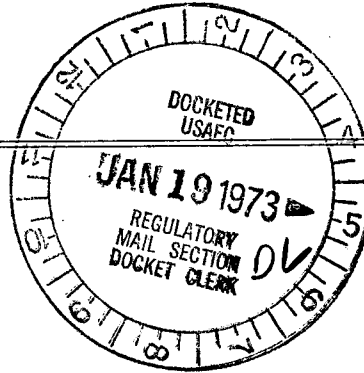


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UNITED STATES ATOMIC ENERGY COMMISSION



IN THE MATTER OF:

CONSOLIDATED EDISON COMPANY  
OF NEW YORK, INC.

(Indian Point Station, Unit No. 2)



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Docket No. 50-247

Place - Washington, D. C.

Date - 11 January 1973

Pages. 8023 - 8241

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ATOMIC ENERGY COMMISSION

(Indian Point Station, Unit No. 2)

Sixth and Pennsylvania Avenue, N. W.  
Washington, D. C.

Thursday, 11 January 1973

The above-entitled matter came on for further hearing, pursuant to adjournment, at 9 a.m.

BEFORE:

SAMUEL W. JENSCH, Esq., Chairman, Atomic Safety  
and Licensing Board.

DR. JOHN C. GEYER, Member.

MR. R. B. BRIGGS, Member.

APPEARANCES:

(As heretofore noted.)

C O N T E N T S

<u>WITNESS</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>
John R. Clark		8026		
John J. Grob, Jr.	8222			

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P R O C E E D I N G S

CHAIRMAN JENSCH: Please come to order.

Mr. Clark has resumed the stand. Is the Applicant ready to proceed?

MR. TROSTEN: Yes, I am, Mr. Chairman.

CHAIRMAN JENSCH: Proceed, please.

Whereupon,

JOHN R. CLARK

resumed the stand as a witness on behalf of the Intervenor, Hudson River Fishermen's Association, and, having been previously duly sworn, was examined and testified further as follows:

MR. TROSTEN: First, in response to the Chairman's question, you asked me yesterday, Mr. Chairman, about the course offerings or the academic requirements in statistics. I pulled out my Columbia College Bulletin for 1972-'73, and they have a Department of Mathematical Statistics and Columbia College offers a degree in Bachelor of Arts, but you can take a major in statistics, 24 points.

CHAIRMAN JENSCH: Yes, I had understood that there are majors in statistics and that sort of thing. But I think your question to the witness was, "Do you have a degree in statistics?" and I had never heard of it, and I thought perhaps the question might have been a little misleading, because if there are not degrees in statistics, you wouldn't



2mil 1 expect him to have one. That was my problem.

2 Will you proceed.

3 MR. TROSTEN: Mr. Chairman, one of my consultants  
4 is not here at the moment, so perhaps we could move forward  
5 on the line of questions we were discussing last night and  
6 then we can switch over later.

7 CHAIRMAN JENSCH: Proceed.

8 CROSS-EXAMINATION (continued)

9 BY MR. TROSTEN:

10 Q Mr. Clark, I would like to discuss with you that  
11 portion of your testimony that deals with the matter of  
12 reduced flow. I would like to analyze with you the influence  
13 of reduced flow on the impingements of fish and whether or  
14 not you give proper emphasis to reduced flow in your  
15 computations of the fish impingement phenomenon at Indian  
16 Point 1 and Indian 2. I am referring here particularly to  
17 pages <sup>28</sup>33 through <sup>38</sup>28 of your testimony.

18 Now, in your October 30, 1972, testimony, on page  
19 36, you state, "Reduced flow is most appropriate for  
20 estimating kills because Con Edison intends to operate Indian  
21 Point 2 at reduced flows in the winter period." Do you see  
22 that part?

23 A Yes.

24 Q Now, this is in reference to fish collections  
25 which were made at Indian Point 2 from February 4 to February

3mil

1 10, 1971. That is the data that you cite at the top of the  
2 page. Is that correct?

3 A That is where I am working from that data.

4 Q What was the flow rate at days 22 and 23 during  
5 this period of time?

6 A 105.

7 Q 105,000 gallons per minute, as you indicate in  
8 the second column, is that correct?

9 A Yes.

10 Q What will be the flow rate per day at Unit 2  
11 during the winter months, when Unit 2 is actually operating,  
12 Mr. Clark, do you know that?

13 A Well, I would expect each of the bays to be pumping  
14 at 105.

15 Q Now, Mr. Clark, are you not aware that Unit 2 will  
16 operate at 84,000 gallons per minute when it is operating  
17 at reduced flow, rather than 105,000 gallons per minute?

18 A I know there has been some talk about bypasses and  
19 all kinds of other schemes for trying to cut it down, because  
20 the pumps won't go down, but I didn't know if you had settled  
21 on anything finally and positively. This is experimental  
22 data. We are talking about the actual experiments that you  
23 ran, right? That is what the 105 is. This is only experi-  
24 mental results.

25 Q These are results that took place during those days,

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1 February 4 through February 10. My question to you is, are  
2 you aware that Unit No. 2 is going to operate at 84,000 gallons  
3 per minute during the winter period?

4 A No, I am not aware of that.

5 Q You have heard talk of it, but you are not aware  
6 that it is indeed going to operate at that level?

7 A Yes, I don't know what your present plans are.

8 Q Would you turn to page 6 of the stipulation  
9 between the Hudson River Fishermen's Association and the  
10 Applicant, please.

11 A I have it.

12 Q Do you see the second line under the heading,  
13 "January, 1971" -- this is in reference to Indian Point 1,  
14 I recognize -- but do you see where it says commence operation  
15 with flow at 60 percent of normal flow?

16 A Yes.

17 Q What would 60 percent of normal flow be?

18 A 84,000.

19 Q Does that suggest to you that Indian Point 2 is  
20 going to operate at 84,000 gallons per minute?

21 A No. It suggests to me that you hope to be able  
22 to do something like that.

23 MR. MACBETH: Moreover, this is in relation to  
24 Indian Point 1.

25 MR. TROSTEN: Yes, I mentioned that.

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1 BY MR. TROSTEN:

2 Q So that doesn't suggest to you that Indian Point  
3 2 is going to operate at 84,000 gallons per minute?

4 A Well, we can go on any hypothesis you want; if you  
5 want to continue with what would happen if, it is all right  
6 with me.

7 Q Would you turn to page 3-18 of the Final Environmental  
8 Statement, please? Do you have it there?

9 A Yes, I have it.

10 Q Would you look down to the column that says Unit  
11 No. 2, 2758? It is the middle heading. It says six pumps,  
12 full flow 840,000, minimum flow, 504,000. What percentage  
13 of 840,000 is 504,000?

14 CHAIRMAN JENSCH: You may give him the computation  
15 and perhaps he will accept it.

16 BY MR. TROSTEN:

17 Q Would you accept that it is 60 percent?

18 A I will check it and see. Sixty percent.

19 Q Does that information suggest to you that Indian  
20 Point 2 is going to operate at 60 percent of flow in the  
21 wintertime?

22 A May I have a minute to study the table?

23 Q Yes.

24 A It certainly doesn't.

25 Q It doesn't suggest that to you?

6mil 1       A       I mean it is just in one part of the thing. It  
2       says from the water box inlet to the outlet. Is that the full  
3       flow of the system? It is just across the condenser tubes,  
4       right? Is that the whole pumping of the plant?

5       Q       Yes, this is through the whole system.

6       A       Why does it say from the water box to the outlet?

7       Q       Well, that suggests to me that that is through  
8       the whole system.

9       A       There isn't any other water bypass or anything  
10      else? I mean I am not sure that I understand that the 84,000  
11      figure is the total amount of water that is going to be drawn  
12      through the intake screens.

13      Q       You think there is some way in which there would  
14      be some lesser, or greater amount of water drawn through the  
15      intake screens, even though this is the minimum flow from the  
16      water box inlet to outlet?

17      A       Let me ask you if the service water and all of the  
18      other stuff comes through a separate pump and bay on that?

19      Q       If you will accept that it does --

20      A       Okay, I will, sure.

21      Q       Let me ask you this, rather than just prolonging  
22      this, Mr. Clark: Would you accept the fact, for purposes of  
23      our discussion here, after that Indian Point 2 will operate  
24      at 84,000 gallons per minute, as one can infer from these two  
25      references that I just cited, and which will in any event be

7mil 1 a matter that is offered in evidence, so there is absolutely  
2 no doubt about this?

3 A Well, I would like to delay just a minute, until  
4 I fully understand what the significance of this table is.  
5 Would you mind if I asked a couple more questions?

6 Q Sure.

7 A What is the difference between minimum water flow  
8 from water box inlet to outlet and minimum flow from water  
9 inlet box to river entrance?

10 Q Suppose rather than my answering your questions at  
11 this point in time, why don't you take a moment to study that  
12 and you can form your own conclusions about that and then I  
13 will proceed with my questions.

14 A All right.

15 CHAIRMAN JENSCH: Who can provide the data that  
16 he needs to understand this? This is the Final Environmental  
17 Statement. Somebody should be able to provide the data.

18 MR. KARMAN: These are Applicant's figures, Mr.  
19 Chairman.

20 CHAIRMAN JENSCH: Perhaps Applicant can explain  
21 something about this and then he can form a judgment.

22 MR. TROSTEN: Mr. Chairman, I am sorry. I don't  
23 know exactly the basis on which the Staff drew up this table.

24 CHAIRMAN JENSCH: They said they took the Applicant's  
25 figures.

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1 MR. TROSTEN: Yes. And I just advised Mr. Clark  
2 the plant will operate at 84,000 gallons per minute for the  
3 pumps during the wintertime period.

4 DR. GEYER: This is just for one bay?

5 MR. TROSTEN: Yes.

6 MR. BRIGGS: The pumps will operate at a higher  
7 flow, will they not? Is this the flow through the screens,  
8 or is it not the flow through the screens?

