

# REGULATORY DOCKET FILE COPY



UNITED STATES ATOMIC ENERGY COMMISSION

IN THE MATTER OF:

CONSOLIDATED EDISON COMPANY OF  
NEW YORK, INC.

(INDIAN POINT STATION, Unit No. 2)

Docket No. 50-247

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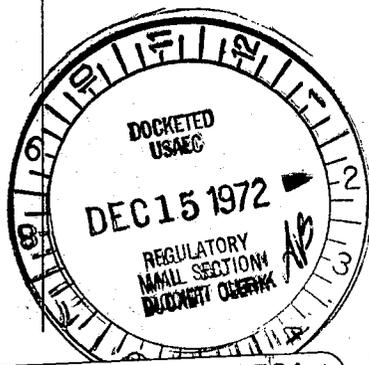
Place - Croton-on-Hudson, New York

Date - 6 December 1972

Pages 6621-6874

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C O N T E N T S

1		
2	<u>Witness:</u>	<u>Page:</u>
3	Robert P. Geckler	6628
4	George W. Knighton	"
5	Moshe Siman-Tov	"
6	Charles C. Coutant	"
7	Charles M. Cartar	"
8	Dr. Mary Jane Oestmann	"
9	Phillip Goodyear	"
10	William Yee	"
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P R O C E E D I N G S

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2 CHAIRMAN JENSCH: Please come to order.

3 Before we proceed, the Board would like to make  
4 an inquiry, but we don't ask for an answer at the present  
5 time unless the parties desire to speak to the matter, but  
6 this proceeding was scheduled by the Atomic Energy Commission  
7 here in this region for the benefit of the public who were  
8 thought to be interested and anxious to attend the hearings and  
9 to participate in some way in the development of the record in  
10 this proceeding. We have observed those who have been present  
11 here the first two days and it is our general impression  
12 that there might be one or two who would be considered a part  
13 of the general public. The others, I believe, are connected  
14 with the participants in one way or another. This morning  
15 there are now four people sitting in the back of the room,  
16 three of whom I infer appear to be a part of a group who have  
17 been here before and are part, I believe, of one of the  
18 participants in the proceeding.

19 So the inquiry that the Board would like to present  
20 is whether it wouldn't be more advantageous for all of the  
21 parties to transfer these proceedings for the next week and  
22 whatever time we need to Washington? The Staff has several  
23 people in attendance here. I don't know whether it approxi-  
24 mates eight or ten, but close to \$250 a day of expense money  
25 for the Staff alone to be here in a matter wholly unrelated

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1 to this or any pending proceeding, I did happen to hear the  
2 Assistant General Counsel of the Atomic Energy Commission  
3 speak a few days ago in which he said that the schedule  
4 that the Staff has is absolutely brutal in its work load and  
5 the Staff has been working Saturdays and occasionally on  
6 Sundays, not intermittently, but following a five-day week,  
7 and it's been getting to be a six and seven-day week for them.

8 There is an advantage, of course, if they were back  
9 in Washington that they could perhaps use a phone call or two  
10 in the evening to be somewhat current about the other cases  
11 that are crowding their schedules, but the purpose of this  
12 hearing here in Croton-on-Hudson appears to be to have been  
13 fulfilled in the sense that the public does not appear to  
14 be interested and the accommodation that the Atomic Energy  
15 Commission desired to extend to the people does not seem to  
16 be accepted; and unless there are some compelling reasons,  
17 the Board would inquire of the parties if it wouldn't be  
18 more convenient for all concerned to have the hearings  
19 in Washington.

20 Staff Counsel?

21 MR. KARMAN: Mr. Chairman, I certainly feel that  
22 this is either our twenty-second or twenty-third separate  
23 trip up to Croton-on-Hudson since December 1, 1970. From  
24 the Staff Counsel's point of view, I think the public  
25 certainly has been given every opportunity to attend,

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to participate in the public hearings that have been held.  
We -- for myself, we wholeheartedly concur in any possibility  
of an arrangement that could hold the hearings down in  
Washin-~~ton~~ because it would certainly save the government  
quite a bit in traveling expenses and per diem expenses  
for all these government witnesses that are here and who  
could be at the -- or close to the base of operations in  
Washington where I feel that if anything, our utility would  
be enhanced. We would certainly be in favor of any move that  
could get us back to Washington.

1 CHAIRMAN JENSCH: The other parties, if they  
#2 2 desire to speak, we will be glad to have their comments.  
arl 3 Otherwise they may speak later on the matter.

4 Hudson River Fishermen?

5 MR. MACBETH: I would just like to say that I feel  
6 that probably the reason the public is not here in large  
7 numbers is not interest in the final outcome of this proceed-  
8 ing, but only that the hearings are extremely technical,  
9 complex and are rather difficult to follow for a layman  
10 who has not read all the documents, and I assume there are  
11 very few members of the public that have had time to do that.

12 I do not oppose in principle a move to Washington.  
13 I would like simply a day to look into the practical details.  
14 I think generally my feeling would be that it would be easier  
15 for me and for my witnesses to be in Washington. I would  
16 just like to check with them and -- see what the possibilities  
17 of accommodation and so on are in Washington.

18 CHAIRMAN JENSCH: Very well. I do appreciate  
19 the problems that each participant would have in making the  
20 change, and I suppose that if there were members of the public  
21 here -- I do not see any here today, so far at least -- that  
22 they might be inclined to push the panic button and get  
23 everybody out to show an interest in the proceeding, but  
24 they have not demonstrated in many of these past sessions  
25 we have had, probably there has been one person whom I

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1 recognized to be a member of the public here, and rather than  
2 sounding the alarm that the hearings are going to be moved  
3 away, I think the past record will probably be more  
4 persuasive in the advisability of a move than some panic-  
5 button approach to it now.

6 MR. MACBETH: I agree with that, Mr. Chairman.  
7 I just wanted to make clear the public is very concerned  
8 about the final outcome. I agree it is very unlikely that  
9 more than one or two members of the public would sit through  
10 these very technical and complicated phases of the hearing  
11 that we are in at the present time.

12 CHAIRMAN JENSCH: Does the Applicant desire to  
13 express a view?

14 MR. TROSTEN: Yes, Mr. Chairman. We do not oppose  
15 in principle a move to Washington. We do think that having  
16 the hearings in the locality generally serves a useful  
17 purpose. I would like to inquire into the practicalities  
18 just as Mr. Macbeth wishes to do so, and we will certainly  
19 advise the Board.

20 CHAIRMAN JENSCH: Thank you.

21 Very well. The witnesses have resumed the stand.  
22 Is the Applicant ready to proceed with further cross-examina-  
23 tion?

24 MR. TROSTEN: We are, Mr. Chairman.  
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1 Whereupon,

2 ROBERT P. GECKLER,

3 GEORGE W. KNIGHTON,

4 MOSHE SIMAN-TOV,

5 CHARLES C. COUTANT,

6 CHARLES M. CARTER,

7 DR. MARY JANE OESTMANN,

8 PHILLIP GOODYEAR and

9 WILLIAM YEE

10 resumed the stand as witnesses on behalf of the Regulatory  
11 Staff, and having been previously duly sworn, were examined  
12 and testified further as follows:

13 MR. TROSTEN: Before moving on to additional  
14 cross-examination, Mr. Chairman, I would like to introduce  
15 to the Board Dr. James T. McFadden, dean of the School  
16 of Natural Resources of the University of Michigan. Dr.  
17 McFadden is one of our witnesses, and I do not believe that  
18 the Board has had an opportunity to meet him yet.

19 CHAIRMAN JENSCH: Very well. Do you desire to  
20 have him sworn now or later?

21 MR. TROSTEN: Later, Mr. Chairman.

22 CHAIRMAN JENSCH: Very well.

23 MR. TROSTEN: Excuse me, Mr. Chairman. Dr. Raney  
24 the Board has already met Dr. Raney at our previous meeting.  
25 Dr. Raney is also with me at the counsel table.

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1 CHAIRMAN JENSCH: As I recall, he has been sworn.

2 MR. TROSTEN: That's correct.

3 CHAIRMAN JENSCH: Very well. Will you proceed,  
4 please?

5 MR. TROSTEN: Mr. Chairman, this morning I would  
6 like to switch to a different topic for interrogation of  
7 Dr. Goodyear. The subject I wish to question on this  
8 morning first concerns the effects of entrainment on the  
9 eggs and larvae as they move through the power plant.

10 Dr. Goodyear, you say that fish may be killed or  
11 injured by entrainment. Do you agree that they may also not  
12 be killed by entrainment?

13 WITNESS GOODYEAR: Yes.

14 MR. TROSTEN: Do you also agree that they may not  
15 be injured by entrainment?

16 WITNESS GOODYEAR: Yes.

17 MR. TROSTEN: Do you agree that in order to  
18 determine whether a particular organism will be killed or  
19 injured by entrainment in a particular plant, you must under-  
20 stand first the biological facts about the particular  
21 organism?

22 WITNESS GOODYEAR: Yes.

23 MR. TROSTEN: And would this include its sensitivity  
24 to temperature?

25 WITNESS GOODYEAR: Yes.

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MR. TROSTEN: Pressure?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Abrasion?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Chemicals?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Now is it not also necessary to understand the temperatures to which the organism will be subjected during its passage through the plant?

WITNESS GOODYEAR: Yes, sir.

MR. TROSTEN: As well as the pressures?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: And the chemicals to which it will be subjected?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: How about the times of exposure?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Is it not necessary also to consider the acclimation conditions of the organism?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Now on page 12-27, would you turn to that page, please?

Referring to that page, do you agree that one can determine the percent mortality and injury of organisms passing through the plant due to entrainment by a carefully

1 designed intake and discharge sampling study?

2 WITNESS GOODYEAR: Yes.

3 MR. TROSTEN: On page 12-27, you refer to  
4 mortality to small bass which will occur at temperatures  
5 above 90 degrees Fahrenheit. Now is not the Delta T  
6 reported in the Chadwick experiment on page 12-27 greater  
7 than that which would occur at Indian Point?

8 WITNESS GOODYEAR: Yes.

9 MR. TROSTEN: Could this possibly cause this  
10 result to differ from the result that would occur if the  
11 Delta T hadn't exceeded 14.6 degrees Fahrenheit?

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: On page 12-28, I would like to  
14 ask you a question about that page. Would you look at that?

15 What actual measurement have you made, Dr.  
16 Goodyear, to support your hypothesis that gas bubbles would  
17 form in the fishes' tissues as a result of the pressure  
18 drop you postulate?

19 WITNESS GOODYEAR: None.

20 MR. TROSTEN: What actual observations have you  
21 made of the damage to fishes which would occur as a result  
22 of such pressure drop?

23 WITNESS GOODYEAR: None.

24 MR. TROSTEN: Have you performed measurements on  
25 striped bass to determine their sensitivity to pressure

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1 change?

2 WITNESS GOODYEAR: No.

3 MR. TROSTEN: Have you studied Dr. Lauer's  
4 October 30th testimony which shows no damage to young  
5 striped bass from pressure changes far higher than those  
6 expected at Indian Point 2?

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2 CHAIRMAN JENSCH: Could we have a reference in  
the page to Dr. Lauer's testimony, please?

3 MR. TROSTEN: Yes. Would you wait just a moment,  
4 please?

5 The pages are 46 through 50, Mr. Chairman. These  
6 are <sup>the</sup> ~~the~~ pages in point.

7 CHAIRMAN JENSCH: Thank you. If the witness desires  
8 to look at those pages before answering, he may do that.

9 MR. TROSTEN: My question is Dr. Goodyear, have  
10 you studied this testimony?

11 WITNESS GOODYEAR: I have read it but I haven't studied  
12 it in detail.

13 MR. TROSTEN: You are not prepared to comment on  
14 it at this point in time?

15 WITNESS GOODYEAR: One moment.

16 (Witnesses conferring.)

17 WITNESS GOODYEAR: From what is given in Dr.  
18 Lauer's testimony, it is very difficult to tell whether or  
19 not pressure changes and -- whether the experiments  
20 themselves are of such a nature to have any bearing on the  
21 theory that was proposed in the statement.

22 MR. TROSTEN: Are you finished, Doctor?

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: Would you tell me the uncertainties  
25 that exist in your mind?

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2           WITNESS GOODYEAR: There are three points in par-  
3 ticular. One cannot tell from this description whether  
4 or not the pressure changes were positive or negative  
5 from acclimation. There was no shear or apparently no  
6 shear involved, no stresses, turbulence which would cause  
7 bubble formation.

8           There was also no increase in temperature which  
9 would also tend to cause bubble formation.

10          MR. TROSTEN: Are you finished, Dr. Goodyear?

11          WITNESS GOODYEAR: Yes.

12          MR. TROSTEN: Would you please explain to me the  
13 second point you made? I don't think I fully understand it.  
14 Perhaps Dr. Lauer, our biologist, would.

15          WITNESS GOODYEAR: The turbulence?

16          MR. TROSTEN: Yes, the point about the shear.

17          WITNESS GOODYEAR: Well, as I understand it, one  
18 of the principal factors causing formation of gas bubbles in  
19 a supersaturated environment is turbulence.

20          MR. TROSTEN: And so you are saying that there was  
21 no indication as to the degree of turbulence or whether there  
22 was turbulence, is that the question?

23          WITNESS GOODYEAR: Yes.

24          MR. TROSTEN: I see.

25          These are the three questions that cause you to have  
uncertainty about the applicability of these results?

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WITNESS GOODYEAR: Yes.

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MR. TROSTEN: I see.

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Now, returning to the statement that you made on page 12-28, are there other empirical data which support your hypothesis of such damage?

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WITNESS GOODYEAR: For pressure change?

7

MR. TROSTEN: Yes, that is right.

8

(Witnesses conferring.)

9

WITNESS GOODYEAR: One moment, please.

10

Would you repeat the question, please?

11

MR. TROSTEN: Would the reporter read the question

12

back.

13

(The reporter read the record as requested.)

14

WITNESS GOODYEAR: Were you restricting your

15

question to striped bass alone?

16

MR. TROSTEN: Were you talking about striped bass

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on page -- striped bass alone on page 12-28 and 12-29?

18

WITNESS GOODYEAR: Yes.

19

MR. TROSTEN: All right. Then I will restrict

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my question to striped bass.

21

WITNESS GOODYEAR: No.

22

MR. TROSTEN: Thank you.

23

On page 12-28, you have a sentence which reads

24

as follows: "At normal operation, the temperatures in the

25

discharge canal at Indian Point would exceed 90 degrees

1 Fahrenheit beginning about mid-June. Thus, the temperature  
2 effect alone could result in substantial mortality of  
3 entrained bass, particularly in late June and July."

4 You see that sentence?

5 WITNESS GOODYEAR: Yes.

6 MR. TROSTEN: What measurements have you taken which  
7 demonstrate that temperatures in the discharge canal at  
8 Indian Point would exceed 90 degrees Fahrenheit beginning  
9 about mid-June?

10 WITNESS GOODYEAR: What measurements I have made?

11 MR. TROSTEN: Yes.

12 WITNESS GOODYEAR: None.

13 MR. TROSTEN: Are you aware of measurements that  
14 have been made that demonstrate that temperatures in the discharge  
15 canal at Indian Point would exceed 90 degrees Fahrenheit  
16 beginning about mid-June?

17 WITNESS GOODYEAR: One moment.

18 (Witnesses conferring.)

19 WITNESS GOODYEAR: Would you repeat the question,  
20 please?

21 MR. TROSTEN: Would the reporter read the question  
22 back, please?

23 (The reporter read the record as requested.)

24 WITNESS GOODYEAR: Assuming the 15 degree Delta T  
25 through the condensers, I have seen measurements -- measurements

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1 of the ambient temperature which would indicate that this  
2 is true.

3 MR. TROSTEN: Are you finished?

4 WITNESS GOODYEAR: Yes.

5 MR. TROSTEN: Where have you seen those measure-  
6 ments?

7 WITNESS GOODYEAR: I will have to check on that,  
8 on that for you. I have got several different sets  
9 of temperature measurements.

10 MR. TROSTEN: Would you check that for me. How  
11 long will it take you to check that?

12 (Witnesses conferring.)

13 WITNESS GOODYEAR: I should be able to do it at  
14 the first break.

15 MR. TROSTEN: All right.

16 CHAIRMAN JENSCH: Would you like to have  
17 *those* thought data before you proceed? We can take a recess  
18 now.

19 MR. TROSTEN: It will be -- yes. It would be  
20 desirable to do that. Thank you, Mr. Chairman.

21 CHAIRMAN JENSCH: All right. Let us take a recess  
22 at this time to recess and reconvene in this room at 9:45.

23 (Recess.)  
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1 CHAIRMAN JENSCH: Please come to order.

2 Would you proceed, Applicant's counsel?

3 MR. TROSTEN: Will you reread the last question,

4 Mr. Reporter?

5 CHAIRMAN JENSCH: What were the measurements  
6 observed or known?

7 MR. TROSTEN: Where did you see those data, I  
8 believe was my last question.

9 WITNESS GOODYEAR: I'd like to hear the first  
10 question, if I may.

11 MR. TROSTEN: Well, let me see if I can recall  
12 the question.

13 I believe I asked you if you had taken any measure-  
14 ments which showed that the temperatures in the discharge  
15 canal at Indian Point would exceed 90 degrees Fahrenheit  
16 beginning about mid-June, and you answered no, you had not.

17 I asked you were you aware of other measurements  
18 which showed that, and you said you believed that you had  
19 seen such data. I asked you where you had seen such data,  
20 and you asked for an opportunity at that point to confer.

21 Is that your recollection of it, Dr. Goodyear?

22 WITNESS GOODYEAR: Essentially, yes.

23 MR. TROSTEN: All right. Have you now had an  
24 opportunity to confer?

25 WITNESS GOODYEAR: Yes.

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1 I have not seen data which show that temperatures  
2 over 90 degrees will be exceeded. I have seen data which  
3 the statement in the report was based on average sampling in  
4 1966, the Carlson McCann report, the average in the river,  
5 was the average of all the stations for each week.

6 However, after studying the other information,  
7 it is apparent that this is not a normal occurrence.

8 MR. TROSTEN: Just to begin, are you saying now  
9 that you want to amend that first sentence there that you  
10 no longer believe that that is an accurate sentence?

11 CHAIRMAN JENSCH: That's on 12-28?

12 MR. TROSTEN: 12-28, the first sentence. Do you  
13 want to change your testimony?

14 It is the first sentence in the first paragraph  
15 on page 12-28. It reads, "At normal operation the  
16 temperatures in the discharge canal at Indian Point would  
17 exceed 90 degrees Fahrenheit beginning about mid-June."

18 Do you want to change your testimony, Dr. Goodyear?

19 WITNESS GOODYEAR: One moment.

20 (Witnesses conferring.)

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1 MR. KARMAN: Might the witness consult with counsel,  
2 Mr. Chairman?

3 CHAIRMAN JENSCH: Oh, yes.

4 (Counsel and witnesses conferring.)

5 CHAIRMAN JENSCH: You may proceed with your  
6 answer when you are ready to give it.

7 WITNESS GOODYEAR: All right. That sentence  
8 really should better read, "at normal operation, the  
9 temperatures in the discharge canal at Indian Point would  
10 exceed 90 degrees beginning in July, although in some  
11 years temperatures in June may also exceed 90 degrees."

12 MR. TROSTEN: Would the reporter -- strike that.

13 Are you saying that you are asking to change your  
14 testimony so that that sentence would be rephrased as you have  
15 just indicated?

16 WITNESS GOODYEAR: Yes.

17 MR. TROSTEN: All right. Would the reporter please  
18 read Dr. Goodyear's revised testimony back?

19 (The reporter read the record as requested.)

20 MR. TROSTEN: All right.

21 Dr. Goodyear, which data are you referring to to  
22 support your revised testimony?

23 WITNESS SIMAN-TOV: Could I add some explanation  
24 to this number?

25 MR. TROSTEN: Before you do that, could you just

1 tell me which data you are using to support this testimony?

2 It would help me if I knew that.

3 WITNESS GOODYEAR: 1966 Carlson-McCann sampling.

4 MR. TROSTEN: All right. I have some more questions  
5 I want to ask you about that, but if you prefer to go ahead,  
6 Mr. Siman-Tov, now, that would be fine with me.

7 MR. MACBETH: Is there a particular graph, chart  
8 in the appendix to Carlson-McCann that you are referring to?  
9 That might make it even simpler.

10 WITNESS GOODYEAR: No. This was in the appendix,  
11 Appendix 2.

12 MR. MACBETH: Thank you.

13 MR. TROSTEN: Appendix <sup>2</sup>~~1~~ of Carlson-McCann?

14 In the blue volume?

15 WITNESS GOODYEAR: Yes.

16 MR. TROSTEN: Before you proceed, Mr. Siman-Tov,  
17 let me turn to that appendix.

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There are several appendix 2s in the blue volume.  
Which one are you referring to, Dr. Goodyear? Appendix  
2-3?

WITNESS GOODYEAR: 2-3, 2-4, 2-5, 2-6, 2-7 and 2-8.

MR. TROSTEN: In other words, all of the Appendix  
2s -- there is 2-9 and 2-10.

WITNESS GOODYEAR: 2-9 and 2-10, yes.

MR. TROSTEN: In other words, you are referring  
to the data in Appendices 2-1 through 2-10 of the  
appendices to the 1965-1968 Hudson River Fisheries Investiga-  
tion?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: All right. Thank you.

Go ahead, Mr. Siman-Tov.

WITNESS SIMAN-TOV: As Dr. Goodyear has mentioned,  
this statement is not based on measurements that have been  
seen at the canal. However, they are reflecting a possibility  
of prediction. In other words, adding the condenser Delta T  
to some measurements of intake temperatures. Now the normal  
temperatures are shown in one place. In one place might be  
in the testimony of Dr. Lawler and in other references to  
which are showing normal temperatures at each month of the  
year. And those temperatures are showing something of 73  
degrees normal temperature in June, mid-June, the second  
part of it.

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Adding to this 14.8 degrees and adding 1 degree  
for recirculation will bring us close to 89 degrees.

However, there is also in page 12-11 --

MR. TROSTEN: Before we go on, would you tell me  
the page in the Lawler testimony to which you are referring?

WITNESS SIMAN-TOV: Yes. It is Figure 9-B, and  
it is after page 16.

1 MR. TROSTEN: Thank you.

2 WITNESS SIMAN-TOV: Now, on page 12-11 of the  
3 Final Statement, there is a curve showing the percentage  
4 that certain temperature -- ambient temperature will be exceeded.  
5 Now, the curve that is showing normal temperatures  
6 in the April 5th -- actually the same curve is also given  
7 in the original Applicant report, showing 79 as being the  
8 maximum temperature.

9 However, when you look at Figure 12-1 in page  
10 12-11, you can see that 79 degrees are exceeded about  
11 15 percent of the time. It is a possibility to extrapolate  
12 from this that also the 73 degrees might be exceeded something  
13 like the same range.

14 MR. TROSTEN: Mr. Siman-Tov, excuse me. Do I --  
15 are you pointing me to the right figure? Figure 12-11  
16 refers to the month of August.

17 WITNESS SIMAN-TOV: No, Figure 12-1.

18 MR. TROSTEN: Which appears on page 12-11?

19 WITNESS SIMAN-TOV: Right.

20 MR. TROSTEN: It refers to the month of August.

21 WITNESS SIMAN-TOV: Yes.

22 MR. TROSTEN: So you are discussing now the  
23 figure which refers to the month of August in reference to  
24 the temperatures in the month of June?

25 WITNESS SIMAN-TOV: Right. No. I am not saying

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1 that this figure is showing month by month what is happening.

2 MR. TROSTEN: It shows the month of August,

3 isn't that right?

4 WITNESS SIMAN-TOV: Right.

5 MR. TROSTEN: Okay.

6 WITNESS SIMAN-TOV: What it is showing is that the  
7 figure -- I am comparing the figure given in April 5th  
8 testimony which is showing normal temperatures.

9 MR. TROSTEN: Yes.

10 WITNESS SIMAN-TOV: The maximum normal temperature  
11 there is 79 degrees.

12 MR. TROSTEN: Yes.

13 WITNESS SIMAN-TOV: Which is more or less in our  
14 book. When you go to this figure here on -- 12-1 on page  
15 12-11, the 79 degrees is exceeded about 15 percent of the time.  
16 This is an indication -- I am trying to give some support to  
17 the other part of the revised testimony which said that in  
18 several years it might come -- might exceed 90 degrees in  
19 mid-June. Since what I am showing here is that the 79 degrees  
20 which is normally considered as being maximum is exceeded  
21 15 percent of the time. Therefore, the 73 degrees which  
22 is considered normal in June will also be exceeded a certain  
23 percentage of the time.

24 MR. TROSTEN: Just so I can understand what you are  
25 saying, Mr. Siman-Tov, what is the 79 degrees supposed to be

eak3 1 the normal temperature of?

2 WITNESS SIMAN-TOV: 79 degrees is the maximum ---

3 MR. TROSTEN: The maximum temperature for what?

4 WITNESS SIMAN-TOV: For the ambient at Hudson  
5 River.

6 MR. TROSTEN: During what --

7 WITNESS SIMAN-TOV: At Indian Point.

8 MR. TROSTEN: During what month.

9 WITNESS SIMAN-TOV: It is in August, I believe.

10 MR. TROSTEN: All right. Thank you.

11 WITNESS SIMAN-TOV: Is the point clear?

12 MR. TROSTEN: I think I understand what you are  
13 saying. Are you finished?

14 WITNESS SIMAN-TOV: I think I am if it is clear  
15 what I say.

16 (Laughter.)

17 MR. TROSTEN: All right.  
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1 MR. TROSTEN: May we confer for just a moment,  
2 Mr. Chairman?

3 CHAIRMAN JENSCH: Yes.

4 MR. TROSTEN: Mr. Chairman, I have a number of  
5 questions I want to ask Dr. Goodyear about this, but it will  
6 be necessary to return to the subject later on after we  
7 have had an opportunity to consider what Mr. Siman-Tov has  
8 just said. Let me ask some of the foundation questions first  
9 and I will return to the subject later.

10 CHAIRMAN JENSCH: Proceed.

11 MR. TROSTEN: Dr. Goodyear, is the <sup>1966</sup> ~~1955~~ Carlson-  
12 McCann sampling data the only information upon which you are  
13 basing your conclusion?

14 WITNESS GOODYEAR: No.

15 MR. TROSTEN: What other information are you basing  
16 it on?

17 WITNESS GOODYEAR: What Mr. Siman-Tov has just  
18 said.

19 MR. TROSTEN: The information Mr. Siman-Tov has  
20 just passed along, has just given us?

21 WITNESS GOODYEAR: Yes.

22 MR. TROSTEN: All right. With respect to the 1966  
23 Carlson -McCann data, what kind of equipment were they using  
24 to measure the temperature?

25 WITNESS GOODYEAR: I do not know.

2mil 1 MR. TROSTEN: To what standard was the equipment  
2 calibrated?

3 WITNESS GOODYEAR: I don't know.

4 MR. TROSTEN: Do you know the exact location in  
5 the Hudson River at which the measurements were taken?

6 WITNESS GOODYEAR: No.

7 MR. TROSTEN: Do you know the depth of the water  
8 at which the measurements were taken?

9 WITNESS GOODYEAR: No.

10 MR. TROSTEN: In other words, you don't know the  
11 depth of the temperature measuring device?

12 WITNESS GOODYEAR: No.

13 MR. TROSTEN: Do you know the distance from the shore  
14 at which these measurements were taken?

15 WITNESS GOODYEAR: No.

16 MR. TROSTEN: Do you know on which days the  
17 measurements were taken?

18 WITNESS GOODYEAR: No.

19 MR. TROSTEN: Do you know the time at which the  
20 measurements were taken?

21 WITNESS GOODYEAR: No.

22 MR. TROSTEN: Do you know the number of measure-  
23 ments that were taken?

24 WITNESS GOODYEAR: No.

25 MR. TROSTEN: Well, I think we have gone as far

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1 as we can on that subject. We will return to this later on  
2 today, I would say, Mr. Chairman.

3 CHAIRMAN JENSCH: Very well.

4 MR. TROSTEN: Dr. Goodyear, if the intake  
5 temperatures were shown to be less than the values you used  
6 in making -- in drawing your conclusion as reflected in your  
7 revised testimony, would this affect your conclusion?

8 MR. KARMAN: Which conclusion are we talking about?

9 MR. TROSTEN: The conclusion expressed in his re-  
10 vised testimony.

11 WITNESS GOODYEAR: Could you be more specific?

12 MR. TROSTEN: Excuse me. That is not a very accurate  
13 way of saying it. In order to get the complete picture, one  
14 would have to take Dr. Goodyear's revised testimony and add  
15 to that the second sentence which appears in the first  
16 paragraph on page 12-28 which reads, "Thus, the temperature  
17 effect alone would result in substantial mortality of  
18 entrained bass particularly in late June and July."

19 Now, let me, in light of the fact that your  
20 testimony is contained in the two sentences taken together,  
21 ask you the question again, <sup>if</sup> the intake temperatures at Indian  
22 Point were shown to be less than the values you used in  
23 drawing your conclusion expressed in these two <sup>sentences</sup> sentences.  
24 <sup>could</sup> ~~Could~~ this affect your conclusion?

25 WITNESS GOODYEAR: Yes, if they were substantially  
lower.

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1 MR. TROSTEN: What do you mean by substantially,  
2 Dr. Goodyear?

3 WITNESS GOODYEAR: One moment.

4 (Witnesses conferring.)

5 WITNESS GOODYEAR: Something on the order of 5  
6 degrees.

7 MR. TROSTEN: What is the data base for your  
8 drawing that conclusion?

9 WITNESS GOODYEAR: Dr. Lauer's testimony.

10 MR. TROSTEN: Now what page of Dr. Lauer's testi-  
11 mony, please?

12 WITNESS GOODYEAR: Page 48.

13 MR. TROSTEN: What does it say on that page?

14 MR. MACBETH: Excuse me. Could we have which  
15 set of Dr. Lauer's testimony?

16 WITNESS GOODYEAR: The October 30.

17 MR. MACBETH: Okay.

18 MR. TROSTEN: Thank you.

19 While Dr. Goodyear is reviewing that, would the  
20 reporter read back Dr. Goodyear's response to my question,  
21 please?

22 (The reporter read the record as requested.)

23 WITNESS GOODYEAR: Would you repeat the last ques-  
24 tion, please?

25 MR. TROSTEN: What was the last question?

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1 (The reporter read the record as requested.)

2 WITNESS GOODYEAR: Let me quote the paragraph.

3 "60 minute exposure maximum tolerance for the striped bass  
4 larva increased from 83 degrees Fahrenheit for the 10-hour  
5 old larva to <sup>88</sup>38 degrees for day old larva. The tolerance  
6 level remained at about 88 degrees for larva beyond this  
7 age."

8 MR. TROSTEN: Thank you. Now with respect to  
9 your question about -- with respect to your answer to my  
10 question, when you referred to something on the order of 5  
11 degrees Fahrenheit, a reduction of something on the order  
12 of 5 degrees Fahrenheit, a reduction from what temperature?

13 WITNESS GOODYEAR: From the 90.

14 MR. TROSTEN: And a reduction of what temperature  
15 at what time of the year?

16 WITNESS GOODYEAR: I am sorry. I don't understand  
17 your question.

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1 MR. TROSTEN: Is this a number which is just an  
2 absolute number, <sup>of</sup> a reduction of five degrees from 90 degrees  
3 at that time of the year?

4 WITNESS GOODYEAR: The sepcific reduction would have  
5 to be something to be studied for a while. I can't respond  
6 that quickly to it.

7 (Witnesses conferring.)

8 WITNESS GOODYEAR: I don't believe I understand  
9 your question.

10 MR. TROSTEN: Let me drop that question and ask  
11 you another one. I think I can understand the problem you  
12 are having with that.

13 Is it correct that the sentence you quoted from  
14 Dr. Lauer's testimony refers to a sixty-minute exposure  
15 maximum temperature?

16 WITNESS GOODYEAR: Yes.

17 MR. TROSTEN: Is temperature tolerance time  
18 dependent?

19 WITNESS GOODYEAR: Yes.

20 MR. TROSTEN: In other words, an organism is able  
21 to undergo a temperature rise for a -- a higher temperature  
22 rise for a short period of time than it is a higher  
23 temperature rise for a longer <sup>period</sup> ~~time~~ of time, is that correct,  
24 generally speaking?

25 WITNESS GOODYEAR: Would you repeat that?

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MR. TROSTEN: Mr. Reporter, would you repeat

2 the question?

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(The reporter read the record as requested.)

