30	40	8.7	.26	40
9.9	.36	37	10.9	.44	34	11.0	.44	33
9.6	.36	41	10.2	.46	43	9.0	.38	52
8.1	.28	53	8.9	.26	37	10.5	.44	38
9.6	.32	36	8.0	.22	43	9.9	.38	39
9.6	.34	38	9.9	.34	35	10.9	.46	35
9.0	.32	44	14.2	1.16	40	12.5	.84	43
9.0	.34	47	11.2	.60	43	9.5	.30	35
8.7	.30	46	10.5	.46	40	9.4	.33	40
9.8	.38	40	11.8	.64	39	9.0	.28	39
9.2	.32	41	10.9	.52	40	13.5	1.02	41
9.1	.32	43	10.4	.50	45	14.9	1.26	38
8.0	.24	47	10.7	.57	47	8.6	.28	44
7.9	.18	37	8.8	.26	38	8.7	.30	46
9.2	.31	40	10.5	.48	42	8.2	.26	47
9.6	.33	37	8.0	.22	43	9.4	.33	40
8.1	.22	41	9.5	.31	36	11.2	.56	40
8.8	.30	44	9.1	.31	40	8.8	.31	46
10.0	.36	36	9.0	.28	38	9.5	.32	37
9.1	.26	35	8.0	.26	51	10.8	.53	42
7.1	.16	45	9.9	.34	35	12.7	.84	41
9.3	.30	37	11.8	.60	36	14.1	1.04	37
10.0	.46	46	10.5	.48	52	9.2	.32	41
9.2	.40	51	14.6	1.16	37	9.4	.30	36

(CONTINUED)

April 4, 1981 - (CONTINUED FROM PREVIOUS PAGE)

RAINBOW TROUT

Length	Weight	"C"	Length	Weight	"C"	Length	Weight	"C"
9.8	.33	35	8.2	.30	55	10.0	.36	38
9.2	.32	41	8.5	.26	42	9.6	.38	43
8.7	.29	44	9.3	.43	54	10.0	.40	40
9.0	.38	52	9.4	.34	41	10.2	.38	36
9.2	.30	39	10.8	.60	48	10.2	.42	40
9.7	.36	40	9.5	.32	37	10.3	.44	40
8.9	.28	40	10.8	.52	41	13.0	1.00	45
13.4	.97	40	7.8	.26	55	8.9	.32	45
10.8	.52	41	12.2	.84	46	11.7	.68	43
13.8	1.14	43	10.0	.40	40	9.5	.34	40
9.3	.36	45	9.5	.42	49	9.1	.28	37
9.9	.38	39	9.5	.36	42	9.6	.34	38
13.6	1.00	40	11.5	.60	40	9.3	.32	40
9.6	.40	45	13.8	.96	36			

CHANNEL CATFISH

Length	Weight	"C"
18.2	2.06	34
17.2	1.85	37

April 3, 1982 - *Assisted by Nacio. Water level 2' below spillway (estimated). Visibili clear. Rooted vegetation growing in the shallow waters. 210 fishermen at 10:30 a.m. Acomita Lake opening day - weather sunny and warm. Emmet Torivio - Supervisor, Game Warden; Duane Mousseau - Game Warden. Emmet. Duane, Nacio & I ran creel census count on some fishermen from 9:30 a.m. to 11 a.m. Before we ran the creel count I explained and went through the census form with Emmet. Than the three of us went and started on th creel count. I showed the two how to identify the species of game fish. Marked adipose fin (clipped) was shown to the two rangers plus cutthroat markings on fish. Those fishermen with fish had a lot of good sized fis both RBTs and CCFs.*

Alex Laweka

April 14, 1982 - Took profile data at 1300 hours near midpoint of lake. Weather was sun and clear with a slight breeze less than 15 mph from west. Used Hydrol 4041 and Hach turbidimeter 16800. No fish mortality observed; Acoma ranger collected 2 RBT specimens earlier today. Algae problem not yet fully developed, some filamentous becoming dominant near north shore. Used Sears cartop with oars and anchor.

(CONTINUED)

ACOMITA LAKE

April 14, 1982 - (CONTINUED FROM PREVIOUS PAGE)

PROFILE DATA

DEPTH (ft)	TEMP. (°C)	pH	D.O. (ppm)	CONDUCTIVITY (micromhos/cm)	TURBIDITY (NTU)
0	12.5	8.1	11.4	1784	7.7
1	12.5	8.1	10.6	1788	
2	12.4	8.0	10.2	1786	
3	12.4	8.0	9.8	1786	
4	12.4	8.0	9.8	1786	
5	12.5	8.0	9.6	1786	
6	12.5	8.1	10.2	1793	
7	12.5	8.1	9.8	1789	
8	12.5	8.1	9.4	1788	
9	12.5	8.0	9.3	1788	
10	12.4	8.0	9.1	1788	
11	12.4	8.0	9.0	1788	
12	12.4	7.9	8.9	1789	
13	12.4	7.9	8.9	1789	
14	12.3	7.9	8.9	1790	
15	12.3	7.9	5.5	1720	