9 MR. TROSTEN: Mr. Woodbury can respond to that.

10 MR. WOODBURY: You are correct, the pumps will  
11 operate at 140,000 gallons a minute, but there is a bypass  
12 from the pressure side of the pump to the suction side of  
13 the pump that enables us to return 40 percent of the flow to  
14 the suction side of the pump and thereby reduce the flow at  
15 the intake.

16 MR. BRIGGS: I think the question is, is 84,000  
17 gallons per minute the flow through the screens that you are  
18 going to operate at?

19 MR. WOODBURY: Yes, sir.

20 CHAIRMAN JENSCH: What is the significance of one  
21 bay or two bays? Are there more than one bay?

22 MR. TROSTEN: There are six bays, Mr. Chairman,  
23 bringing it up to a total of <sup>504,000</sup>~~504~~ gallons per minute as indicated  
24 in the Staff's table.

25 CHAIRMAN JENSCH: Thank you.

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1 THE WITNESS: Mr. Chairman, it would be helpful  
2 to me if someone could just sketch the flow of water on the  
3 blackboard. Would that be all right? Just where that water  
4 comes back in when it recirculates in relation to the screens?

5 MR. TROSTEN: Would you like to have that informa-  
6 tion, Mr. Chairman?

7 CHAIRMAN JENSCH: Yes.

8 MR. BRIGGS: Could you put the deicing flow on it  
9 also?

10 MR. TROSTEN: Yes.

11 MR. WOODBURY: I have here a cross-section of the  
12 intake for one of the six screens showing the fixed screen,  
13 the bar racks, the traveling screen, the pump intake, and the  
14 pump bypass. The water coming through the screen in the  
15 wintertime, some 84,000 gallons a minute, is taken in through  
16 this section of the pump, together with the difference  
17 between 84,000 and 140,000, which is returned here, making a  
18 total intake through the suction side of the pump of  
19 140,000 gallons a minute. Forty percent of that is bypassed  
20 and returned in this manner to the suction side of the pump,  
21 thereby reducing by 40 percent the amount of water that comes  
22 in through the intake screens. There does exist in the  
23 system a deicing loop which is shown here, by which we are  
24 enabled to pump from the discharge canal back into the intake.  
25 The purpose of the deicing loop is to prevent ice from forming



10mil

1 on the screening system. The capacity of the deicing loop  
2 is about 35,000 gallons a minute. And a discussion of that  
3 was reflected in the testimony which was presented by the  
4 company in connection with a 50 percent license, at which time  
5 we proposed to use the deicing loop as a means of reducing the  
6 flow through the screen. Prior to the availability of this,  
7 which was -- this bypass system -- which was put on at a  
8 later date. We do not at this time expect to use the deicing  
9 loop and the figure of 84,000 gallons a minute is predicated  
10 on not using the deicing loop. Were we to use the deicing  
11 loop, that 84,000 would be reduced.

12 There is a problem in using the deicing loop, in  
13 that it distorts the flow through the intake screen.

14 DR. GEYER: The deicing loop in effect recirculates  
15 water through the plant and back and reduced by that much  
16 new water taken into the system?

17 MR. WOODBURY: Yes, sir, it does, with about a 15-  
18 degree delta T.

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1 CHAIRMAN JENSCH: Is there any other question you  
2 have, Mr. Clark, before we proceed with the further questions?

3 THE WITNESS: No, sir.

4 CHAIRMAN JENSCH: You understand the situation now?

5 THE WITNESS: Yes, thank you.

6 BY MR. TROSTEN:

7 Q Is it correct in your analysis contained in your  
8 October 30th testimony you used a flow rate of 105,000 gallons  
9 per minute, which does not reflect the conditions that will  
10 exist when unit No. 2 is actually opening?

11 A I used the only data available for those tests,  
12 the flow rates that were available as reported and the data  
13 that are associated with them in this analysis.

14 It is the only reduced flow data available. And I  
15 used it in the sense that it was the only thing that the  
16 company had available for reduced flow, not that I meant to  
17 say that I had information that you were going to operate at  
18 105. Q There

19 Q There is no suggestion in your testimony -- you used  
20 some data for a period of February 4 through February 10, 1971.

21 A Yes.

22 Q At 105,000?

23 A Right.

24 Q But you did not use the data that were available that  
25 indicate that the flow was going to be 84,000. Is that correct?

kar 2 1 A You had no experiments that I encountered for a  
2 flow rate of 84,000.

3 Q You did not use a flow rate of 84,000 in your  
4 calculations. Is that correct?

5 A No.

6 CHAIRMAN JENSCH: When was the 84,000 figure developed?

7 MR. TROSTEN: Mr. Chairman, I believe that there is  
8 testimony in connection with the 50 percent list that indicates  
9 that we were going to use 84,000 gallons per minute. I would  
10 have to go back and double check that to be sure it is there.  
11 We believe it is there.

12 CHAIRMAN JENSCH: The reason I asked is Mr. Woodbury  
13 said they put on this bypass, as I understood it, to account  
14 for the distorting effect of de-icing and therefore they  
15 reduced it 140,000 or something like that. My thought was that  
16 this was added later, and if the figures weren't there, he  
17 couldn't use them.

18 MR. TROSTEN: Mr. Woodbury will respond in a moment.  
19 Something was available to the staff, we have to double check  
20 to be sure exactly what, that enabled them to draw up that  
21 figure.

22 CHAIRMAN JENSCH: Some of these things could be  
23 eliminated if we could kind of time the developments, because we  
24 spend so much time asking Mr. Clark why he didn't use the  
25 figures if they weren't there to be used.

kar 3 1 MR. KARMAN: We believe it is in the October 1971  
2 testimony of the Applicants.

3 MR. WOODBURY: That is correct.

4 CHAIRMAN JENSCH: Which of course probably was after  
5 the time he prepared his October 30th statement.

6 MR. TROSTEN: This is October 1971, Mr. Chairman.

7 MR. MACBETH: I believe what the witness said was  
8 the experimental data had been limited to the previously reduced  
9 flow of 105,000 gallons per minute.

10 CHAIRMAN JENSCH: And this 84,000 was just kind of  
11 a projected estimate that had not yet been confirmed. Is that  
12 your thought?

13 MR. MACBETH: As I take it, there has been no  
14 operating experience before October 30th of this year at  
15 84,000, has there?

16 MR. WOODBURY: That is correct.

17 MR. MACBETH: I think that is the point.

18 CHAIRMAN JENSCH: I suppose there is a difference  
19 between experimental data and what you hope for in operation.

20 MR. WOODBURY: Can I make an attempt to clarify  
21 this?

22 CHAIRMAN JENSCH: Sure.

23 MR. WOODBURY: In 1970 we conducted experiments on  
24 Indian Point I and concluded from those experiments that we  
25 should reduce the flow in the wintertime to reduce the

kar 4 1 impingements on the skeins and as a result did redect the flow  
2 at Indian Point I. At that same time a decision was made to  
3 modify the intake for Indian Point II to be able to reduce the  
4 flow at Indian Point II in the same manner.

5 That work was placed under contract and it took  
6 some time to get it done, but it was completed along in May  
7 or thereabouts of this past year, 1972. Testimony to that  
8 effect, I am reasonably certain, was entered in the record in  
9 October 1971 in my testimony in connection with the 50 percent  
10 list. It is also a matter of record in state hearings.

11 CHAIRMAN JENSCH: Yes, as I understand the answer  
12 now from the witness, it is just a difference between what was  
13 experimentally confirmed and what is projected and hoped for  
14 at Indian Point II.

15 MR. WOODBURY: We have not been able up to now to  
16 operate the pumps with the bypass and conduct measurements to  
17 ascertain what the exact flow is, but it is designed for 84,000,  
18 sir.

19 BY MR. TROSTEN:

20 Q Mr. Clark, did you refer to the 105,000 and not  
21 mention the 84,000 because you knew that there were no experimenta  
22 data for the 84,000 and there were for the 105,000? Is that the  
23 reason why you did this?

24 A Yes, it is the only thing that was available.

25 Q Mr. Clark, during what interval each year will unit

kar 5 1 No. 2 be operated at reduced flow?

2 A During the winter period.

3 Q And what is the meaning of the term "winter period"  
4 as you understand it?

5 A Oh, when it is cold.

6 Q It gets cold in July sometimes.

7 A Do you want the exact dates?

8 Q The dates that you considered?

9 A It may be helpful if you told me or referred me to  
10 a page.

11 Q What dates did you use? I am asking you what dates  
12 you used? In other words, you made a computation --

13 A On the top of page 36, which is what we are talking  
14 about, I have merely summarized the results of Con. Edison's  
15 experiments and drawn certain averages. That is all.

16 Q Well, but you have drawn a conclusion here. You  
17 said that "The reduced flow rate is most appropriate for  
18 estimating kills, because Con. Edison intends to operate at  
19 Indian Point No. II at reduced flow in the winter period."  
20 Do you see that phrase "in the winter period" that appears in  
21 the third line?

22 A Yes.

23 Q Now, in drawing your conclusion it was most appropriate  
24 at for estimating kills because it would be operated at reduced  
25 flow in the winter period, what did you consider to be in the

kar 6 1 winter period? Times when it is cold?

2 A Well, actually to attempt -- if I remember right --  
3 in an attempt to make the thing, the estimates as cautious  
4 as possible, I applied the reduced flow to the whole year.

5 Q One hundred five thousand to the whole year?

6 A Well, the evidence is that you kill more fish when  
7 you pump harder, and therefore to try to be cautious on my  
8 side of it, to apply the reduced flow situation to the whole  
9 year and thereby minimize the value of the estimate.

10 Q Can you show me where you applied the reduced flow  
11 to the whole year?

12 A If you will give me a minute to check through this.

13 Q Yes.

14 A To answer that I would have to go a step further,  
15 because the calculation is based not only on that, but on some  
16 other records. There are two sets of data that I had to work  
17 from.

18 One was the Indian Point II tests in February  
19 of 1971 and the other was the 1972 experience. On a reduced  
20 flow base at 105,000 I found that the Indian Point No. II kill  
21 was 3.2 times the February daily average for Indian Point No. I.