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(Witnesses conferring.)

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WITNESS GOODYEAR: Could you read that again,

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please.

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(Laughter.)

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(The reporter read the record as requested.)

9

(Witnesses conferring.)

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MR. TROSTEN: Dr. Goodyear, is there something

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about the question that you don't understand?

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WITNESS GOODYEAR: Yes. The specific comparison

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about higher for a longer period of time and higher for

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a shorter period of time needs some clarification.

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MR. TROSTEN: Let me try again. Then maybe I will have

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confer.

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(Laughter.)

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Is it correct that an organism can endure a given

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temperature for a -- excuse me. Stop. I will --

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(Laughter.)

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CHAIRMAN JENSCH: Will there be less damage for

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a shorter period of time than the greater damage at the longer

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period of time at the same high temperature.

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MR. TROSTEN: I think -- yes.

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(Laughter.)

Thank you, Mr. Chairman.

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WITNESS GOODYEAR: The answer is yes.

MR. KARMAN: Did you respond to that, Dr.  
Goodyear?

WITNESS GOODYEAR: I said yes.

MR. KARMAN: I didn't know whether Mr. Trosten  
heard you.

MR. TROSTEN: I didn't. I am sorry.

Are you able to compare the 60-minute exposure  
*through*  
time ~~to~~ the time for transit to the plant, that is from the  
intake through the discharge canal.

WITNESS GOODYEAR: I have to study that for a  
period.

MR. TROSTEN: Would you do that?

WITNESS GOODYEAR: Now?

MR. TROSTEN: Yes.

(Witnesses conferring.)

WITNESS GOODYEAR: The -- to answer your question  
I would have to go and look at the specific operating  
procedure for that time period because we have several  
different transit times. However, in all cases it would be  
much shorter than 60 minutes.

MR. TROSTEN: Would you accept the fact that it  
could be as short as 11 minutes for Unit 1 and 2 combined  
and 14 minutes for Unit 1 alone -- *I am sorry, for* for Unit 2 alone?

WITNESS GOODYEAR: Yes.

1 MR. TROSTEN: Thank you.

2 All right, Dr. Goodyear. I would like to leave  
3 this subject for the timebeing. We will want to come back  
4 to it later with particular regard to what Mr. Siman-Tov  
5 had said.

6 Thank you.

7 I would like to move on to a different topic now,  
8 Dr. Goodyear, and I would like to discuss the subject of  
9 compensation and related matters.

10 Now, on page 5-61, you estimate a 30  
11 percent to 50 percent reduction in the recruitment of the  
12 adult striped bass population.

13 MR. KARMAN: Do you have that before you, Dr. Goodyear?

14 WITNESS GOODYEAR: Yes.

15 MR. TROSTEN: On page 5-61 and you say -- I will  
16 read the sentence, "The effect of plant operation for even  
17 a short period is therefore expected to reduce future landings  
18 in the neighborhood of 30" -- that is your corrected  
19 testimony -- "to 50 percent beginning about the fifth year  
20 after operation begins."

21 You see that sentence?

22 WITNESS GOODYEAR: Yes.

23 MR. TROSTEN: Now, this sentence is based upon a  
24 number of assumptions including the following assumptions,  
25 that there would be no offsetting increase in survival of

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1 striped bass as a result of compensatory mechanisms, is  
2 that correct?

3 WITNESS GOODYEAR: Yes.

4 MR. TROSTEN: Dr. Goodyear, do you consider that  
5 any animal or fish population, if it were to continue to grow,  
6 would ultimately reach the point where a response would  
7 occur which would tend to lower the growth rate?

8 WITNESS GOODYEAR: Yes.

9 MR. TROSTEN: Or to increase the mortality rate?

10 WITNESS GOODYEAR: Yes.

11 MR. TROSTEN: Or possibly both?

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: Now, would you say that the reverse  
14 is also generally true, that is if an animal  
15 or a fish population were to continue to decline, it would  
16 ultimately reach the point where a response ~~which~~ would occur,  
17 which would tend to increase the growth rate?

18 WITNESS GOODYEAR: Not necessarily.

19 MR. TROSTEN: Or to decrease the mortality rate?

20 WITNESS GOODYEAR: Not necessarily.

21 MR. TROSTEN: Or both?

22 WITNESS GOODYEAR: Again, not necessarily.

23 MR. TROSTEN: Not necessarily? All right. Would  
24 you please give me an example of a situation, a documented  
25 example of a situation where a population which was continuing

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1 to decline did not ultimately reach the point where  
2 a response would occur.

3 WITNESS GOODYEAR: Passenger pigeons.

4 MR. TROSTEN: Dr. Goodyear, is the passenger  
5 pigeon a fish?

6 (Laughter.)

7 WITNESS GOODYEAR: No.

8 MR. TROSTEN: Is it true, Dr. Goodyear, that  
9 there are animals that once lived that no longer live?

10 WITNESS GOODYEAR: Yes.

11 MR. TROSTEN: Is it true that there are a great  
12 many animals that once lived that no longer live?

13 WITNESS GOODYEAR: Yes.

14 MR. TROSTEN: Would you say that it is probably  
15 true that there are more animals that once lived that no  
16 longer live than there are animals that presently live?

17 WITNESS GOODYEAR: Yes.

18 MR. TROSTEN: Thank you.

19 Dr. Goodyear, would you please provide a documented  
20 example of a population which is regulated only by factors  
21 other than its own density?

22 WITNESS GOODYEAR: One moment.

23 (Witnesses conferring.)

24 WITNESS GOODYEAR: Would you please read the  
25 question again?

(The reporter read the record as requested.)

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CHAIRMAN JENSEN: Is this something related  
to his direct testimony? I think these suppositions  
that you gave him preceding kind of laid a foundation for a  
general discussion, but it wasn't related to anything he has  
presented. Now that you have given him several general  
assumptions, you are asking for a documentary presentation  
that is unrelated to his direct evidence and I just  
wondered what is the relevancy of the question you have  
in mind.

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MR. TROSTEN: Oh, yes. It is relevant in this way,  
Mr. Chairman. When you review Dr. Goodyears testimony,  
it is clear that --

1 CHAIRMAN JENSCH: Page what?

2 MR. TROSTEN: Page 5-56, to take just an example  
3 of this, on the first sentence in the page, "Two factors are  
4 important for a population to produce sufficient offspring  
5 to saturate the available habitat: The absolute number of  
6 viable eggs produced and the fraction of the eggs, larvae  
7 and juveniles that dies from factors which are independent  
8 of the population density."

9 In the last sentence he concludes that striped  
10 bass are not limited in this manner and <sup>they can</sup> ~~can~~ be seen from the  
11 fact that no important change in growth pattern has been  
12 observed although population densities have increased by  
13 an order of magnitude on the Atlantic Coast."

14 CHAIRMAN JENSCH: You are asking about what he has  
15 said there?

16 MR. TROSTEN: Yes, sir.

17 CHAIRMAN JENSCH: If you direct your attention  
18 to page 5-56 and give us supportive data for those statements  
19 which have been made.

20 Could you do that?

21 MR. TROSTEN: Mr. Chairman, let me be certain that  
22 I am clear about this.

23 Dr. Goodyear's comments and Dr. Goodyear's  
24 testimony are drawn from general principles. Dr. Goodyear  
25 is drawing general principles -- drawing conclusions from

1 general principles that he believes are applicable to the  
2 striped bass population and he is also drawing specific  
3 conclusions with regard to the striped bass population.  
4 I think it is important to understand the general principles  
5 also as well as the specifics of the striped bass population.

6 CHAIRMAN JENSCH: Well, unless he accepts the  
7 premise of your statement, I think he should have the oppor-  
8 tunity to discuss his own testimony. I don't know that  
9 the general principles include the universities, decline  
10 in population. One of my colleagues suggested the dinosaur  
11 might be mentioned, but I don't think we can expect the  
12 witness on the stand to give a documentary presentation on  
13 that regard.

14 I think we should limit ourselves to what the  
15 testimony of this witness has brought in and we will get  
16 back to something more specific with reasonable assurance.

17 MR. TROSTEN: May I ask you this question, Dr.  
18 Goodyear: Is it correct that your testimony on page 5-54  
19 through 5-55 relates the striped bass population and the  
20 principle of compensation to general principles of  
21 compensatory response or are you drawing your conclusions  
22 with regard to the striped bass population solely from studies  
23 or analyses relating to the striped bass population?

24 WITNESS GOODYEAR: I am not sure I understand  
25 your question.

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MR. TROSTEN: Are you drawing your conclusions about the compensatory reserve of the striped bass population solely from studies that have been made of the striped bass? Is that the sole basis for your testimony, Dr. Goodyear?

WITNESS GOODYEAR: That and the information as presented on -- the concepts presented on 5-54.

MR. TROSTEN: Yes, I understand. And those concepts don't necessarily relate to the striped bass only, do they?

WITNESS GOODYEAR: No.

MR. TROSTEN: Thank you.

Now bearing that in mind, could you respond to the question that I just asked? Mr. Reporter, can you find the question I addressed to Dr. Goodyear?

Let me read it again. It would be difficult for you to do.

Would you please provide a documented example of a population which is regulated only by factors other than its own density?

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WITNESS GOODYEAR: Could I confer with counsel

for a minute?

MR. KARMAN: Well, Mr. Chairman, the only problem that we are encountering at the moment is the point that the Chairman raised about straying too far from the problem which -- from the issue which is before us and at the moment it is striped bass. The -- if we are going to start going into the population densities of other organisms or mammals or animals of some type or another, I think we may -- we are having difficulty enough in going through this very technical matter without protracting it indefinitely. I am afraid we may stray too far off the record.

MR. TROSTEN: Mr. Chairman, really, I am not asking for Dr. Goodyear to give me a dissertation on the population of other animals. We are discussing a subject which obviously -- and Dr. Goodyear knows and we all know -- that this is a subject where you must draw on general principles in order to derive conclusions. I am not asking him to analyze for me the population response of other populations. I am simply asking him to -- I am simply asking him to undertake to describe and give examples of the concepts that are inherent in his testimony. That's the reason why I am asking the question.

CHAIRMAN JENSCH: Yes, I think your last statement provides a limitation that the witness needs that you really

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1 are asking him what are the supporting data for his conclu-  
2 sions and assumptions set forth in 5-A54 and 55. I think if  
3 limited to what he presented, it would be helpful.

4 MR. TROSTEN: Precisely, Mr. Chairman.

5 WITNESS GOODYEAR: May I make a point? The  
6 recruitment to the fishery is density independent according  
7 to this analysis. But the regulation of the population is  
8 density dependent, and operates through fluctuations in  
9 mortality caused by the fishery.

10 MR. TROSTEN: So I gather that you are drawing a  
11 distinction between the recruitment to the fishery which I  
12 assume you mean to be the recruitment to the fish that are  
13 more than zero plus years old?

14 WITNESS GOODYEAR: Yes.

15 MR. TROSTEN: As opposed to the -- the size of  
16 the population as a whole? Are you drawing a distinction  
17 between those two things? Your last comment, do I understand  
18 that that's what you are doing, is that you are drawing a  
19 distinction between recruitment to the fisheries, that is  
20 the addition to the total fish population of those fish  
21 which are zero plus age old as opposed to the control of the  
22 size of the fishery as a whole? Is that what you are doing?

23 I don't understand the distinction. That's why  
24 I am struggling with it here.

25 WITNESS GOODYEAR: Regulation in the population

1 can operate through changes in mortality rate. Those changes  
2 in mortality rate can occur any time before -- or actually  
3 they can occur at any point in the population.

4 MR. TROSTEN: Yes.

5 WITNESS GOODYEAR: The point I am making is that  
6 presently in the striped bass population that I studied, or  
7 the data indicates that the location in life history at which  
8 mortality rates are changing is in the fishery itself,  
9 rather than before the fishery, so that the limitations  
10 on fecundity occur by changes in survival once the fish  
11 enter the fishery.

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1 MR. TROSTEN: Yes. I hear what you are saying,  
2 but are you saying that whereas the population as a whole is  
3 not regulated by factors -- only by factors other than its own  
4 density, the recruitment to the fishery is regulated only by  
5 factors other than density, is that what you are saying?

6 WITNESS GOODYEAR: Would you repeat that again,  
7 please.

8 MR. TROSTEN: Would the reporter please read my  
9 question back to Dr. Goodyear?

10 (The reporter read the pending question.)

11 (Witnesses conferring.)

12 MR. KARMAN: If you have some difficulty with the  
13 question, Dr. Goodyear, maybe you can try to explain it in  
14 your own words as to what you really mean.

15 MR. TROSTEN: Please do.

16 CHAIRMAN JENSCH: Will you first tell us what the  
17 question means. That will be helpful. I think a couple  
18 members here on the Board -- what do you understand the  
19 question to call for?

20 WITNESS GOODYEAR: I am not sure.

21 MR. TROSTEN: May I have another go at it, Mr.  
22 Chairman?

23 CHAIRMAN JENSCH: Yes, sure.

24 MR. TROSTEN: I thought Dr. Goodyear said that he  
25 was not arguing that the total fish population, the total

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1 striped bass population, was regulated by factors which were  
2 -- strike that.

3 I thought Dr. Goodyear was saying that he felt  
4 that the total population was not regulated only by factors  
5 which were -- I am sorry.

6 Let me collect my thoughts.

7 (Laughter.)

8 CHAIRMAN JENSCH: It may be your question, as I  
9 take it you are reading the same question several times,  
10 one of it -- it may be that it was drawn by one of your  
11 technical assistants. He should feel free if he can  
12 rephrase the wording of that, to state it. It will be all  
13 right with us.

14 MR. TROSTEN: Let me try it again. I apologize  
15 to the Board for turning this around.

16 I have the impression that what Dr. Goodyear was  
17 saying was that the recruitment to the fishery was regulated  
18 by density independent factors only.

19 CHAIRMAN JENSCH: Is that correct, Dr. Goodyear?

20 WITNESS GOODYEAR: Yes, with some qualification.  
21 The recruitment to the fishery -- we are talking first about  
22 East Coast striped bass population.

23 Secondly, the recruitment is dependent upon the  
24 number of spawn or number of -- yes, number of eggs spawned  
25 in the season of production. Between the year that they are

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spawned and the year they enter the fishery I am saying that there is little or no density dependent changes in mortality.

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MR. TROSTEN: Little or no ~~density~~ <sup>density dependent</sup> changes in

mortality?

WITNESS GOODYEAR: Between -- well -- the density feedback mechanism that is presently working in the Atlantic Coast striped bass population apparently is working through changes in mortality caused by the fishery so that the actual recruitment in terms of numbers of individuals is dependent upon the reproduction earlier.

Do you understand?

MR. TROSTEN: Are you finished?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Now I understand that -- from what you are saying that the recruitment to the fishery is controlled solely by density independent mechanisms or would you say almost completely by density independent mechanisms?

WITNESS GOODYEAR: Almost completely.

MR. TROSTEN: By density independent mechanisms?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Would you please provide for me a documented example of a population -- of a fish population where the recruitment to the fishery was controlled either solely or almost solely, as you just indicated, by density independent mechanisms?

WITNESS GOODYEAR: The Hudson River shad population. This is -- there's several publications on it, but one

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1 would be Talbott's publication.

2 I would provide it to you if you wish.

3 MR. TROSTEN: Just a moment, Mr. Chairman.

4 Dr. Goodyear, how many adult Hudson River spawned  
5 striped bass are predicted to exist by your mathematical  
6 model?

7 WITNESS GOODYEAR: Would you repeat --

8 MR. TROSTEN: I said how many --

9 WITNESS GOODYEAR: Would you repeat the question,  
10 please?

11 (The reporter read the pending question.)

12 WITNESS GOODYEAR: Could I confer with counsel,  
13 please?

14 MR. TROSTEN: Certainly.

15 (Counsel and witnesses conferring.)

16 WITNESS GOODYEAR: The model which was used in this  
17 analysis does not predict the numbers of fish in the adult  
18 striped bass population.

19 MR. TROSTEN: You say it does not predict?

20 WITNESS GOODYEAR: It is not designed to predict.

21 MR. TROSTEN: So it has not made any predictions?

22 WITNESS GOODYEAR: On the number of fish in the  
23 adult striped bass population.

24 MR. TROSTEN: Does it predict the numbers of  
25 fish which are recruited to the adult striped bass population?

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WITNESS GOODYEAR: No.

MR. TROSTEN: It is not designed to predict that?

WITNESS GOODYEAR: It is not designed to predict that.

MR. TROSTEN: Thank you.

Dr. Goodyear, do you consider that commercial and sports fishing is causing the adult population of striped bass to decline?

WITNESS GOODYEAR: Presently?

MR. TROSTEN: Yes.

WITNESS GOODYEAR: No.

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1 mil 1 MR. TROSTEN: Dr. Goodyear, what is your estimate  
2 of the number of Hudson River <sup>spawned</sup> ~~spawn~~ striped bass which are  
3 caught each year by commercial and sports fishermen?

4 WITNESS GOODYEAR: I'd have to check my notes on  
5 that.

6 MR. TROSTEN: All right. Would you do that?

7 WITNESS GOODYEAR: It would take a few minutes.

8 MR. TROSTEN: All right. Could you do that, please?  
9 Have you got your notes?

10 WITNESS GOODYEAR: They are either here or in the  
11 room.

12 CHAIRMAN JENSCH: Is this a convenient time for  
13 a recess?

14 At this time, let's recess, to reconvene in this  
15 room at 11:00 o'clock.

16 (Recess.)

17 CHAIRMAN JENSCH: Please come to order.

18 MR. TROSTEN: Mr. Chairman, Dr. Goodyear has told  
19 me that he needs some additional time to consult his notes  
20 with respect to my last question. I would like to move on  
21 to another question.

22 CHAIRMAN JENSCH: Yes. The Board was wondering  
23 if it would be helpful at all to the parties and expedite the  
24 case, to use the required programming for these cases if you  
25 gave your questions to the witnesses, especially insofar

2mil 1 you are seeking foundation evidence, if it would save some  
2 time on the witness stand. We have observed, you are appa-  
3 rently reading a very carefully-prepared cross-examination,  
4 and some of the questions may have some new answers that the  
5 witnesses are having difficulty accepting. As I infer some  
6 of the answers, the witnesses can accept part of the premise  
7 for the question, but some of the side effects of the question  
8 are not quite what the witness is able to accept, and I just  
9 wondered whether, if you have a long list of questions,  
10 if you could give them to the witness and he could prepare  
11 his responses maybe during the noon hour or in the evening  
12 and then we could kind of incorporate some tight responses  
13 and move right on.

14 You could consider that. It might be helpful  
15 to move the case along.

16 Will you proceed, please.  
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1 MR. TROSTEN: Thank you, Mr. Chairman.

2 Dr. Goodyear, in your opinion, would a reduction  
3 in adults caused by the fishery lead to lower egg production  
4 of striped bass?

5 WITNESS GOODYEAR: Yes.

6 MR. TROSTEN: Would the fewer larvae which are  
7 hatched from the smaller egg production be expected to  
8 experience greater survival than from larger broods?

9 WITNESS GOODYEAR: No.

10 MR. TROSTEN: Well, Dr. Goodyear, would you tell  
11 me, then, are there any compensatory mechanisms operative  
12 in Atlantic striped bass?

13 WITNESS GOODYEAR: Yes.

14 MR. TROSTEN: Would you tell me what they are?

15 WITNESS GOODYEAR: The fishery.

16 MR. TROSTEN: The fishery is a compensatory  
17 mechanism?

18 WITNESS GOODYEAR: The effort which changes  
19 mortality rates in the adult striped bass population changes  
20 the egg production for continuity of population.

21 MR. TROSTEN: Excuse me. I don't think you under-  
22 stand my question. You are not saying that the fishery is  
23 a compensatory mechanism, are you?

24 WITNESS GOODYEAR: It is, yes. It is a part of  
25 the compensatory process.

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MR. TROSTEN: Would you define what you mean by compensatory mechanism?

WITNESS GOODYEAR: In the sense we are using it here, a compensatory mechanism is a mechanism which changes mortality rates so that at high density mortality rates are higher and at low densities, mortality rates are lower.

MR. TROSTEN: Would the reporter read that answer, please?

(The reporter read the record as requested.)

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MR. TROSTEN: Are you not, Dr. Goodyear, describing a density dependent mechanism in that response to my question?

WITNESS GOODYEAR: Maybe I misunderstood your question.

MR. TROSTEN: Would the reporter read my question.

(The reporter read the record as requested.)

WITNESS GOODYEAR: The answer is yes.

MR. TROSTEN: In other words, you are describing a density dependent mechanism?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Thank you.

Now you were describing -- let's see if we can go back a little bit. We got off on a side track there. I asked you, are there any compensatory mechanisms operative in Atlantic striped bass and you answered yes.

Then, now, would you go on from there? I had asked if you would describe them. Would you go on from there?

WITNESS GOODYEAR: The fishing effort causes mortality in the striped bass population.

MR. TROSTEN: Yes.

WITNESS GOODYEAR: At high population levels -- well, let me back up for a minute.

The fishing effort in the fishing -- the laws

eak2 1 which regulate catch are controlling in a large part the  
2 striped bass population.

3 MR. TROSTEN: That is your opinion.

4 WITNESS GOODYEAR: Yes.

5 Just a moment.

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1 MR. TROSTEN: Yes.

2 WITNESS GOODYEAR: Would you look, please, at  
3 Figure V-12 on page V-57.

4 MR. TROSTEN: Yes. I am looking at it, Dr.  
5 Goodyear.

6 WITNESS GOODYEAR: In 1938, there was a law passed  
7 which restricted fishing for striped bass such that they  
8 could not -- no one could keep fish less than 16 inches.  
9 In effect this decreased the mortality rate in the population.  
10 If you will notice about six years later, in one generation  
11 time, there was a marked increase in the landings, indicating  
12 a response to the decreased fishing intensity or mortality.

13 MR. TROSTING: Yes.

14 WITNESS GOODYEAR: If you will notice the line  
15 drawn for the Hudson landings, you will notice that beyond  
16 that period there is an inverse relationship between Atlantic  
17 landings and landings in the Hudson, and for the period  
18 from 1950 to 1960, actually you go for all the data base  
19 which can be gathered -- if you will turn the page, actually  
20 two pages, you find a regression analysis. This actually  
21 should be a curve or linear regression rather than straight,  
22 but for our purposes it is sufficient here because it shows  
23 a negative relationship. The catch in the Hudson is compared  
24 with the number of yards of haul seine that were licensed  
25 in New York.

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You will find there is a negative correlation. There is a one-year lag such that the New York effort is compared -- the New York effort of one year is compared with the Hudson landings on the next indicating a negative relationship actually as you see here, over that span, some 78 percent of the variation that can be accounted for by the fishing effort, the haul seine effort, in the Atlantic on the preceding year.

This is a negative feedback mechanism operating in the fishery or through the fishery at high fishing intensity, survival is lower.

Does that help?

MR. TROSTEN: Are you finished?

WITNESS GOODYEAR: Yes.

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1 mil 1 MR. T OSTEN: We will get back later today to the  
2 opinions you have expressed in your testimony here and the  
3 opinions you have expressed in these graphs. Are you the  
4 person, by the way, Dr. Goodyear, whom we should cross-  
5 examine with respect to that?

6 WITNESS GOODYEAR: Yes.

7 MR. TROSTEN: Thank you.

8 Is it your opinion that these graphs indicate  
9 that the -- these being the graphs appearing on pages 5-57  
10 through 5-60 indicate that there is a compensatory  
11 mechanism operative in the Atlantic striped bass? I am a  
12 little confused.

13 WITNESS GOODYEAR: Within the fishing regulations,  
14 yes.

15 MR. TROSTEN: Within the fishing regulations.

16 Does the answer to <sup>my</sup> ~~your~~ question mean the same  
17 thing <sup>as that</sup> as you are saying that the fishing in the Atlantic  
18 and in the Hudson is controlling the striped bass population?

19 WITNESS GOODYEAR: Yes.

20 MR. TROSTEN: I see. Are there any other  
21 compensatory mechanisms as you are defining that term  
22 operative in the Atlantic striped bass population?

23 WITNESS GOODYEAR: Any others?

24 MR. TROSTEN: Any others.

25 WITNESS GOODYEAR: I can't answer that. I don't

1 know.

2 MR. TROSTEN: Is it your opinion that this is the  
3 only compensatory -- I am having -- frankly, I am having  
4 trouble because I think we are --

5 WITNESS GOODYEAR: May I make a point?

6 MR. TROSTEN: Yes.

7 WITNESS GOODYEAR: I can't say it is the only one.  
8 It is the predominant one based on this analysis.

9 MR. TROSTEN: Let me rephrase my question again,  
10 then. I will state it the way I understand it because  
11 frankly I am still having a little difficulty with the way you  
12 are using the term compensatory mechanism.

13 But is it your opinion that the fishery is the  
14 only factor which is controlling the striped bass population?

15 WITNESS GOODYEAR: It is the only factor that I  
16 have been able to identify.

17 MR. TROSTEN: So you are not ruling out the  
18 possibility that there might be some other factor that is  
19 controlling it?

20 WITNESS GOODYEAR: That is participating in control-  
21 ling it, yes.

22 MR. TROSTEN: That is participating in the control  
23 of it.

24 WITNESS GOODYEAR: Yes.

25 MR. TROSTEN: You are not ruling it out?

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WITNESS GOODYEAR: I am not ruling anything else out.

MR. TROSTEN: On page 5-56, Dr. Goodyear, when you say there is a four to six-year lag between spawn and recruitment to the fishery, do you see that?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Do you mean that is the length of time which must elapse for an individual to survive from the egg to the mature female stage?

WITNESS GOODYEAR: No.

MR. TROSTEN: What do you mean by the sentence four to six-year lag -- excuse me. No. What do you mean by the lag between the spawn and the recruitment to the fishery?

WITNESS GOODYEAR: This is the time period which occurs between spawning and capture by the fishery.

MR. TROSTEN: Capture by the fishery?

WITNESS GOODYEAR: Yes. The fishery is taking or was during the '60s, the fourth, fifth, and sixth -- primarily the fourth, fifth, and sixth year class.

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1 MR. TROSTEN: In other words, you mean the time  
2 between the time that the fish is spawned to the time when  
3 fishermen, commercial or sports fishermen begin  
4 to catch these fish, is that -- begins to catch that fish,  
5 is that what you meant?

6 WITNESS GOODYEAR: Yes.

7 MR. TROSTEN: I understand. Thank you.

8 You say on page 5-61 that, "The effect of plant  
9 operation for even a short period is, therefore, expected  
10 to reduce future mid-Atlantic " -- I am interpolating that  
11 phrase -- "landings in the neighborhood of 30 to 50  
12 percent beginning about the fifth year after operation begins."

13 The 30 percent is your corrected number?

14 WITNESS GOODYEAR: Yes.

15 MR. TROSTEN: I am going to list what I understand  
16 to be a number of assumptions which I believe are most  
17 critical to your hypothesis and as I list them, I want you  
18 to tell me <sup>whether</sup> ~~what~~ you agree that this is an assumption that  
19 you have made and I want you to tell me whether this is  
20 very important to your hypothesis. Would you do that?

21 WITNESS GOODYEAR: The -- you are going to give  
22 me a list of assumptions.

23 MR. TROSTEN: I am going to give you a list of  
24 assumptions that I consider to be -- to underlie that conclusion  
25 which you have drawn. These assumptions being, in my opinion,

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1 very important to your conclusion, and as I list these  
2 assumptions, I am going to ask you if you agree that you  
3 made these assumptions and I want to ask you whether you  
4 agree that these are very important to your conclusion. All  
5 right?

6 MR. KARMAN: These are Mr. Trosten's assumptions  
7 and I want to know whether you use some of those  
8 same assumptions.

9 MR. TROSTEN: Okay. Do you understand what I mean?

10 WITNESS GOODYEAR: Yes.  
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1 MR. TROSTEN: Is it correct that you assume that  
2 there will be 100 percent mortality of entrained striped  
3 bass eggs and larva?

4 WITNESS GOODYEAR: Yes.

5 MR. TROSTEN: Is that an important -- is that a  
6 very important assumption to your conclusion?

7 WITNESS GOODYEAR: Not the exact magnitude;  
8 mortality is important.

9 MR. TROSTEN: Mortality. If it turned out that  
10 there were 1 percent mortality, would this very significantly  
11 affect your conclusion?

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: If it turned out there were 10  
14 percent mortality, would that very significantly affect your  
15 conclusion?

16 WITNESS GOODYEAR: Yes.

17 MR. TROSTEN: If it turned out there were 25  
18 percent mortality, would that very significantly affect your  
19 conclusions?

20 WITNESS GOODYEAR: The percentage -- the percentage  
21 will be a direct percentage comparison.

22 MR. TROSTEN: Oh, I see. In other words, if it  
23 turned out that there were 10 percent mortality instead of  
24 100 percent mortality, then I should correct this -- if it  
25 turned out that that were the case, I should correct this --

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1 your testimony to read the effect of plant operation for  
2 even a short period is therefore expected to reduce future  
3 landings in the neighborhood of three to five percent  
4 beginning about the fifth year after operation begins?

5 WITNESS GOODYEAR: Yes.

6 MR. TROSTEN: Thank you.

7 Now did you assume that there will be impingement  
8 of some two to five million fish annually of which some four  
9 percent will be striped bass?

10 WITNESS GOODYEAR: No.

11 MR. TROSTEN: What -- did you assume any number  
12 of impingement of fish?

13 WITNESS GOODYEAR: No.

14 MR. TROSTEN: I see. All right. Thank you.

15 Did you assume that striped bass eggs and larvae  
16 are uniformly subject to entrainment during the first six  
17 to eight weeks of their life?

18 WITNESS GOODYEAR: No.

19 MR. TROSTEN: Did you assume that they were  
20 uniformly subject to entrainment for some different stage of  
21 their life?

22 WITNESS GOODYEAR: Perhaps you could clarify what  
23 you mean by uniformly.

24 MR. TROSTEN: Yes, I will do that. That they are  
25 all uniformly distributed in the river and that they will not

1 avoid the intakes of the plant because of behavioral  
2 characteristics?

3 WITNESS GOODYEAR: That was not an assumption, no.

4 MR. TROSTEN: Would you tell me how long you  
5 assumed that they were subject to entrainment, please?

6 WITNESS GOODYEAR: They were subject to entrainment  
7 for eight weeks.

8 MR. TROSTEN: For eight weeks?

9 Will you tell me whether they were uniformly  
10 subject to entrainment during the eight week period, please?

11 WITNESS GOODYEAR: One moment.

12 (Witnesses conferring.)

13 WITNESS GOODYEAR: No.

14 MR. TROSTEN: Would you describe the distribution --  
15 you can use the easel if you wish. Would it be helpful  
16 for you to show me the curve?

17 WITNESS GOODYEAR: The -- I don't think we are  
18 talking about the same thing. When you asked me uniform  
19 entrainment -- uniformly distributed or -- excuse me --

20 MR. TROSTEN: There were two parts to my question.  
21 I understand that. Would you care to explain --

22 WITNESS GOODYEAR: The --

23 CHAIRMAN JENSCH: Let him try to clear up.

24 Apparently there is dispute or confusion.

25 Go ahead.

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WITNESS GOODYEAR: There are portions of the population which are never exposed to the entrainment. Therefore the uniformity of exposure of the population does not exist. The portion which is exposed, which is present at or in the Indian Point vicinity, was considered to be uniform -- of a uniform exposure for the entire period.

MR. TROSTEN: May I ask you a question about what you just said?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: When you said the <sup>portion</sup>~~portion~~ that is at Indian Point, are you referring to the eleven mile segment of river that's described in the Carlson-McCann report?

WITNESS GOODYEAR: No, four and a half mile.

1 MR. FROSTEN: Four and a half mile. Bounded  
2 by which point, Dr. Goodyear?

3 WITNESS GOODYEAR: Bounded by mile point 40 to  
4 mile point 45, approximately.

5 MR. FROSTEN: Is it correct you were assuming  
6 that all of the eggs and larvae that were found for an eight-  
7 week period in mile point 40 to mile point 45 were subject  
8 to entrainment for the eight-week period, uniformly subject  
9 to entrainment?

10 WITNESS GOODYEAR: Yes.

11 MR. FROSTEN: And that they did not have any  
12 capability to avoid the plant because of behavioral character  
13 istics?

14 WITNESS GOODYEAR: Yes.

15 MR. FROSTEN: All right. Would you describe  
16 the susceptibility to entrainment of the remaining larvae  
17 in the river, those that didn't reside for the eight-week  
18 period in the segment you have described. What was their  
19 susceptibility during this eight-week period?