Frank Halfmoon

March 9, 1982 - Time: 1600 hours
Water color: Green
Weather: NW breezes 15 mph (reads "less than")
Depth: 16 ft.
Secchi: 6 ft.
Personnel: Loren Panteah and Frank Halfmoon
Instrument: Hydrolab 4041

PROFILE DATA

DEPTH (ft)	TEMP. (°C)	pH	D.O. (mg/l)	CONDUCTIVITY (micromhos/cm)
0	7.8	9.2	11.0	1664
1	7.7	9.2	10.9	1664
2	7.7	9.2	10.8	1664
3	7.7	9.1	10.7	1665
4	7.6	9.1	10.6	1665
5	7.6	9.1	10.6	1666
6	7.6	9.1	10.5	1668
7	7.6	9.0	10.5	1668
8	7.5	9.0	10.5	1669
9	7.5	9.0	10.4	1670
10	7.5	9.0	10.4	1670
11	7.5	9.0	10.3	1670
12	7.5	9.0	10.3	1671
13	7.4	9.0	10.2	1673
14	7.3	9.0	10.1	1671
15	7.2	9.0	10.0	1672
16	7.1	9.0	10.0	1672

Frank Halfmoon

ACONITA LAKE

Sept. 25, 1981 - Time: 1815 hours
Temp. = 18.4°C
pH = 9.3
D.O. = 8.6
EC = 1709

Visibility 3 ft.; color green; vegetation bloom. Weather clear with westerly wind. Can see 10 anglers, but not whole lake. Level is down 5-7" 2 boys (local) say fish caught are small (8") and not many.

Frank Halfmoon

Sept. 30, 1982 - Time: 1000 hours
Weather: Cloudy, slight northerly breezes, less than 10 mph.
Air Temp. = 60°F(+5°)
Instruments: Hydrolab 404| and Hach 16800

Readings collected on east shore. Lake closed to fishing - no anglers present. Several hundred coots/ducks.

TEMP. (°C)	pH	D.O. (mg/l)	EC (micromhos/cm)	TURBIDITY (NTU)
17.0	8.8	6.4	1846	3.8

Water level = -2.8'; Area = 57 acres

Frank Halfmoon

ACOMITA LAKE

Jan. 6, 1983 - Water level 4' below spillway (estimated). Visibility 100% iced over. No aquatic weeds visible. No fishermen at 4 p.m. Hydrolab turbidity readings taken 200 ft. below the dam. Headgate opened 12/20/82 per telecon with Dennis Lorenzo.

Discharge level on gage	TEMP.	pH	D.O.	CONDUCTIVITY (2k)
2.00	3.3° C	8.9	10.0	1999
1.90				
1.80	Turbidity 10.2 NTU, Range 100			
1.70				
1.60				
1.50				
1.40				
1.30				
1.20				
1.10				
.90 Water level				
.80				
.70				
.60				
.50				
.40				
.30				
.20				
.10				

Alex Laweka

Behnke
EXHIBIT
84 6 99
8b

NEA 12/5/86

RELATIVE CONTRIBUTION OF GRANTS STP EFFLUENT TO LAKE ACCOTINK*

Grants STP Load to Lake Accotink

$$TN\,(mg/L)_{\text{due to Grants}} = \frac{(1.7\,cfs)(9\,mg/L) + 3.2\,cfs}{3.2\,cfs + 1.7\,cfs + 2\,cfs} = 2.2\,mg/L$$

$$W_N\,(g/yr) = \left(0.65\,\frac{ft^3}{sec}\right)\left(2.2\,\frac{mg}{L}\right)\left(\frac{28.32\,L}{ft^3}\right)\left(86,400\,\frac{sec}{d}\right)\left(365\,\frac{d}{yr}\right)$$

$$= 1.28 \times 10^9\,\frac{mg}{yr} \times \frac{g}{10^3\,mg}$$

$$= 1.28 \times 10^6\,g/yr$$

$$W_P\,(g/yr) = \frac{4\,mg\,P/L}{9\,mg\,N/L} \times 1.28 \times 10^6\,g/yr = 5.7 \times 10^5\,g/yr$$

Percent of Total Load

$$N: \frac{1.28 \times 10^6\,g/yr \text{ from Grants STP}}{11.9 \times 10^6\,g/yr \text{ total}} \times 100 = \boxed{10.8\,\%}$$

$$P: \frac{5.7 \times 10^5\,g/yr \text{ from Grants STP}}{15.9 \times 10^5\,g/yr \text{ total}} \times 100 = \boxed{35.8\,\%}$$

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* Preliminary estimate