22 Q Now, in the '72 tests I found that Indian Point  
23 II was killing 11.6 times as many as Indian Point I. Now, this  
24 is at --

Q How many days of testimony were there in February?

kar 7 1       A       Ten days. And you will notice -- this is the  
2 second paragraph on page 36, and it says at a nominal reduced  
3 flow at 105. So in both cases I am working on the base of  
4 information available at a reduced flow of 105. And I have  
5 concluded from looking at those two that a fair estimate of the  
6 relationship, the comparison between Indian Point I and Indian  
7 Point II would be five times.

8       Q       Five times.

9       A       Now, this is all at reduced flow.

10       Q       Now, did I hear you say a moment ago that the first  
11 comparison in February '71, between Indian Point II and Indian  
12 Point I was 3.2, Indian Point II at 105,000 gallons per minutes  
13 was 3.2 of Indian Point I. Is that correct?

14       A       That is correct.

15       Q       And that was when Indian Point II was operating at  
16 105,000, as opposed to 84,000, which is what it will operate at?

17       A       If you say so.

18       Q       Okay. So you used -- nevertheless, you concluded  
19 there should be a multiple of five added to comparison Indian  
20 Point II to Indian Point I?

21       A       Yes, because the other was about 12 times as much  
22 killed at Indian Point II as Indian Point I.

23       Q       Mr. Clark, were the 1972 tests run on Indian Point  
24 II at reduced flow or full flow? By reduced flow I mean 105,000  
25 gallons per minutes.



kar 8 1 A Would you give me a minute, please?

2 CHAIRMAN JENSCH: If you have the results of these  
3 tests, he used your tests for his calculation, can you submit  
4 them to him? I know you want to find out his understanding of  
5 it, but if you have the figures, you can say is this your under-  
6 standing of it.

7 MR. TROSTEN: My question is, did you calculate on  
8 the basis of full flow or reduced flow?

9 CHAIRMAN JENSCH: All right.

10 THE WITNESS: That was calculated on the basis of  
11 reduced flow.

12 BY MR. TROSTEN:

13 Q Is it not true that the tests -- what was your answer,  
14 excuse me? It was that Indian Point II was being run at  
15 reduced flow, did you say?

16 A I said that -- this is the second sentence in  
17 paragraph two on page 36 -- at a nominal reduced flow of  
18 105,000 gallons per minute, the estimated count would be 105  
19 over 140, which is the direct proportion times 97, times 10  
20 to the third, or 75,000 fish.

21 So I reduced it from 97,000 down to 75,000 fish to  
22 express the lower rate that you all claim will happen when you  
23 pump at reduced flow.

24 Q The tests, however, that you were looking at when  
25 fish counts were made, those tests were at full flow, did you

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1 know that?

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A I think it says so in the sentence above that.

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1 Q So the comparison that you made of 11 or 12  
2 times, I forget what you said, of the ratio of Indian Point 1  
3 kills to Indian Point 2, was a comparison that was full flow  
4 at Indian Point 2, versus Indian Point 1, is that right?

5 A Will you give me a minute on this, too, so I get it  
6 straight?

7 No, that would be about 15 times the amount of the  
8 Indian Point kill. See, I have reduced it to get this 11.6  
9 from some much higher figure that actually happened there.  
10 I reduced it down to re-equate it with reduced flow to get  
11 it down to below 12 times as much.

12 Q Factoring it down, in an effort to make it more  
13 realistic in your view, you reduced it down to 105, as opposed  
14 to 84, which is what it will be?

15 A Yes. See, there is a formula in parens there,  
16 the fifth line up from the bottom, that gives the way it was  
17 done. The actual calculation is there on the page.

18 Q I guess I still haven't gotten an answer to my  
19 original question as to what you consider to be the winter  
20 period, and how you worked this out. I got lost there in  
21 that answer.

22 A What I did was I found that it would be most useful  
23 in making a rather cautious estimate of the total amount of  
24 fish kill not to overemphasize it, to use that reduced flow  
25 calculation over the whole 12-month period.

ar2

1 Q I don't really quit see how you did that.

2 A You just develop a ratio between -- all we have to  
3 go on is Indian Point 1 and the kills there over the years,  
4 the data that we have. So you have to develop a comparative  
5 figure, using Indian Point 1 as your index or pilot, and  
6 then you get a scale. The scale says almost 12 times as  
7 many will be killed at Indian Point 2 as Indian Point 1.  
8 And this is on reduced flow. And then just carry it through  
9 the year. In other words, the estimates that flow from  
10 this series of adjustments and so forth here would give you  
11 an estimate of the total amount killed on a reduced flow basis  
12 throughout the year, July, October, and so on.

13 Q Is it correct to say that what you did was you got  
14 some results from Indian Point 2 and you compared them with  
15 Indian Point 1, and sometimes the Indian Point 2 results were  
16 much higher than the Indian Point 1, one time they were much  
17 lower, and in order to come to what you considered to be a  
18 conservative estimate of the relationship between the two,  
19 you included sort of a fudge factor for reduced flow, and  
20 recognized in some way that it was going to operate at  
21 reduced flow, but it wasn't very clear in your mind as to what  
22 the period of reduced flow was. Is that correct?

23 A That is not a fudge factor, that is exactly the way  
24 Con Ed ran its scientific tests of the effect of reduced flow  
25 versus full flow at that plant between February 4 and February

ar3

1 10, 1971. It is just exactly what happened up there.

2 Q Well, will you accept the fact that Indian Point 2  
3 is going to be operated at reduced flow, that is, 84,000 gallons  
4 per minute, for the period from October 1 through March 31  
5 as a premise for our questioning?

6 A All right.

7 Q That is a period of six months each year, correct?  
8 Half of each year?

9 CHAIRMAN JENSCH: From October what?

10 MR. TROSTEN: October 1 through March 31.

11 THE WITNESS: Right.

12 BY MR. TROSTEN:

13 Q Now when Unit No. 2 is operating, as I mentioned,  
14 as a premise for the questioning, we will assume it will  
15 operate at reduced flow from October 1 through March 31. Is  
16 it correct that this is the six months of the year when fish  
17 collections have been the highest at Unit No. 1?

18 A Yes.

19 Q Now you state on page 36 that reduced flow will  
20 be used in the winter months, the winter period, I should say.

21 A Yes.

22 Q And you say on page 37 that you refer to four seasons  
23 September through November, December through February, March  
24 through May, and June through August. Is that your definition  
25 of the fall, winter, spring and summer seasons?

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1 A Well, I don't know whether I intended those to be  
2 labeled winter, spring, fall and summer or anything. It  
3 just happened to be three months of the year. They don't  
4 agree exactly with the seasons. The seasons generally start  
5 around the 20th or 21st of the month.

6 Q Do you consider December through February as the  
7 winter period?

8 A Yes, that is good enough, surely. December 21 to  
9 March 31, I guess.

10 Q Isn't it correct then that your analysis not only  
11 used an inappropriate flow period, 105,000 versus 84,000,  
12 but also used an incorrect time interval for the winter period,  
13 that is, December through February as opposed to October 1  
14 through March 31?

15 MR. MACBETH: I object. Could we have this in  
16 two parts? The first premise is an incorrect flow factor  
17 was used, and I don't think the witness has accepted that.  
18 and if Applicant's counsel establishes he has, fine, but other-  
19 wise I would like to take the question in parts.

20 CHAIRMAN JENSCH: I was going to ask you,  
21 inappropriate in relation to what? You said he used an  
22 inappropriate flow rate. As I understand it, he said he  
23 used the actual one. Is it inappropriate to use the actual?

24 MR. TROSTEN: Inappropriate in a sense that he used  
25 a flow rate that is not the flow rate that will actually be

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1 used.

2 CHAIRMAN JENSCH: I do recall you did say will you  
3 accept this as a premise for a question. He may not find it  
4 easy to accept the projected or hoped-for flow rate, I don't  
5 know. But will you state it in two parts?

6 MR. TROSTEN: Yes.

7 BY MR. TROSTEN:

8 Q Is it not correct that you used a flow rate in  
9 your calculations of 105,000 gallons per minute as the flow  
10 rate appropriate for reduced flow, whereas in fact the flow  
11 rate is going to be 84,000 gallons per minute?

12 A I used no flow rate in my calculations.

13 Q If that is the case, why did you refer to 105,000  
14 gallons a minute on the top of page 36 as characteristic of  
15 reduced flow, and why did you refer to reduced flow as  
16 105,000 gallons a minute on the top of the page?

17 A The top of page 36 is a recapitulation of experi-  
18 ments done by Con Ed between February 4 and 10, 1971. That  
19 is all that is.

20 Q In the first paragraph on the top of page 36,  
21 where you refer to the reduced flow rate as most appropriate  
22 for estimating kills, were you not referring to 105,000 gallons  
23 per minute?

24 A No, I was referring to the idea of using a reduced  
25 flow rate in an attempt to reduce the amount of impingements.

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1 The only data I had available to use in any calculations or  
2 in any comparative sense was the data from an experiment  
3 designed by Con Edison in which they used 105 gallons a minute  
4 as reduced flow, and 140,000 gallons a minute as the higher  
5 flow. That is all I had to work with, it was the only  
6 results we had, and that is what I used. I did not use a flow  
7 rate in my calculations and I don't mean to say that this is  
8 specific only to 105, and it wouldn't apply to anything else.  
9 It only applies to a reduced flow situation.

10 Q Mr. Clark, on the fifth line from the bottom on  
11 page 36, where you do a calculation of the amount of fish that  
12 would have been impinged at all six bases, did you not use a  
13 ratio of 105 to 140?

14 A That is right.

15 Q Does that indicate that you used 105 in your calcula-  
16 tions?

17 A That means I was correcting the situation to the  
18 actual conditions of the experiment. In other words, all  
19 that is is using the only values that I had, which were 140  
20 and 105. I think the problem here is you are trying to make  
21 too much out of the 105, which is the only figure I had to  
22 work with, the only thing I had to go by. I don't know whether  
23 less or more would have any predictably significant difference.

24 Q I didn't hear the last part.

25 A I don't know that you would get a difference in



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1 the -- I don't know what kinds of difference you might get  
2 in your results if you had pumped at 102 or 108. I don't  
3 mean to indicate that this is something that is exactly right  
4 only for that specific flow rate.