20 WITNESS GOODYEAR: The fish that were present  
21 in that vicinity did not necessarily reside there for  
22 the full eight weeks. The --

23 MR. FROSTEN: The fish in the four and a half mile  
24 segment?

25 WITNESS GOODYEAR: It was a one-tide excursion.

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1 MR. TROSTEN: I see.

2 WITNESS GOODYEAR: The susceptibility or the  
3 exposure of the rest of the population depends upon their  
4 residence within that zone.

5 MR. TROSTEN: All right. Let's move on to  
6 another assumption.

7 Did you assume that 70 to 90 percent of the  
8 surviving eggs and larvae annually produced in the Hudson  
9 River migrate past Indian Point at a time when they are in  
10 a planktonic form? <sup>now</sup> ~~Now~~ -- did you assume that?

11 WITNESS GOODYEAR: No.

12 MR. TROSTEN: What did you assume with regard to  
13 the percentage of surviving eggs and larvae annually  
14 produced in the Hudson River which migrated past Indian  
15 Point?

16 WITNESS GOODYEAR: It is dependent upon spawning  
17 location and flow.

18 MR. TROSTEN: Did you assume that there will be  
19 no compensatory increase in survival rates of zero  
20 plus striped bass as a result of mortality caused by the  
21 plants?

22 WITNESS GOODYEAR: For that year class?

23 MR. TROSTEN: For that year class.

24 WITNESS GOODYEAR: Yes.

25 MR. TROSTEN: Did you assume that any eggs and

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larvae which are entrained by the plant will immediately  
be replaced by others -- other eggs and larvae?

CHAIRMAN JENSCH: Other striped bass?

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1 MR. TROSTEN: On the striped bass eggs and larvae?  
2 Let's leave that question, Dr. Goodyear. I under-  
3 stand it requires a fair amount of explanation and we can  
4 get into that later. We will get into that later.

5 Now did you assume the general validity of the  
6 Carlson-McCann, Rathjen and Miller -- the Carlson-McCann  
7 and Rathjen and Miller data for the purposes of determining  
8 egg and larval abundance and distribution?

9 WITNESS GOODYEAR: Would you please repeat that?

10 MR. TROSTEN: Would the reporter read the question?

11 CHAIRMAN JENSCH: Before he does that, I wonder if  
12 you could add to it what is that assumption of that distri-  
13 bution so we have that precisely in mind to see whether he  
14 assumed that.

15 MR. TROSTEN: I guess I really ought to rephrase  
16 that question. I understand why the witness may be having  
17 difficulty with it, Mr. Chairman, and probably the Board, too.

18 CHAIRMAN JENSCH: Thank you.

19 MR. TROSTEN: When I asked about the general  
20 validity, I intended to say did you assume that the Carlson  
21 and McCann and Rathjen and Miller data were adequate for  
22 purposes of determining egg and larval abundance and  
23 distribution. That is a more correct way of stating it.

24 WITNESS GOODYEAR: If you will give me a moment,  
25 I would like to read what I said.

1 I don't see it right offhand. The method -- to  
2 answer your question, the general trends which were shown  
3 were considered to be valid. The precise numbers, because  
4 of their -- of the type of sampling that was done, the  
5 absolute numbers are very likely to be in error.

6 MR. TROSTEN: By how much in error, Dr. Goodyear?

7 WITNESS GOODYEAR: That is difficult to say.

8 I don't know.

9 MR. TROSTEN: Would you say they could be five  
10 percent off?

11 CHAIRMAN JENSCH: Aren't we getting into guessing?  
12 He said he didn't know. Presumably he made no calculation.  
13 Try five percent, six and a half percent. What do you think  
14 it is? If you made a calculation, can you tell us what you  
15 think the error is and tell us and ask him if he represents  
16 that?

17 MR. TROSTEN: Couldn't they be off by a factor  
18 of 10, Dr. Goodyear?

19 CHAIRMAN JENSCH: Or 15, 20, 25, 30, 35, 40.

20 Surely your technician has made the calculation.

21 MR. TROSTEN: That is just the point, Mr.

22 Chairman. We haven't made the calculation because you can't.

23 CHAIRMAN JENSCH: Well, as he said, he didn't  
24 know. If you can't make the calculation, what do you want  
25 him to guess for?

(Laughter.)

*answering*

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2 MR. TROSTEN: Would you mind ~~asking~~ -- Could it be  
3 off by a factor of 10?

4 WITNESS GOODYEAR: Certainly. The numbers --  
5 the numbers that are used are used as indexes.

6 MR. TROSTEN: Could they be off by a factor of 100?

7 CHAIRMAN JENSCH: Off from -- factor of error of  
8 from what? What is your standard?

9 MR. TROSTEN: From the numbers presented and used  
10 by Dr. Goodyear in his analysis.

11 CHAIRMAN JENSCH: I understood he took the trend  
12 only from these data and not the numbers.

13 MR. TROSTEN: Did you take the trend or the  
14 numbers, Dr. Goodyear?

15 WITNESS GOODYEAR: The trend.

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1 MR. TROSTEN: In other words, you didn't use any  
2 numbers from the Carlson-McCann - Rathjen and Miller data?  
3 You didn't use absolute numbers?

4 WITNESS GOODYEAR: Use in what sense?

5 MR. TROSTEN: In your model, Dr. Goodyear.  
6 Did you just use a trend in your model and didn't use any  
7 numbers?

8 WITNESS GOODYEAR: Let me reflect a moment.

9 MR. TROSTEN: Yes, please do.

10 (Witnesses conferring.)

11 WITNESS GOODYEAR: Yes. The data, of course, are  
12 reported as numbers.

13 MR. TROSTEN: And did you use them in your model  
14 as numbers?

15 WITNESS GOODYEAR: As percentages. If you look  
16 at it as index figures, the assumption -- basic  
17 assumption is that the sampling is not biased from one point  
18 to another, from one sampling spot to another. So that the  
19 numbers can then be compared within a set of data.

20 MR. TROSTEN: Did you use <sup>actual</sup> ~~factual~~ numbers from  
21 Carlson and McCann or from Rathjen and Miller concerning  
22 larval abundance or distribution in drawing up your model?

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: Could those numbers have been off  
25 by a factor of 10, that is they could be 10 times more or

1 10 times less?

2 MR. BRIGGS: Excuse me, Mr. Trosten. Could I ask  
3 a question? Did you use numbers or ratios of numbers? Or  
4 both?

5 WITNESS GOODYEAR: Both.

6 MR. BRIGGS: Okay. Thank you.

7 MR. TROSTEN: Thank you, Mr. Briggs.

8 Could those numbers have been 100 times -- could  
9 those numbers really be 100 times greater or 100 -- one-  
10 one hundredth as great as the numbers you used in your model?

11 CHAIRMAN JENSCH: May I inquire the relevance of  
12 this? You are asking him is it possible that there is an  
13 error of one percent or 100 percent. You said there could be  
14 no calculation made. He said he didn't know. I suppose  
15 anything-is possible. If he says, oh, yes, I suppose they  
16 could be off; he doesn't know. You can't calculate it.  
17 What good is the result of an answer that you are seeking  
18 as to what you would -- perhaps you would argue, the man said  
19 this thing could be off 100 percent. Anything is possible.  
20 It is speculative and uncertain and indefinite. I have  
21 difficulty understanding the relevancy of the question.

22 MR. TROSTEN: Mr. Chairman, I think it is  
23 terribly important because it affects whether Dr. Goodyear  
24 knows whether the results that he is predicting have any  
25 confidence levels at all.

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1 CHAIRMAN JENSCH: Well, are you going to ask him,  
2 in the converse, as I understood you in some types of your  
3 questions, if it may not kill, it may kill or something?  
4 Are you going to say the numbers may be absolutely valid,  
5 do you agree there might be that possibility, too, so that  
6 you could get it both ways and you could argue one side  
7 and he could argue the other?

8 MR. TROSTEN: I am prepared to ask for Dr. Goodyear  
9 to say, if he wishes, that the numbers might be valid, but  
10 then I would like to ask him if he knows whether the numbers  
11 are valid.

12 MR. KARMAN: He indicated --

13 MR. TROSTEN: The answer is he doesn't know, is  
14 that correct, Dr. Goodyear?

15 WITNESS GOODYEAR: The absolute magnitude of the  
16 numbers, I do not know whether they are valid or not.  
17 However --

18 CHAIRMAN JENSCH: Let him go ahead now.

19 WITNESS GOODYEAR: I might point out the error that  
20 is inherent in the sampling should be distributed evenly  
21 throughout all the sampling locations so that as far  
22 as the way the data were interpreted, it is very difficult  
23 to believe that the -- any error, even an error on the order  
24 of magnitude or even two orders of magnitude of error would  
25 change the method or the results of the analysis.

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1 MR. TROSTEN: Dr. Goodyear, we will get back later  
2 to your opinion that the error could not be -- that the error  
3 is uniform.

4 WITNESS GOODYEAR: That was an assumption.

5 MR. TROSTEN: Right. We will return later in the  
6 day to that assumption so we can get to that.

7 Dr. Goodyear, just to cover a point in here that  
8 we slipped over, I think, was the -- your assumption that  
9 there would be no compensation in the first year class,  
10 no compensatory increase in survival as a result of mortality  
11 caused by the plants, a very important assumption to your  
12 conclusion?

13 WITNESS GOODYEAR: Yes.

14 MR. TROSTEN: Thank you.

15 Dr. Goodyear, is it correct that there are a  
16 number of important uncertainties associated with some of  
17 the assumptions that you have listed that you made in  
18 reaching your ultimate conclusion?

19 WITNESS GOODYEAR: Would you provide the list?

20 MR. TROSTEN: Yes, I will go over the list that  
21 you indicated were important assumptions. One that there will  
22 be 100 percent mortality of entrained striped bass, eggs,  
23 and larva.

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The next one was that there -- that the striped bass, eggs, and larvae are subject to entrainment during the first six to eight weeks of their life, during eight weeks -- excuse me -- of their life, I believe you said that.

WITNESS GOODYEAR: Six to eight weeks.

The eight-week figure was the figure you asked me a few minutes ago that the 30 to 50 percent number was based on.

MR. TROSTEN: All right. That there will be no compensatory increase in survival rates as a result of -- in the first year class as a result of mortality caused by the plants and the adequacy of the Carlson-McCann and Rathjen-Miller data for purposes of determining egg and larval abundance in distribution?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: By the way, was the latter assumption that the Carlson-McCann and Rathjen-Miller data adequate for this purpose, an important assumption to your conclusion?

WITNESS GOODYEAR: That they are adequate.

MR. TROSTEN: That they are adequate for this purpose?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: All right.

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1           Would you say that there is a band of uncertainty  
2 encompassing any of these assumptions?

3           WITNESS GOODYEAR: Yes.

4           MR. TROSTEN: Do you know how large that  
5 band of uncertainty is.    What level -- in other words,  
6 I guess I can't really phrase this in a statistical sense,  
7 but take the matter of -- that there will be 100 percent  
8 of mortality of eggs and larva. You are not a hundred percent  
9 sure that that will occur, are you?

10          WITNESS GOODYEAR: That 100 percent mortality  
11 would be the weakest of these points that you raise.

12          MR. TROSTEN: The weakest in what sense, Doctor?

13          WITNESS GOODYEAR: The one that would be --  
14 one which could be quantified in a much more --

15          MR. TROSTEN: More readily.

16          WITNESS GOODYEAR: Not only more readily but  
17 would have more influence.

18          MR. TROSTEN: Are you saying, incidentally, that this  
19 is the factor to which your model is most sensitive? You  
20 are not saying that.

21          WITNESS GOODYEAR: No.

22          MR. TROSTEN: All right. Would you say that there  
23 is a degree of uncertainty as to whether there will be  
24 no compensatory increase in survival rates in the  
25 first year class as a result of mortality caused by the plants?

          WITNESS GOODYEAR: A degree?

1 MR. TROSTEN: A degree of uncertainty.

2 WITNESS GOODYEAR: Yes.

3 MR. TROSTEN: Do you know how large a degree?

4 Are you able to quantify that?

5 WITNESS GOODYEAR: Very small.

6 MR. TROSTEN: In your opinion, there is a very  
7 small degree of uncertainty associated with that assumption?

8 WITNESS GOODYEAR: Yes.

9 MR. TROSTEN: Would you say that there is a  
10 degree of uncertainty associated with the adequacy of the  
11 Carlson-McCann and Rathjen-Miller data for purposes of  
12 determining egg and larval abundance and distribution in  
13 the Hudson River?

14 WITNESS GOODYEAR: Would you repeat?

15 MR. TROSTEN: Would the reporter read the question,  
16 please.

17 (The reporter read the record as requested.)

18 WITNESS GOODYEAR: Yes.

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2 with assumptions, maybe as a layman, as an attorney, isn't  
3 there some degree of uncertainty in every assumption basically  
4 inherent in the fact that it is an assumption, that there is  
5 some degree of uncertainty?

6 CHAIRMAN JENSCH: There is a good philosophical  
7 inquiry.

8 (Laughter.)

9 MR. KARMAN: What I was trying to do, if that is  
10 so, we might be obviating the necessity of repeating each  
11 time is there a degree of uncertainty in an assumption.

12 CHAIRMAN JENSCH: Yes. I think one way to obviate  
13 a lot of these questions is if the questions had been submitted  
14 to the witnesses before the hearing. We have had endeavors  
15 by many parties in this proceeding and many efforts made  
16 in and out of this proceeding to expedite the proceedings.  
17 This Board is mindful of that and anxious to expedite the  
18 hearing. I take it the Applicant has chosen the method,  
19 however, of keeping the questions until the witness is on  
20 the stand. We are necessarily going to take time, and  
21 these assumptions, what degree of uncertainty or lack of  
22 foundation evidence, what happens to a fish egg in the Hudson  
23 River with the tidal flow, I would imagine there is some  
24 uncertainty to being able to tag it and trace it.

25

We have to understand the reality of the situation.

1 MR. TROSTEN: Mr. Chairman, I am very mindful  
2 of the need not to encroach upon the Board's time, and it is  
3 our strong desire to move the hearing along. It is true I  
4 have had to prepare very carefully in order to cross-examine  
5 Dr. Goodyear's very considered presentation here.

6 On the other hand, it is not correct, sir, that  
7 I had decided in advance on all of the questions to ask Dr.  
8 Goodyear, and indeed, it is -- I found it necessary to go  
9 off into tangents in order to inquire into these matters  
10 as he raises these points.

11 CHAIRMAN JENSCH: We understand the answers  
12 vary with the question. I think there has been a general  
13 outline of your questions that you have been reading that  
14 perhaps to some extent could have been submitted to the  
15 witness.

16 Not having done so, let us go on with what we have.

17 MR. TROSTEN: Thank you, sir.

18 Dr. Goodyear, would you say that there is a  
19 substantial degree of uncertainty associated with the  
20 adequacies of these numbers?

21 WITNESS GOODYEAR: Which numbers?

22 MR. TROSTEN: The Carlson and McCann and Rathjen  
23 and Miller numbers concerning egg abundance and egg distribu-  
24 tion.

25 By the way, when you answered yes to my last

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1 question, were you answering yes as far as both abundance  
2 and distribution?

3 CHAIRMAN JENSCH: Let's get the question and the  
4 answer.

5 MR. TROSTEN: Please.

6 (The reporter read the record as requested.)

7 CHAIRMAN JENSCH: The question is to what were  
8 you answering yes, the double question, the first part, the  
9 second part?

10 WITNESS GOODYEAR: To both.

11 MR. TROSTEN: What would you say the degree of  
12 uncertainty is? Would you say there is a plus or minus  
13 50 percent confidence level above that, or would you say  
14 based upon your previous answer that you don't know  
15 what the level of confidence is, that it might be a hundred  
16 times off, 10 times off, something you don't know?

17 MR. MACBETH: Could we distinguish between  
18 abundance and distribution at this point?

19 MR. TROSTEN: Yes. Let's spread this out and  
20 separate it into two questions.

21 What is your level of confidence in the adequacy  
22 of the Carlson and McCann and Rathjen and Miller abundance  
23 levels? The numerical values?

24 WITNESS GOODYEAR: I don't know.

25 MR. TROSTEN: You don't know what the level of

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1 confidence is?

2 WITNESS GOODYEAR: No.

3 MR. TROSTEN: What about for distribution?

4 WITNESS GOODYEAR: It would be much less, the  
5 confidence level would be much smaller.

6 MR. TROSTEN: You would have a greater confidence  
7 in the distribution values than you would have in the  
8 abundance values?

9 WITNESS GOODYEAR: Yes.

10 MR. TROSTEN: All right. But you -- other than  
11 that it is a greater confidence, you wouldn't be able to  
12 quantify it?

13 WITNESS GOODYEAR: No.

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14 MR. TROSTEN: Is there not another important  
15 assumption you made in reaching -- in your hypothesis that  
16 30 to 50 percent of the -- that the effect of plant operation  
17 for even a short period is therefore expected to reduce  
18 future, that is mid-Atlantic landings, in the neighborhood of  
19 30 to 50 percent beginning about the fifth year after operation  
20 beings? And is that assumption not the fact that the Hudson  
21 River contributes a very substantial portion of the total  
22 striped bass making up the mid-Atlantic fishery?

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: Would you say that's a very  
25 important assumption?

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WITNESS GOODYEAR: Yes.

MR. TROSTEN: Dr. Goodyear, have I left out any important assumptions that you made that I haven't listed?

WITNESS GOODYEAR: That's difficult to answer.

MR. KARMAN: That sure is difficult, Mr. Trosten. Do you have any in mind?

MR. TROSTEN: I think I have touched upon most of them, but if Dr. -- if I am wrong, I wish that Dr. Goodyear, either now or after he has had a chance to reflect on this, would let me know and let me know and let the Board know.

Would you do that, Dr. Goodyear?

WITNESS GOODYEAR: Yes, I'd have to see the transcript tomorrow.

MR. TROSTEN: Study the transcript of this questioning that's been going on for the last 15 minutes, and then let me know and let the Board know whether there are other very important assumptions to which your model is very sensitive. Would you do that?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Thank you very much.

Now on the basis of the -- now on the basis of the number of assumptions that I have listed, and perhaps there are other assumptions that I haven't thought about on which your estimate of 30 to 50 percent rests, would you say that there is a band of uncertainty encompassing your estimate

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1 of 30 to 50 percent?

2 WITNESS GOODYEAR: Yes.

3 MR. TROSTEN: Would you say that it is 10 percent?

4 In other words, it might be 27 percent to 55 percent?

5 MR. KARMAN: Dr. Goodyear, only if you feel that  
6 you can quantify this percentage level.

7 WITNESS GOODYEAR: I would like to point out  
8 that the estimate incorporates a range.

9 MR. TROSTEN: Yes, there is a 20 percent.

10 WITNESS GOODYEAR: Well, it is 40 percent in the  
11 estimate, 40 percent of the mean.

12 MR. TROSTEN: All right. Now would you say that  
13 the number might be, instead of 30 percent to 50 percent,  
14 could it be 40 percent -- <sup>that is, 20</sup> ~~40~~ percent to 60 percent?

15 WITNESS GOODYEAR: Yes.

16 CHAIRMAN JENSCH: While there is a pause, if I  
17 may ask, will your witnesses be prepared to give us, so we  
18 won't have to take time on the stand, ask them if they will  
19 give us the percent in figures if you can quantify it, of  
20 the uncertainty in their estimates and calculations so each  
21 witness will come on and tell us how far off they think  
22 their estimates and calculations are. Would you do that?

23 MR. TROSTEN: Yes.

24 CHAIRMAN JENSCH: Thank you.

25 MR. TROSTEN: Would you say that the number,

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instead of being 30 to 50 percent, might be 3 to 5 percent?

WITNESS GOODYEAR: It could be based on the assumption we were talking about a few minutes ago, based on the percent mortality which occurs upon condenser passage.

MR. TROSTEN: Only based upon that assumption?

WITNESS GOODYEAR: That would be the basic assumption which I feel right now could produce that degree -- could alter that conclusion.

MR. TROSTEN: Could there be some other assumption that might prove not to be as -- could some other assumption *and could not be proven to be not true and that simply affect your estimate?*

WITNESS GOODYEAR: You were asking about degrees of certainty.

MR. TROSTEN: No --

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1 CHAIRMAN JENSCH: Let him finish.

2 WITNESS GOODYEAR: There are other assumptions  
3 which could make that -- or could accommodate a change in the  
4 estimate by that much, but in degree of certainty upon which  
5 those assumptions are based, the material upon which  
6 assumptions are based provides a much greater degree of cer-  
7 tainty. It provides everyone with a much greater degree  
8 of certainty.

9 MR. TROSTEN: How much greater in --

10 WITNESS GOODYEAR: Order of magnitude.

11 MR. TROSTEN: In other words, you have an order  
12 of magnitude greater degree of certainty of some of these  
13 assumptions than other assumptions?

14 WITNESS GOODYEAR: Yes.

15 MR. TROSTEN: We will get back to how you  
16 determine the -- which one you have the order of magnitude  
17 and how you determine that later. Okay?

18 Now would you say that instead of being three  
19 to five percent it could be one to two percent?

20 WITNESS GOODYEAR: Could it be?

21 MR. TROSTEN: Yes.

22 WITNESS GOODYEAR: Yes.

23 MR. TROSTEN: Could it not produce -- could there  
24 not be any increase upon level? *in the level of mortality*

25 WITNESS GOODYEAR: Yes.

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2 MR. TROSTEN: Could the operation of the plant  
improve the striped bass population?

3 WITNESS GOODYEAR: Yes.

4 MR. TROSTEN: What is your level of confidence  
5 in these areas, matters?

6 WITNESS GOODYEAR: I am not sure how to answer you  
7 on that.

8 MR. TROSTEN: Strike the question. I will ask you  
9 another question.

10 Dr. Goodyear, is it correct that as a matter of  
11 formal logic if you have a number of assumptions that underlie  
12 a conclusion and if there is a degree of <sup>uncertainty</sup> ~~certainty~~ associated  
13 with one or more of these assumptions that you cannot  
14 demonstrate formally the degree of uncertainty in the  
15 conclusion?

16 (Witnesses conferring.)

17 WITNESS GOODYEAR: Would you repeat the question  
18 again?

19 MR. TROSTEN: Is it correct, Dr. Goodyear, that  
20 if there are a number of uncertainties associated with  
21 several assumptions that are made in drawing a conclusion  
22 and that you do not know the level of uncertainty associated  
23 with one or more of these assumptions, that you cannot demon-  
24 strate formally what the level of certainty is of the final  
25 conclusion?

1                   WITNESS GOODYEAR: This is true.

2                   MR. TROSTEN: Is it correct that there are a number  
3 of uncertainties associated with the various assumptions you  
4 have made in drawing your conclusion that the operation of  
5 the plant for even a short period is therefore expected to  
6 reduce future, that is mid-Atlantic, landings in the  
7 neighborhood of 30 to 50 percent beginning in the neighborhood  
8 -- beginning about the fifth year after operation begins?

9                   WITNESS GOODYEAR: Yes.

10                  MR. TROSTEN: Is it then correct that you-- do  
11 you know the level of uncertainty of these various assumptions?

12                  WITNESS GOODYEAR: No. I would like to point out  
13 that it will be very difficult to quantify certain of the  
14 assumptions that are the ones which carry a great degree of  
15 uncertainty. For instance, mortality upon condenser passage  
16 in the field for a plant in operation, the entrainment  
17 mortality that is observed in the laboratory or from animals  
18 that are removed from the discharge canal and held may not be  
19 a real estimate.

20                   So that must be taken into account.

21                   Do you understand?

22                  MR. TROSTEN: Yes, I think I understand, Dr.

23                  Goodyear.

24                  CHAIRMAN JENSCH: Excuse me. While there is a  
25 pause, is there any of this -- I don't know what the trend

1 of your question is -- but does this end up to explain how  
2 they are still scraping the fish off the screens? I mean,  
3 the uncertainties about assumptions of how many fish, but  
4 they are still shoveling them into the trucks, I presume,  
5 and so if you have these assumptions then you are still  
6 getting bad results, your folks may be absolutely right in the  
7 count of the number of fish eggs that float up and down the  
8 river; but if they are still taking dead fish off, what  
9 does it do to say whether there is a greater degree of  
10 confidence in one assumptions or the other?

11 MR. TROSTEN: Mr. Chairman, I should point out  
12 the discussion so far really hasn't involved impingement  
13 at all.

14 CHAIRMAN JENSCH: I understand.

15 MR. TROSTEN: It has involved only entrapment  
16 as Dr. Goodyear pointed out.

17 So, therefore, in response to your question, the  
18 -- we are not shoveling away <sup>fish</sup> in trucks. There are a --  
19 numbers of these small one to two to three-inch white perch  
20 that are being impinged in the cold weather and I guess in the  
21 previous discussion, we have attempted to explore and we will  
22 go into this further how the measures that we have  
23 adopted, we expect will substantially reduce the numbers  
24 of these fish that are impinged on the screens.

25 May I confer for a moment, Mr. Chairman?

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1 CHAIRMAN JENSEN: Certainly.

2 MR. TROSTEN: Thank you.

3 Dr. Goodyear--would the reporter read back Dr.  
4 Goodyear's response to my last question?

5 (The reporter read the record as requested.)

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1 MR. TROSTEN: Is it true since you do not know  
2 the level of uncertainty associated with these various  
3 underlying assumptions that you do not -- you are unable to  
4 demonstrate formally and, indeed, it cannot be demonstrated  
5 formally what the level of uncertainty is in your estimate  
6 of 30 to 50 percent of entrainment?

7 WITNESS GOODYEAR: Yes.

8 MR. TROSTEN: Dr. Goodyear, would it be helpful  
9 if you had more information on some of these uncertainties?

10 WITNESS GOODYEAR: Yes.

11 MR. TROSTEN: Dr. Goodyear, is it your view, that  
12 we already have most of the data available to resolve these  
13 uncertainties?

14 WITNESS GOODYEAR: No.

15 MR. TROSTEN: Would you look at page 6525 of the  
16 transcript -- not right now, when you have a chance and  
17 let me know if you care to modify your testimony in some fashion.

18 CHAIRMAN JENSCH: Let's take a look at that. It  
19 might be something that can be answered right away.

20 Would you tender that portion to the witness, please,  
21 Applicant counsel?

22 MR. TROSTEN: Yes.

23 (Handing document to witness.)

24 CHAIRMAN JENSCH: I presume to get the context you  
25 should go back to 6524 or 6523?

MR. TROSTEN: He would really have to go back to

eak2 1 6515. That is why I thought -- would the Board -- I don't  
2 want to impose upon the Board, but he would really have to  
3 go back to my question on 6515 and follow it through from  
4 there.

5 CHAIRMAN JENSCH: That will take more time. I thought  
6 you were just referring to just one page. That does involve  
7 quite a bit of context. Perhaps we should defer it. Thank  
8 you.

9 MR. TROSTEN: All right. You think about that, Dr.  
10 Goodyear, and we will come back. Okay.

11 DR. Goodyear, I would like to go on to another  
12 subject, is that all right with you?

13 WITNESS GOODYEAR: Yes.

14 MR. TROSTEN: Fine.

15 On page 5-54, you claim that the reproductive  
16 strategy of the species, that is the striped bass  
17 species, is to supersaturate the nursery areas with the young  
18 striped bass and let density dependent mortality reduce the  
19 population to a level near the maximum production capability  
20 of the estuary.

21 CHAIRMAN JENSCH: I can't find that. Would you  
22 give me the paragraph please?

23 MR. TROSTEN: I beg your pardon.

24 It is -- the second paragraph -- first full  
25 paragraph on the page, beginning in the fifth line, the last

1 work, "In simplified terms, the reproductive strategy . . ."  
2 And so forth. Thus the number of recruits leaving the  
3 estuary each year is relatively stable and is somewhat  
4 independent of the number of eggs spawned provided  
5 sufficient spawn is provided to saturate the nursery areas.  
6 Thus relatively stable recruitment is maintained over a wide  
7 range in the standing crop of adults.

8 Do you see that?

9 WITNESS GOODYEAR: Yes.

10 MR. TROSTEN: I would like to explore that with  
11 you for a little while.

12 Dr. Goodyear, are striped bass usually recognized  
13 by experts as a species in which recruitment is relatively  
14 stable from year to year?

15 WITNESS GOODYEAR: No.

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1 mil 1 MR. TROSTEN: What would you say the magnitude  
2 of their variation in year class strength is judged by the  
3 literature, Dr. Goodyear?

4 WITNESS GOODYEAR: Using what as a base?

5 MR. TROSTEN: Using the preceding -- wait a minute.  
6 From year to year, Dr. Goodyear.

7 WITNESS GOODYEAR: Presently on the order of 50  
8 percent or so. Earlier, say in the early '30s, particularly  
9 1934 year class, from a much smaller based population  
10 was more on the order of -- more on an order of magnitude.

11 MR. TROSTEN: I see. Let me ask you this. I  
12 have heard the phrase a sixfold increase. This is a phrase  
13 that is used. I think it is in a Staff statement and I have  
14 seen it in Dr. Koo's report. In your opinion, what is  
15 the sixfold referred to now?

16 WITNESS GOODYEAR: The sixfold is not year  
17 class dominant. That is the change from the '30s to now or  
18 to --

19 MR. TROSTEN: I see.

20 CHAIRMAN JENSCH: Let him go ahead and finish.

21 WITNESS GOODYEAR: That's essentially it.

22 CHAIRMAN JENSCH: All right.

23 MR. TROSTEN: All right. Thank you, Dr. Goodyear.

24 Do striped bass spawn in a stable environment,  
25 physically and biologically speaking?

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CHAIRMAN JENSCH: May I have that read back, Mr.

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Reporter, please?

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(The reporter read the pending question.)

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CHAIRMAN JENSCH: Thank you.

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WITNESS GOODYEAR: Stable by what comparison?

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MR. TROSTEN: Are the conditions relatively the

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same from year to year?

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WITNESS GOODYEAR: No.

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MR. TROSTEN: Are the eggs and young of striped

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bass vulnerable under natural conditions to loss by

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settling to the bottom from the water temperature outside

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their tolerance range?

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WITNESS GOODYEAR: Would you repeat that, please?

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MR. TROSTEN: Would you repeat the question, Mr.

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Reporter.

16

(The reporter read the pending question.)

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MR. TROSTEN: Let me rephrase the question. I

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stated it poorly. Would you say that the eggs and young

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of striped bass are vulnerable under natural conditions to

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loss by settling to the bottom?

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WITNESS GOODYEAR: Yes.

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MR. TROSTEN: How about subjection to water tem-

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perature outside their tolerance range?

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WITNESS GOODYEAR: Yes.

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MR. TROSTEN: How about salinity stress?

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1 WITNESS GOODYEAR: Yes. I would like to point out  
2 again that your -- the question seems to be independent of  
3 the portion of the population which could --

4 MR. TROSTEN: Yes. It is. Right.

5 The answer is yes?

6 WITNESS GOODYEAR: The answer is yes.

7 MR. TROSTEN: Are the eggs and young of striped  
8 bass subject to predators?

9 WITNESS GOODYEAR: Yes.

10 MR. TROSTEN: Are they subject to starvation?

11 WITNESS GOODYEAR: Yes.

12 MR. TROSTEN: Would you say that the volume of fresh  
13 water flow in estuaries has been shown to influence the  
14 strength of year classes in striped bass?

15 WITNESS GOODYEAR: Yes.

16 MR. TROSTEN: What is the range over which fresh  
17 water flow varies in the Hudson River during a season when  
18 striped <sup>bass egg</sup> ~~bass, egg~~, and larvae are present there?

19 Perhaps Mr. Siman-Tov could help you on that.

20 (Witnesses conferring.)

21 CHAIRMAN JENSCH: Is this a matter of record  
22 information anywhere? Could you direct his attention to a  
23 specific record showing the water flow?

24 MR. TROSTEN: I am not aware that it is a matter  
25 of record.

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1 WITNESS GOODYEAR: I can look it up in just a couple  
2 of seconds.

3 MR. TROSTEN: All right. Why don't you have Mr.  
4 Siman-Tov or yourself look it up.

5 MR. BRIGGS: I was wondering whether you people  
6 didn't know the water flow of the river.

7 MR. TROSTEN: It is available.

8 CHAIRMAN JENSCH: Even a recollection.

9 (Laughter.)

10 MR. TROSTEN: This was a communication gap.

11 It is on page A-V-41.

12 Thank you.

13 Do you see the variation there?

14 CHAIRMAN JENSCH: A-V-41? Right?

15 MR. TROSTEN: From year to year.

16 We are interested in it from year to year, Dr.  
17 Goodyear, and I apologize, but apparently -- I am not  
18 sure that it is in your statement for year to year.

19 WITNESS GOODYEAR: It is a factor of two or per-  
20 haps three.

21 MR. TROSTEN: From year to year?

22 WITNESS GOODYEAR: Yes.

23 MR. TROSTEN: Could this influence the mortality of  
24 the striped bass and larvae? ~~the~~ eggs?

25 WITNESS GOODYEAR: Yes.

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1 MR. TROSTEN: Thank you. Are striped bass  
2 prolific spawners as fish go?

3 WITNESS GOODYEAR: Prolific in what sense?

4 MR. TROSTEN: Do they spawn a lot of eggs?

5 WITNESS GOODYEAR: The striped bass produce a lot  
6 of eggs, but they are also very large.

7 MR. TROSTEN: The eggs?

8 WITNESS GOODYEAR: The striped bass.

9 MR. TROSTEN: I see.

10 WITNESS GOODYEAR: A fish that weighs seven or eight  
11 pounds may get one and a half million eggs, but this is  
12 not really unusual.

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1 MR. TROSTEN: Can striped bass spawn 5 million  
2 eggs, do you think?

3 WITNESS GOODYEAR: Very large ones, yes.

4 MR. TROSTEN: Do you think a striped bass could  
5 spawn 10 million eggs?

6 WITNESS GOODYEAR: I'd have to check my notes.  
7 A very, very large one could.

8 MR. TROSTEN: Right. Well, are striped bass  
9 prolific spawners as fish go, would you say, relative to  
10 other fish?

11 WITNESS GOODYEAR: Well, for instance, by compari-  
12 son to shad, no.

13 MR. TROSTEN: By comparison to some other fish in  
14 the Hudson?

15 WITNESS GOODYEAR: By comparison to some fish  
16 they would be producing more eggs, yes.

17 MR. TROSTEN: Okay.

18 Does the typical age structure of the striped bass  
19 population in your opinion provide any buffering against an  
20 occasional weak year class?

21 WITNESS GOODYEAR: Would you repeat that, please?

22 (The reporter read the pending question.)

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: Have single large year classes  
25 been known to dominate a striped bass fishery over a period

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1 of several years?

2 WITNESS GOODYEAR: Three years, two or three  
3 years, yes.

4 MR. TROSTEN: Just two or three years?

5 WITNESS GOODYEAR: Predominantly.

6 MR. TROSTEN: For example, the 1934 class, would  
7 you say that dominated the fishery or just two or three years?

8 WITNESS GOODYEAR: Yes. Well, let me -- yes.

9 MR. TROSTEN: You would say that?

10 WITNESS GOODYEAR: Yes.

11 MR. TROSTEN: Is all of this that we have been  
12 describing, the fact that the striped bass is prolific  
13 spawner, the fact that it has typical age structure -- I  
14 am sorry, that its typical age structure provides a buffering  
15 against an occasional weak year class, the fact that single  
16 large year classes have been known to dominate the fishery  
17 over a period of several years, the fact that the range of  
18 fresh water flow in the Hudson River varies from year to year  
19 by a factor of, I believe, two or three, I think you said,  
20 during the period when striped <sup>bass</sup> ~~bass~~ eggs and larvae are  
21 known to be present, the fact that the degree of fresh water  
22 flow in estuaries has been shown to influence the strength of  
23 the year classes in striped bass, the fact that the eggs and  
24 young of striped bass are vulnerable under natural conditions  
25 to loss from a variety of factors that you listed -- does

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1 that all suggest to you that is typical of a fish whose  
2 reproductive strategy is to supersaturate nursery grounds  
3 and to allow density dependent factors to adjust recruitment  
4 to a stable level each year?

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WITNESS GOODYEAR: Do those factors fit a population whose normal --

MR. TROSTEN: Whose reproductive strategy is to supersaturate nursery grounds and allow density dependent factors to adjust recruitment to a stable level each year as you said would occur on page 5-54.

WITNESS GOODYEAR: The answer is no. The reproductive strategy and the -- if a population is sufficiently reduced that its normal method of population maintenance is not operative, then you would not expect that the normal reproductive strategy would be operating. In other words, they are not saturating the nursery areas.

MR. TROSTEN: Have you finished?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: Mr. Reporter, would you read the answer, please?

(The reporter read the record as requested.)

MR. TROSTEN: All right. I just wanted to ask you one question and then we will get back to the opinion you just expressed, in a moment, later today.

Would you say that the number of recruits leaving the estuary each year is relatively stable?

WITNESS GOODYEAR: No.

MR. TROSTEN: Are you changing the opinion you express on page 5-54 in the third sentence -- fourth sentence

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1 on that page which reads, "Thus the number of recruits  
2 leaving the estuary each year is relatively stable and is  
3 somewhat independent of the number of eggs spawned provided  
4 sufficient spawn is produced to saturate the nursery area?"

5 WITNESS GOODYEAR: Were you asking me if I wanted to  
6 change --

7 MR. TROSTEN: I am asking you if the number of  
8 recruits leaving the estuary is relatively stable and you said  
9 no. Then I asked you if you wanted to change the testimony  
10 I have just read to you.

11 WITNESS GOODYEAR: No.

12 MR. TROSTEN: Would you please reconcile what  
13 you just said with your testimony?

14 WITNESS GOODYEAR: You say provided sufficient  
15 spawn is produced to saturate the nursery area. If  
16 sufficient spawn is not produced to saturate the nursery area.

17 MR. TROSTEN: I see. You are saying the relatively  
18 the number of recruits leaving the estuary each year is not  
19 relatively stable and the reason for this is that  
20 sufficient spawn is not produced to saturate the nursery  
21 area.

22 WITNESS GOODYEAR: Yes.

23 MR. TROSTEN: And that is the only reason?

24 WITNESS GOODYEAR: That is the predominant reason.

25 MR. TROSTEN: Is there any other reason?

35  
1 WITNESS GOODYEAR: Other factors play a role.

2 MR. TROSTEN: What would you say those other  
3 factors are? Would you enumerate them for me?

4 WITNESS GOODYEAR: One moment.

5 MR. TROSTEN: Yes.

6 (Witnesses conferring.)

7 WITNESS GOODYEAR: Yes.

8 MR. TROSTEN: What did you say, Dr. Goodyear?

9 WITNESS GOODYEAR: All of the factors you mentioned  
10 a few moments ago which play a role in regulating population  
11 also contribute. The variation of water flow, salinity,  
12 temperature, sedimentation rates. All of that, all of the  
13 instability in the system also play a role.

14 MR. TROSTEN: I see. Do you think you would  
15 like to change and clarify your testimony that reads, "Thus  
16 the number of recruits leaving the estuary each year is relatively  
17 stable and is somewhat independent of the number of eggs  
18 spawned provided sufficient spawn is produced to saturate  
19 the nursery area"?

20 MR. KARMAN: I think the clarification has been  
21 made orally. Dr. Goodyear has read what the Final Environ-  
22 mental Statement says and he is -- he has testified now, and  
23 I think that's certainly sufficient clarification.

24 MR. TROSTEN: I agree, Mr. Karman. I just wanted  
25 to be sure I understood what Dr. Goodyear was saying.

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WITNESS GOODYEAR: No.

MR. KARMAN: No, what?

(Laughter.)

CHAIRMAN JENSCH: He doesn't want it clarified.

WITNESS GOODYEAR: He asked me a moment ago if I wanted to change.

MR. TROSTEN: You don't want to change it because you feel you have sufficiently clarified it by what you have just said, is that correct?

MR. KARMAN: I think we are quibbling now, Mr. Trosten.

MR. TROSTEN: I want to understand what Dr. Goodyear is saying. I don't want to badger him. I just want to understand what he is saying.

WITNESS GOODYEAR: The reproductive strategy that is described herein would be operative if sufficient spawn were produced. As long as spawning intensity is lower and sufficient to saturate the nursery areas, then the recruitment rate from the spawning is going to be related more strongly to the reproductive input, the number of eggs produced, than it is to the size of the nursery area.

MR. TROSTEN: How much spawning is necessary to saturate the nursery areas?

WITNESS GOODYEAR: That's difficult to say. But I would like to point out if the reproductive -- if the

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1 nursery areas were being saturated such that the reproductive-  
2 or the recruitment was dependent more upon factors other  
3 than the production of eggs, then the year class abundance  
4 should not vary nearly in order of magnitude or five or six-  
5 fold from one period of time to another.

6 MR. TROSTEN: Is this how you -- is that the way  
7 in which you determine that there has not been enough spawn-  
8 ing to determine -- to saturate the nursery area? Is that how  
9 you come to that conclusion, the basis for your conclusion?

10 WITNESS GOODYEAR: Basically, yes.

11 MR. TROSTEN: Is there some other basis that you  
12 rest your conclusion upon?

13 WITNESS GOODYEAR: There are other pieces of  
14 information which also lend credence to the opinion, yes.

15 MR. TROSTEN: But basically -- all right.

16 Now would you say that the saturation level for  
17 the nursery area in the Hudson River can vary from year to  
18 year?

19 WITNESS GOODYEAR: Yes.

20 MR. TROSTEN: Do you know how you can tell from  
21 one year to the other whether you have reached the saturation  
22 level?

23 WITNESS GOODYEAR: Would you repeat the question?

24 (The reporter read the pending question.)  
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WITNESS GOODYEAR: Not from one year to the next.

MR. TROSTEN: Then you wouldn't know whether in any particular year whether the number of recruits leaving the estuary was relatively stable, right?

WITNESS GOODYEAR: Relatively stable? The term relatively stable would include the variations in the nursery.

MR. TROSTEN: Yes.

WITNESS GOODYEAR: The carrying capacity of the nursery area would change as you suggested or would be likely to change depending upon the other forms that are in the area. There is no reason to believe that it would be exactly the same. You would have to study over a long period of time to determine whether or not from the standpoint of year by year --

MR. TROSTEN: Yes, go ahead.

WITNESS GOODYEAR: Year by year recruitment. Recruitment is not a good word to use there.

MR. TROSTEN: Would the reporter read back the witness' answer please.

CHAIRMAN JENSCH: Has he finished?

WITNESS GOODYEAR: No.

MR. TROSTEN: Oh, excuse me.

CHAIRMAN JENSCH: Go ahead with your answer.

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WITNESS GOODYEAR: I am afraid I lost my train

of thought.

MR. TROSTEN: I apologize.

CHAIRMAN JENSCH: Let's reread the answer.

(The reporter read the record as requested.)

WITNESS GOODYEAR: Yes. The year by year comparison

to factors in the nursery area to determine which factors  
were influencing the production or the survival of the  
first year class. A year by year comparison would be  
very difficult to do and to predict from that standpoint the  
potential contribution of variation in the saturation level.  
It would be very, very difficult to predict from sampling  
data of the nursery and the composition of the nursery, the  
carrying capacity variation of the nursery. I will leave it  
at that for now.

1 MR. TROSTEN: Are you finished?

2 WITNESS GOODYEAR: Yes.

3 MR. TROSTEN: Do you feel, then, you do not have  
4 enough data available at the present time to make that  
5 determination?

6 CHAIRMAN JENSCH: What was the determination?  
7 How many fish eggs in a nursery?

8 MR. TROSTEN: I believe it was the carrying  
9 capacity of the nursery. Is that what you said, Dr. Goodyear?

10 WITNESS GOODYEAR: Yes. That is true. However,  
11 I would like to point out before you start out again the  
12 variation in recruitment rate which has occurred indicates  
13 that the nursery is not or has not been over that range,  
14 it's not been saturated.

15 In other words, the sixfold increase production  
16 of striped bass which has occurred indicates that recruitment  
17 is not yet limited or was not limited by the last data I  
18 was examining, was not limited by the resources in the  
19 nursery area.

20 MR. TROSTEN: Thank you, Dr. Goodyear.

21 Let's proceed.

22 Dr. Goodyear, for striped bass in general, what  
23 is the relative --

24 CHAIRMAN JENSCH: Excuse me. You are about to go  
25 to a different subject?

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2 MR. TROSTEN: No, I am continuing on the subject  
3 of compensatory mechanisms, Mr. Chairman, but if you would  
4 like to break, we can do that.

5 CHAIRMAN JENSCH: I thought to accommodate the  
6 institution, which has asked us to recess about 1:00 o'clock  
7 for lunch, maybe if you take a few minutes' recess and  
8 come back and continue to 1:00 o'clock. Will that be  
9 convenient?

10 MR. TROSTEN: Certainly would.

11 CHAIRMAN JENSCH: At this time, let's recess, to  
12 reconvene in this room at 12:35.

13 (Recess.)  
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1 CHAIRMAN JENSCH: Please come to order.

2 The witnesses have resumed the stand.

3 Will you proceed, Applicant's counsel?

4 MR. TROSTEN: Yes, Mr. Chairman.

5 Dr. Goodyear, for striped bass in general, what  
6 is the relative importance in your opinion of density  
7 dependent and density independent processes in determining  
8 the size of striped bass year classes?

9 WITNESS GOODYEAR: Could you rephrase the question?

10 MR. TROSTEN: Would you want it reread or is there  
11 something about it you don't understand?

12 WITNESS GOODYEAR: Could you reread it first?

13 MR. KARMAN: It has been requested that if  
14 possible the reporter could use the microphone in reading  
15 back the question. One of our witnesses is having difficulty.

16 (The reporter read the pending question.)

17 WITNESS GOODYEAR: The striped bass, the variation  
18 in year class as generally observed is a variation from a  
19 base which -- your question is very difficult to answer because  
20 the variation in year class is primarily related to changes  
21 in fecundity or actual egg production based on the information  
22 that I have seen.

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Now the change in the fecundity which causes the year class variation is controlled to a degree by density dependent mechanisms. It is also controlled by legislation which protects -- which causes certain factors to be -- causes the mortality rates to be lower so there has been a change in mortality rates as a result of legislation which has caused a general increase in the population. The variation in year class abundance from the base is a density feedback mechanism but working not between production of spawn and recruitment but between recruitment and production of spawn.

MR. TROSTEN: I am not sure on the basis what I have been told that I would agree that the variation in year classes is so -- as dependent on fecundity as you indicate, Dr. Goodyear, but in any event, would you agree that the relative importance of density dependent and density independent processes can vary from year to year, there can be a --

WITNESS GOODYEAR: Yes.

MR. TROSTEN: All right. Would you say that both types of processes can operate simultaneously?

WITNESS GOODYEAR: Yes.

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MR. TROSTEN: Would you give me an example of an animal population which grows in geometric sequence unless checked by forces outside the population?

WITNESS GOODYEAR: Just a moment.

(Witnesses conferring.)

WITNESS GOODYEAR: Would you like an example?

MR. TROSTEN: If you would give me one, I would appreciate it.

Dr. Goodyear, are you going to name us an animal? Is that what you are up to?

WITNESS GOODYEAR: Striped bass.

(Laughter.)

What I am going to do is I am going to show you first the -- Dr. Lawler, in his testimony earlier, provided two graphs.

MR. TROSTEN: Before you go on, would the reporter read the question? I'd like to have the record clear.

(The reporter read the record as requested.)

MR. TROSTEN: Dr. Goodyear, I understand you are about to demonstrate how the striped bass population grows in geometric sequence unless checked by forces outside the striped bass population, is that correct?

WITNESS GOODYEAR: What I am going to show you is how the striped bass population growth compares with a model which is unchecked. By outside forces or inside forces either.

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1 In other words, which has no density feedback mechanism.

2 MR. TROSTEN: Do I understand that you are going  
3 to show how the striped bass population grows?

4 WITNESS GOODYEAR: How the growth during the last  
5 -- well, during the period from 1930 until 1964, how that --  
6 how the growth of that population compares with the growth  
7 of a population which has no compensation as was presented  
8 in Dr. Lawler's testimony.

9 MR. TROSTEN: I understand. Is it your contention  
10 that the pattern you are about to depict in the striped  
11 bass population is an example of a striped -- of a population  
12 growing in geometric sequence unless checked by a force  
13 outside that population?

14 I am afraid --

15 WITNESS GOODYEAR: Yes.

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MR. TROSTEN: All right. Go ahead.

WITNESS GOODYEAR: This is a copy directly out of the testimony.

(Slide.)

I am not saying this is -- no comment on it except that it represents a situation where there is compensatory mechanism at work in a population. In this case it is in the juvenile stage.

MR. TROSTEN: Do I understand you to say you were not adopting Dr. Lawler's testimony as your own, is that correct?

WITNESS GOODYEAR: The graph is a good example. I am not adopting his testimony.

(Laughter.)

(Slide.)

All right, the -- in this case there is no compensation and the population is growing.

MR. TROSTEN: What -- for the record, Dr. Goodyear, would you identify as you go along the pages of Dr. Lawler's testimony that you are referring to in depicting -- and would you please remember to describe this in such a way that the transcript will reflect what you are saying, please?

WITNESS GOODYEAR: This is Figure 8 of his April 5th testimony.

MR. TROSTEN: Thank you.

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1 WITNESS GOODYEAR: You will notice the population  
2 is growing and continues to grow within the range which is  
3 presented here.

4 (Slide.)

5 Now the actual population, if you will notice  
6 the mid-Atlantic population, these are estimates of direct  
7 plots of the catch in the mid-Atlantic fishery, the  
8 commercial catch. If you notice, there is a general  
9 increase starting in the early '30s. I am sorry, the scale  
10 dropped off. It goes from the early '30s to the last plot  
11 of 1964. There is a general increase.

12 This indicates -- one of the principal things it  
13 indicates is that the population is not checked so that at  
14 this time it has not been checked by either internal or  
15 external forces. It is one growing in geometrical  
16 sequence presently.

17 MR. MACBETH: Mr. Chairman, could I raise a  
18 technical question? Is there some way we could have this  
19 chart incorporated into the record at some point? As far as  
20 I know, it appears in none of the documents. It may be of  
21 some importance.

22 MR. KARMAN: This last slide, Dr. Goodyear, the  
23 one before you indicated was one of Dr. Lawler's Figure 8,  
24 what is this particular slide?

25 WITNESS GOODYEAR: This one?

MR. KARMAN: Yes.

WITNESS GOODYEAR: This is a copy of a figure that is preserved in Dr. Koo's current analysis of the population trends in striped bass fishery in the Atlantic Coast.

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1 MR. TROSTEN: Would you identify it further  
2 and provide a copy for the transcript, Dr. Goodyear?

3 CHAIRMAN JENSCH: That take up your problem?

4 MR. MACBETH: Yes.

5 CHAIRMAN JENSCH: Make it sufficient numbers so  
6 the reporter can include it in all transcripts.

7 WITNESS GOODYEAR: The figure is what you are  
8 referring to, not the whole document?

9 MR. TROSTEN: Just the figure, yes.

10 WITNESS GOODYEAR: Right.

11 MR. KARMAN: Have you finished with this question,  
12 Dr. Goodyear?

13 WITNESS GOODYEAR: I believe so.

14 MR. TROSTEN: So you have then in these two  
15 graphs, you have in your opinion depicted a population, that  
16 is the striped bass population, which is growing in geometric  
17 sequence unless checked by forces outside the population?  
18 I am afraid that you may --- I have a little --

19 CHAIRMAN JENSCH: You have given him a question.  
20 Now let him think about that particular answer.

21 MR. TROSTEN: All right, thank you.

22 WITNESS GOODYEAR: At the present time the forces  
23 which are controlling the population are working from the  
24 outside of the population. In other words, the things --  
25 for population control itself, internally would have to

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1 either regulate its own fecundity based on density, or to  
2 regulate survival based on density or some feature similar  
3 to that which would regulate the fecundity based on the  
4 density. For a population to be controlled outside,  
5 the feedback mechanism can involve another type of  
6 organism so that, for instance, a predator, so that  
7 high population densities cause increases in predator activity  
8 which do not work, then, from within the population. The  
9 feedback and the controlling factor works from outside the  
10 population, but is influenced by the density of the popula-  
11 tion.

12 MR. BRIGGS: It seems to me the question could have  
13 been answered yes or no also. Could you give a yes or no  
14 answer to it?

15 WITNESS GOODYEAR: I gave a yes answer, I thought.

16 MR. BRIGGS: I am sorry. I missed that.

17 WITNESS GOODYEAR: I may not have.

18 MR. TROSTEN: Is it your opinion, Dr. Goodyear,  
19 that based upon the analysis presented by Koo in the second  
20 graph that you show that the striped bass population is grow-  
21 ing in geometric proportion?

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1 WITNESS GOODYEAR: I believe so but I would have  
2 to study a little bit. There are portions of the -- well,  
3 let me back up for a second. The generation time in the  
4 striped bass population is about six years so that there are  
5 many other buffering factors at work.

6 However, the growth is from something like --  
7 I would have to check the exact figures, but it is like  
8 two orders of magnitude change in a thirty-year period  
9 which essentially is a very large change in population. Now,  
10 whether or not it is exactly a geometric progression, I  
11 would have to check on, but it does act like an increase  
12 from geometric progression.

13 MR. TROSTEN: Now, your opinion is based upon the  
14 data collected from 1930 to 1966 and in  
15 sum, it is your opinion that commencing in 1936, the  
16 striped bass population commenced a geometric expansion  
17 of its population, is that correct?

18 CHAIRMAN JENSCH: Well, didn't he just say that  
19 it acted like it, he would have to take it subject to check.

20 MR. TROSTEN: Excuse me. Commencing in 1930,  
21 the striped bass populations began an expansion in the nature  
22 of a geometric expansion, is that correct.

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: All right. Now, considering  
25 the growth potential of striped bass based on the high fecundity

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1 of this species, what portion of the -- this potential is being  
2 realized in the graph you have shown of Koo?

3 WITNESS GOODYEAR: Potention for what?

4 MR. TROSTEN: Potentialfor growth, considering the  
5 high fecundity of the striped bass which you have  
6 described previously, what proportion of this growth potential  
7 is being realized in accordance with that graph?

8 WITNESS GOODYEAR: It will be a very small  
9 propoxtion. I am not sure exactly of the number. As I  
10 said a moment ago, there are many other factors which  
11 influence the rate of growth and if you were to remove all  
12 of the fishery, for instance, which would remove the greatest  
13 part of the mortality in the population, the growth initially  
14 would be very, very rapid.

15 MR. TROSTEN: Are you saying -- are you finished?

16 WITNESS GOODYEAR: Yes.

17 MR. TROSTEN: Are you saying that there are  
18 factors other than the fishery which are limiting that growth  
19 *potential*  
~~potention?~~

20 WITNESS GOODYEAR: No. I am saying the growth  
21 potential is limited by the fishery and if you remove the  
22 fishery, there would be an initial very rapid growth.

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1                   MR. TROSTEN: Now if striped bass did not  
2 cannibalize their young, and if survival were greater, would  
3 the population not expand even faster?

4                   WITNESS GOODYEAR: Cannibalism is not a -- yes,  
5 the answer is yes. However, cannibalism -- if you  
6 make a comparison between the East and West Coast population,  
7 you find that cannibalism on the West Coast is -- accounts  
8 for a much, much larger portion of mortality than on the East  
9 Coast. As a matter of fact, food habit studies for East  
10 Coast populations have not shown cannibalism to any signifi-  
11 cant extent.

12                   MR. TROSTEN: Would you say that  
13 habitat resources can limit a population without intra-  
14 specific competition being involved?

15                   CHAIRMAN JENSCH: Could I have that question read  
16 again, please?

17                   (The reporter read the pending question.)

18                   WITNESS GOODYEAR: It can participate in the  
19 limitations, yes.

20                   MR. TROSTEN: But in other words --- strike that.  
21 In other words, intra-specific competition would  
22 be involved if habitat resources were limiting a population,  
23 is that correct?

24                   WITNESS GOODYEAR: Would you repeat that question,  
25 please?

1 (The reporter read the pending question.)

2 MR. TROSTEN: That is intra-specific competition.

3 WITNESS GOODYEAR: Excuse me. Would you read  
4 that again, please?

5 (The reporter read the record as requested.)

6 WITNESS GOODYEAR: This is commonly true.

7 MR. TROSTEN: Would you say that my statement is  
8 correct?

9 WITNESS GOODYEAR: I'd have to study the question  
10 in some detail. There are a large number of factors besides  
11 intra-specific competition and generall speaking, your  
12 statement is true.

13 MR. TROSTEN: In other words --

14 WITNESS GOODYEAR: I wouldn't want to commit  
15 myself on that.

16 MR. TROSTEN: In other words, you are not able  
17 at this point to think of an example where this would not be  
18 true at this point in time, is that correct?

19 WITNESS GOODYEAR: I wouldn't say that, either.

20 MR. TROSTEN: You are able to think of an example  
21 at this point in time where this would not be correct, my  
22 statement would not be correct?

23 At this point in time, Dr. Goodyear?

24 WITNESS GOODYEAR: Yes.

25 MR. TROSTEN: You are not at this point in time able

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1 to think of such an example?

2 WITNESS GOODYEAR: The -- no, I -- maybe I mis-  
3 stated my idea. I can think of an example. However, I am  
4 not sure what it is exactly applicable. If for instance,  
5 habitat resources reduce growth rate and there is a large  
6 degree of cannibalism, then the mortality that is associated  
7 with cannibalism would increase, but not directly -- the  
8 mortality would increase because of a reduced resources, but  
9 not directly as a result of mortality -- I have to study that  
10 some. The terminology --

11 MR. KARMAN: Do you think this would be a good  
12 time for us to take our luncheon break, Mr. Chairman?

13 CHAIRMAN JENSCH: Yes. Is this a convenient  
14 place to interrupt your cross-examination?

15 MR. TROSTEN: Yes, it is.

16 CHAIRMAN JENSCH: What do you suggest?

17 MR. TROSTEN: Mr. Chairman, I would like to recon-  
18 vene relatively promptly because I would like to go as far  
19 as I can with Dr. Goodyear here, particularly while some of  
20 the Applicant's witnesses are also available to participate  
21 in the discussion.

22 CHAIRMAN JENSCH: An hour?

23 MR. TROSTEN: An hour would be fine.

24 CHAIRMAN JENSCH: At this time, let's recess, to  
25 reconvene in this room at 2:00 o'clock.

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(Whereupon, at 1:00 p.m., the hearing was  
recessed, to reconvene at 2:00 p.m., this same day.)

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AFTERNOON SESSION

(2:00 p.m.)

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CHAIRMAN JENSCH: Come to order, please.

4

The witnesses have resumed the stand. Applicant's counsel, would you proceed, please.

6

MR. TROSTEN: Yes, Mr. Chairman.

7

Dr. Goodyear, if a predator reduces a population in size, in your opinion, are the surviving individuals not likely to have experienced increased survival or reproductive rate?

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11

Would the reporter read the question back?

12

(The reporter read the pending question.)

13

WITNESS GOODYEAR: Increased over what?

14

MR. TROSTEN: Over the rate of survival or the rate of reproduction, which was operative prior to the time that the predator reduced the size of the population.

15

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WITNESS GOODYEAR: Not necessarily.

18

MR. TROSTEN: Do you think it is possible that the survival or reproductive rate of that population would increase?

19

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WITNESS GOODYEAR: Yes.

22

MR. TROSTEN: And what you are saying is you are not sure whether it would increase or not?

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WITNESS GOODYEAR: Depends on what is causing the mortality. Natural unchanged mortality -- it depends

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1 on the factors which are causing the mortality and whether  
2 or not they change.

3 MR. TROSTEN: Are you finished?

4 WITNESS GOODYEAR: Yes.

5 MR. TROSTEN: In other words, are you saying it  
6 depends on all the factors, not just the predation that I  
7 described?

8 WITNESS GOODYEAR: Yes.

9 MR. TROSTEN: When a population is reduced to a  
10 lower level, is competition among members of the species  
11 not reduced?

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: That is population -- that is  
14 competition is reduced?

15 WITNESS GOODYEAR: Competition is reduced, yes.

16 MR. TROSTEN: Competition is reduced?

17 All right.

18 Now, could a species be in competition with another  
19 species, that is inter-specific competition and experience  
20 no competition among its own members, that is intra-specific  
21 competition?

22 WITNESS GOODYEAR: That would be difficult to  
23 formulate.

24 MR. TROSTEN: Difficult to formulate?

25 WITNESS GOODYEAR: Formulate a mechanism for that

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1 to exist.

2 MR. TROSTEN: I see.

3 Could -- all right.

4 Would you describe what you mean by the term regu-  
5 lation which appears on page 5-55 in the first sentence?

6 I'll read the sentence to you and ask you a specific question  
7 about it. "On the other hand --" this is the first full  
8 paragraph -- "...a species whose population is regulated  
9 by factors other than its own density, e.g., predation or  
10 competition with other species, could not compensate for  
11 changes in survivorship of the other individuals in the  
12 population."

13 Would you give me a rigorous definition of the  
14 term regulation as you use it in that sense?

15 WITNESS GOODYEAR: Just a moment.

16 MR. TROSTEN: Yes.

17 WITNESS GOODYEAR: Regulation in this sense was  
18 used in terms of the factors which regulate mortality rates  
19 in the population within -- in the context it is used here, it  
20 is used for a change in predation --- a change in mortality  
21 within the generation time rather than across a generation  
22 time. It is not necessarily clear from the way it is  
23 written.

24 MR. TROSTEN: Let me read what you said and think  
25 about what you just read, Dr. Goodyear.

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1 Well, let me ask you does regulation as you use  
2 it here not imply maintenance of a population within some  
3 perhaps wide but nevertheless prescribed numerical bounds?

4 CHAIRMAN JENSCH: I wonder if I could have that  
5 question, please.

6 (The reporter read the pending question.)

7 WITNESS GOODYEAR: No.

8 CHAIRMAN JENSCH: Thank you.

9 WITNESS GOODYEAR: You might look at the -- you  
10 could almost substitute limited for that.

11 MR. TROSTEN: So that it could read really, "On  
12 the other hand, a species whose population is limited by  
13 factors other than its own density, for example predation or  
14 competition with other species, could not compensate for  
15 changes in survivorship of the other individuals in the  
16 population?"

17 WITNESS GOODYEAR: Yes.

18 MR. TROSTEN: Are you implying in this sentence  
19 that competition with other species is strictly a factor  
20 which limits a population -- strike that.

21 I'll start again. Are you saying in this sentence  
22 that competition with other species is a factor which  
23 regulates a population which is unrelated to the density of  
24 the population?

25 WITNESS GOODYEAR: It can be, yes.

1 MR. TROSTEN: Could it -- go ahead.

2 WITNESS GOODYEAR: If, for instance, the competitive  
3 interaction is strong enough that the growth rate of a  
4 particular organism is slowed by the competition, then mor-  
5 tality could be higher because of a longer exposure of a  
6 particular sized individual to its principal predator. In  
7 other words, a small fish would stay small longer because of  
8 resource limitations imposed by competition with its  
9 principal competitor. This could increase mortality rates.

10 MR. TROSTEN: Resulting in a greater loss to the  
11 population from predation than would be the case if the  
12 population were smaller, is that correct? And they were  
13 not so limited by competition, such that the population  
14 size was generally smaller than would otherwise be the case?  
15 The growth rate, excuse me, was otherwise smaller?

16 WITNESS GOODYEAR: Could you --  
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1 MR. TROSTEN: I'll try to restate that. You  
2 postulated a situation where crowding, I'll use that term  
3 loosely, was causing a <sup>slow</sup> ~~low~~ growth rate of the population,  
4 correct? Or that is a possible case?

5 WITNESS GOODYEAR: Crowding with another species  
6 whereas the intraspecific competition was less than the inter-  
7 specific competition.

8 MR. TROSTEN: Let's say that crowding within  
9 the species was causing a slower growth rate. Would you accept  
10 that as a possible situation that could occur?

11 WITNESS GOODYEAR: Yes.

12 MR. TROSTEN: And if the population were growing  
13 more slowly because of this intraspecific competition, is it  
14 not correct that the period of time during which the members  
15 were subject to predation would be greater?

16 WITNESS GOODYEAR: Yes.

17 MR. TROSTEN: Now under those circumstances, would  
18 there not be a greater impact upon the population through  
19 predation than would be the case if there were not as many  
20 members of that population?

21 WITNESS GOODYEAR: Of that size class?

22 MR. TROSTEN: Yes.

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: All right. Thank you.

25 Now let me ask you a question about a -- about

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1 the passenger pigeon. You were talking about that bird  
2 earlier. Now the passenger pigeon, I gather, either became  
3 extinct or just about extinct, is that right, Dr. Goodyear?

4 WITNESS GOODYEAR: Yes.

5 MR. TROSTEN: Now the fact that the passenger  
6 pigeon became extinct, does that in your opinion indicate  
7 that no compensation, no competitive -- no compensatory  
8 mechanisms were operating in that population as its population  
9 size lowered to the point of extinction?