5 Q Well, we will talk later about the difference  
6 between 84 and 105.

7 A Fine.

8 Q But what we are talking about at the moment is  
9 whether or not you used the 105. I am a little confused  
10 because I see 105 referred to repeatedly throughout your  
11 testimony, yet a few moments ago you said you didn't use any  
12 specific number for your reduced flow calculations.

13 A No, that is the proportion to convert the numbers,  
14 to reduce the numbers down.

15 Q Am I to understand then you just guessed at what  
16 reduced flow might amount to, and you didn't use 105? Just  
17 sort of a general feeling about it?

18 A It is here in this --

19 CHAIRMAN JENSCH: He used a figure of 105, whether  
20 it is reduced, enlarged, modified, changed, altered, whatever  
21 it does, does it make any difference what you call it, as  
22 long as he used that figure?

23 MR. TROSTEN: Yes, it doesn't make any difference.  
24 All right.

25 MR. MACBETH: I think another side is the

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1 actual multiplication figure is -- it first came out at 3.2  
2 and the second 11.6, so using the 5 doesn't reflect a  
3 precise average of the two, it is an attempt to take a  
4 conservative figure, so it does not reflect a precise lower  
5 flow rate. I think that is one of the points that causes  
6 some confusion.

7 MR. TROSTEN: I understand Mr. Clark's explanation  
8 of that. Thank you.

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1 BY MR. TROSTEN:

2 Q Now, turning to the second part of my question: Is  
3 it not correct that you did not use the six-month period of  
4 reduced flow operations, October 1 through March 31, in drawing  
5 your calculations as to when reduced flow would be put into  
6 effect by the company?

7 A Yes, that is used, it is included in the 12-month  
8 period of the year in which this calculation which takes into  
9 account reduced flow applies.

10 You have to understand that all of these seasons  
11 have been, the number of fish killed in all of these seasons,  
12 has been calculated on the basis of reduced flow.

13 And up here, if this is confusing you, where I said  
14 in the winter period in the third line of Paragraph 1, page  
15 36, that the winter period there is intended to mean the cold  
16 time of the year, the time when the fish kills occur, sometimes  
17 they start in November, sometimes December, sometimes January,  
18 and so on.

19 Q Will you show me any place in your testimony where  
20 you indicated that you took into account in drawing up your  
21 estimate of the number of fish that would be killed the fact  
22 that the plants will be operated at reduced flow for six-months  
23 of the year?

24 A Well, no, because it is planned for the whole  
25 twelve months. In other words, in this thing it says if

sw2

1 ConEdison were to operate its plant at reduced flow for the  
2 whole year, your six months plus the other six months, that  
3 would be the result.

4 Q What would be the result?

5 A These numbers of fish killed on page 37. The  
6 striped bass that are there, for example. And the other is  
7 in the table, wherever it is, Table 6.

8 Q What you are saying, again, what you are telling  
9 me is you made what you consider to be a "very conservative  
10 estimate," that appears on the first line on page 37, and this  
11 takes into account reduced flow, and takes into account the  
12 fact it will be operated at reduced flow during the "winter  
13 period."

14 Is that what you are saying?

15 A During the whole year.

16 Q Where does it say that?

17 A I don't know any other way to tell you this except  
18 to just keep repeating it. The estimates I have made of the  
19 impingement at Indian Point 2 are based upon reduced flow rates  
20 for 12 months of the year.

21 Q Can you tell me where, can you show me where this  
22 reflects it, Mr. Clark?

23 I am having difficulty, because I can't see where  
24 this is shown in your calculations.

25 A Well, let me just explain it to you. There are two

sw3 1 factors that we have to go on.

2 Q Yes. Why don't you just give us --

3 CHAIRMAN JENSCH: Let him finish his answer.

4 THE WITNESS: (Drawing on blackboard.)

5 My calculations show that based upon, --reflecting  
6 the evidence in two tests, for which we have records for  
7 Indian Point 2, the first of these indicates that Indian Point  
8 2 kills 3.2 times as many as Indian Point 1, at reduced flow.

9 Second, it indicates, at reduced flow, Indian Point  
10 2 would kill 11.6 times as many fish as Indian Point 1.

11 Taking a conservative average of these two, it would  
12 indicate that Indian Point 2 would kill five times as many as  
13 Indian Point 1 at reduced flow. And this is the figure upon  
14 which all four seasons, all 12-month estimates, are based.

15 MR. MACBETH: Excuse me a moment.

16 Don't you mean that Indian Point 2 would kill four  
17 times as many and the combined would be five times? That  
18 seems to be what is reflected in your testimony on page 37.

19 THE WITNESS: Excuse me. Five times Indian Point  
20 1 gives you the combined Indian Point 1 and Indian Point 2  
21 kills. The two together. Thank you.

22 BY MR. TROSTEN:

23 Q And this calculation you have just drawn is the  
24 way in which you reflected in your own mind the fact that  
25 Indian Point 2 is going to be operating at reduced flow, which

sw4 1 we now know will be 84,000 gpm, and the fact that Indian  
2 Point 2 is going to be operated for six months of the year at  
3 reduced flow?

4 A. Yes.

5 If I were to just take an average between these  
6 two, it would be 7.4.

7 Q. You mean adding 11.6 and 3.2 would be 7.4?

8 A. Yes, taking an arithmetic mean of these two figures  
9 it would be 7.4, which would give a much higher estimate, by  
10 50 percent, than this.

11 So, in effect, the estimates that I have made are  
12 reduced by 50 percent over what this average here would show.  
13 So that is what I meant by a very conservative estimate, and  
14 it applies to the whole year.

15 Q. Now, just to put these things in perspective, with  
16 regard to those numbers, in 1971, when Indian Point 2, the  
17 fish kill was 3.2 times the fish kill at Indian Point 1, the  
18 Indian Point 2 was operating at 105,000 gallons per minute,  
19 right?

20 A. Right.

21 Q. In 1972 -- that was for a period from February 4  
22 through February 10, 1971. That is a seven-day period it sounds  
23 like.

24 In 1972, there was a 10-day period that is  
25 reflected in your calculations.

sw5

1 A. Yes.

2 Q. And Indian Point 2 was operating at full flow at  
3 that time, not reduced flow?

4 A. Full flow.

5 Q. And --

6 A. But this figure, this is not a full-flow figure  
7 here, this is a reduced flow figure here.

8 MR. MACBETH: Would you indicate for the record  
9 what the figure is?

10 THE WITNESS: 11.6.

11 BY MR. TROSTEN:

12 Q. That is a reduced flow figure by your definition  
13 of reduced flow?

14 A. Yes.

15 Q. In other words, it represents the projected  
16 impingement at Indian Point 2 for all six days for the 10 days  
17 if Indian Point 2 were operating at 105,000 gallons per  
18 minute?

19 A. Yes.

20 Q. All right.

21 And this is how you reflected these two facts?

22 A. Yes.

23 Q. Fine.

24 CHAIRMAN JENSCH: It seems to me maybe some time  
25 you would like to put in your own calculation. As I

sw6

1 understand your interrogation, you are saying let's go through  
2 this at 84,000, and if you want to put in that calculation,  
3 he may accept it as a premise, but I don't think you should  
4 be limited in putting in a further calculation.

5 MR. TROSTEN: Yes.

6 BY MR. TROSTEN:

7 Q Mr. Clark, are you aware that the -- you do know,  
8 do you not, that Indian Point 2 operates with fixed screens  
9 installed in front of the intakes?

10 A Yes.

11 Q Are you aware that a standard operating procedure  
12 at Indian Point 1 results -- at Indian Point, rather --  
13 results in the outer fixed screens being raised and cleaned  
14 once daily?

15 A Yes, I have read that.

16 Q Are you also aware that during the period from  
17 January 12, 1970, to March 7, 1970, the fixed screens were  
18 blocked off the bottom on Indian Point 1 on several occasions  
19 and for almost a month were never raised?

20 CHAIRMAN JENSCH: What was that last part?

21 MR. TROSTEN: Were never raised.

22 CHAIRMAN JENSCH: Thank you.

23 THE WINTESS: Do you think it would be advisable  
24 if I referred myself to the schedule you are talking about?



SW7

1 BY MR. TROSTEN:

2 Q Yes, and to the stipulation, page 5.

3 MR. MACBETH: If this is contained in the stipu-  
4 lation, I don't see any need to cross-examine the witness on  
5 it.

6 MR. TROSTEN: The reason I wanted to cross-examine  
7 the witness on it is that I am probing his understanding of  
8 the facts and the basis upon which he drew up his estimate  
9 that a very conservative estimate reflecting both '71 and '72  
10 reduced flow results would be four times unit number 1. That  
11 is that basis for it.

12 MR. MACBETH: All right. I think it might be quicker  
13 if you pointed to the part of the stipulation you are reading  
14 from.

15 MR. TROSTEN: Right.

16 The part of the stipulation is the middle of the  
17 page, five lines down on page 5. You see December 1969, fixed  
18 fine screens partially lowered, January 28, 1970, fixed fine  
19 screens fully lowered and backup screens installed.

20 THE WITNESS: I don't seem to find that on page 5.

21 BY MR. TROSTEN:

22 Q There are two entries, January 1969 and 1970.

23 A Yes.

24 Q So is the answer to my question yes? Do you recall  
25 the question?

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1

A. I better have it again.

2

(The reporter read the question as requested.)

3

THE WITNESS: That was January 12 to what?

4

BY MR. TROSTEN:

5

Q. Just a moment, please, excuse me.

6

A. I am having trouble finding that on the page.

7

MR. MACBETH: Could I have the question read

8

again?

9

(The reporter read the question as requested.)

10

BY MR. TROSTEN:

11

Q. Mr. Clark, I apologize. The stipulation does not

12

fully cover the facts that I have described to you. It

13

partially covers them. It says December 1969, fixed fine

14

screens partially lowered; January 28, 1970, fixed fine screens

15

fully lowered, and backup screens installed; and it has

16

several other entries running through April, but it does not

17

cover the facts I asked you?