10 WITNESS GOODYEAR: No.

11 MR. TROSTEN: Is it not correct that -- is it not  
12 indeed likely that compensatory mechanisms were strongly  
13 operative in the population of the passenger pigeon as  
14 its size lowered toward extinction.

15 WITNESS GOODYEAR: Yes.

16 MR. TROSTEN: Thank you.

17 All right, Dr. Goodyear, I would like to move to  
18 another discussion. I'd like to discuss with you the contribu-  
19 tion of the Hudson River fishery to the Mid-Atlantic  
20 striped bass fishery and also the contribution of the Chesapeake  
21 Bay to the mid-Atlantic striped bass fishery, all right?

22 WITNESS GOODYEAR: Yes.

23 MR. TROSTEN: On page 12-36 you have a discussion  
24 of the contribution of the Chesapeake Bay to the mid-Atlantic  
25 striped bass fishery. Do you not agree, Dr. Goodyear, that

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1 it is the consensus of expert opinion by those who have  
2 studied the subject in depth that the Chesapeake Bay  
3 supplies most of the coastal stock along the mid and north  
4 Atlantic coasts?

5 WITNESS GOODYEAR: Yes.

6 MR. TROSTEN: Is it possible, Dr. Goodyear, that  
7 a very large percentage of the fish represented by  
8 Atlantic landings in your Figure 5 -- Figure 12-2 which  
9 appears on page 12-37 are not spawned in the Hudson River?

10 WITNESS GOODYEAR: Is it possible?

11 MR. TROSTEN: Yes.

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: Is it possible, for example, that  
14 a very large percentage of the fish which are represented  
15 by Atlantic landings in the figure I have just described are  
16 spawned in the Chesapeake Bay?

17 WITNESS GOODYEAR: It is possible, yes.

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CHAIRMAN JENSCH: May I interrupt a moment? Perhaps

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to save time, I notice in some previous answers you have

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added, and it might be helpful here if you could, whether

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it is probably in your judgment. Now, I understand we almost

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have a premise that anything is possible. Would you give

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us your additional comment of do you think it is probable

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and that might clear up so we don't have to go back into the

8

subject later.

9

Would that be helpful to you?

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MR. TROSTEN: I think it would be very helpful, Mr.

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Chairman, and I appreciate the suggestion. The only thing

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I suggest, though, is that if Dr. Goodyear does that, that

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he be careful to indicate when this is his opinion.

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CHAIRMAN JENSCH: I presume he is always stating

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his opinion in that respect.

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MR. TROSTEN: No. It is a little more complex

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than that. Dr. Goodyear's opinion contradicts the

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opinion of most of the experts who have studied this particular

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subject and I think that it is -- as he has just indicated.

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I think that, therefore, it is important so that we keep

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the record clear that Dr. Goodyear distinguish between his

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opinion and the opinion of most of the experts who have --

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and the opinion of the concensus of the experts who have

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studied this.

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CHAIRMAN JENSCH: I think that demarcation could

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1 probably be made. If you say his opinion contradicts many  
2 of them, everytime he expresses it, you say it is a contradiction.  
3 In any event, if you want to identify it further, you may  
4 pursue the course.

5 MR. TROSTEN: I think it would be helpful because  
6 I believe -- and I could be wrong, perhaps Dr. Goodyear could  
7 help me on this -- I believe Dr. Goodyear's opinion is not  
8 supported by any other expert opinion. If I am incorrect  
9 in this respect, I would appreciate being so informed.

10 MR. KARMAN: I don't think we want to go into that.  
11 That is a little testifying on the -- on the record.

12 CHAIRMAN JENSCH: He will take the stand later,  
13 I am sure.

14 (Laughter.)

15 MR. TROSTEN: I will be glad to ask Dr. Goodyear  
16 that question so we can have testimony on the record.

17 CHAIRMAN JENSCH: I think if he does express  
18 what is probable or improbable, he should say whether it  
19 is his opinion. I think it would be helpful.

20 MR. TROSTEN: Thank you.

21 CHAIRMAN JENSCH: You have been given two questions,  
22 both of which you said it was possible. Can you indicate  
23 the probability in any way?

24 WITNESS GOODYEAR: It is highly probable that a  
25 portion of the landings come from the Chesapeake. However,  
it does not appear probable that the greatest bulk come from

eak3 1 the Chesapeake because of certain data which have been  
2 accumulated over the last 25 years concerning migrations of  
3 the Chesapeake striped bass.

4 So, it is a relative magnitude. I would estimate  
5 that something like 20 percent and that may be high. About 20  
6 percent of the Atlantic population comes from the Chesapeake.

7 MR. TROSTEN: The mid-Atlantic population?

8 WITNESS GOODYEAR: Yes. The mid-Atlantic population.

9 MR. TROSTEN: Just so I can be clear about this,  
10 you are not saying that it is your opinion that it is improbable  
11 that a large percentage, considerably more than 20 percent  
12 of the mid-Atlantic landings originate from the Chesapeake  
13 Bay because of the data presented in Figures 5-12 through  
14 5-15, are you?

15 Would the reporter read that question back, please.

16 (The reporter read the record as requested.)

17 CHAIRMAN JENSCH: On what pages are 5 --

18 MR. TROSTEN: They appear 5-57 through 5-60.

19 CHAIRMAN JENSCH: Thank you.

20 WITNESS GOODYEAR: Could you restate the question.

21 MR. TROSTEN: Let me try it again. The data  
22 presented in Figures 5-12 through 5-15 are not the  
23 data you were relying upon in drawing your conclusion that it  
24 is improbable that a very larger percentage of the mid-Atlantic  
25 landings originate in the Chesapeake Bay?

WITNESS GOODYEAR: This is true.

1 MR. TROSTEN: Is it indeed the tagging studies  
2 that have been performed in the Chesapeake Bay that lead you  
3 to conclude that it is ~~improbable~~ <sup>improbable</sup> that a large percentage  
4 of the mid-Atlantic landings originate from the Chesapeake  
5 Bay?

6 WITNESS GOODYEAR: Yes.

7 MR. TROSTEN: Thank you. Now just taking as a  
8 hypothesis, Dr. Goodyear, that a very large percentage of  
9 the mid-Atlantic landings, that is the striped bass caught  
10 in the mid-Atlantic, did indeed originate in the Chesapeake  
11 Bay and by a very large percentage I mean substantially  
12 more than 20 <sup>percent</sup> ~~percent~~? If that hypothesis were correct, would  
13 it be possible that increased mortality of young-of-the-year  
14 fish in the Hudson would not substantially affect mid-  
15 Atlantic landings?

16 WITNESS GOODYEAR: This is true.

17 MR. TROSTEN: Dr. Goodyear, referring to your page  
18 12-36, what percentage of the Chesapeake Bay striped bass  
19 population has been tagged?

20 WITNESS GOODYEAR: A very, very small percentage.

21 MR. TROSTEN: Do you have any idea what percentage  
22 it is?

23 WITNESS GOODYEAR: I could calculate it, an estimate  
24 for you, but it would be -- there have been many thousands of  
25 fish tagged in the Chesapeake, but there have been many

1 millions of Chesapeake fish.

2 MR. TROSTEN: Would you tell me how you would  
3 calculate what percentage the tagging represented of the  
4 total population?

5 WITNESS GOODYEAR: What percentage?

6 MR. TROSTEN: Yes. You said you could calculate  
7 it. I wanted you to tell me how you would calculate it.

8 WITNESS GOODYEAR: The manner exactly in which  
9 I would go about it?

10 MR. TROSTEN: Yes. Tell me exactly how you would  
11 calculate what percentage the thousands of taggings in  
12 the Chesapeake Bay represented relative to the total  
13 population of the striped bass in the Chesapeake Bay?

14 WITNESS GOODYEAR: The number of fish which  
15 had been tagged is known.

16 MR. TROSTEN: Yes.

17 WITNESS GOODYEAR: That number divided by the  
18 landing -- Chesapeake landings corrected for size to give  
19 numbers of fish would give you an estimate.

20 MR. TROSTEN: Is that an estimate that would have  
21 any confidence levels on it?

22 WITNESS GOODYEAR: You could put confidence levels  
23 with it, yes.

24 MR. TROSTEN: What would be those confidence levels?

25 WITNESS GOODYEAR: They would depend primarily upon

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1 the confidence intervals that you would be able to -- your  
2 estimate of the number of fish represented by the Chesapeake  
3 landings would have confidence intervals based on the methodology  
4 that you used to calculate the number of fish from the landing  
5 data.

6 MR. TROSTEN: All right. I will accept your  
7 conclusion that you could make an estimate. Has any estimate  
8 been made to your knowledge of the total population sizes of  
9 the striped bass in the Chesapeake Bay?

10 WITNESS GOODYEAR: The total population?

11 MR. TROSTEN: Yes. The total population of striped  
12 bass in the Chesapeake Bay.

13 WITNESS GOODYEAR: There have been estimates  
14 made, yes.

15 MR. TROSTEN: Do you know what those estimates are?

16 WITNESS GOODYEAR: Not right offhand. Maryland --  
17 excuse me for a minute.

18 MR. TROSTEN: Yes.

19 (Witnesses conferring.)

20 WITNESS GOODYEAR: I don't know the estimates  
21 right offhand.

22 MR. TROSTEN: All right. Would you look into  
23 that, Dr. Goodyear, and let us know the data that you -- I  
24 am sorry -- let us know the sources of the estimate that you  
25 referred to. I am not aware of it and I would appreciate it

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1 if you would let me know what it is.

2 WITNESS GOODYEAR: The estimates -- yes, I will.

3 MR. TROSTEN: Thank you.

4 Dr. Goodyear, if only a small percentage of the  
5 Chesapeake -- strike that.

6 Would you say that only a very small percentage  
7 of the Chesapeake Bay population has been tagged?

8 WITNESS GOODYEAR: Yes. That was my original  
9 statement.

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1 MR. TROSTEN: Yes. Now if only a small percentage  
2 of the Chesapeake population has been tagged, isn't it  
3 possible that even though a small percentage of the tagged  
4 fish move upward along the Coast, that this could result in a  
5 huge migration of striped bass?

6 CHAIRMAN JENSCH: The tagging could cause the  
7 migration?

8 MR. TROSTEN: No, Mr. Chairman. Dr. Goodyear  
9 has said that he doesn't know what percentage of the total  
10 population of striped bass has been tagged and he doesn't  
11 know what the total population of striped bass in the  
12 Chesapeake Bay is. What I am asking him is this: That  
13 isn't it possible that even though a small percentage of  
14 the total population of the Chesapeake Bay is moving upward  
15 as -- strike that.

16 Let me gather my thoughts on this.

17 Even though only a small percentage of the total  
18 population of the Chesapeake Bay is migrating northward,  
19 doesn't this mean that a huge number of fish could be migrat-  
20 ing northward, Dr. Goodyear?

21 WITNESS GOODYEAR: Could be migrating northward?

22 MR. TROSTEN: Yes.

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: Thank you.

25 MR. MACBETH: Mr. Chairman, is this the kind of

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1 question to which we should have a probability estimate?

2 CHAIRMAN JENSCH: Well, if he's able to give it.

3 WITNESS GOODYEAR: This is a difficult thing to  
4 answer. The percentage of striped bass which seems to be  
5 leaving the Chesapeake, based on the tagging studies, is about  
6 one or two percent of the fish which have been tagged, are  
7 caught outside of the Chesapeake with the exception of the  
8 larger fish which are known to be migratory. But the fish  
9 turn up on the East Coast, up in -- along Long Island and  
10 they -- even up in the New England area as two year olds  
11 and tagging studies for fish of that age class have shown  
12 very, very small percentages leaving the Chesapeake.

13 The confidence interval on that would be  
14 difficult to -- the confidence level would be difficult to  
15 stimulate simply because there haven't been enough recaptures  
16 up the Coast from fish tagged during that age group to get a  
17 confidence level.

18 MR. TROSTEN: But it is <sup>nevertheless</sup> ~~never~~ less, Dr. Goodyear,  
19 on the basis of the tagging studies that you have concluded  
20 that the Chesapeake Bay does not contribute a very substan-  
21 tial portion of the striped bass which constitute the mid-  
22 Atlantic fishery, is that correct? That is the basis on  
23 which you have drawn that conclusion?

24 WITNESS GOODYEAR: That is one of the principal  
25 pieces of evidence, yes.

1                   MR. TROSTEN: Is there another basis?

2                   WITNESS GOODYEAR: The rate of growth of the  
3 Atlantic and Chesapeake populations have not been the same  
4 with the Atlantic Coastal growth -- the growth of the  
5 Atlantic population, this is mid-Atlantic, of which I am  
6 speaking; the growth of that population has been much more  
7 rapid than that of the Chesapeake. That is another piece  
8 of information which indicates that the -- if, for instance,  
9 the Chesapeake -- reproduction in the Chesapeake is  
10 responsible for the Atlantic Coast catch, then the catch  
11 on the Atlantic Coast should represent a -- or an increase  
12 in the production in the Chesapeake should increase the  
13 catch on the Atlantic Coast by approximately the same  
14 amount.

15                   This has not been true.

16                   MR. TROSTEN: When you say growth, are you  
17 referring to the growth of the population or the growth of  
18 the members of the population?

19                   WITNESS GOODYEAR: Excuse me for a moment.

20                   I am sorry.

21                   MR. TROSTEN: Would the reporter read the question  
22 back to Dr. Goodyear, please?

23                   (The reporter read the record as requested.)

24                   WITNESS GOODYEAR: I was referring to the growth  
25 of the population in numbers. However, I need to make a few

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little calculations to be able to continue with that particular --

Wait a minute.

I'd like to study that particular question for a while.

MR. TROSTEN: All right. Thank you.

We will go on to another question, Dr. Goodyear.

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Dr. Goodyear, is it your position -- strike that

question.

How many spawning rivers are there in the Chesapeake Bay, Dr. Goodyear?

WITNESS GOODYEAR: I would have to check, but it is something on the order of 13 major spawning rivers.

MR. TROSTEN: Major spawning rivers?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: In other words, without going through the whole list, the collection of tide water rivers along the western shore and the eastern shore for the most part, are spawning waters for the striped bass, is that right?

WITNESS GOODYEAR: Yes.

MR. TROSTEN: As well as the C&D Canal, is that correct?

WITNESS GOODYEAR: Eggs have been collected in the C&D Canal which indicates spawning occurs there, yes.

MR. TROSTEN: Is that not a major striped bass body of water, Dr. Goodyear?

WITNESS GOODYEAR: I have some reservations about answering that, that is or is not. There is evidence to indicate that it is, but there is also evidence to indicate that survival may not be -- for eggs that are spawned within that range, their survival may not be too good. I would hesitate to answer either way.

ak2 1 MR. KARMAN: Are we talking now about the C&D  
2 Canal, Mr. Trosten?

3 MR. TROSTEN: Yes, sir.

4 MR. KARMAN: Thank you.

5 MR. TROSTEN: Dr. Goodyear, where were the  
6 tagging studies performed in the Chesapeake Bay upon which  
7 you rely for your conclusion?

8 WITNESS GOODYEAR: Well, there is a large  
9 number of samples taken including -- I would have to check  
10 which one of them, but most of the major spawning regions  
11 have been studied with tagging. The biggest numbers come  
12 from the Potomac River.

13 MR. TROSTEN: Have there been sampling -- strike  
14 that. Have there been tagging studies of all of the major  
15 spawning rivers in the Chesapeake Bay, to your knowledge?

16 WITNESS GOODYEAR: Not to my knowledge right now.  
17 I have not looked at that specific point.

18 MR. TROSTEN: Now, what data support your conclusion  
19 that only a very small percentage of the bass less than  
20 four years old, migrate out of the Chesapeake Bay.

21 WITNESS GOODYEAR: If you will give me a moment,  
22 I will show you some of them.

23 MR. TROSTEN: Thank you.

24 (Slide.)

25 WITNESS GOODYEAR: This series of data was compiled

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1 Mansueti for studies done up to -- I believe it was 1961.

2 MR. TROSTEN: Dr. Goodyear, would you please  
3 describe the text and arrange that a copy of this table  
4 be included in the transcript?

5 MR. KARMAN: Mr. Trosten, we will certainly  
6 endeavor to have copies of all of these --

7 MR. TROSTEN: Thank you. Thank you, very much.

8 MR. MACBETH: Could Dr. Goodyear identify the text  
9 from which the table comes? That might also be helpful.

10 WITNESS GOODYEAR: One moment.

11 Excuse me for taking so long.

12 MR. TROSTEN: That is all right, Dr. Goodyear.

13 WITNESS GOODYEAR: This is an article by Mansueti  
14 entitled, "Page Code and Movement of the Striped Bass Taken  
15 in Fishing Gear near Maryland," and this particular table was  
16 a summary of both his own -- particular table was a summary  
17 of both his own tagging results and those of several others  
18 which have been compiled up to that time.

19 Now, one thing I should note, this particular  
20 sample here that is quoted shouldn't really be included in this --  
21 the rest of it because it represents a tagging effort, fish  
22 that were tagged above a dam.

23 (Indicating.)

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1 MR. TROSTEN: Would you describe which sample  
2 you just referred to?

3 WITNESS GOODYEAR: The Whitney 1961 sample.

4 MR. KARMAN: Dr. Goodyear, you will have to  
5 continually describe those. Otherwise the record will not  
6 indicate which one you are admitting.

7 WITNESS GOODYEAR: Okay.

8 If you notice Pearson tagging in 1933 to '38,  
9 none of the fish were taken outside of the Bay. Between  
10 90 percent were recovered within the Bay.

11 Vladykov and Wallace tagged almost 3000 fish  
12 and recovered 1 percent outside the bay.

13 Raney, Woolcott and Mehring, unknown number  
14 taken from outside the bay.

15 Hollis and Davvis, four tenths of a percent  
16 recaptured outside the bay.

17 Mansueti, 1956, none of them taken outside of  
18 the bay.

19 Massmann, four tenths of a percent were taken,  
20 recovered outside of the bay.

21 Chapoton and Sykes recovered 7.2 percent.

22 Now these numbers, the percentage figures, to get  
23 a relative indication of the contribution, that percentage  
24 should be contrasted with the percent recovered so that, in  
25 other words, if you don't recover 30 percent of them, then

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1 that 30 percent -- the 70 -- if you don't recover 70 percent  
2 of them, your distribution should be rated to the 30 percent  
3 you do recover.

4 In the <sup>case</sup> ~~case~~ of Chapoton and Sykes there were more  
5 recovered outside than inside. If you notice the size class  
6 ranged from 21 to 50 inches in age groups four and above.  
7 This is a general trend that's been noticed in virtually all  
8 of the tagging studies.

9 MR. TROSTEN: Dr. Goodyear, I believe you said  
10 there were more recovered outside of the bay in Chapoton  
11 and Sykes. It is just the reverse, or maybe I didn't hear  
12 you correctly.

13 WITNESS GOODYEAR: That is just the reverse of  
14 the rest of the studies. However, it is not the reverse in  
15 concept because of the age distribution for the fish.

16 Whitney we can't use.

17 Mansueti, three tenths of a percent.

18 In all cases where young fish were tagged, the  
19 far greater proportion were recovered within the bay.  
20 Actually, generally within the river system in which they  
21 were tagged. The same trend has shown up in each study which  
22 I have been able to find in which fish were tagged within the  
23 river system or within the Chesapeake Bay.

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1 Another publication not listed in this list is  
2 the movements of striped bass tagged and released in the  
3 Potomac River, 1959 to '61. In this case they recovered  
4 five-tenths of a percent -- one and a half percent outside  
5 of the bay and 37 percent within the bay. That represented  
6 nearly 9000 fish.

7 There are several others. We can go through  
8 them, if you like.

9 Have to fumble around a bit.

10 MR. TROSTEN: Why don't we stop with this for the  
11 time being.

12 Leave that on, would you, Dr. Coutant?

13 It is these tagging studies summarized by  
14 Mansueti and several others that I wish you'd give us the  
15 references at some point so we could at least know what  
16 they are. It is these tagging studies that form the basis  
17 for your opinion that the Chesapeake Bay does not contribute  
18 a very substantial portion of the striped bass population  
19 of the mid-Atlantic region, is that right? The ones you  
20 are describing right here?

21 WITNESS GOODYEAR: Would you repeat that, please.

22 MR. TROSTEN: Would you read the question back?

23 (The reporter read the pending question.)

24 WITNESS GOODYEAR: By substantial, you mean over  
25 80 percent or so?

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1 MR. TROSTEN: Yes.

2 WITNESS GOODYEAR: Yes.

3 MR. TROSTEN: All right. By the way, I wasn't --  
4 I think I heard you say a number 80 in there. I wasn't  
5 intending to -- something well over 20?

6 WITNESS GOODYEAR: Right.

7 MR. TROSTEN: All right. Now how many fish were  
8 tagged? Can you see roughly how many were there? It looks  
9 to me like on the order of 12,000 or something like that,  
10 would you say, ten to twelve thousand? The number ~~tagged~~ <sup>tagged</sup>  
11 Oh, you have to leave out the Whitney one, is that correct?

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: That would be on the order of  
14 six or seven thousand?

15 WITNESS GOODYEAR: Within this report here, yes.

16 MR. TROSTEN: That's right.

17 And how many fish were recovered leaving out the  
18 178 from Whitney?

19 WITNESS GOODYEAR: Would be around 30 percent.

20 MR. TROSTEN: How many in numbers? Can you tell  
21 there?

22 WITNESS GOODYEAR: Something like 1500.

23 MR. TROSTEN: So it is on the -- the -- on the  
24 basis of the recovery of these 1500 fish, you are largely  
25 basing your opinion on that? There are other tagging studies,

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1 I realize, but it is the recovery of these 1500 fish?

2 WITNESS GOODYEAR: Some of the other tagging  
3 studies are --

4 MR. TROSTEN: I understand. There may be some  
5 more.

6 WITNESS GOODYEAR: There are greater numbers.

7 CHAIRMAN JENSCH: Let him finish. He is telling  
8 us there are other tagging, greater numbers of fish were  
9 tagged or recovered?

10 WITNESS GOODYEAR: Both.

11 CHAIRMAN JENSCH: Both?

12 WITNESS GOODYEAR: There's -- there is a problem  
13 that I have to go back and check to make sure that Whitney  
14 reported twice, but there was something like 9000 fish  
15 tagged in the Potomac, 8973, and 3000 were -- 3344 of them  
16 were recovered. There are several other studies, too.  
17 There are substantially more than is indicated on this chart.

18 MR. TROSTEN: On this chart it is around 1500, but  
19 there are more as you just explained?

20 WITNESS GOODYEAR: Yes.

21 MR. TROSTEN: When does a fish start to migrate,  
22 striped bass, rather, start to migrate?

23 MR. KARMAN: Do you want to keep that chart up,  
24 Mr. Trosten?

25 MR. TROSTEN: Yes, please leave it up.

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WITNESS GOODYEAR: Would you rephrase or --

MR. TROSTEN: Let me ask it this way: When does a striped bass leave the Chesapeake Bay and start to perform its migrations? Do you know that?

WITNESS GOODYEAR: Generally after their fourth year.

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1 MR. TROSTEN: All right. If it is after their  
2 fourth year that they leave the Chesapeake Bay and begin to  
3 perform their migrations, then you wouldn't expect to find them  
4 outside of the Chesapeake Bay until after their fourth year,  
5 is that right?

6 WITNESS GOODYEAR: That's right.

7 MR. TROSTEN: So therefore you would expect to  
8 find all of the striped bass that you tagged that were under  
9 four years of age in the Chesapeake Bay?

10 WITNESS GOODYEAR: The far greatest percentage,  
11 yes.

12 MR. TROSTEN: How many of the recaptures in the  
13 Chesapeake Bay were under four years of age?

14 WITNESS GOODYEAR: Well, I can't say exactly  
15 right offhand, but by far the greatest proportion of them  
16 would have been recaptured under four years of age because  
17 the exploitation rate is so high that most of them that are  
18 tagged are recaptured in their first -- the first year follow-  
19 ing their tagging; so most of these which represent tagging  
20 of principally two and three year old fish would have been  
21 tagged before the fourth year.

22 MR. TROSTEN: And these are the ones that are  
23 recaptured predominantly in the Chesapeake Bay, is that right?

24 WITNESS GOODYEAR: Yes.

25 MR. TROSTEN: So the predominant age group for

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1 which recaptures were high in the Chesapeake Bay was under  
2 four years of age, is that correct?

3 WITNESS GOODYEAR: Yes.

4 MR. TROSTEN: Do you know how soon after tagging  
5 these fish were recaptured?

6 WITNESS GOODYEAR: Well, it varies considerably  
7 depending upon what season they were captured, but almost  
8 always within the same year. Now the greatest proportion  
9 were within the same year, in some cases within six months.

10 MR. TROSTEN: What is the relationship of the size  
11 of the water body outside the Chesapeake Bay <sup>that is</sup> to the mid-  
12 Atlantic water body) to the water body within the Chesapeake  
13 Bay --

14 CHAIRMAN JENSCH: Excuse me. Is that a premise he  
15 has accepted, or are you asking is there a relationship  
16 and if he says yes, you can ask him what it is. I think  
17 your question assumes a premise that I don 't know if it's  
18 been established. You ask him what is the relationship. I  
19 think the predicate for it is, is there a relationship.

20 MR. TROSTEN: No. I was only asking for a  
21 quantitative relationship, Mr. Chairman. Size relationship,  
22 that's all I was asking about. What is the size of the water  
23 body of the mid-Atlantic water body in which the striped  
24 bass is found. What is the size of the water body? In other  
25 words, the striped bass is <sup>rarely</sup> really found more than four or five

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1 miles offshore, isn't that right?

2 WITNESS GOODYEAR: Yes.

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1                   MR. TROSTEN: What is the size of the water body  
2 in the mid-Atlantic region in which the striped bass are found  
3 relative to the size of the Chesapeake Bay? Can you give  
4 me some rough idea?

5                   WITNESS GOODYEAR: Just a moment.

6                   (Witness conferring.)

7                   CHAIRMAN JENSCH: This is a statistical matter  
8 that one of your -- can one of your assistants give us an  
9 estimate? I know the witnesses here would like to be as  
10 precise as possible. Perhaps your witnesses -- Dr. Ranay  
11 has worked on the Chesapeake. Perhaps it is five miles wide  
12 and so many miles long.

13                   MR. TROSTEN: Mr. Chairman, I don't have the  
14 answer to the question. I don't think any of our witnesses  
15 do. Let's drop that and I could talk to Dr. Goodyear about  
16 it later, is that all right?

17                   WITNESS GOODYEAR: We have a map around here.

18                   MR. TROSTEN: I am prepared --

19                   CHAIRMAN JENSCH: This type of thing you can get from  
20 some recognized source rather than taking the time of the  
21 witness to calculate the size of a water body; all of your  
22 technical assistants who work on these things can give you  
23 these figures.

24                   MR. TROSTEN: All right. I'll move on.

25                   Dr. Goodyear, does not the probability of

1 recapturing a fish decrease with the size of a water body  
2 being fished?

3 WITNESS GOODYEAR: Not necessarily.

4 MR. TROSTEN: All right.

5 WITNESS GOODYEAR: It would depend upon whether  
6 or not the intensity of the fishing is uniform throughout  
7 the water body or throughout the area inhabited.

8 MR. TROSTEN: May we have a minute's conference?

9 CHAIRMAN JENSCH: Surely.

10 MR. KARMAN: Could we pull the plug on that  
11 thing for a moment? I think that the --

12 MR. TROSTEN: Yes.

13 MR. KARMAN: Mr. Chairman, is it possible for us to  
14 have a few minutes?

15 CHAIRMAN JENSCH: Yes. I think the Applicant  
16 desires to confer with his assistants. At this time, let  
17 us recess and reconvene in this room at 3:10.

18 (Recess.)

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1 CHAIRMAN JENSCH: Please come to order.

2 Are you ready to proceed, Applicant's counsel?

3 MR. TROSTEN: I am, Mr. Chairman.

4 CHAIRMAN JENSCH: Proceed, please.

5 MR. TROSTEN: Dr. Goodyear, is it true that as the  
6 Chesapeake Bay population is increased there has been an  
7 increase in the population along the North Atlantic Coast?

8 WITNESS GOODYEAR: Yes.

9 MR. TROSTEN: Suppose that many bass more than four  
10 years old migrate out of the Chesapeake Bay. Would you say  
11 that that is a possible supposition?

12 WITNESS GOODYEAR: Yes.

13 MR. TROSTEN: Are these bass capable of reproduc-  
14 tion?

15 WITNESS GOODYEAR: At four years?

16 MR. TROSTEN: Yes.

17 WITNESS GOODYEAR: Some of them would be.

18 MR. TROSTEN: Thank you. Now, Dr. Goodyear, on  
19 the basis of the discussion we had during the first day of  
20 the hearing, it is <sup>my</sup> ~~an~~ impression that you have not had  
21 personal experience, field experience in studying the striped  
22 bass, is that correct, sir?

23 WITNESS GOODYEAR: That is true.

24 MR. TROSTEN: Am I correct in understanding that  
25 the conclusion that you have drawn concerning the contribution

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1 of the Chesapeake Bay to the mid-Atlantic population is based  
2 upon a study of literature developed by others?

3 WITNESS GOODYEAR: Yes.

4 CHAIRMAN JENSCH: In that definition of literature,  
5 you mean the statistics?

6 MR. TROSTEN: That's correct, sir.

7 CHAIRMAN JENSCH: Thank you. Proceed.

8 MR. TROSTEN: Dr. Goodyear, I am going to read  
9 to you an excerpt from the papers prepared by J. L. McNugh  
10 of the Marine Sciences Research Center, State University of  
11 New York at Stony Brook.

12 MR. KARMAN: Do you have a copy for Dr. Goodyear?

13 MR. TROSTEN: I think I do.

14 WITNESS GOODYEAR: Is that the one in the AAAS?

15 MR. TROSTEN: Don't let me forget to get this back.

16 (Handing document to Witness Goodyear.)

17 MR. KARMAN: This has not been distributed  
18 previously?

19 MR. TROSTEN: No, sir.

20 Are you familiar with this document, Dr. Goodyear?  
21 Have you seen it before?

22 WITNESS GOODYEAR: I'll have to study it for a  
23 minute to be able to answer it.

24 MR. TROSTEN: It is just the portion on the striped  
25 bass I am going to discuss with you. It is just a page and

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1 a half or so.

2 The reference, Mr. Macbeth, is Fishery Bulletin,  
3 Volume 70, No. 3, 1972.

4 MR. MACBETH: Thank you.

5 MR. KARMAN: Have you seen this before, Dr.  
6 Goodyear?

7 WITNESS GOODYEAR: I haven't seen this particular  
8 one before, but I am familiar with the hypothesis that is  
9 being presented.

10 MR. KARMAN: I just wanted to make sure you were  
11 familiar enough to discuss it.

12 MR. TROSTEN: I am going to read to you a quota-  
13 tion. Let me start reading slowly. "It seems unlikely --"  
14 do you see that?

15 WITNESS GOODYEAR: Yes.

16 MR. TROSTEN: "It seems unlikely that the great  
17 increase in striped bass landings over a 35-year period  
18 has come about through an equivalent increase in fishing  
19 effort, for this species has been popular as a commer-  
20 cial and recreational species for a long time. It has been  
21 been suggested (Mansueti, 1961) that the species has been  
22 able to take advantage of increased nutrient loads in its  
23 nursery areas in Chesapeake Bay and elsewhere and that the  
24 increased catch has been largely, if not completely, caused  
25 by a real increase in abundance. This is entirely hypothesis

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1 and data probably do not exist with which to test it."

2 Dr. Goodyear, do you agree with McHugh's statement  
3 in the last sentence which I have just read to you, that is,  
4 "This is entirely hypothesis and data probably do not exist  
5 with which to test it"?

6 WITNESS GOODYEAR: Not entirely.

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1 MR. TROSTEN: In what respect do you disagree  
2 with McHugh's hypothesis?

3 WITNESS GOODYEAR: Certain of the --

4 MR. TROSTEN: With McHugh's statement, excuse me.

5 WITNESS GOODYEAR: The -- there is data which  
6 would be meaningful in interpreting whether or not there has  
7 been a real increase in abundance so that at least that portion--  
8 there are several points which should be made about that.

9 MR. TROSTEN: Well ---

10 CHAIRMAN JENSCH: Wait a minute. Let him go ahead.  
11 Go ahead, Doctor.

12 WITNESS GOODYEAR: In the first place, the  
13 commercial fisheries take primarily fish below or at least  
14 the female they take are below reproductive age, or they  
15 were for a very long period. This is particularly true in  
16 the Chesapeake itself. From the tagging data which was  
17 gathered by Alprin and Schaeffer on the Long Island -- Alprin  
18 was looking at tag returns of fish in Long Island in Great  
19 South Bay, Long Island, and Schaeffer was looking at fish  
20 returns tagged from the surf water. Their results show the  
21 larger fish are being predominantly taken by sport fisheries,  
22 a disproportionate amount of them being taken by sport  
23 fisheries versus the commercial fisheries.

24 That disproportionate amount would increase -- let  
25 me rephrase that.

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1 That changing proportion causes the catch by  
2 the sport fishery as indicated was going up here in this  
3 document. That does not have the same effect upon reproduc-  
4 tion or potential reproduction as the same increase in a  
5 commercial fishery so that the degrees to which the sport  
6 fishery increases in terms of number of people, actually  
7 number of pounds that are taken, doesn't have the same effect  
8 as an increase in the commercial fishery.

9 There is -- I would like to show you one -- a graph  
10 here which is a plot of the catch per amount of license  
11 haul seining in hundreds of yards versus the catch per  
12 unit -- the catch per unit versus effort.

13 In other words, it is the function -- it compares  
14 the -- each of the asterisks is a data point.

15 (Slide.)

16 Now --

17 MR. TROSTEN: Is this a figure in the Final  
18 Environmental Statement, Dr. Goodyear?

19 WITNESS GOODYEAR: No, it is not.

20 Theoretically if a population -- if the fishery  
21 were regulated or the catch were regulated by the fishery  
22 itself -- well, go back and try again.

23 If the catch were regulated by the amount of  
24 fishing effort, that is in terms of the actual landings on a  
25 given year were a function of the effort on that year, then

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1 you would expect that the -- there would be no correlation  
2 between catch per unit intensity and intensity. No relation-  
3 ship at all.

4 All right. For the period from 19-- I believe  
5 '47 -- I'll check that in a minute -- but over a period of  
6 years, up to 1964, the catch per unit intensity, this is  
7 striped bass landings by haul seining principally on Long  
8 Island, but you can see that at low fishing intensities  
9 there is a very high catch per unit effort.

10 At high fishing intensities, the catch per effort  
11 is very low, indicating they have withdrawn a very substantial  
12 portion of the stock by the fishing. Essentially what it  
13 says is if the effort goes up, you don't catch more fish  
14 because you have caught them already, is what it amounts to.

15 This particular diagram was plotted from Koo's  
16 data.

17 MR. TROSTEN: Dr. Goodyear, would you give me the  
18 source of those data, please?

19 WITNESS GOODYEAR: It is Dr. Koo.

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MR. TROSTEN: I see. Is this plotted from some particular table in Koo?

WITNESS GOODYEAR: Yes, from a particular table. It is a table which compares haul seining catches -- haul seine catches on the New York coast versus -- there is three columns in it and I am not sure which one is which. It is haul seining versus catch, it is New York data.

MR. TROSTEN: Would you state for the record at some point, what the table is so we can have it or do you know it?

WITNESS GOODYEAR: I believe we gave -- it is Table 8, New York striped bass statistics for haul seining catches and the period was 1947 through 1966.

MR. TROSTEN: Thank you.

Now I --

MR. MACBETH: Could I just make the same request that this table and this form be included in the transcript?

MR. TROSTEN: Will you do that?

MR. KARMAN: I have that continual commitment.

MR. MACBETH: Thank you, Mr. Karmen.

MR. TROSTEN: Dr. Goodyear, I appreciate your response and I certainly am interested in it. I am not sure that you were really responding to the question I asked. However, at least I am not sure that I understood your response as being directed to my question.

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1                   What I specifically asked you was whether you agreed  
2 with McHugh's statement in the last sentence. Now, I  
3 am not trying to get into a discussion of what McHugh  
4 meant, but let me tell you what I was really directing  
5 my question to. When I asked you the question, I meant it  
6 to ask -- I meant to ask you whether you agreed the data  
7 probably do not exist with which to test the hypothesis that  
8 the increase in the species is the result of its being  
9 able to take advantage of increased nutrient loads in its  
10 nursery areas on the Chesapeake Bay and elsewhere. That is  
11 really what I meant.

12                   WITNESS GOODYEAR: Would you repeat that?

13                   That is not what the sentence states here.

14                   MR. TROSTEN: Well, okay. The -- there are two  
15 sentences in here. "It has been suggested (Mansueti 1961)  
16 that the species has been able to take advantage of increased  
17 nutrient loads and its nursery areas in the Chesapeake Bay  
18 and elsewhere <sup>in</sup> ~~and~~ that the increased catch has been largely,  
19 if not completely, caused by a real increase in abundance."

20                   " This is entirely hypothesis and data probably  
21 do not exist with which to test it." In other words, I  
22 was throwing out the question of whether the striped bass  
23 is a species that really thrives on the increased nutrient  
24 loads in the nursery areas and so forth.

25                   CHAIRMAN JENSCH: In other words, if they get more

1 food to eat, they will do better, is that your point?

2 MR. FROSTEN: That is right.

3 WITNESS GOODYEAR: Yes. The idea that the  
4 nursery areas have actually increased in productivity --

5 MR. FROSTEN: Because of the increased nutrients  
6 in the nursery area?

7 WITNESS GOODYEAR: Yes. That hypothesis is fairly  
8 well known.

9 MR. FROSTEN: Do you agree <sup>that</sup> the data probably  
10 don't exist with which to test it? Do you agree  
11 with that part of the sentence. He sort of finishes  
12 off and says this is entirely high --

13 MR. KARMAN: I thought Dr. Goodyear responded to  
14 that already by saying not entirely.

15 WITNESS GOODYEAR: Yes. The information I just  
16 presented indicates that the increase in catches is very real,  
17 a very real increase in abundance.

18 MR. FROSTEN: Yes.

19 WITNESS GOODYEAR: Okay. So that was one of the  
20 things he was saying could not be tested.

21 MR. FROSTEN: Right.

22 WITNESS GOODYEAR: The -- I agree it can't be  
23 rigorously tested. However, if you go back in the  
24 records from old catch records, you find that it was at one  
25 time much, much higher.

CHAIRMAN JENSCH: Let him finish. Go ahead.

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1 WITNESS GOODYEAR: So at a time when the nutrient  
2 load was not as high, the fish were more abundant. Now  
3 whether or not that's due to changes in the mortality rate  
4 or not is not very clear. There are a lot of evidence  
5 that could be used to examine this hypothesis.

6 MR. TROSTEN: So you would say the data probably  
7 do exist to test the hypothesis that the species has been  
8 able to take advantage of increased nutrient loads in its  
9 nursery area on the Chesapeake Bay?

10 WITNESS GOODYEAR: Yes. I think that there --  
11 I am not sure that a rigorous analysis could be made, but  
12 certainly a much more detailed analysis than is presented  
13 here.

14 MR. TROSTEN: Would you say --

15 CHAIRMAN JENSCH: Excuse me. By "presented here,"  
16 you mean much more detailed analysis than that which McHugh  
17 set forth in this document referred to by Applicant's  
18 counsel?

19 WITNESS GOODYEAR: Yes.

20 CHAIRMAN JENSCH: Thank you.

21 MR. TROSTEN: Mr. Chairman, I am sorry, I didn't  
22 hear you. Would the reporter read the last comment by the  
23 Chairman?

(The reporter read the record as requested.)

24 CHAIRMAN JENSCH: I am just trying to identify  
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1 the "here" part and that's the document that you and he  
2 have been talking about.

3 MR. TROSTEN: I understand, sir, thank you.

4 Dr. Goodyear, is it true that both catch and catch  
5 per unit gear has been tending upward over the period of  
6 time the Lovett, ~~Danckammera~~ <sup>Danskammer</sup> and Indian Point plants have  
7 been operating?

8 WITNESS GOODYEAR: Yes.

9 MR. TROSTEN: In your opinion, does this prove  
10 that these plants caused this improvement?

11 (Laughter.)

12 CHAIRMAN JENSCH: Excuse me. I don't have the  
13 notes on this. When did ~~Danckammera~~ <sup>Danskammer</sup> start?

14 MR. TROSTEN: These plants started up over a  
15 period of about 20 years starting '49 or possibly '47, Mr.  
16 Chairman.

17 CHAIRMAN JENSCH: And Lovett, same time?

18 MR. TROSTEN: Yes.

19 CHAIRMAN JENSCH: Thank you.

20 WITNESS GOODYEAR: Would you repeat the question,  
21 please?

22 (The reporter read the pending question.)

23 WITNESS GOODYEAR: No.

24 MR. TROSTEN: In your opinion, Dr. Goodyear, is  
25 it possible that these plants caused this improvement?

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WITNESS GOODYEAR: Is it possible, in my opinion?

MR. TROSTEN: Yes, sir.

CHAIRMAN JENSCH: While there is a pause, could you tell me what the heat level is or the temperature level of the water coming out of those fossil fuel plants so we can get some temperature?

MR. TROSTEN: Are you talking about the Delta T across the condensers, Mr. Chairman?

CHAIRMAN JENSCH: That would be one, but also what is the temperature at the time it enters the Hudson River after passing through the condensers?

MR. TROSTEN: I understand the Delta T is about 14 degrees from the Lovett plant, and <sup>about</sup> ~~about~~ 18 degrees from Danekammer Danekammera, Mr. Chairman.

CHAIRMAN JENSCH: How about Indian Point?

MR. TROSTEN: Indian Point is 14 degrees -- Indian Point is?

CHAIRMAN JENSCH: Well, that's the only one that's been operating.

MR. TROSTEN: I am sorry. Yes.

(Laughter.)

MR. MACBETH: I hope that's true, Mr. Chairman.

CHAIRMAN JENSCH: You are not talking about the catch at the Indian Point on the screens.

MR. TROSTEN: It is about 13 degrees, Mr.

1 Chairman, for Indian Point 1.

2 CHAIRMAN JENSCH: And the different statistics  
3 are in there about whether it is 79 or 83 degrees. These  
4 figures, I think, we discussed this morning, for ambient  
5 in the river?

6 MR. TROSTEN: Yes, that's right.

7 CHAIRMAN JENSCH: Very well. Thank you.

8 MR. KARMAN: Do you understand the question, Dr.  
9 Goodyear?

10 WITNESS GOODYEAR: I understand the question, but  
11 I am not sure that the -- the problem is that I -- for -- I  
12 agree it is possible.

13 MR. TROSTEN: Do you agree it is possible?

14 WITNESS GOODYEAR: I agree it is possible, but I  
15 cannot formulate a mechanism which would allow it to occur  
16 which would cause it. So I really can't have an opinion on  
17 how it would work, but, of course, anything is possible.

18 CHAIRMAN JENSCH: You say it is possible, but it  
19 is improbable?

20 WITNESS GOODYEAR: I don't know any way for that  
21 direction of change to be caused by the plant.

22 CHAIRMAN JENSCH: So you say it is improbable?

23 WITNESS GOODYEAR: Yes.

24 CHAIRMAN JENSCH: Thank you.

25 MR. TROSTEN: Well, let me try to formulate a

1 mechanism. How about selective removal of <sup>weaker</sup> ~~less~~ ~~poor~~  
2 members of the population? Would you say that that is a  
3 conceivable mechanism whereby this possible improvement  
4 that you described could come about?

5 WITNESS GOODYEAR: One moment.

6 (Witnesses conferring.)

7 WITNESS GOODYEAR: Under some circumstances  
8 that certainly would be true.

9 MR. TROSTEN: All right. Thank you. Now do you  
10 think that there are adequate data to test the hypothesis  
11 that I advanced to you that operation of the -- strike that,  
12 Mr. Reporter.

13 Do you think that there are adequate data, Dr.  
14 Goodyear, to test the hypothesis that I advanced to you  
15 that the operation of the <sup>Danekammer</sup> ~~Danekammer~~, Lovett and Indian Point  
16 1 plants have increased the abundance of the striped bass  
17 in the Hudson River?

18 WITNESS GOODYEAR: Based on the mechanism you  
19 suggested?

20 MR. TROSTEN: No, just based generally. Based  
21 on any mechanism.

22 CHAIRMAN JENSCH: While there is a pause, I  
23 wonder if I can understand the question. If he says it is  
24 improbable so it won't occur, will there ever be data?

25 MR. TROSTEN: I gather from what he said, Mr.

1 Chairman, that his answer was going to be no.

2 MR. KARMAN: He asked it.

3 CHAIRMAN JENSCH: Move along. If you will,  
4 give him the information.

5 WITNESS GOODYEAR: In order to test the hypo-  
6 thesis or to examine the hypothesis you just presented,  
7 you have to have a mechanism to formulate -- a conceptual  
8 mechanism around which to test -- to gather data to test the  
9 hypothesis. I don't know whether there is enough data or not  
10 because I cannot provide a rational hypothesis for it to  
11 occur.

12 MR. TROSTEN: Are you finished?

13 WITNESS GOODYEAR: Yes.

14 MR. TROSTEN: So you would say there are  
15 inadequate data at the present time?

16 WITNESS GOODYEAR: No. I say I do not know  
17 whether there are adequate data.

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1 mil 1 MR. TROSTEN: All right. Now I have just suggested  
2 to you a conceivable hypothesis, a conceivable mechanism  
3 whereby this event could take place and you agreed that it  
4 was conceivable, did you not?

5 WITNESS GOODYEAR: Under certain circumstances.

6 MR. TROSTEN: All right. So now you have a con-  
7 ceptual framework, Dr. Goodyear, to determine whether adequate  
8 data are available. Would your answer now be that <sup>there</sup> they are  
9 adequate or inadequate data?

10 WITNESS GOODYEAR: Not without a slight bit of  
11 study. To answer your question, you have to formulate the  
12 very specific complete system. The fact that you remove  
13 weak fish doesn't necessarily increase the stock at all  
14 unless it does something and there has got to be a change  
15 some place besides the mortality of the weaker fish.

16 MR. TROSTEN: Well, let me say --

17 CHAIRMAN JENSCH: Have you finished?

18 Go ahead.

19 WITNESS GOODYEAR: Well, it would take a long  
20 time, essentially, to formulate -- I don't know how long,  
21 but it would take a while to formulate a mechanism and it  
22 may not be possible to do it within the data base that is  
23 available. I can't answer your question without considerable  
24 study.

25 MR. TROSTEN: All right. Now presumably we could

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1 sit here and discuss other conceivable mechanisms whereby  
2 this could occur. For example, the slight addition of heat  
3 to the water body might, you know, possibly create some  
4 conditions that would be more conducive in certain years  
5 when the temperature was unduly cold or the salt front was  
6 in the wrong position whereby the productivity of the  
7 estuary was increased. Don't you agree that that is -- if we  
8 discuss this long enough together, we might come up with  
9 another mechanism whereby this could come about.

10 WITNESS GOODYEAR: I am certain there are several  
11 mechanisms which you could postulate, yes.

12 MR. TROSTEN: Given the fact there are these  
13 mechanisms we could postulate, would you say the data  
14 base is adequate or inadequate under the present circumstance  
15 to determine whether these hypotheses are actually valid at  
16 the present time?

17 WITNESS GOODYEAR: As I said before, I cannot say  
18 whether data base is here or not here without having  
19 examined the hypothesis to see what data would be needed.

20 MR. TROSTEN: Okay. Now, under these circumstances,  
21 is there some thought in your mind that perhaps there are  
22 inadequate data upon which to draw the conclusion that  
23 the operation of a single power plant will cause a marked  
24 decrease in abundance in the striped bass in the Hudson  
25 River?

3mil 1 WITNESS GOODYEAR: Would you repeat that, please.

2 MR. TROSTEN: Would the reporter repeat the  
3 question, please?

4 (The reporter read the pending question.)

5 WITNESS GOODYEAR: Would you read it again, please?

6 (The reporter read the record as requested.)

7 WITNESS GOODYEAR: Could I have a few moments?

8 MR. TROSTEN: Yes.

9 (Witnesses conferring.)

10 WITNESS GOODYEAR: Would you read the question  
11 again, please.

12 (The reporter read the record as requested.)

13 (Witnesses conferring.)

14 WITNESS GOODYEAR: I am sorry. I am having  
15 trouble following the question.

16 MR. KARMAN: If you have that kind of difficulty,  
17 perhaps you might request of Mr. Trosten that he could be a  
18 little more specific in certain areas, especially any area  
19 giving you some concern in answering and responding  
20 adequately.

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WITNESS GOODYEAR: Could you per chance simplify the question a little bit.

MR. TROSTEN: Could you tell me what there is about the question that you don't understand?

WITNESS GOODYEAR: I can't -- well, right now I am having trouble getting the whole question in mind.

MR. TROSTEN: Would the reporter read the question again.

(The reporter read the record as requested.)

CHAIRMAN JENSCH: What you are really asking is it not, do you think a single power plant lessens the abundance of striped bass? You will have the question of one more power plant, one more power plant, and whether the combination. But the present question is do you think there are data that a single power plant lessens the abundance of striped bass?

MR. TROSTEN: No, it is a little bit more than that, Mr. Chairman.

We were discussing the adequacy of the data base to draw certain conclusions that the <sup>Howell</sup> ~~Lovett~~ Indian Point 1 and <sup>Danskammer</sup> ~~Danskammer~~ plants had increased the abundance of the striped bass and Dr. Goodyear said that, gee, these data are really inadequate. I agree.

Then I said to him, well, given the state of facts, do you think that perhaps the data are inadequate to determine

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1 that the operation of a single power plant will  
2 decrease the abundance of the striped bass in the Hudson  
3 River. I just wanted to see what his response was.

4 MR. MACBETH: Mr. Trosten's phrasing of Dr.  
5 Goodyear's response is not what I remember. Perhaps the  
6 reporter could read back Dr. Goodyear's earlier response  
7 about inadequate data conceptualizing the mechanism.

8 CHAIRMAN JENSCH: Well, it could be done but as  
9 I understood the witness that he couldn't formulate any  
10 mechanism by which data could be developed to make this  
11 analysis. The question is coming in the same form but limited  
12 to a single plant. If the gentleman can't formulate a matter  
13 by which data could be developed to help the fish grow from  
14 a single power plant, he is asking the same question --

15 MR. TROSTEN: Mr. Chairman, there is more.

16 MR. MACBETH: My understanding of Dr. Goodyear's  
17 statement was that he couldn't conceptualize a mechanism  
18 by which the plants could increase the population and, therefore,  
19 he did not know what data he would have to have to test  
20 the concept or the hypothesis. Therefore, he was not saying  
21 the data was inadequate but simply that he didn't know what  
22 data he would need because he couldn't find the hypothesis  
23 on which data could be tested.

24 MR. TROSTEN: Mr. Chairman, the record will speak  
25 for itself. Dr. Goodyear very clearly indicated that he couldn't

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1 conceive of mechanisms whereby this could come about.

2 MR. KARMAN: Well that is --

3 CHAIRMAN JENSCH: He said he could sit here and  
4 hypothesize forever.

5 WITNESS GOODYEAR: If I might have a word?

6 (Laughter.)

7 My feeling about this discussion is, without  
8 being able to examine the hypothesis in its entirety and  
9 examine the data in relationship to the mechanisms which could  
10 contribute to the hypothetical conclusion, I can't say  
11 either way whether there is or is not enough data. That has  
12 to be done with some effort to find data.

13 MR. FROSTEN: This is with regard to the hypothesis  
14 that the operation of the Lovett-Danekammera and Indian Point 1  
15 Plant has increased the abundance of the striped bass?  
*Danekammera*

16 WITNESS GOODYEAR: It is true for any hypothesis.

17 MR. FROSTEN: All right. Well let me  
18 just ask you the question then, do you consider that there  
19 *are* and inadequate data upon which to draw the conclusion  
20 that the operation of a single power plant will cause  
21 a marked decrease in abundance of the striped bass in the  
22 Hudson River?

23 I will ask you that question in isolation.

24 WITNESS GOODYEAR: I am still having problems  
25 formulating the whole thing.

1 MR. TROSTEN: With that question?

2 WITNESS GOODYEAR: Yes. Inadequate data. Could  
3 we take a few minutes?

4 MR. TROSTEN: Sure.

5 MR. KARMAN: Could we have a short break, Mr.  
6 Chairman?

7 CHAIRMAN JENSCH: Yes, at this time, let's recess  
8 to reconvene in this room at four o'clock.

9 (Recess.)

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1 CHAIRMAN JENSCH: Please come to order.

2 Now the Board in the recess has been giving  
3 some consideration to the length of the cross-examination  
4 of the Staff witnesses. Bearing in mind that this arrangement  
5 for the Staff to be thrust into cross-examination was thought  
6 to be a means of accommodating the schedule of the Staff  
7 witnesses, but as oftentimes happens when there is a  
8 variance from a regular order of business, we sometimes end  
9 up with more complications than we seek to avoid, and it is  
10 apparent to the Board that the Staff witnesses are -- have  
11 been under a pretty thorough and searching and carefully  
12 prepared examination, before in a sense the Applicant's  
13 witnesses have put on their case and seen what the shape of  
14 that case is, before the other parties are cross-examined.

15 It may be the shape of the Applicant's testimony  
16 will be possibly in a little different form and these  
17 factors may be a basis for consideration by the Staff.

18 Now we don't know just what the schedule by  
19 the parties will be, but it appears to the Board that perhaps  
20 we are taking a little more time than originally estimated,  
21 under no criticism of doing that. But we keep in mind the  
22 kind of arrangements that would have to be made to take care  
23 of the full cross-examination that the parties are entitled  
24 to undertake.

25 Now there are two two ways of making an adjustment

1 in the schedule and one is to say we will stop now with  
2 any cross-examination of the Staff, and let the Applicant  
3 go forward and present the cases for some of these  
4 hypotheses or whatever they are, to see if they have any  
5 data that even warrants any cross-examination of those phases,  
6 for instance, or whatever other respect.

7 But the Applicant has the burden of proof here  
8 and until the evidence in support of that burden has been  
9 presented, presumably there would be an opportunity to make a  
10 motion for summary judgment, that sort of thing. Those  
11 procedural devices will not be available if we continue in  
12 this type of schedule. I don't know whether that will be  
13 made or not.

14 But the regular order of business somehow  
15 always proves to be the best way to proceed, and we are in a  
16 variance from that, and we think normally, as the Staff  
17 being thrust into a position that really is not their burden  
18 to bear at the moment.

19 Now there is another alternative, and that's to  
20 kind of do it a half day one party, and a half day the  
21 other, but we think when the answer to this question is  
22 given that the cross-examination of the Staff should cease.  
23 We will just have to pray for another time even if our next  
24 week is not fully taken up with the other parties, and try  
25 to find a few days at some other time in order to meet the

1 Staff schedule.

2 But the Staff is, we think, has had sufficient  
3 trial by fire at the moment, and we think it is time for  
4 the Applicant to face up to the same approach.

5 MR. TROSTEN: Mr. Chairman, may I speak to that?

6 CHAIRMAN JENSCH: Yes.

7 MR. TROSTEN: In the first place, Mr. Chairman,  
8 I would say that I certainly concur that the Staff and Dr.  
9 Goodyear in particular has had a heavy burden here, and I  
10 apologize for any imposition on him.

11 CHAIRMAN JENSCH: I don't think you should feel  
12 thatway at all. I just think it is the variance from the  
13 order that we permitted that perhaps is not proving to be  
14 the wise choice.

15 MR. TROSTEN: Now, the second point I would like  
16 to make is that I must respectfully disagree with the  
17 Chairman's conclusion drawn here. The Staff as the proponent  
18 of a condition has the burden of proof with respect to  
19 the condition and I do not believe that the variance  
20 from the normal procedure of cross-examination which was  
21 approved by the Board is any wise inappropriate in this  
22 particular case for that reason. As far as the Applicant  
23 coming forward with the -- its case, the Applicant has come  
24 forward with its case. There is evidence in the record  
25 which supports the cross-examination, and which supports the

*hypothesis*

ar4 1 principles, the ~~hypothesis~~ that the Applicant's counsel has  
2 been advancing.

3 In the third place, the Applicant has always been  
4 willing to be cross-examined first in this case, and it was  
5 merely the unwillingness on the part -- I am not criticizing  
6 this, I am just remarking on it, the unwillingness on the  
7 part of either of the parties to proceed on that basis that  
8 led us to this other position.

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2 CHAIRMAN JENSCH: There is no criticism of any  
3 party in this proceeding and we recognize that we all were  
4 endeavoring to accommodate the Staff's schedule. While the  
5 Applicant was ready to go ahead, it deferred its presentation.  
6 I think that while the Staff may have the burden of going for-  
7 ward to support the condition, it still remains the basic  
8 requirement that the Applicant with the burden of proof  
9 has evidence to adduce on environmental matters and must  
10 bear the burden of proof in that regard. That will remain  
no matter when they are cross-examined.

11 MR. FROSTEN: Again I respectfully disagree with  
12 the Chairman's statement. I believe although the Applicant  
13 clearly under <sup>and</sup> the regulations ~~in~~ the Administrative  
14 Procedure Act, has the burden of proof, the Staff as the  
15 proponent of a condition also has the burden of proof and  
16 as I indicated at the prehearing conference, I do not  
17 believe that this is merely the burden of coming forward.  
18 But be that as it may, I feel this: that the Applicant  
19 has come forward with its evidence in this proceeding.  
20 We have as we always have been prepared -- as far as I am  
21 concerned, Mr. Chairman, it would have been all right to have  
22 -- had we known about it in an adequate time, for us to have  
23 been cross-examined this week instead of our cross-  
24 examine the Staff this week.

25 CHAIRMAN JENSCH: We understand.

2mil 1 MR. TROSTEN: I would really like to go on with the  
2 cross-examination of the Staff now. In any event -- but,  
3 of course, the Chair will rule as <sup>it</sup> sees fit.

4 But however the Chair does rule on this matter,  
5 I would like to proceed with the cross-examination of Dr.  
6 Goodyear by Dr. McFadden <sup>or</sup> and a technical interrogator in view  
7 of the fact that Dr. McFadden has come here from the  
8 University of Michigan to make <sup>his</sup> ~~this~~ interrogation and has  
9 accommodated this schedule accordingly.

10 CHAIRMAN JENSCH: We had not been informed he was  
11 here for that purpose or had been called specially to  
12 undertake this. Perhaps we could have resolved the matter  
13 prior to his actually being here.

14 His appearance here today was a first and your  
15 statement is the first indication we have that he would seek  
16 to be an interrogator.

17 MR. TROSTEN: <sup>I had observed</sup> I observed to Mr. Kazman, Mr.  
18 Chairman, and I will for the record, make the statement now,  
19 at the present time the Applicant intends to request at  
20 least two technical interrogations of the Staff. The  
21 first I have just mentioned by Dr. McFadden of Dr. Goodyear  
22 with respect to the regression analyses contained in  
23 Figures 5-13 through 5-15. I simply am unable, Mr. Chairman,  
24 to make the contribution that I think should be made to the  
25 Board with regard to the statistical evaluations and hence

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1 I am requesting permission under the AEC's rules that a  
 2 technical interrogation be conducted of Dr. Goodyear by Dr.  
 3 McFadden.

4 The other request I make of the Board now is that  
 5 Dr. Lawler be permitted --- and Mr. Karman -- counsel for the  
 6 Regulatory Staff has been advised previously of both of  
 7 Applicant's counsel's requests.

8 I <sup>request</sup> requested Dr. Lawler be permitted to perform a  
 9 technical interrogation of Dr. Goodyear also with respect  
 10 to the Hudson River hydrodynamic aspects of the models  
 11 presented by Dr. Goodyear, models 5-2 and 5-3 presented in  
 12 those appendixes and also with respect to the <sup>three of</sup> ~~three other~~ of  
 13 the model and the output of the model.

14 Here again I simply do not have the background  
 15 in computer modeling or in mathematics to make the contribu-  
 16 tion that I think the Board deserves.

17 CHAIRMAN JENSCH: Well, on the mathematical  
 18 phase, I understand Dr. Siman-Tov is the technical mathemati-  
 19 cian. So I presume --

20 MR. TROSTEN: Whoever it is.

21 CHAIRMAN JENSCH: We feel very strongly that right  
 22 now -- either we are going to suspend the hearing for today  
 23 in order to provide rest for the gentlemen or we can go ahead  
 24 with your evidence.

25 MR. TROSTEN: Well, our evidence is in, Mr. Chairman.  
 We have gone ahead with it and offered it.

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1 CHAIRMAN JENSCH: Well, the offering of the  
2 evidence really was kind of done to move it along. The  
3 Staff has its evidence in. Your case is not done until  
4 it has been cross-examined. So that really the fact that  
5 you could put your evidence in doesn't excuse or authorize going  
6 ahead out of a different procedure because when you put your  
7 evidence in, you are supposed to be ready for cross-examination  
8 then. We accommodate your witnesses who weren't here at  
9 times. So we really can kind of forget that -- that we  
10 bundled all this evidence in the first day.

11 MR. TROSTEN: Is the Staff counsel prepared to  
12 cross-examine this afternoon?

13 MR. KARMAN: We would ordinarily follow the  
14 Intervenor's cross-examination, Mr. Chairman.

15 MR. MACBETH: I certainly had not anticipated  
16 this. I had discussed with counsel for Consolidated Edison  
17 this schedule for the hearings and our feeling was that  
18 I would take up cross-examination of their witnesses, week  
19 after next. Now, if we had a recess say until noon tomorrow,  
20 I think that I could be prepared to start cross-examination  
21 that would be reasonably focused and swift. I think if I began  
22 it right now that we simply would be delayed, a fact that I had  
23 not anticipated beginning now and frankly, had not anticipated  
24 beginning for ten days.

25 CHAIRMAN JENSCH: What was going to happen next  
week?

1 MR. TROSTEN: I was --

2 MR. MACBETH: The witnesses for the Intervenors  
3 were going to be put on the stand and Mr. Trosten  
4 promised me he had five days of work for them.

5 MR. TROSTEN: I was prepared to undertake cross-  
6 examination of Dr. Aynsley on Monday and Mr. Clark as soon  
7 as we could conclude with Dr. Aynsley. I anticipated we  
8 ought to be able to be finished in five days most  
9 of which I imagine would involve Mr. Clark.

10 CHAIRMAN JENSCH: Well, it looks like there will  
11 have to be a third week somewhere along the line found for  
12 scheduling, do you not agree?

13 MR. TROSTEN: Yes. It was my thought we could  
14 proceed on into the third week and if all went well, I  
15 thought we could conclude -- frankly, the interrogation of  
16 the Staff has taken longer, Mr. Chairman, than I had  
17 anticipated.

18 CHAIRMAN JENSCH: No criticism at all.

19 MR. TROSTEN: I really thought I could be  
20 finished. As these things happen, it has just  
21 taken longer than I thought.

22 I would say realistically speaking, it looks  
23 to me as if the interrogation <sup>of</sup> by the Staff by myself and  
24 by Mr. Macbeth is going to extend into the early part of  
25 next week which I don't think is going to create a serious

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problem provided we assure that Dr. Yee and Dr. Coutant  
are able to get to the Shoreham hearing.

I will be prepared as I have agreed, to undertake  
cross-examination of Dr. Aynsley as soon as the Staff  
cross-examination is <sup>finished</sup> prepared and I assume that we can get  
to it early next week. I hope so.

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1 CHAIRMAN JENSCH: Well, the question is raised  
2 could you go ahead with some other witnesses rather than  
3 this grouping at the moment? We think this group should  
4 have a rest.

5 MR. TROSTEN: Unfortunately -- I could --  
6 Doctor -- Mr. Chairman, I suppose it is possible that we could  
7 Yes, it is possible that we could undertake cross-examination  
8 of someone other than Dr. Goodyear. It would have to be Dr.  
9 Oestmann, I believe.

10 MR. KARMAN: On what?

11 MR. TROSTEN: On the Staff's balancing.

12 MR. KARMAN: Dr. Oestmann is not our principal  
13 witness.

14 MR. TROSTEN: Who would your witness be?

15 MR. KARMAN: Mr. Carter or Mr. Knighton.

16 MR. TROSTEN: I see. Mr. Carter or Mr. Knighton.  
17 In any event, Mr. Chairman, I hope we can proceed with the  
18 interrogation on the regression analyses this afternoon, so  
19 that Dr. McFadden can get back to the university.

20 CHAIRMAN JENSCH: Well, I am sorry you did not  
21 inform us of this. We try to accommodate the schedule that  
22 we have been informed about and have kept those matters in  
23 mind in our scheduling.