18

So, let me simply ask you the question: Are you

19

aware that during the period from January 12, 1970, to March 7,

20

1970, the fixed screens were blocked off the bottom on several

21

occasions, and for almost a month period were never raised?

22

Are you aware of that?

23

A. I will have to study this. I have my notes there,

24

and if I can just refer to them.

25

A. All right. My notes say that on January 12 to some

sw9

1 time on the 14th of January, the fixed screens were up by  
2 about three feet; that from January 14 through January 22, the  
3 screens were removed. From January 22 to January 30, the  
4 screens were down most of the time. From January 31 on, the  
5 screens were down most of the time.

6 Now, that doesn't seem to agree with what you said.

7 Doesn't that indicate, for almost a month period  
8 they were never raised?

9 A. No, certainly not.

10 Q. All right.

11 A. Would it be helpful to put my notes on the black-  
12 board and see if we can work it out.

13 Q. If you wish to. We can probably find something  
14 that will enable us to reach agreement on this. I think  
15 probably a better way to do this would be to confer during the  
16 break.

17 CHAIRMAN JENSCH: Do you want to do that now?

18 MR. TROSTEN: Yes.

19 CHAIRMAN JENSCH: How long do you want? 15 minutes?

20 MR. TROSTEN: All right.

21 CHAIRMAN JENSCH: At this time, we will recess to  
22 reconvene at 10:20.

end 4

23 (Recess.)

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CHAIRMAN JENSCH: Please come to order.

MR. TROSTEN: Mr. Chairman, I would like to move along. We have to get some more documents to cover that last question, so I would like to move along with this line of questioning and then, if I can, return to Dr. Raney and complete the questioning on this later.

BY MR. TROSTEN:

Q Now, turning to the stipulation, page 5, are you aware that in the period from November 6, 1969, to January 11, 1970, the fixed screens were either in a fully raised or partially lowered position? Is that indicated to you by the stipulation?

MR. MACBETH: Would you read the question?

(Whereupon, the reporter read the pending question.)

THE WITNESS: No, it isn't.

BY MR. TROSTEN:

Q Do you see the "fall '69, fixed fine screens blocked in fully open position, December '69, fixed fine screens partially lowered, January 1, 1970, screens fully lowered."

A Now, ask the question again.

Q Are you aware in the period from November 6, '69, to January 11, 1970, the fixed screens were either in a fully raised or partially lowered position?

dor 2.

1 MR. MACBETH: Where did January 11 come in?

2 MR. TROSTEN: There is no January 11. If you  
3 are having problems with the premise, we will cover it in  
4 the next set of questions.

5 MR. MACBETH: I would prefer to use the dates  
6 in the stipulation, if you are referring to the stipulation.

7 MR. TROSTEN: We will confer with you later on  
8 this point, Mr. Macbeth.

9 I think under the circumstances, Mr. Chairman,  
10 we better defer this line of questioning.

11 CHAIRMAN JENSCH: Very well.

12 MR. TROSTEN: Until we have the data available.

13 Mr. Chairman, I would like to return, if I may,  
14 now, to the July 14 testimony and the matter of thermal  
15 effects.

16 CHAIRMAN JENSCH: Very well, proceed, please.

17 BY MR. TROSTEN:

18 Q Mr. Clark, I refer you to page 8 of your testimony.

19 A Excuse me a minute until I get it.

20 Q Yes.

21 A The page, please, again?

22 Q Page 8.

23 On page 8 and succeeding pages, I understand you to  
24 discuss the attraction of fishes to the thermal gradients  
25 created by the thermal plume in the Hudson River from the

dor 3

1 plant operations and the movements the fishes would take in  
2 relation to that thermal plume.

3 I would like to discuss the bases for your con-  
4 clusions in this respect.

5 A. Yes.

6 Q. Mr. Clark, what data indicate to you and support  
7 your conclusion that water of a delta T .1 degree F and 1  
8 degree F -- I am reading from the second full paragraph,  
9 the second sentence -- higher than ambients would extend  
10 over hundreds of acres of the Hudson River, attracting  
11 juvenile fish toward the plant?

12 I am focusing on the last phrase there. What  
13 data indicate to you that fish in the Hudson would actually  
14 follow the temperature gradients of the thermal plume to  
15 the hottest part, which you indicate in the next sentence.  
16 You say these fish would move up the gradients, seeking their  
17 preferred temperature, which would bring the fish into the  
18 region near the discharge point, where the high delta Ts  
19 are to be found.

20 A. Would you give me a minute to check this out,  
21 please?

22 Q. Yes, sure.

23 A. That comes from page 5973 of the testimony.

24 Q. 5973.

25 A. 5973, where Dr. Raney says it comes in contact

dor 4

1 with the plume -- referring to a fish -- "and it will move  
2 into the plume until it reaches the point where the tempera-  
3 ture basically is 10 or 11 degrees Fahrenheit higher than  
4 the ambient temperature. So that if the plume, indeed, has  
5 this magnitude of difference from 1 to 10 degrees, I would  
6 expect the greatest concentrations in winter to be in the  
7 warmer part of the plume."

8 Q Dr. Raney says, "It comes in contact with the  
9 plume and it will move into the plume until it reaches  
10 a point where the temperature is basically 10 to 11 degrees  
11 Fahrenheit." Is the ambient temperature?

12 A That has to do with white perch under winter  
13 conditions, I might add.

14 Q And this is the statement that you base your  
15 conclusion on, that the fish would move directly and follow  
16 a temperature gradient into the hottest parts, is that  
17 correct?

18 A No, that is not all. It is the general, growing  
19 knowledge of people in the field of thermal studies involving  
20 fish behavior and power plants and so on, coupled with other  
21 general experience, that temperatures are attractive to  
22 fish within a certain range, that they are extraordinarily  
23 sensitive to temperature, that they are able to perceive  
24 small gradients, and to move in a designated direction, the  
25 designated direction being moving toward somewhat higher

1 temperatures.

2 Q Mr. Clark, could there be other influences that  
3 would deter a fish from following a temperature gradient  
4 such as you describe on page 8 of your testimony?

5 For example, what about salinity or light or  
6 oxygen?

7 A Yes, I am sure that the fish in their natural  
8 habitat, under the influence of this plume, and feeling its  
9 attraction, and responding directionally, would also be  
10 influenced by other environmental factors, and other  
11 preferenda they have for other parameters.

12 Q Might this deter them from following it?

13 A Certainly.

14 Q Now, if a fish did follow the thermal gradient,  
15 would they be attracted away from the plant intakes to the  
16 discharge, so that they would not be present to be impinged  
17 at the intake?

18 A I would go as far as to say they would be  
19 attracted to the general vicinity of the plant site, along  
20 that part of the river where the Indian Point plant is  
21 situated. Their precise location would depend upon tide  
22 and other things we discussed yesterday.

23 Q We covered that yesterday, all right.

24 Does the tide affect movements of the fish in  
25 the river?



dor 6

1 A I would expect it to have a strong effect.

2 Q How about feeding patterns?

3 A Would that affect their movements?

4 Q Yes.

5 A Could you rephrase the question slightly so that  
6 I understand it?

7 Q Yes.

8 Would feeding patterns tend to influence the  
9 movements of fishes in the river, so that they would be  
10 influenced to move to a particular portion of the river?

11 A Oh, would they go somewhere to feed, some  
12 different place?

13 Q Yes.

14 A Sure.

15 Q Would this influence their movements so they  
16 might not tend to follow the thermal gradient?

17 A In the summer time when they are feeding heavily.  
18 Probably not in the winter at all when they are at reduced  
19 feeding.

20 Q Would you please produce that portion of  
21 Icthyological Associates bulletin 7 which concludes that  
22 juvenile white perch living in waters of temperatures in  
23 the range from 35 degrees Fahrenheit to 75 degrees Fahrenheit  
24 always prefer a higher temperature.

I believe you referred to this on page 7. Yes,

dor 7

1 you refer to the Ichthyological Associates Bulletin 7.

2 A. Page 46, Figure 9.

3 Q. What was the reference again?

4 A. Figure 9.

5 Q. And this figure demonstrates to you that fishes  
6 living in waters of temperatures anywhere in the range  
7 from 35 degrees to 75 degrees Fahrenheit always prefer a  
8 higher temperature?

9 MR. MACBETH: Mr. Chairman, I object to that on  
10 the grounds that the witness' testimony says that juvenile  
11 white perch, rather than fishes.

12 MR. TROSTEN: Excuse me, juvenile white perch  
13 always prefer a higher temperature.

14 CHAIRMAN JENSCH: Is that what the testimony  
15 says "always"?

16 MR. TROSTEN: Yes.

17 CHAIRMAN JENSCH: Very well.

18 THE WITNESS: I would have to do a little more  
19 digging into their paper, in response to finding a conclusion  
20 in the paper that says it as clearly as I have here, that  
21 interprets the results of this figure as clearly as I have.

22 The point of the whole thing is for any  
23 acclimation temperature, you find a preferred temperature  
24 that is higher.

dor 8

1 BY MR. TROSTEN:

2 Q Do you consider that the authors of the  
3 Ichthyological Associates reached the conclusion that juvenile  
4 white perch living in waters of temperatures from 35  
5 degrees Fahrenheit to 75 degrees Fahrenheit always prefer  
6 a higher temperature?

7 A To get to that specifically, I would have to  
8 look back through the bulletin. It is in this Figure 9,  
9 page 46, that presents the results that led to this  
10 conclusion.

11 And I would have to check in the paper to see  
12 if, to certify that their own text reaches an opinion of  
13 the kind I have expressed here, such that you would call it  
14 a conclusion.

15 Q Let me read you the conclusion here. On page  
16 20 and 21, they say:

17 "Conclusion: It is clear that estuarine  
18 fishes will actively avoid stressful thermal  
19 conditions, although the temperature that will  
20 elicit avoidance response is dependent on  
21 acclimation temperature, light level, salinity,  
22 and the size of the fish affected by the  
23 temperature increase."