24 MR. TROSTEN: Mr. Chairman, I apologize for not  
25 informing you, but I had no idea there was any necessity to

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1 inform you of this.

2 CHAIRMAN JENSCH: Well, we had understood that the  
3 schedules would be arranged for the accommodation of the wit-  
4 nesses. And we want to give them a rest at the present time.

5 We think that without any criticism of the form of  
6 questioning, I think there are so many possible ramifications  
7 of some of your questions that the witnesses desire to  
8 consider them very carefully and while even some of those  
9 questions might have been submitted to the Staff prior to the  
10 -- their being on the stand, the case would have moved along  
11 somewhat. That wasn't done, but the nuances and the  
12 possibilities of interpretations from these questions appear  
13 to be of some serious concern to the Staff and they have  
14 weighed each question carefully today as they have on the other  
15 days. We think it is taking more time than need be because  
16 I think they are somewhat fatigued.

17 MR. TROSTEN: I leave it to the discretion of  
18 the Chair, of course. But Dr. McFadden does have to leave  
19 by 6:30 in order to get back to the university. I respectfully  
20 request that he be allowed to proceed with cross-examination  
21 of Dr. Goodyear.

22 MR. BRIGGS: Mr. Trosten, could you give us some  
23 idea about the extent of the cross-examination?

24 MR. TROSTEN: I don't think this would be very  
25 extensive at all. I would imagine it would be concluded in

3mil 1 a half hour, that is Dr. McFadden's interpretation.

2 CHAIRMAN JENSCH: Could you give us -- do we have  
3 his --

4 MR. TROSTEN: Let me provide Dr. McFadden's  
5 qualifications to the Board. They are contained in his  
6 testimony of October 30th, copies of which have been  
7 distributed to all parties before.

8 MR. KARMAN: Mr. Chairman, Staff Counsel is  
9 deeply appreciative of the Board's consideration of our  
10 witnesses and any fatigue that has overtaken them. I have  
11 been requested by Dr. Goodyear that if it is at all possible  
12 for him to have a look at the questions, even while he is sit-  
13 ting there, it might very well expedite the --

14 CHAIRMAN JENSCH: Let's do that. Let's take a  
15 half hour. Can you give us a list of the questions you plan  
16 to propound so they can review them and then we will come  
17 back to the oral interrogation.

18 I think we should eliminate this surprise both  
19 in the kind of interrogation and second in the questions.  
20 Furthermore, if you have questions written out, as  
21 apparently you have had for these witnesses so far, you  
22 will give these -- give the questions to the other wit-  
23 nesses. I think these things will move faster if some of the  
24 things are adequately prepared in that way.

25 MR. TROSTEN: Mr. Chairman, I object to that. I

4mil 1 object to being -- having the burden imposed upon me to  
2 prepare all of my questions in advance.

3 CHAIRMAN JENSCH: You don't have to. You don't  
4 have to prepare all of them.

5 MR. TROSTEN: Then I object to it, Mr. Chairman.

6 CHAIRMAN JENSCH: Do you have some of your ques-  
7 tions written out?

8 MR. TROSTEN: I have some of my questions prepared  
9 which I am modifying, Mr. Chairman, as the Chair can see,  
10 during the course of interrogation. I do not wish to provide  
11 a <sup>tentative</sup> ~~temporary~~ list and to be confined to the questions that  
12 I prepared. I object --

13 CHAIRMAN JENSCH: You will not be confined and you  
14 will not be limited in an oral expansion or modification of  
15 change.

16 MR. TROSTEN: No, Mr. Chairman. I find that  
17 that is confining. I object to the Staff counsel's request.

1 CHAIRMAN JENSCH: Well, we think that for the  
2 interest of expediting this case, and certainly the  
3 Applicant has made several indications that it wants to  
4 expedite in every way, this certainly is one way to do it.  
5 Not take the witnesses by surprise. I think people have  
6 been quoting from different cases where the words have been  
7 indicated that this isn't a game, this is a search for  
8 truth. If you want some documentary support, for instance,  
9 for any of these statements, you can request them and they  
10 can be assembled. But to take the time on the stand for  
11 some of the questions we have had yesterday and today seems  
12 to be overlooking the fact that the case could have been  
13 moved by a submission of the areas of your interrogation  
14 that recites the specifics you wanted.

15 MR. TROSTEN: Mr. Chairman, some of the questions  
16 that are being posed to Dr. Goodyear were formulated between  
17 the hours of 12:00 and 3:00 last night, and are indeed  
18 being formulated right now, as well as some of the questions  
19 that were written out in advance. I -- it is true that I  
20 have some of the questions written out in advance, but I am  
21 modifying them as I go along, depending upon what Dr.  
22 Goodyear says, and I object to being asked to do that. I  
23 think it is a terrible imposition.

24 CHAIRMAN JENSCH: Well, if you can tell us where  
25 the imposition is, bearing in mind that you are now being

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1 informed that there will be no limitation on your oral  
2 change, modification, or interrogation, but I think that  
3 the fair outline that you know where you want to examine  
4 these witnesses and a great deal of time has been taken on  
5 the stand yesterday and today because the witnesses felt  
6 that some of your questions we inferred were requiring  
7 a certain precision that I think you have emphasized  
8 as premises for some of your interrogation, that there is a  
9 great deal of uncertainty, about the number of molecules  
10 of water in the Hudson River and how they change and modify,  
11 what floats and sinks. I think these things are things  
12 that shouldn't be any secret at all. I don't quite understand  
13 your feeling of imposition because you are not going to be  
14 restricted and you won't be confined. You wouldn't be  
15 altered and it is just that the witnesses should know what  
16 you have in mind because ordinarily your witnesses would  
17 have to sustain some of these things before the Staff  
18 witnesses would hear them and they would be prepared by  
19 virtue of the examination that's been undertaken.

20 Since the Staff isn't having the benefit of  
21 the orderly procedure, it seems quite reasonable to suggest  
22 that you indicate wherein you plan to interrogate.

23 MR. TROSTEN: I certainly will indicate wherein  
24 I plan to interrogate.

25 CHAIRMAN JENSCH: Let's take a recess so you can

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1 inform this Board.

2 MR. TROSTEN: I will take a recess and be glad  
3 to go over it with Dr. Goodyear. I would like to say this:  
4 In compliance with the agreement that we had reached, I  
5 furnished to the Staff counsel prior to the prehearing  
6 conference a list of the areas in which we plan to interrogate  
7 furnished a similar list and received such a list from the  
8 Intervenors, and I was under the impression that this list  
9 was adequate.

10 Had I been informed by counsel for the Regulatory  
11 Staff that he desired greater precision in the areas in  
12 which I wished to interrogate, I would have been more than  
13 happy to have accommodated him because I strongly share the  
14 Chairman's desire to expedite the conduct of this <sup>hearing</sup> year. I  
15 will be very pleased to discuss with Dr. Goodyear in the  
16 break and to discuss with any of the other witnesses in  
17 as great precision as I can the areas in which I wish  
18 to question them.

19 CHAIRMAN JENSCH: All right. In the meantime if  
20 Dr. McFadden can talk to Dr. Goodyear about the regression  
21 analysis and if you can talk with Knighton and Carter, I  
22 think we will have a round-robin that will move it along.

23 At this time let's recess and reconvene in this room  
24 at 5:00 o'clock.

25 (Recess.)

1 CHAIRMAN JENSCH: Please come to order.

2 Before we proceed, perhaps a summary note should  
3 be made in reference to the several charts that Dr. Goodyear  
4 has used to illustrate his presentation in part. The  
5 parties, have in fact, more or less, stipulated  
6 for its inclusion into the record. It had been my thought  
7 that when we finished with Dr. Goodyear, one formal  
8 order would have been entered including it all but perhaps  
9 it is better to take it up for each one.

10 For the present purposes, all charts used by Dr.  
11 Goodyear to illustrate his presentation today, as I  
12 understand it, there is no objection to it being included  
13 in the record, is that correct?

14 MR. TROSTEN: The stipulation that Applicant is  
15 suggesting, Mr. Chairman, is that they be included  
16 in the record not for evidentiary purposes, but merely  
17 to indicate that these are the documents that Dr. Goodyear  
18 has relied upon and upon which he bases his opinion.

19 In other words -- I don't think they are being  
20 offered for the truth of the matters asserted. It is  
21 simply something that he has used on the basis of which  
22 he has drawn his conclusions.

23 CHAIRMAN JENSCH: Well, various arguments  
24 can be made about that. We will accept that for the  
25 purpose of admission here. If there is anything further  
in that regard we can consider it later.

ak2 1 MR. FROSTEN: Well, Mr. Chairman, excuse me.

2 CHAIRMAN JENSCH: I appreciate you don't have  
3 an opportunity to cross-examine the authors of the chart  
4 prepared by other persons, Carlson-McCann in part,  
5 Koo's.

6 MR. FROSTEN: I never intended by including these  
7 documents -- obviously Dr. Goodyear has relied upon these  
8 and I fully appreciate that. The only reason I wanted  
9 these documents in the record, and I am going to ask that  
10 another document be included in the record, a letter  
11 from Mr. Kazman to me with some attachments, is simply for  
12 the purposes of easing the record but not for the  
13 purpose -- not for any evidentiary purpose and I don't think  
14 it should be included.  
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1 CHAIRMAN JENSCH: We won't make a ruling in that  
2 regard at this time. It will just be for the purpose stated.

3 Any other objection to the inclusion of these  
4 charts?

5 I hear no objection. The charts which have been  
6 heretofore identified and utilized by Dr. Goodyear in his  
7 presentation may be physically incorporated in the transcript.

8 (The document follows.)  
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2 CHAIRMAN JENSCH: In respect to the  
3 request made by Applicant's counsel for examination by Dr.  
4 James T. McFadden as a technical interrogator in the  
5 proceeding, the Board has looked at the statement of experience  
6 and background of Dr. McFadden. Any objection by any party  
7 to his participation as a technical interrogator?

8 MR. KARMAN: Staff has no objection, Mr. Chairman.

9 CHAIRMAN JENSCH: Hudson River Fishermen's  
10 Association?

11 MR. MACBETH: No objection.

12 CHAIRMAN JENSCH: As I understood it, this is  
13 largely a mathematical inquiry you are going to undertake?

14 DR. MC FADDEN: Yes, sir.

15 CHAIRMAN JENSCH: While I didn't see anything  
16 about mathematics or computer programming or whatever this  
17 regression analysis is about, I understand it is inherently  
18 a part of some of the subjects you have already considered,  
19 and there being no objection, you may be permitted to proceed  
20 with your interrogation.

21 DR. MC FADDEN: Thank you, Mr. Chairman.

22 MR. TROSTEN: Before Dr. McFadden proceeds, does  
23 Dr. Goodyear desire to supply an answer at a later time  
24 to the question that was before the Board when we recessed,  
25 or how does that stand? That was a question that I  
delivered to you, Dr. Goodyear, from the reporter's notes

mil 1 and what is your desire in that respect?

2 WITNESS GOODYEAR: I think we can answer it at this  
3 time.

4 CHAIRMAN JENSCH: Do you want to have it entered  
5 now? If they are ready to answer, let's have the answer.

6 MR. TROSTEN: Yes. Let us have the answer.

7 CHAIRMAN JENSCH: Something about a single power  
8 plant helping grow striped bass.

9 MR. TROSTEN: Yes, sir.

10 (Laughter.)

11 WITNESS GOODYEAR: We seem to have lost the ques-  
12 tion.

13 (Laughter.)

14 CHAIRMAN JENSCH: Well, let's start that search  
15 some other time and, Dr. McFadden, will you go forward,  
16 please?

17 MR. TROSTEN: Thank you.

18 DR. MC FADDEN: Dr. Goodyear, with regard to  
19 Figure 5-13 on page 12-38 you state that the data were  
20 smoothed by a running average of three. Could you tell me,  
21 please, whether data points produced by a three point running  
22 average are independent observations?

23 CHAIRMAN JENSCH: Excuse me. What was the  
24 reference again, please?

25 DR. MC FADDEN: Yes, sir. The question refers to

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1 Figure 5-13 on page 5-58 and the text <sup>reference</sup> refers to the method of  
2 smoothing by running an average of threes was to page 12-38.

3 MR. TROSTEN: At this time, Mr. Chairman, I would  
4 like to ask that the letter from counsel for the Regulatory  
5 Staff which I will identify in just a moment --

6 CHAIRMAN JENSCH: Do you want to get an answer to  
7 this question first or do you want to put this --

8 MR. KARMAN: Did we find it? Have we found the  
9 question yet?

10 CHAIRMAN JENSCH: No. This is something else.

11 MR. TROSTEN: I am sorry to disrupt the procedure,  
12 Mr. Chairman, but the -- there is a letter which the  
13 Regulatory Staff has sent to me which is crucial to the  
14 understanding of the question and the answer which I want  
15 to have -- ask that it be inserted in the record.

16 CHAIRMAN JENSCH: Reference to Dr. McFadden's  
17 question?

18 MR. TROSTEN: Yes.  
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1 CHAIRMAN JENSCH: Proceed.

2 MR. TROSTEN: It is a letter of November 10,  
3 1972 responding to Applicant's request for documents. On  
4 page 3 and 4 of the attachment there is a description of  
5 the methodology employed by Dr. Goodyear in preparing  
6 Figures 5-12, 5-13, and 5-14 and 5-15. I am going to ask  
7 that this document be included in the record on the same  
8 basis as the graphs and charts used by Dr. Goodyear as well  
9 as enclosures A, B, and C, referred to on pages 3 and 4.  
10 If the Board wishes, I would be happy to deliver a copy of  
11 this to the Board so they can consider this while Dr.  
12 McFadden asks the questions.

13 CHAIRMAN JENSCH: Do you have sufficient copies,  
14 incidentally, to give the reporter?

15 MR. TROSTEN: I will. I don't have them at this  
16 moment.

17 MR. MACBETH: Could Mr. Trosten state again  
18 exactly what basis this letter is going in on, or is he  
19 proposing this letter go in on?

20 MR. TROSTEN: I am suggesting it be included  
21 in the record purely for the purpose of identification  
22 without being offered in evidence and simply as an ease, as an  
23 aid for those studying the transcript. That is the basis.

24 CHAIRMAN JENSCH: Well, the methodology, I take  
25 it, is subject to inquiry. Don't you want that part of it

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1 in the record as evidence? You are going to interrogate  
2 in reference to it, I take it?

3 MR. TROSTEN: I guess that's right. I will ask  
4 Dr. Goodyear, or perhaps his counsel would like to ask Dr.  
5 Goodyear whether he adopts this as his testimony in this  
6 proceeding.

7 MR. KARMAN: I -- have you looked at that, Dr.  
8 Goodyear?

9 WITNESS GOODYEAR: I would like to read it first.

10 MR. KARMAN: He may refresh his recollection.

11 MR. TROSTEN: Thank you.

12 MR. KARMAN: Make sure it is the same thing.

13 (Witnesses and counsel conferring.)

14 MR. TROSTEN: Here is a copy, Mr. Chairman. It  
15 happens to be the only one I have got at the moment. Here  
16 are the parts A, B, and C.

17 CHAIRMAN JENSCH: We didn't get copies of this,  
18 did we?

19 MR. TROSTEN: No, sir. This was a request -- in  
20 response to your question, Mr. Chairman, I do not believe  
21 that counsel for the Regulatory Staff provided copies of  
22 this letter to the Board. It was a request for documents  
23 made by the Applicant to the Regulatory Staff in accordance  
24 with the Commission's regulations to which this letter  
25 responds.

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1 MR. MACBETH: Mr. Trosten, do you have another  
2 copy by any chance?

3 MR. KARMAN: I sent you a copy, Mr. Macbeth.

4 MR. MACBETH: Unfortunately I didn't realize  
5 it was an evidentiary document. I didn't bring it with me.

6 WITNESS GOODYEAR: For now can we just be concerned  
7 with item three?

8 MR. TROSTEN: Yes, sir.

9 CHAIRMAN JENSCH: Well, is there any objection  
10 to the Applicant counsel's request that this document be  
11 physically incorporated in the transcript for the purpose  
12 of reference and to the extent that methodology is reflected  
13 as a matter of evidence?

14 MR. KARMAN: No objection.

15 MR. MACBETH: Just to make this clear, is Dr.  
16 Goodyear adopting this as his testimony? If he is doing  
17 that, I have no objection to it.

18 MR. KARMAN: The answer is yes, Mr. Macbeth.

19 MR. MACBETH: Fine. No objection.

20 CHAIRMAN JENSCH: There being no objection, the  
21 request of Applicant's counsel is granted and the statement  
22 which has been adopted by Witness Goodyear may be physically  
23 incorporated within the transcript as if orally given, and  
24 shall constitute evidence in reference to the methodology.

25 (Document to be furnished.)

1 CHAIRMAN JENSCH: With that background, will  
2 you proceed? Can you proceed?

3 Can you give us the question again?

4 DR. MC FADDEN: Yes, sir.

5 MR. KARMAN: Did you have something to say, Dr.  
6 Goodyear?

7 WITNESS GOODYEAR: Yes, sir. We are all aware ---  
8 I would like to only include item three right now because  
9 that's all I looked at.

10 MR. KARMAN: Mr. Trosten said that's what he is  
11 going to interrogate on.

12 DR. MC FADDEN: With respect to the data on  
13 Figure 5-13, insofar as the data points have been produced  
14 by a three point running average, are the data points  
15 independent observations?

16 WITNESS GOODYEAR: No.

17 DR. MC FADDEN: Is independence of observations  
18 a requirement in order for treatment of data by statistical  
19 regression to be valid?

20 WITNESS GOODYEAR: Yes.

21 DR. MC FADDEN: Dr. Goodyear, are the observations  
22 in Figure 5-12, page 5-57, which are the basis for Figure  
23 5-13, serially correlated observations apart from the  
24 smoothing procedure which has been used?

25 WITNESS GOODYEAR: Yes. I would like to show you

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1 something else that might help clear up the matter.

2 (Slide.)

3 All of the rest of these -- all of the diagrams  
4 I have here and all of the regression analyses, except  
5 one, and I will note that one and show it to you, are based  
6 on a year-by-year comparison.

7 This particular plot represents the catch in the  
8 Hudson and the catch in the Atlantic on the same year.  
9 The serial correlation -- well, the -- they are not  
10 significantly correlated according to this diagram. This is  
11 catch testimony.

12 DR. MC FADDEN: Could I ask for a clarification,  
13 please?

14 MR. KARMAN: Dr. Goodyear, I would appreciate  
15 that each time you put one of those on the screen that you  
16 would identify it so the record can be clear as to exactly  
17 what you have been discussing.

18 (Slide.)

19 WITNESS GOODYEAR: The -- in what manner would  
20 you like --

21 DR. MC FADDEN: The serial correlation to which  
22 I refer is not a correlation between the X and the Y  
23 variables, but a correlation among the successive observation  
24 in the set of Xs and the successive observations in the set of  
25 Ys. The serial correlation net would be reflected by a

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1 simple plot such as Figure 5-12.

2 WITNESS GOODYEAR: The only difference between  
3 this plot and Figure 5-12 is that the two axes are not  
4 separated by a period of years such that if the serial  
5 correlation were to exist -- I am not saying serial correla-  
6 tion doesn't exist, because I believe it does, but the degree  
7 of influence in the regression should be indicated by a  
8 correlation in this particular plot or in one based on  
9 abundance.

10 In neither case was that correlation found.

11 DR. MC FADDEN: Dr. Goodyear, the serial correla-  
12 tion to which I refer would be reflected if the data points  
13 were identified as to year of origin and that identification  
14 cannot be made on the graph which you display. That  
15 identification can be made on a graph such as Figure 5-12.

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WITNESS GOODYEAR: I am sorry. I don't understand

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the relevance.

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MR. MC FADDEN: My question is, are the observations in Figure 5-12, considering just the Hudson Landings by themselves or just the Atlantic landings by themselves serially correlated apart from the smoothing procedure which has been employed.

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WITNESS GOODYEAR: The answer is yes.

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MR. MC FADDEN: Are serially correlated observations independent observations as required for valid analysis by linear regression?

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WITNESS GOODYEAR: Yes.

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MR. MC FADDEN: Do I understand you correctly to say that serially correlated observations are independent in the terms required for linear regression.

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WITNESS GOODYEAR: Maybe I misunderstood your question.

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MR. MC FADDEN: I thought perhaps you did. I am asking whether serially correlated observations and you have stated that those in Figure 5-12 are serially correlated -- are independent observations as required for valid analysis by linear regression? Are the successive values independent of one another or is there a tendency for closely adjacent observations to be more nearly alike than are distantly associated observations, distantly associated in time.

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1 WITNESS GOODYEAR: I am sorry. Would you  
2 repeat -- I know what the answer is, but I --

3 CHAIRMAN JENSCH: Take the first question; he gave  
4 you two questions. Just take the first one. Could you  
5 reread that first question?

6 (The reporter read the record as requested.)

7 WITNESS GOODYEAR: They are serially correlated.

8 MR. MC FADDEN: Right.

9 WITNESS GOODYEAR: And your second question was --

10 MR. MC FADDEN: Are serially correlated observations  
11 independent observations, independent of one another, in  
12 the sense required for valid <sup>analysis</sup> allocation of linear regression?

13 WITNESS GOODYEAR: No.

14 MR. MC FADDEN: Thank you.

15 CHAIRMAN JENSCH: Now, the second question, can  
16 you read that?

17 Or has the answer covered that.

18 MR. MC FADDEN: Yes, sir.

19 CHAIRMAN JENSCH: It won't be necessary to read that  
20 now.

21 MR. MC FADDEN: Referring to Figure 5-13, in view  
22 of your statement that the observations are not independent  
23 as required for valid application of linear  
24 regression, what meaning can you attach to the R square  
25 value of 0.93 or for that matter, to the R square value of  
0.79 which you obtained without the smoothed data?

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1 MR. KARMAN: Was that figure, 0.79 or 97?

2 MR. MC FADDEN: 0.79 cited in the <sup>text</sup> ~~text~~ on page

3 12-38.

4 WITNESS GOODYEAR: These values are, as I pointed  
5 out in the text, are showing much too high a degree of  
6 correlation.

7 MR. MC FADDEN: In the text -- are you finished?

8 WITNESS GOODYEAR: Yes.

9 MR. MC FADDEN: In the text, do you not attribute  
10 that excessively high correlation value to the procedure  
11 of smoothing with a moving average of threes and calculate  
12 a lower R square as 0.79 which removes this objectionable  
13 feature?

14 WITNESS GOODYEAR: For the Hudson landings, the  
15 plot on figure 5-13 --

16 MR. MC FADDEN: Yes.

17 WITNESS GOODYEAR: The greatest proportion of  
18 the correlation.

19 MR. MC FADDEN: Yes.

20 WITNESS GOODYEAR: Is provided by the smoothing  
21 technique.

22 MR. MC FADDEN: Would you please explain, Dr. Goodyear,  
23 how you can conclude that increased mortality of larva <sup>and</sup> when  
24 juvenile striped bass is very likely to cause proportionately  
25 reduced recruitment, when your argument is based upon an

1 invalid application of statistical methods?

(Witnesses conferring.)

2 MR. KARMAN: Could I have the question repeated,  
3 please?

4 (The reporter read the record as requested.)

5 MR. KARMAN: I object to that, Mr. Chairman. That is  
6 an assumption based upon fact that I have not seen where the  
7 witness has indicated that his assumption was invalid.  
8 Unless I didn't hear the record properly.

9 CHAIRMAN JENSCH: Would you care to respond, Dr.  
10 McFadden?

11 MR. MC FADDEN: Yes, sir. I was referring  
12 in the choice of the word invalid to Dr. Goodyear's statement  
13 that the observations used in the analysis were not independent  
14 of one another in the sense required for the valid appli-  
15 cation of regression analysis. The conclusion to which this  
16 invalid procedure is related in the past question is a  
17 paraphrase of the conclusion given in the text of the Staff  
18 document.

19 CHAIRMAN JENSCH: On what page?

20 MR. MC FADDEN: In the middle paragraph, that is  
21 the second paragraph of page 5-56.

22 CHAIRMAN JENSCH: Thank you.

23 What was the sentence you paraphrased?

24 MR. MC FADDEN: The last sentence of the second  
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1 paragraph of 5-56 beginning with the words, "Because of the  
2 linearity of the relationship . . . "

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CHAIRMAN JENSCH: Thank you.

Do you have any further comments, Staff Counsel?

MR. KARMAN: I am trying to understand how that fits in with some kind of an invalidity of an assumption. Maybe it is because I am an attorney and not a statistician.

MR. TROSTEN: I believe, Mr. Karman, that the interrogator has pointed out that the serially correlated observations are not independent observations as required for valid linear regression analysis and Dr. Goodyear has concurred by his response that the serially correlated observations are not independent observations as required for valid evaluation by the linear regression analysis; and hence on the basis of that admission by the witness, the interrogator has asked the question that he has.

MR. KARMAN: We will let Dr. Goodyear discuss any invalidity.

CHAIRMAN JENSCH: What do you mean by independent observation? You can't rely upon the statistics gathered by another group, is that correct?

DR. MC FADDEN: Observations from time series such as those of Figure 5-12 typically are not independent of one another, in the sense that closely adjacent years tend to influence one another strongly in value. For strictly valid application of regression, the chance of the difference between two adjacent observations should be

1 just as great as the chance for a substantial difference  
2 between two observations separated by a longer span of years.

3 CHAIRMAN JENSCH: Very well. It doesn't make any  
4 difference in that sense who gathered the statistics?

5 DR. MC FADDEN: No, sir.

6 CHAIRMAN JENSCH: It is the time factor you have  
7 in mind?

8 DR. MC FADDEN: No, sir. Although who gathered  
9 the statistics could in part account for where the serial  
10 correlation came from; not inevitably so, but possibly so.

11 MR. KARMAN: I better leave it to Dr. Goodyear  
12 to discuss validity on this subject.

13 CHAIRMAN JENSCH: Very well. Proceed, Dr.  
14 Goodyear.

15 WITNESS GOODYEAR: Would you repeat your last  
16 question?

17 MR. TROSTEN: Would the reporter repeat the last  
18 questions?

19 (The reporter read the pending question.)

20 WITNESS GOODYEAR: The invalidity of the techniques  
21 influences the precision of the estimate and the degree of  
22 serial correlation has a strong bearing on the interpretation  
23 of the data and interpretation of regression analysis.  
24 Strictly speaking, the regression that is presented herein  
25 is invalid, but for practical sense, this is not necessarily so.

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1 DR. GEYER: May I ask a question to clear this  
2 thing up for me a little bit? If we look at page 12-37, the  
3 Atlantic landing curve and the Hudson landing curves are both  
4 together, one being shifted five years relative to the other.  
5 Now as I understand it, what we are talking about is there any  
6 relationship between these two curves.

7 DR. MC FADDEN: No, sir, that is not correct.  
8 The question does not bear in any way at this point upon the  
9 relationship between the two curves shown, but rather upon the  
10 relationship between successive or closely adjacent observa-  
11 tions within each of those curves and you will see that the  
12 earlier years typically are low values; the later years  
13 typically are high values and therein lies the lack of  
14 independence of the observations which this line of questioning  
15 is pursuing.

16 DR. GEYER: Figure 5-13 on page 5-58 shows values  
17 of along one curve against values along the other, doesn't  
18 it?

19 DR. MC FADDEN: Yes, sir, but the base data are  
20 those of figure 5-12 or the figure that you just referred to  
21 later on, 12-37 -- page 12-37, figure 12-2. Those are the  
22 base data which are used by Dr. Goodyear's agreement in an  
23 invalid way, in applying regression in Figure 5-13.

24 DR. GEYER: Okay. Continue.

25 DR. MC FADDEN: Did we get an answer to that last

1 question?

2 CHAIRMAN JENSCH: Yes. He said for practical  
3 purposes this was all right, but on a theoretical analysis,  
4 it might be different.

5 MR. KARMAN: Were you finished with your answer,  
6 Dr. Goodyear?

7 WITNESS GOODYEAR: It does reduce the degree of  
8 correlation from the point nine three that is expressed here.  
9 However, as one of the principal functions of this plot was  
10 to find an estimate of the intercept to know whether or not  
11 there was a large external source of striped bass which could  
12 not be accounted for by the Hudson landings.

13 DR. MC FADDEN: Dr. Goodyear, do you not use the  
14 regression statistics explicitly, the R square value of 0.93  
15 in your statement on -- in the last sentence, second paragraph of  
16 page 5-56 in reaching the conclusion that was referred to in  
17 my previous question?

18 CHAIRMAN JENSCH: Which is -- will you state it  
19 again?

20 DR. MC FADDEN: The question that referred to arrival  
21 at the conclusion that increased mortality of striped bass --  
22 larval and juvenile striped bass is likely to cause  
23 proportionately reduced recruitment.

24 The question again is do you not use in your text  
25 at the point where you draw your conclusion the very regression

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1 statistics which you are agreeing are based upon an invalid  
2 application of statistical methods and the values for which,  
3 on Figure 5-13, you now assert are incorrect?

4 MR. TROSTEN: The specific conclusion to which  
5 Dr. McFadden is referring is contained in the last sentence  
6 in the second paragraph on page 5-56, is that not correct,  
7 Dr. McFadden?

8 MR. KARMAN: Mr. Chairman, I am going to object  
9 to some of Mr. -- Dr. McFadden's paraphrasing of what Dr.  
10 Goodyear is testifying, as to his admissions and allow the  
11 record to speak for itself, please.

12 CHAIRMAN JENSCH: I think that is important because  
13 I think it tends to confuse the witness. Now, as I under-  
14 stand the answer of the witness, he has said that -- perhaps  
15 from a strictly or technical-legal-theoretical point of view  
16 that these observations should be independent. But for  
17 practical purposes this was done, as I understand it, to give  
18 an estimate of the intercept. For practical purposes, it  
19 fitted that purpose, so it isn't necessarily invalid for the  
20 purpose for which it was used. I think that is the objection  
21 the Staff counsel is making.

22 MR. KARMAN: Words such as incorrect. I object  
23 to that. Of course, Dr. McFadden not being an attorney is not  
24 possibly well-grounded in the type of interrogation that is  
25 required, but these type of words have to be avoided if

1 possible.

2 MR. TROSTEN: May I speak to the counsel's objection?

3 CHAIRMAN JENSCH: Surely.

4 MR. TROSTEN: Now I want to make it clear, Mr.  
5 Chairman, that first of all, Dr. McFadden was refering the  
6 witness to the conclusion that he expresses on page 5-56  
7 in the last sentence of the second paragraph. I will read  
8 the sentence --

9 CHAIRMAN JENSCH: We have that and I think the  
10 only question is the form of the question, there has been an  
11 objection to the form of the question, in that he has made a  
12 characterization that Staff counsel does not believe is  
13 justified by the record. Direct your comments to that.

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1 MR. TROSTEN: I will. It is very clear, Mr.  
2 Chairman, that the witness was simply referring to Dr.  
3 Goodyear's admission that he made an invalid application of  
4 statistical methods. Dr. Goodyear has said that even though  
5 he made an invalid application of statistical methods, that  
6 the application was appropriate or adequate for the purpose  
7 and all that Dr. McFadden was referring to in raising his  
8 question, and I would ask that the reporter read the quest-  
9 back to the Board after the conclusion of this discussion,  
10 was asking how he could conclude, as he did on page 5-56, that  
11 increased mortality of larval and juvenile striped bass  
12 is very likely to occur, to cause proportionately reduced  
13 recruitment when the argument was based upon an invalid  
14 application of statistical methods.

15 MR. KARMAN: That was not the word I heard. I  
16 heard the word "incorrect."

17 MR. TROSTEN: Excuse me. I heard the word  
18 "invalid."

19 CHAIRMAN JENSCH: We will have it read. I think  
20 the objection was as to form, and I think it is important  
21 to consider that form at the moment.

22 Could you give us a rereading of the question?

23 (The reporter read the record as requested.)

24 CHAIRMAN JENSCH: Both are invalid and incorrect.  
25 Restate the question.

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Objection sustained.

MR. TROSTEN: Yes. I will restate the question.

Excuse me, Dean McFadden.

DR. MC FADDEN: With all due respect to the various counsel present --

CHAIRMAN JENSCH: Just restate the question. We will go on from there.

DR. MC FADDEN: My reference of invalidity was to the method, the invalid application of the method has been shown to produce a number which is incorrect, if I understand the situation.

CHAIRMAN JENSCH: Do you desire to state a question? You may proceed to another question.

WITNESS GOODYEAR: I would like to comment at this point.

MR. TROSTEN: Mr. Chairman, do you want the question restated?

CHAIRMAN JENSCH: Yes.