24 "Most of these variables also have been found to  
25 affect temperature preference although generally, small

dor 9

1 increases in temperature are likely to be preferred."

2 A. Yes. That is saying the same thing.

3 Q. You think that is saying the same thing as what  
4 you said?

5 A. I used the word "generally," and they used the  
6 word "generally."

7 Q. Didn't you use the word "always" on page 7?

8 A. "Always prefer a higher temperature generally." It  
9 is just giving a little and taking it back, I guess.

10 Q. Does that bulletin indicate that -- excuse me.  
11 Does that bulletin indicate that a plus 15 to 20 degree  
12 Fahrenheit change did not produce mortalities and that  
13 apparent stress was not present, except in some cases at  
14 plus 15 degrees Fahrenheit?

15 A. That is -- much.

16 Q. Would you read the question back?

17 MR. MACBETH: I think there was also two  
18 questions there.

19 (Whereupon, the reporter read the record as  
20 requested.)

21 CHAIRMAN JENSCH: Is there some part of the  
22 bulletin to which you refer that indicates that position  
23 to you?

24 MR. TROSTEN: Yes, I think so. Let me give two  
25 references here.

1           One, I am contrasting Mr. Clark's characterization  
2 of the conclusions of the authors of Ichthyological  
3 Associates Bulletin 7, which appears in the first sentence  
4 in the first paragraph on page 7, with the data contained  
5 on page 37, Table 8, of that bulletin.

6           CHAIRMAN JENSCH: Now, if this is something he  
7 wants to review sometime during a break, it might save some  
8 time. As I understood it, he wanted to get the context  
9 of the bulletin in mind.

10          THE WITNESS: The first thing I have to do is  
11 understand the question.

12          It is the use of the negative in there that has  
13 me a little confused.

14          Did you say do I agree or do I not agree?

end 5

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BY MR. TROSTEN:

Q No, I looked at your sentence here that said:

"In thermal shock studies reported by the same authors, obvious thermal stress was shown for both white perch and striped bass, beginning with delta-T 10 degrees F. and becoming pronounced at delta-T 15 degrees.F."

Then I went back and looked at Table 8 that appears on page 37 and I don't think those data show what you say they show.

A All right.

Q So, why don't you look at that and we can move on.

A What page is Table 8 on?

Q Page 37, Table 8, summary of testimony shock studies with white perch.

The Chairman suggested perhaps you might look at it during the break and we can move on.

CHAIRMAN JENSCH: You can postpone this.

You should take your time to do that.

Will you proceed.

BY MR. TROSTEN:

Q Were not the testimony shock studies reported in Bulletin number 7, a direct transfer from ambients to higher temperatures?

Do you want to think about that, too? That would be

2  
1 fine.

2 When you are thinking about it -- let me ask you  
3 this question, which does not relate to the Bulletin 7.  
4 Would not the fish swimming along a gradient in the Hudson  
5 River gradually encounter the higher temperatures in the  
6 plume?

7 A. Yes, just like they did in the tank.

8 Getting back to your other question, when they  
9 were put in that experimental flume, it had a gradient  
10 temperature setup in it and the fish were supposed to swim  
11 up to the temperature they preferred, rejecting certain  
12 temperatures and being attracted to others.

13 So it was a gradient along the tank, by which a  
14 fish could move at any rate he chose, he could move an inch  
15 an hour or --

16 Q I think you are describing the temperature  
17 preference and avoidance studies and I was talking  
18 about the temperature shock studies. I believe that is  
19 correct.

20 A I am sorry.

21 Q You think about it and we will come back to these  
22 questions when you have had a chance to refresh your  
23 recollection on the bulletin.

24 A Fine.

25 Q I am referring now to page 8 of your testimony.

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1           What data supports your conclusion that the heated  
2 effluents itself must at all times tend to concentrate  
3 juvenile fish in the part of the flume with higher temperature?

4           Do you see that, the "all times" is underscored,  
5 the third line from the bottom of page 8.

6           A.     That is just based on the same aspect we were  
7 discussing a few minutes ago, which is that the fish always  
8 want to go to warmer temperatures, and they will go to the  
9 center of the plume, reinforced by Dr. Raney's statement of the  
10 same kind.

11          Q.     You were relying on the Raney testimony on page  
12 5972?

13          A.     I feel my idea is confirmed by him, he has had so  
14 much experience in the river with his tests and all.

15          Q.     Is it not true that the page I read you before  
16 from Bulletin 7, pages 20 and 21, indicate that this is only  
17 a general tendency? Those temperature avoidance studies indi-  
18 cate this is only a tendency?

19          A.     Anything they ever did anything with went to a  
20 warmer temperature.

21                 This figure that summarizes the experiments has  
22 to be qualified by statements like that. I don't see any  
23 qualifications on Figure 9. It just says this is the way  
24 it works. You put them at 40, they want to go to 48 or 50.  
25 Put them in 50, they want to go to 60, 62.



mm4

1 It doesn't say this is only what is going to  
2 happen part of the time.

3 Q What table are you reading from?

4 A The figure on page 46.

5 Q Oh, that figure you were referring to.

6 A Yes, the summary of the experiment.

7 It shows they always go to higher temperatures,  
8 if they are given an opportunity. From any acclimation  
9 temperature, they always want to go up. From any temperature  
10 in which the fish have been acclimated or adjusted and learned  
11 to live in and get used to, they will go to a higher  
12 temperature.

13 Q Excuse me, I am not a statistician, but isn't it  
14 true that these lines represent regression analyses and that  
15 this tends to show a relationship, but not an absolute relation-  
16 ship?

17 Isn't that true?

18 Is that what it means when it says calculated  
19 regression lines?

20 A It means the best fit to the data.

21 Q But does that mean that -- that doesn't mean every  
22 time you conduct an experiment, a certain result occurred.

23 A If that didn't happen, he should have said so in  
24 his paper, or someplace.

Q Isn't it true the authors of this paper said, and

1 I will repeat part of the quote I read before from pages 20  
2 and 21:

3 "Most of these variables also have been found  
4 to affect temperature preference, although generally  
5 small increases in temperature are likely to be  
6 preferred."

7 Does that sound like an absolute conclusion?

8 A It says that unless there are -- well, you can  
9 state it simply this way, with everything else equal, they  
10 will always go to the higher temperatures.

11 Q That is your characterization of it?

12 A Yes, that is the simplest way I can think to  
13 explain it to you.

14 Q Turning to page 9, what data exists which, in your  
15 opinion, support the conclusions that you express on page 9  
16 that the food supply of lower organisms is most disrupted near  
17 the plant?

18 CHAIRMAN JENSCH: Would you give us the paragraph  
19 and line?

20 MR. TROSTEN: The first three lines on page 9.

21 CHAIRMAN JENSCH: Thank you.

22 The sentence that starts back on page 8:

23 "The heated effluents itself must at all times  
24 tend to concentrate juvenile fish in the part of the  
25 plume with higher temperatures, the part close to the

mm6

1 plant where concentrations of chemicals are highest  
2 or oxygen may be reduced and where the food supply,  
3 (of lower organisms) is most disrupted by adverse  
4 internal and external effects."

5 MR. TROSTEN: And I am focusing on the phrase,  
6 "Where the food supply of lower organisms is most disrupted."

7 THE WITNESS: You want to know the data?

8 BY MR. TROSTEN:

9 Q I want to know the data that exists that support  
10 the conclusions that the food supply of lower organisms is  
11 most disrupted.

12 A That means that the plankton that go through the  
13 plant are killed, some, and that disrupts the food chain.

14 It also means as Massengill showed for Haddam  
15 Neck, that the benthic creatures around the bottom are also  
16 very greatly stressed.

17 That is two examples.

18 Q When you say who showed?

19 A Massengill.

20 Q Oh, yes.

21 First of all, let's take part of your conclusions  
22 piece by piece. With regard to the zooplankton that go  
23 through the plants that are killed, those are available to be  
24 eaten by fish, isn't that correct?

25 A Let me explain to you one of the problems about

mm71 that that I have recently encountered, and this is from the  
2 studies that Carpenter has done in Woods Hole working at  
3 Millstone.

4 He found a very great absence of copepods at the  
5 outlet of the plant that he was studying up there.

6 The discharge points, whatever you call it, anyway,  
7 the part behind the weir between the weir and the plant,  
8 is that called the stilling pond? Whatever it is, anyway, at  
9 the discharge, between the points of discharge and the position  
10 of this weir, there is an impoundment and he couldn't find  
11 the copepods anywhere in there, dead or alive, that were  
12 coming in the other end of the plant.

13 So, by pursuing his investigation to the ultimate, he  
14 discovered the copepods were all on the bottom. And that  
15 while the ones that went there right away, after being stunned  
16 and shocked, or whatever, causing them to fall down to the  
17 bottom, still appeared to be alive. They never left that  
18 pond.

19 So, they were injured, stunned, killed and never  
20 went out over the water and back into the bay water. They never  
21 got back out, in other words.

22 This is the kind of thing that can happen where you  
23 have any kind of a blockage of water, of the clean flow of  
24 water out of the discharge canal, like you might say with a  
25 wall of any kind.

1 Q I don't see how that answers my question.

2 A It certainly disrupts the food supply if all of  
3 the copepods are getting knocked out and none are coming out  
4 of the ends of the plant for them to feed on.

5 Q Who performed this study?

6 A E. J. Carpenter, Woods Hole Oceanographic Institute

7 Q Is this work published?

8 A No, work in progress.

9 Q How extensive an experimentation, what sort  
10 of sampling did he conduct of the outflow to determine this?

11 A I don't know, but I would be glad to supply the  
12 information. I was just attempting to use it as an  
13 illustration to explain to you what I mean by disruption of  
14 the food supply of lower organisms.

15 Q Let's assume that the organisms all didn't just  
16 plummet to the bottom suddenly and stay there, but they  
17 went out into the river and that they were stunned. Would  
18 they be available to be eaten by fish?

19 CHAIRMAN JENSCH: Are they in the heat preferred  
20 area, is that part of your assumption?

21 MR. TROSTEN: I guess so, yes.

22 CHAIRMAN JENSCH: If they are flushed out of the  
23 plume area, and the fish are in the plume area, what is your  
24 assumption in that case?

25 MR. TROSTEN: Under the assumption that the fishes

ty 2

1 are congregating in the plume area, because it is their  
2 preferred temperature, and that is where these zooplankton  
3 are coming out, yes, using that assumption.

4 THE WITNESS: I would agree that the critter  
5 coming out of there that is stunned, whether it be a fish or  
6 zooplankton or what-not, would, being stunned, loss of  
7 equilibrium and so forth, would fall easy prey to such  
8 predatory consuming creatures, scavengers, whatever was there.

9 BY MR. TROSTEN:

10 Q Or if he were dead, he would also be available; is  
11 that true?

12 A I am not sure of this, many of the fishes have to  
13 eat live stuff. They don't go around like a blue fish or  
14 striped bass and so forth, they don't go around scavengering  
15 up dead stuff out of the river, they eat live stuff.

16 Q With regard to those zooplankton that are not  
17 killed by passage through the plants they of course would be  
18 available to be eaten?

19 A Yes.

20 Q You are aware of the NYU studies. We have an  
21 open question here having to do with the extent to which the  
22 NYU data on entrainment effects on zooplankton affects  
23 your conclusion, so we will wait until we get to that.

24 A Yes.

25 Q Now you say on page 10 that these various responses

1 I am reading from the second paragraph, first sentence --  
2 "These various responses of juvenile fish have been observed  
3 in relation to the plume for Indian Point No. 1, a small  
4 plant."

5 Taking that sentence, which responses are you  
6 referring to?

7 CHAIRMAN JENSCH: Excuse me, may I understand the  
8 question? The question is to be considered in connection with  
9 the preceding paragraph, I assume.

10 Are you unable to identify what these various  
11 responses are from the preceding paragraph?

12 MR. TROSTEN: Yes, I am unable to identify by the  
13 structure of the sentence and the paragraph preceding what the  
14 phrase "These various responses" relates to.

15 THE WITNESS: I believe it refers only to the  
16 preceding paragraph.

17 BY MR. TROSTEN:

18 Q Only to the preceding paragraph? I see.

19 Now on page 10 you say "Experience at Indian Point  
20 No. 1 shows that juvenile fish" --

21 A Excuse me, I can't find that.

22 Q I am sorry, I can't find it myself. I will go on  
23 to another question.

24 On page 10 you say "The heated discharge of  
25 Indian Point Units 1 and 2 will be four times the amount of

1 Indian Point No. 1" --

2 A Excuse me, where are you?

3 Q The second paragraph, page 10, the second sentence  
4 "This more massive plume will serve to attract more juvenile  
5 fish to plant side than has occurred with only Indian Point  
6 No. 1 in operation."

7 What data demonstrate that the more massive plume  
8 of Indian Point 2 will serve to attract more juvenile fish to  
9 plant side than has occurred with only Indian Point 1 in  
10 operation?

11 A I think I can explain that best at the board, if I  
12 may.

13 Q Yes.

14 A (Drawing.) If you are to assume this is the  
15 Hudson estuary north, and this is the discharge port, let's  
16 take a flood tide situation where the heated water is  
17 coming out in some fashion such as this, these being the  
18 isotherms, and let's say that this is the situation under  
19 Indian Point 1, where the fish may find preferred temperatures  
20 throughout this area here, temperatures of their choice.  
21 And this is the intake area. And let's say it is this area.

22 Now if you increase the amount of discharge  
23 considerably, so that this spreads out in this fashion, you  
24 create this area wherein the fish find a preferred temperature,  
25 and increase the area in which they would inhabit, allowing



ty 5

1 more fish to live in the plume.

2 Q But isn't there a difference, Mr. Clark, between  
3 a situation in which you have created, and you can reasonably  
4 demonstrate there will be a larger area in the river where  
5 a temperature will exist that you can show would be attractive  
6 to fish under certain circumstances, and drawing the conclusion  
7 that it will attract fish to that area? That there won't be  
8 other influences that will deter them?

9 A I will accept that there will be other influences.

10 Q Now on page 9 you say "Experience at Indian Point  
11 No. 1 shows that juvenile fish are indeed attracted by heated  
12 plume, especially in winter, as indicated by the history of  
13 massive fish kills at Indian Points 1 and 2, which is detailed  
14 in other testimony."

15 Now I want to know, with regard to that, whether  
16 you disagree with the following statement that appears in  
17 Volume 1, page D(1)2 of the Compliance Division Report of  
18 Inquiry into Allegations Concerning Operation of Indian Point  
19 Plant at Con Edison. I will read it to you.

20 CHAIRMAN JENSCH: When you finish reading it, if you  
21 will hand the document to him, so he can get it in context.

22 MR. TROSTEN: Yes, I will.

23 CHAIRMAN JENSCH: Thank you.

24 THE WITNESS: I have the document here.

25 MR. TROSTEN: Do you have the document?

ty 6

1 THE WITNESS: Yes. Is it the summary conclusions?

2 MR. TROSTEN: No, I am reading from the report  
3 itself.

4 THE WITNESS: Page what, please?

5 MR. TROSTEN: Volume 1, page D(1)2.

6 THE WITNESS: Volume 1. That is the summary.

7 MR. TROSTEN: Excuse me, that is the summary. It  
8 is in paragraph 6. "It has not been possible to identify" --

9 THE WITNESS: Excuse me, I haven't found the page.

10 BY MR. TROSTEN:

11 Q It is page D(1)2 of Volume 1, the summary and  
12 conclusions.

13 CHAIRMAN JENSCH: What is the date of the document?

14 MR. TROSTEN: October 1971. It is the Report of  
15 Inquiry into Allegations Concerning Operation of Indian  
16 Point 1 Plant of Consolidated Edison Company (For Periods of  
17 August 1962 to June 1970), Prepared by the Division of  
18 Compliance, U. S. Atomic Energy Commission.

19 CHAIRMAN JENSCH: Thank you.

20 BY MR. TROSTEN:

21 Q The statement reads "It has not been possible to  
22 identify a single factor that explains the accumulation of  
23 large numbers of fish at Indian Point 1 and their impingement  
24 on the screens."

Do you disagree with that conclusion?

1 A I don't disagree with that conclusion?

2 Q I don't disagree that --

3 CHAIRMAN JENSCH: Excuse me, may I understand the  
4 question? Does he agree that the Compliance Section was not  
5 able to identify a single factor causing the accumulation of  
6 fish killed?

7 MR. TROSTEN: Well, the sentence says "It has not  
8 been possible to identify a single factor."

9 My question is really not does he agree it was not  
10 possible for the Compliance Division to find that out, but  
11 does he agree it hasn't really been possible. I am asking a  
12 somewhat broader question than does he strictly agree that the  
13 Compliance Division couldn't find it. I am just asking him  
14 whether he agrees it really hasn't been possible.

15 DR. GEYER: I am confused by the use of the word  
16 "a single factor."

17 Do you mean not one single factor or just mean  
18 factors and you can't pick out one?

19 MR. TROSTEN: I think what the Compliance Division  
20 meant by that is that they couldn't find one single factor, of  
21 many, that explained the accumulation. I believe that is  
22 what this means. Of course I don't really know.

End #7 23 Would you like to see it?

24

25

1 CHAIRMAN JENSCH: My only point is that if you are  
2 asking him to explain what is in the minds of the Compliance  
3 Section, there may be so many factors that they couldn't pick  
4 out one, and maybe if they worked on it a little longer, they  
5 could; I don't know.

6 MR. TROSTEN: I agree that it is tricky to ask  
7 people to figure out what somebody else had in mind. I am not  
8 really asking that.

9 BY MR. TROSTEN:  
Q Let me ask the question in this way, Mr. Clark:  
10 Do you agree that it hasn't been possible for anyone to  
11 identify a single factor that explains the accumulation of  
12 large numbers of fish at Indian Point 1 and their impingements  
13 on the screens. Do you agree with that?

14 MR. MACBETH: Could we try to get the ambiguity out  
15 by making it clear what you mean by a single factor.

16 MR. TROSTEN: I mean one single factor.

17 MR. MACBETH: You mean no one has been able to  
18 find any factor that influences the impingements or no one  
19 has been able to find the only factor?

20 MR. TROSTEN: The only factor.

21 THE WITNESS: The reason that they haven't been  
22 able to is obviously because there isn't one. I mean those  
23 fish are there for all kinds of reasons in that river, in that  
24 particular part of the river, doing whatever they are doing  
25 and the heat, as it serves to attract them, is doing so,

1 in combination with many factors.

2 As that same statement in this allegations thing  
3 continues to point up, including the warm water, the various  
4 factors that we are involved; they just didn't want to put  
5 their finger on one thing and say it was just the water or  
6 whatever.

7 BY MR. TROSTEN:

8 Q I agree. It is quite true the Division of  
9 Compliance and others who have looked into this problem have  
10 considered the possibility that the influence of recirculated  
11 warm water during a period when the intake and discharge  
12 structure was different may have been a factor.

13 The reason I am asking you this question is  
14 because of what I interpret to be a rather sweeping conclusion  
15 that you have expressed on page 9, where you say, "Experience  
16 at Indian Point 1 shows that juvenile fish are indeed  
17 attracted by the heated plume, especially in winter, as  
18 indicated by the history of massive fish kills at Indian  
19 Points 1 and 2 which is detailed in other testimony."

20 A Well, here is the way you think about it and work  
21 on a thing like that. You say to yourself, well, could heat  
22 attract fish to a plume, I mean is this a natural kind of  
23 reaction that fishes would have.

24 Then you look in the literature, talk to people  
25 who are supposed to know and you find, sure, you know, almost

1 wherever there are plumes from power plants, all throughout  
2 this country, you know, particularly in the northern segments,  
3 out in California, along the coast there, up in New England,  
4 everywhere we look there are fish being attracted by the  
5 thermal plumes.

6 Menhaden come into Northport and the plume  
7 in the spring, they are so thick the fellow told me you could  
8 practically walk on their backs, and they stayed in the plume.