MR. TROSTEN: Please explain how you can conclude that increased mortality of larval and juvenile striped bass is very likely to cause proportionately reduced recruitment when your argument is based upon an invalid application of statistical methods?

WITNESS GOODYEAR: The application as it was first presented to me was strictly invalid. The degree of

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1 the invalidity, I agree that R square value could be too  
2 high, probably is. But the accuracy of the prediction, if  
3 the invalidity of the procedure, strictly speaking,  
4 does not necessarily alter the accuracy of the prediction.  
5 The three point running average does, but this serial  
6 correlation does not if there is a cause-and-effect relation-  
7 ship causing the serial correlation.

8 MR. TROSTEN: May we confer for a moment?

9 CHAIRMAN JENSCH: Surely.

10 DR. MC FADDEN: Dr. Goodyear, could the failure  
11 to meet assumptions inherent in the regression method, as  
12 you have agreed is characteristic of this treatment of  
13 data in Figure 5-13, affect the outcome of the regression  
14 analysis in any way other than a reduction or an artificial  
15 increase in precision?

16 For example, could this failure to meet the  
17 assumptions inherent in regression analysis affect the  
18 accuracy of the regression or affect the conclusion as to  
19 whether a regression relationship exists at all?

20 MR. MACBETH: Mr. Chairman, that was at least  
21 three questions. When Dr. Goodyear answers them, could  
22 we have him identify them as to which he is answering?

23 CHAIRMAN JENSCH: I think the latter part was  
24 an illustration of his question. There may be two parts to  
25 that first.

1 Would the reporter reread the first part of the  
2 question?

3 (The reporter read the pending question.)

4 CHAIRMAN JENSCH: Can you answer that part of  
5 it?

6 WITNESS GOODYEAR: Yes.

7 CHAIRMAN JENSCH: All right. Will you give us  
8 an answer for that, please?

9 Can you give us an answer?

10 WITNESS GOODYEAR: The answer is yes.

11 (Laughter.)

12 CHAIRMAN JENSCH: Read the rest of it.

13 (The reporter read the record as requested.)

14 CHAIRMAN JENSCH: Could it affect it some other  
15 way other than specified?

16 WITNESS GOODYEAR: When I say precision, I  
17 actually meant accuracy. I am sorry. The answer is yes.

18 CHAIRMAN JENSCH: Very well.

19 Next question.

20 DR. MC FADDEN: Has the second question been  
21 answered?

22 CHAIRMAN JENSCH: You gave a for-example part  
23 of it, but I didn't understand that was a part of the ques-  
24 tion.

25 DR. MC FADDEN: The answer is sufficient.

CHAIRMAN JENSCH: Proceed.

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1 MR. MC FADDEN: In Figure 5-13, do you

2 <sup>imply</sup>  
3 apply a cause and effect relationship?

4 WITNESS GOODYEAR: Yes.

5 MR. MC FADDEN: Rather than the Atlantic catch  
6 and Hudson landings being related as cause and effect,  
7 could <sup>they</sup> ~~the~~ both perhaps be effects of some third factor which  
8 is a common cause.

9 CHAIRMAN JENSCH: May I have that question please,  
10 Mr. Reporter?

11 (The reporter read the record as requested.)

12 CHAIRMAN JENSCH: Can you identify what other  
13 factor that might be?

14 MR. MC FADDEN: I could suggest as possibilities  
15 environmental or climatic changes over broad regions or  
16 fishing effort in part.

17 CHAIRMAN JENSCH: Would that be a common cause  
18 to those?

19 WITNESS GOODYEAR: Yes. The fishing effort,  
20 with changes in mortality rate, I quite agree. I might  
21 point out again as I did sometime ago, that the serial corre-  
22 lation which isoperated through time, does not affect the  
23 correlation of the catch in the Atlantic and in the Hudson  
24 on the same year. The point is that the invalidity of the  
25 technique is caused by altering -- the -- or raising -- both  
axes in the same direction through time, I guess, would be the

eak2 1 best way to put it. But it is not sufficient to cause a --  
2 it is sufficient to cause a -- it is sufficient to cause a  
3 six percent correlation that was observed.

4 MR. TROSTEN: Mr. Chairman, may I ask -- we do not  
5 have an answer to Dr. McFadden's question yet. May we have  
6 that answer from the witness?

7 WITNESS GOODYEAR: I am sorry.

8 CHAIRMAN JENSCH: I thought he answered it. I  
9 think the question was rather than these catches, could they  
10 be affected by a common cause and I asked Dr. McFadden  
11 could he suggest what the common cause could be and he said  
12 fishing and the witness said yes, that could be a factor.

13 MR. TROSTEN: No. But I want an answer --  
14 what I am seeking, Mr. Chairman, what we are seeking here  
15 is an answer to the basic question, not just whether fishing  
16 itself, one of the possible causes given to  
17 the Chairman in response to his question, was the cause, but  
18 whether it could be -- there could be a third cause, a common  
19 <sup>cause</sup> ~~cause~~, not necessarily the one suggested by Dr. McFadden.

20 MR. KARMAN: He answered yes to one. It would seem  
21 self-evident the answer was yes.

22 MR. TROSTEN: Is your answer to the question yes?

23 WITNESS GOODYEAR: Yes.

24 MR. TROSTEN: Thank you.

25 MR. MC FADDEN: Do you believe fishing effort in

1 the Hudson River is correlated with fishing effort in New  
2 York waters, New York-Atlantic waters?

3 CHAIRMAN JENSCH: Where does one start and the  
4 other end? Could you tell me? Where is the fishing in the  
5 Hudson and the New York-Atlantic waters?

6 MR. MC FADDEN: There are separate statistics  
7 collected for the two regions. I cannot define the  
8 boundaries myself.

9 CHAIRMAN JENSCH: Can you? Can the witness do it?  
10 If he can't, I don't know how you can correlate. Maybe they  
11 all run together.

12 MR. MC FADDEN: They aren't.

13 CHAIRMAN JENSCH: Can you define the distinction  
14 between fishing -- the Hudson waters and the New York-Atlantic  
15 waters?

16 WITNESS GOODYEAR: Yes.

17 CHAIRMAN JENSCH: Very well. Proceed. Tell us  
18 somewhat about what the distinction or the demarcation is.

19 WITNESS GOODYEAR: Well, the Hudson statistics  
20 are related principally to licensed -- licenses of  
21 gill nets and material of that nature. I would have to check  
22 that point. I am not sure.

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1 CHAIRMAN JENSCH: Can you answer the question of  
2 correlation?

3 WITNESS GOODYEAR: I know the difference.

4 CHAIRMAN JENSCH: All right, go ahead.

5 WITNESS GOODYEAR: Do you want more -- the  
6 difference is that it is a different type of gear and the  
7 statistics are kept separately.

8 CHAIRMAN JENSCH: Thank you.

9 DR. MC FADDEN: Could I rephrase that question?  
10 Are trends in fishing effort in the Hudson River parallel  
11 roughly with -- by trends with fishing effort for Atlantic  
12 waters of New York State?

13 WITNESS GOODYEAR: Again I would have to check.  
14 The trends in the Hudson seem to follow the shad fishery, but in  
15 the last few years both the Atlantic effort and the Hudson  
16 effort have been dropping off, or at least the last series  
17 of data I looked at so there may be a correlation.

18 DR. MC FADDEN: Dr. Goodyear, could correlated  
19 efforts -- levels of fishing effort have influenced both  
20 Hudson River and Atlantic landings so as to produce a proper  
21 correlation between the two sets of landing statistics which  
22 has been interpreted as cause and effect between the two  
23 sets of landing statistics?

24 WITNESS GOODYEAR: Would you repeat that, please?

25 CHAIRMAN JENSCH: Reporter, reread it.

1 (The reporter read the pending question.)

2 CHAIRMAN JENSCH: To produce the proper correlation?  
3 Could you help me, Doctor? What do you mean by a proper  
4 correlation? If the correlated efforts will produce a proper  
5 correlation ---

6 DR. MC FADDEN: I don't think that was the word  
7 I used.

8 (The reporter read the record as requested.)

9 DR. MC FADDEN: Mr. Chairman, if I might offer  
10 a correction. The intended word was positive correlation,  
11 not proper correlation.

12 CHAIRMAN JENSCH: That is could positive efforts  
13 produce a proper correlation. Do you understand the question?

14 WITNESS GOODYEAR: Yes.

15 CHAIRMAN JENSCH: Proceed.

16 WITNESS GOODYEAR: If the effort were positively  
17 correlated for catch, the answer would be <sup>yes</sup> ~~yes~~. However,  
18 effort in both cases are not positively correlated with catch.

19 DR. MC FADDEN: And, Dr. Goodyear, do you base  
20 this statement on your analysis in Figure 5-15?

21 WITNESS GOODYEAR: No.

22 DR. MC FADDEN: Have you attempted regression analyses  
23 similar to Figure 5-13 using data for striped bass landings  
24 from areas other than Atlantic landings?

25 WITNESS GOODYEAR: Would you repeat, please? For ---

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CHAIRMAN JENSCH: Reporter, please reread it.

(The reporter read the record as requested.)

WITNESS GOODYEAR: This is Hudson versus other areas?

DR. MC FADDEN: Yes, sir.

WITNESS GOODYEAR: The answer is yes, but I am trying to think of exactly which -- well, for now, yes.

DR. MC FADDEN: Are you able at this time to report the outcome of such analyses?

WITNESS GOODYEAR: Well, I can't give you the specific case; however, a correlation -- there was a statistically significant correlation which probably reflects the serial correlation; however, the correlation -- the determinative capacity was very low.

MR. TROSTEN: May I confer with the interrogator for a moment, Mr. Chairman?

CHAIRMAN JENSCH: Surely.

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6:00 p.m.

1 DR. MC FADDEN: Dr. Goodyear, in cases where  
2 relationships similar to that in Figure 5-13 were shown to  
3 exist between Hudson River landings and landings from other  
4 areas approximately five years later, would you infer a  
5 cause-and-effect relationship as you have for the data used  
6 in Figure 5-13?

7 WITNESS GOODYEAR: No, because there is no  
8 conceptual framework upon which to base such a conclusion.

9 MR. KARMAN: I wonder if we can get some kind  
10 of an idea how much longer we are going to be, Mr. Chairman?

11 CHAIRMAN JENSCH: You mean to say the 30 minutes  
12 are up, in other words?

13 (Laughter.)

14 MR. KARMAN: Yes.

15 MR. TROSTEN: About 10 minutes, Mr. Chairman.

16 CHAIRMAN JENSCH: Proceed. This fellow has been  
17 on the stand since 9:00 o'clock this morning, and it is  
18 6:00 o'clock now.

19 DR. MC FADDEN: Dr. Goodyear, if there were such  
20 a conceptual relationship, would your answer be different?

21 WITNESS GOODYEAR: Would it or could it?

22 DR. MC FADDEN: Would it?

23 WITNESS GOODYEAR: I don't know.

24 DR. MC FADDEN: Dr. Goodyear, in Figure 5-15,  
25 page 5-60, were nine observations used in the analysis?

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1 WITNESS GOODYEAR: Yes.

2 DR. MC FADDEN: Were data available from the  
3 years 1962, '63, and '64, which were not used in the  
4 analysis?

5 WITNESS GOODYEAR: Yes.

6 DR. MC FADDEN: Would you explain why those data  
7 were not included?

8 WITNESS GOODYEAR: One moment.

9 (Slide.)

10 This particular graph again is just a plot of  
11 New York effort as a function of catch per effort. The  
12 determinative features of a change -- in order to get a  
13 regression such as this or a set of data such as between the  
14 Atlantic and the Hudson, one would have to look at a point  
15 in time where the mortality rates were changing as a function  
16 of the fishing effort.

17 This would occur at the same time that the fishing  
18 effort stopped having a great influence on the -- well, it  
19 would -- yes, stopped having a great influence on the catch  
20 per unit effort.

21 In other words, in this particular plot the data  
22 points out here --

23 MR. MACBETH: Could the witness explain for the record  
24 where he was pointing on the graph?

25 WITNESS GOODYEAR: Just a moment, please.

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(Witnesses conferring.)

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2 WITNESS GOODYEAR: The point I was pointing at  
3 was on the X axis at a location beyond the turning point  
4 indicated by the data curve (indicating).

5 In this region, the fishing intensity --  
6 change in fishing intensity would not be expected to produce  
7 a great deal of change in the mortality.

8 In this region, where the catch per unit  
9 effort/ <sup>is</sup> responding partially to the effort -- yes, the catch per  
10 unit effort is responding partially to the effort, then  
11 the fishing effort is impinging upon population, causing  
12 increased mortality -- well, causing a change of mortality  
13 where the effort is not at all, or very, very -- very low  
14 correlation between the effort and catch per unit effort.

15 Then the primary thing which produces the mortality  
16 is something else. There is very little effect of the effort  
17 on mortality.

18 The series of data points which are plotted in  
19 Figure V-15 come from this area in the plot. That is the  
20 reason they were selected for that purpose.

21 CHAIRMAN JENSCH: Excuse me just a minute. I  
22 think we should get some identification. You have used -- the  
23 last two references here, the first time you used the -- the  
24 last two -- was on an area parallel to the line at the bottom,  
25 let me say; and this last reference was in the southeast

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1 quadrant of the area shown, is that generally your identifica-  
2 tion of your plot points?

3 WITNESS GOODYEAR: Yes.

4 CHAIRMAN JENSCH: Very well.

5 Just to be inclusive of this, these last two  
6 documents which have been used by reference, is there any  
7 objection to their being physically incorporated in the  
8 transcript?

9 MR. TROSTEN: None.

10 CHAIRMAN JENSCH: Very well. The reporter will  
11 physically incorporate the documents in the transcript, these  
12 two charts.

13 (Documents to be furnished.)  
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1 CHAIRMAN JENSCH: Very well. Will you proceed?

2 DR. MC FADDEN: While that figure is up, could I  
3 ask one question about it? This is a general question which  
4 bears upon an analysis of the type depicted in the figure  
5 now projected, this figure having been shown on a number of  
6 occasions in relation to this line of questioning. If you  
7 were to take a set of numbers representing catch which were  
8 simply a series of randomly varying numbers and a set of  
9 figures representing effort which were also simply a randomly  
10 varying set of numbers and you paired adjacent catch and  
11 effort figures to produce a catch per unit effort statistic,  
12 then regressed the catch per unit of effort statistic upon  
13 the effort data, could you not produce a statistically  
14 significant regression?

15 WITNESS GOODYEAR: I suspect you could.

16 DR. MC FADDEN: Thank you.

17 WITNESS GOODYEAR: However, I would like to point  
18 out that the -- in this particular case, data pairs are not  
19 manually selected. They occur during a period when effort  
20 was inclining and it is a series with no missing data points.

21 CHAIRMAN JENSCH: Have you concluded your examina-  
22 tion?

23 MR. TROSTEN: Just a moment, please, Mr. Chairman.

24 DR. MC FADDEN: I have a very few remaining  
25 questions, if I could, Mr. Chairman.

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1 CHAIRMAN JENSCH: Proceed.

2 DR. MC FADDEN: Would the inclusion of the 1962,  
3 '63, and '64 observations in Figure 5-15 have strengthened  
4 or weakened the relationship you develop there?

5 WITNESS GOODYEAR: Would you repeat the question,  
6 please.

7 CHAIRMAN JENSCH: Reporter, reread it.

8 (The reporter read the pending question.)

9 CHAIRMAN JENSCH: Or is there a third alternative?  
10 He gave you two choices, strengthened or weakened or is there  
11 some other effect?

12 WITNESS GOODYEAR: The inclusion of the data --  
13 I have run that and as I remember, the regression analysis,  
14 the R square value, the whole relationship changed. However,  
15 I might point out there is no conceptual framework for includ-  
16 ing the data points outside of the range. The regression  
17 should only be -- should only exhibit itself when it has a  
18 strong determinative relationship. This determinative rela-  
19 tionship will only exist as long as some other factor is not  
20 causing the same -- taking over the same role. If you look  
21 in the -- Dr. Koo's data and at the same period that the --  
22 the haul seine catch upon which this particular figure  
23 is based, at the same time the haul seine catches are dropping  
24 off in determinative features; the catches in New Jersey  
25 along the coast, by trawling industry, go up quite rapidly.

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1 MR. MC FADDEN: If there were conceptual  
2 framework, Dr. Goodyear, would your conclusion be different?

3 WITNESS GOODYEAR: It would depend upon what that  
4 framework was and how the data fit it. I cannot answer that.

5 MR. MC FADDEN: Thank you. Dr. Goodyear, for  
6 what period of years did the highest effort observation  
7 in Figure 5-15 come?

8 WITNESS GOODYEAR: As I remember, from the early

9 '50s.

10 MR. MC FADDEN: That is correct if my interpretation  
11 of the data is consistent with yours, the highest effort  
12 observations would come from the years 1947, '48, '52 and  
13 '53, without exception.

14 Dr. Goodyear, is it possible that -- in your  
15 opinion that in the face of a healthy and expanding  
16 striped bass stock on the Atlantic coast as described by  
17 Dr. Koo in his paper, the high levels of effort occurred  
18 in the earlier years when the stock was smaller due to causes  
19 other than fishing and the lower levels of effort  
20 have occurred in more recent years when a stock was coinci-  
21 dentally larger?

22 CHAIRMAN JENSCH: What is the question? Do you  
23 want to ask what Dr. Koo said? Do you have what  
24 Dr. Koo said?

25 MR. MC FADDEN: No, sir, I wanted Dr. Goodyear's  
opinion on the basis of what Dr. Koo said and the postulate

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1 set forth in my question.

2 MR. TROSTEN: Would the reporter reread the question,  
3 please?

4 CHAIRMAN JENSCH: Yes, please.

5 (The reporter read the record as requested.)

6 CHAIRMAN JENSCH: You are asking him the cause.  
7 In your opinion, did the high level of effort occur  
8 when there was small stock and low level of effort when there  
9 was large stock, is that your question?

10 MR. MC FADDEN: Yes, sir.

11 CHAIRMAN JENSCH: And that is determined from  
12 what base, do you ask that opinion?

13 MR. MC FADDEN: From Dr. Goodyear's appraisal of  
14 the data in Figure 5-15.

15 WITNESS GOODYEAR: Are you asking in my opinion,  
16 do I think it might or it does relate in this way?

17 MR. MC FADDEN: Might, please.

18 WITNESS GOODYEAR: It might, yes. However, there  
19 is a negative correlation. This again points back to  
20 the hypothesis presented concerning the relationship between  
21 catch in the Atlantic and preceding catch next to abundance  
22 in the Hudson. There is a negative correlation between  
23 the catch in the Hudson -- the fishing effort in the  
24 Hudson and later catch in the Atlantic. A newer fishing  
25 effort -- fishing effort is correlated or should be

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1 correlated with mortality so that the escapement to --  
2 or the level of escapement in the Hudson would be influenced  
3 by the fishing effort giving this correlation. This is  
4 another factor of strength -- another strengthening point which  
5 in response to your question makes it difficult to conclude  
6 that such a situation does, in fact, occur.

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1 DR. MC FADDEN: Dr. Goodyear, in the data of  
2 Figure 5-15 and in a -- both in the data as presented  
3 there and in a similar plot which incorporates the several  
4 additional years of data which I referred to earlier, there  
5 is a strong temporal clustering of the observations, that  
6 is sets of adjacent years are located on the plot in close  
7 proximity to one another. Specifically the years 1947, '48,  
8 '52, '53 represent one such cluster; the years 1955, '56,  
9 '57 and '58 represent another such cluster; the years 1959  
10 and '60 represent another such cluster. When you consider  
11 the -- this temporal clustering of observations and the  
12 violation this represents of the basic assumption of  
13 independence of observations in regression analysis, do  
14 you believe that the analysis of Figure 5-15 is a scientifically  
15 sound basis for the conclusion reached by the Staff, and I  
16 quote as follows from --

17 MR. KARMAN: Mr. Chairman, I object to the form  
18 of this question. Besides being argumentive, it is  
19 excessively long, and we have -- the Board has graciously  
20 extended its courtesy to Dr. McFadden so that he might be  
21 able to leave tonight, but I am not quite sure whether any  
22 of us will leave the hearing room tonight.

23 CHAIRMAN JENSCH: I think first of all let him  
24 finish the question. The thing I have in mind is he is  
25 referring to some other chart with other plotting and I

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1 think that should be tendered to the witness for his review  
2 rather than take it from an oral presentation.

3 DR. MC FADDEN: The question pertains to  
4 Figure 5-15.

5 CHAIRMAN JENSCH: And another plot you said  
6 to which you referred showed several different clusters.

7 DR. MC FADDEN: Figure 5-15 can be supplemented  
8 with additional observations which will cluster in the  
9 lower left-hand quadrant.

10 CHAIRMAN JENSCH: Would you prepare such a  
11 clustering so the witness may see it as you propose it?

12 DR. MC FADDEN: Yes, sir.

13 I have such a plot here.

14 CHAIRMAN JENSCH: Tender it to the witness so he  
15 will understand what you are asking him about.

16 Do you recognize the validity of that presenta-  
17 tion?

18 WITNESS GOODYEAR: What was the question?

19 DR. MC FADDEN: I wasn't able to finish the ques-  
20 tion.

21 The question -- Mr. Chairman, could I offer just  
22 the quotation now which completes the question?

23 CHAIRMAN JENSCH: Do you think it is a  
24 scientifically valid development of your theory or some such?

25 DR. MC FADDEN: Scientifically valid basis for

1 the conclusions reached by Staff, and then I wished to  
2 quote from paragraph 3, page 5-56, "The population is  
3 highly sensitive to changes in mortality rates and that the  
4 fishery itself is fluctuating because of overexploitation  
5 during periods of high fishing intensity."

6 CHAIRMAN JENSCH: That's the last half of that  
7 sentence, paragraph 3?

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1 DR. MC FADDEN: Yes, sir.

2 CHAIRMAN JENSCH: Well, they refer to two as  
3 their support for that figure, V-14 and V-15. Your question  
4 is, is 15 enough. They have suggested that V-15 is needed  
5 for that conclusion, too.

6 WITNESS GOODYEAR: If you would, I would  
7 appreciate knowing the problem that you are representing.  
8 I don't --

9 DR. MC FADDEN: In the diagram which I have given  
10 to you, I have circled the sets of observations which are  
11 ~~temporarily~~ *temporally* clustered.

12 WITNESS GOODYEAR: Oh. I see what the point is  
13 now.

14 The -- similarly to what you were saying a minute  
15 ago, or what I was saying a minute ago, about the catch per  
16 unit effort versus catch, there has been a decline in effort  
17 in the Hudson which causes -- has caused the catch not to  
18 be more closely related to -- for the abundance not to be  
19 more closely related to catch than to catch per unit effort.  
20 This trend has occurred and -- well, the trend has occurred  
21 in about the same time period. It corresponds to these  
22 points.

23 Excuse me for a minute.

24 (Witnesses conferring.)

25 CHAIRMAN JENSCH: While he is looking for that,

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1 it ought to be noted that we have almost reached an hour of  
2 this examination. Is this your last question?

3 DR. MC FADDEN: Mr. Chairman, this is the  
4 last question except as the answer may draw out some other  
5 brief ramifications and I hope that doesn't happen.

6 CHAIRMAN JENSCH: I hope so, too.

7 (Laughter.)

8 WITNESS GOODYEAR: I thought I had brought the plot  
9 or at least a -- I thought I had brought the plot or at least a  
10 summary of it, but I don't have it with me.

11 CHAIRMAN JENSCH: Perhaps you can bring it at  
12 another session of the hearing.

13 DR. MC FADDEN: Would you be able to attempt an  
14 answer to the question if the reporter were to read it now  
15 or are you -- do you lack sufficient information at hand to  
16 fruitfully attempt an answer?

17 CHAIRMAN JENSCH: I think if he wants the plot,  
18 I think to illustrate a point, he should have those data.  
19 It is unfair to him to try to do some of this recollection  
20 work.

21 DR. MC FADDEN: Well, sir, he hasn't made it clear  
22 to me that that is the case.

23 WITNESS GOODYEAR: The answer is that the data  
24 points for 62 through 84 which reflect -- they are biased  
25 on the low side because of a reduced fishing effort in the

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1 Hudson and should not be expected to fall on that same curve.

2 DR. MC FADDEN: Dr. Goodyear, excluding those points  
3 I refer to the temporal clustering of the three other groups  
4 and raised the -- in fact, in my question I didn't refer to  
5 the particular points that you are citing an objection to in  
6 terms of their inclusion in this -- in my plot.

7 Could you phrase a response strictly in terms of  
8 the other three clusters of points which is referred to in  
9 my original question?

10 WITNESS GOODYEAR: Could I have that question again?

11 (The reporter read the pending question.)

12 WITNESS GOODYEAR: Could you finish the question?

13 DR. MC FADDEN: The question concludes with the  
14 quote which embodies the conclusion drawn from that analysis  
15 in part at least and I quote in paragraph three, page 5-56,  
16 "The population is highly sensitive to changes in mortality  
17 rates and that the fishery <sup>itself</sup> efforts is fluctuating because  
18 of over-exploitation during periods of high fishing intensity."

19 WITNESS GOODYEAR: Is the question do I wish to  
20 alter that?

21 DR. MC FADDEN: The question is that considering  
22 the temporal clustering of the data and the violation of  
23 the basic assumptions required for regression analysis which  
24 that represents, do you believe that the analyses -- analysis  
25 of Figure 5-15 is a scientifically valid basis for the

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1 conclusion embodied in the quotation that I just read?

2 MR. KARMAN: Mr. Chairman, I waited for the end of  
3 the question, but I thought you had warned Dr. McFadden to  
4 stop using words like violate and incorrectly. Nobody has  
5 ever indicated that there has been a violation of anything  
6 or person, except time tonight.

7 MR. TROSTEN: Excuse me, Mr. Chairman. Mr. Karman  
8 has overlooked the fact that Dr. Goodyear has admitted that  
9 there is a violation.

10 MR. KARMAN: Dr. Goodyear never used the word  
11 violation during the course of his testimony.

12 MR. TROSTEN: Mr. Karman, we could, if we wished,  
13 go back to review the transcript to find a place in which Dr.  
14 Goodyear admitted that there had been a violation of the  
15 principles of statistical analysis to which Dr. McFadden  
16 referred. I don't think it is necessary to  
17 impose upon <sup>anyone</sup> ~~everything~~ to do that. I think you should accept  
18 and I think that Dr. Goodyear will accept he did make such an  
19 admission.

20 CHAIRMAN JENSCH: I think the more important thing,  
21 however, and I think it is time, perhaps, to be a little  
22 strict on this -- there has been no acceptance of the  
23 validity of the temporal clustering until the basic foundation  
24 of the accuracy of that. This is some chart that Dr.  
25 McFadden has worked up and he says don't you think there is

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1 something here, don't you think you ought to change the conclu-  
2 sion you have set forth? Until Dr. McFadden has taken the  
3 stand to support the analysis he's presented, you are asking  
4 this gentleman, the witness, to express a conclusion as to a  
5 foundation that's not been established. I think we are going  
6 to have Dr. Goodyear back on the stand again. We will have Dr.  
7 McFadden again. It is 6:30. This witness has done most of  
8 the testifying since 9:00 o'clock this morning. I think it is  
9 an imposition on him to pursue this type of questioning with  
10 documents that have not been substantiated. I think we just  
11 have to insist upon strict foundation.

12 MR. TROSTEN: We are prepared to adjourn the  
13 hearing. We have many more questions which we have to  
14 direct to Dr. Goodyear. We can simply resume this line of  
15 questioning and the other questions at a later time.

16 CHAIRMAN JENSCH: Very well. Thank you very much.

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CHAIRMAN JENSCH: Messrs. Coutant, Goodyear and Siman-Tov are temporarily excused.

(Witnesses temporarily excused.)

CHAIRMAN JENSCH: Let's take up the question of the next session. When shall that be and for how long?

MR. TROSTEN: We are prepared tomorrow morning to -- I have discussed with counsel for the Applicant and for the Intervenor the future schedule. We are prepared to undertake cross-examination of Mr. Siman-Tov tomorrow morning with regard to the Staff's thermal model and we are further prepared to undertake cross-examination of Dr. Knighton and Mr. Carter with respect to the matter of alternative cooling systems and cost/benefit balance. If the Board desires -- first of all, we are prepared to continue with Dr. Goodyear tomorrow if the Board so desires.

If the Board would prefer to not do that, we are prepared to adjourn the hearing at the conclusion of our cross-examination of the witnesses I have just described.

At that point, we can go either way, Mr. Chairman. We would be delighted to commence cross-examination of Dr. Aynsley and Mr. Clark. I estimate as I say, that it would take approximately five days to conclude that cross-examination.

If Mr. Macbeth would prefer, we would be prepared to be cross-examined starting on Monday or Tuesday. I leave

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1 that up to the Board's discretion.

2 MR. MACBETH: I have requested certain documents  
3 from the Applicant and if I receive those documents sometime  
4 in the course of the day tomorrow, I would be prepared to  
5 cross-examine the Applicant's witnesses next Tuesday, and if  
6 I -- I took it from the earlier discussion from the Board  
7 that that would be a preferable course and I am prepared  
8 to follow that course.

9 CHAIRMAN JENSCH: Well, I think the sooner we get  
10 to a cross-examination of the Applicant's witnesses and get  
11 their entire evidence --

12 MR. KARMAN: And the Staff naturally, Mr. Chairman,  
13 would be prepared to follow the Intervenor with any  
14 cross-examination of the Applicant that we would have.

15 MR. TROSTEN: Mr. Chairman, we will be prepared.  
16 We have agreed with Mr. Macbeth to provide the  
17 underlying data contained in Dr. Lauer's analysis and we  
18 will undertake to do everything practical to make these  
19 data which are available at the laboratory available to  
20 Mr. Macbeth or Mr. Clark. The problem is that these  
21 are raw data contained in the laboratory and that they are  
22 being analyzed and we will certainly do everything  
23 we can to work out an acceptable arrangement.

24 CHAIRMAN JENSCH: Well, whatever would be the  
25 arrangement, we are more interested in meeting the time schedule.

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1 The thought is if you finish with Siman-Tov, Knighton  
2 and Carter tomorrow, we would resume on Tuesday, is that  
3 the thought and start with Applicant's witnesses? Is that  
4 agreeable with the Applicant?

5 MR. KARMAN: Unless they can finish with Dr. Goodyear.

6 MR. FROSTEN: We have a great deal more for  
7 Dr. Goodyear. We would be prepared to do it at some  
8 subsequent time if the Board so desires.

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arl 1 MR. KARMAN: We will get to cross of you  
2 before we get back to him?

3 MR. TROSTEN: That's right. Hopefully the week  
4 after next, Mr. Chairman. In other words, it is my under-  
5 standing that what we can do is we will conclude --  
6 cross-examination of Applicant's witness by the intervenors  
7 and the Staff will take place commencing on Tuesday and  
8 will be completed on Friday. This is -- all estimates seem  
9 to indicate this can be done. If that is the case, we will  
10 commence cross-examination of Dr. Aynsley and Mr. Clark  
11 the following week.

12 CHAIRMAN JENSCH: We all hope for a white  
13 Christmas, I think.

14 (Laughter.)

15 MR. MACBETH: I have not been aware of any  
16 agreement with counsel about the following week. I will  
17 have to check with Dr. Aynsley and Mr. Clark about their  
18 availability for that week. I did have them available for  
19 this coming week. I hope I can make them available for  
20 the following week, but I would like to have some time to  
21 check that with them. There are certain practical problems  
22 as we march on past the 18th or 19th of December, and I  
23 would like to have an opportunity to check those.

24 I would also like --

25 CHAIRMAN JENSCH: Can we hear from you in the

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1 morning on that?

2 MR. MACBETH: Yes.

3 I have -- I would also like to add, and I have  
4 checked the question of moving to Washington, and that  
5 would be perfectly agreeable to Intervenor's counsel.

6 CHAIRMAN JENSCH: Applicant have any objection  
7 to resuming Tuesday in Washington?

8 MR. TROSTEN: May we address that tomorrow morning?

9 CHAIRMAN JENSCH: Yes. Tomorrow morning at the  
10 outset.

11 MR. TROSTEN: Thank you. We will.

12 CHAIRMAN JENSCH: Any other matter we can take  
13 up before midnight -- I mean tonight.

14 (Laughter.)

15 At this time let's recess and reconvene in this  
16 room tomorrow morning at 9:00 o'clock.

17 (Whereupon, at 6:35 p.m., the hearing was adjourned,  
18 to reconvene at 9:00 a.m., Thursday, December 7, 1972.)

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