9 There is a lot of scientifically collected data, in  
10 addition to these anecdotes, people studying fish catches in  
11 the plumes and all kinds of things. There is no question  
12 but this is what you expect.

13 Then you say to yourself, okay, if that is the  
14 general case, I would expect something like this to happen at  
15 Indian Point and then you try to find evidence of it happening,  
16 and you find nobody has been out there seeing what is in the  
17 plume, not even once, so you don't know that. So you say to  
18 yourself, well, if the heat is doing anything about attracting  
19 fish to plant-side, maybe they will show up on the screens  
20 and then there they are on the screens.

21 CHAIRMAN JENSCH: I wonder if I could understand  
22 your last answer. Is it your view, or tell me what is the  
23 evidence in this record, have there not been analyses of the  
24 number or kinds of special distribution of the fish in the  
25 plume?

mea-4

1 THE WITNESS: Not to my knowledge have I ever seen  
2 one bit of material or results of any tests or experiments  
3 carried out to see what kind of fish are living out in that  
4 plume.

5 CHAIRMAN JENSCH: They have just been collecting them  
6 from the screen.

7 THE WITNESS: Apparently, sir.

8 CHAIRMAN JENSCH: I see.

9 BY MR. TROSTEN:

10 Q Mr. Clark, are you aware of the fact that there  
11 have been fish collected at times when there was no plume?

12 CHAIRMAN JENSCH: Collected how? On the screens or  
13 net or what?

14 MR. TROSTEN: On the intake screens.

15 THE WITNESS: Yes, I am.

16 BY MR. TROSTEN:

17 Q So, there would be no heat to attract them there  
18 at that time, from the plant?

19 A Right.

20 Q The point I was trying to get to, Mr. Clark, is do  
21 you agree that there is a difference between drawing  
22 conclusions with regard to the attraction of fish to thermal  
23 plumes, a phenomenon which is well recognized by biologists,  
24 as I understand it, and concluding that experience at Indian  
25 Point 1 shows that juvenile fish are indeed attracted by the

1 heated plume, especially in winter, as indicated by the  
2 history of massive fish kills at Indian Point 1 and 2?

3 A Of course if we had some real data describing the  
4 conditions of life during the fish kill periods up there,  
5 where the fish were, how they lived, what they did, what  
6 their abundances and species were, if we knew anything  
7 about what is going on in front of the plant, and if we had  
8 experimental data to go with it, you could come up with an  
9 X plan agency which would be independent of the screen  
10 records.

11 Q Now, there have been efforts made to determine  
12 what is going on in front of the plant in terms of the  
13 phenomenon and things like that, isn't that right?

14 A I have seen nothing of it. I have seen no records  
15 or results or anything.

16 Q Mr. Clark, have you had an opportunity during last  
17 evening to find the portion of the testimony that dealt with  
18 Dr. Raney's testimony in June having to do with the migration  
19 pathways of the fish? Remember we were discussing that  
20 yesterday in relation to --

21 A Yes, you wanted me to find the place where it said  
22 they migrated over channels.

23 Q The part I was particularly interested in finding  
24 was this yesterday: I said, "Would you please look back at  
25 the June testimony and find the place where Dr. Raney



1 testified that the fish migrated over the channel, that is  
2 over the deepest part of the river."

3 A No, I didn't have a chance to get around to that.

4 Q If you could do that sometime before we close  
5 today, it would be helpful, I think.

6 CHAIRMAN JENSCH: Would you want to consider an  
7 earlier recess? I see Dr. Raney is here; I presume you  
8 would like to have some interrogation while he is here.

9 MR. TROSTEN: Yes. But I can move on easily to the  
10 main subject.

11 CHAIRMAN JENSCH: All right. My thought was an  
12 earlier or longer recess.

13 MR. TROSTEN: No, the best thing to do I think, I  
14 would like to do it while Dr. Raney is here, but if Mr.  
15 Clark could do it sometime during the luncheon recess, it  
16 would be very helpful.

17 THE WITNESS: Excuse me, I can give you the answer  
18 right now on page 5851 of the transcript, the last three  
19 lines.

20 BY MR. TROSTEN:

21 Q Five-eight-five-one.

22 A Where he says, "In my experience, based upon  
23 extensive gill netting of over 35 years, they are mostly  
24 found in or near the channels during my drags."

25 Q That is correct. Now, did Dr. Raney at any point

1 indicate that the channel, that he defined the channel as you  
2 have defined the channel, that is the deepest part of the river?

3 A No, he didn't define channel there.

4 Q So, your definition of the channel is simply your  
5 definition of the channel.

6 A I think you would find a natural amount of  
7 variation in different people's definition of a channel.

8 Q But Dr. Raney at no point indicated, did he, that  
9 the migration pathway -- and this is the important point,  
10 really, not how different people define channels, because I  
11 believe if you check the Corps of Engineers, U.S. Coast and  
12 Geodetic Survey, everybody has a different view -- but Dr.  
13 Raney at no point indicated the migration pathway was as you  
14 indicated, over on the east side of the river next to the  
15 plant?

16 A No, that is inferred from two of the statements.  
17 But I think that in my little figure there, where I tried to  
18 show, just that little diagram, I think figure 4, I think  
19 that is a fair representation over the top of anybody's view  
20 of what the channel might be. I haven't reduced that down  
21 just to the center part of the channel.

22 As you see where the "A" is and the dotted line  
23 to the left, I have included most of what anybody might  
24 consider to be the channel.

25 Q I have to disagree with that, Mr. Clark, because

1 there is testimony in the record here, including your own  
2 testimony on page 11, which indicates that the fish migrate in  
3 the upper 20 feet of water, which indicates quite clearly to  
4 me that the fish migrate all across the river.

5 I believe if you look back at the overall text of  
6 the June testimony, you will see that there is testimony  
7 that indicates that the fish do migrate all over the river.  
8 And I further believe, am led to believe, that it is not  
9 that clear, that no one has really defined the point in the  
10 river where the fish migrate. That is why I take exception to  
11 your definition of it in these two figures.

12 A Dr. Raney said with 35 years of experience in that  
13 river, with gill netting, excuse me, his conclusion is that  
14 fish mostly migrate in the channels. It couldn't be clearer.  
15 It just says point blank in the channels, in or near the  
16 channels. I interpret that to mean if you take an area  
17 which pretty fairly covers the channel area, there you have a  
18 lateral confinement of some kind, and if you take his other  
19 statement, it says the top 20 feet, and you get a horizontal  
20 confinement, you have kind of got boxed in the area where you  
21 generally expect the fish to be migrating.

22 CHAIRMAN JENSCH: Excuse me a moment. I think you  
23 mentioned the Corps of Engineers and the Coast and Geodetic  
24 Survey having different definitions of channels. I wonder if  
25 sometime during the course of the hearings you could give us

mea-9

1 those definitions, so we can see whether this is fairly  
2 consistent or whether we should move the channel a foot or  
3 two east or west or up or down.

4 MR. TROSTON: All right, let me make a note of that

5 CHAIRMAN JENSCH: In fact, if you could get it  
6 before the witness leaves the stand, we could relate it to  
7 his testimony.

8 BY MR. TROSTEN:

9 Q Let's turn back to the substantive part of Dr.  
10 Raney's testimony where he was discussing where the fish  
11 migrate. I am turning to page 5843 of the testimony. I will  
12 read this to you.

13 Mr. Macbeth asked Dr. Raney: "Could you tell us where  
14 across the river alewife migrate?"

15 Answer: "On a given night you might find alewife at any  
16 given points in the river but the larger number of them that  
17 are actually migrating, rather than milling around, would be  
18 found in or near the channels. At night they would be  
19 moderately close to the surface. This is the indication we  
20 get from gill net sets."

21 CHAIRMAN JENSCH: Is that near the surface still  
22 in the channel area? Did he say that. I didn't quite get  
23 it.

24 MR. TROSTEN: He said, "they are actually migrating  
25 rather than milling around, would be found in or near the

1 channels. At night they would be moderately close to the  
2 surface."

3 CHAIRMAN JENSCH: Thank you.

4 MR. TROSTON: On page 5826 and 27, Mr. Macbeth  
5 asked the following question: "Could you describe for me the  
6 place in the water column in which the alewife migrates? Is  
7 there a particular part of the water column?

8 Answer, Dr. Raney: "The alewife, blueback herring  
9 and American shad on the upstream migration to spawn normally  
10 move at night and normally move fairly close to surface waters  
11 On the downstream migration in the fall at the end of the year  
12 they move both day and night."

13 So, the point is, I believe, that these fish  
14 migrate near the surface of the water as you indicate on page  
15 11 of your testimony.

16 THE WITNESS: Yes. And also in the channel.

17 BY MR. TROSTEN:

18 Q All right.

19 A We can get that clarified. The point I think that  
20 Dr. Raney and I agree on is the idea that fish have two modes,  
21 one is the migratory mode and the other is kind of spreading  
22 around, feeding, spawning, whatever they are doing at the  
23 time. But when they are on one of these determined migration  
24 courses is the time we are talking about here with the surface  
25 and over the channel, not when they spread out to feed or that

1 Q All right, I will move now to another subject.  
2 This is the subject of the contribution of the Hudson River  
3 to the mid-Atlantic fishery population of striped bass.

4 Mr. Clark, would you get out your 1968 and 1969  
5 papers?

6 A Would that be the striped bass migration?

7 Q Yes, the 1968 paper on seasonal movements of  
8 striped bass and the 1969 paper that you prepared with Susan  
9 Smith.

10 CHAIRMAN JENSCH: Do you want to confer as to the  
11 working papers you would like to have available for interroga-  
12 tion, take a few minutes recess now?

13 MR. TROSTEN: All right.

14 CHAIRMAN JENSCH: At this time let us recess in  
15 this room to reconvene at 11:30.

8148  
End 8

16 (Recess.)  
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RA #10 1  
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CHAIRMAN JENSCH: Please come to order.

2 Mr. Clark has resumed the stand. Is Applicant  
3 ready to proceed?

4 MR. TROSTEN: Yes.

5 CHAIRMAN JENSCH: Will you proceed?

6 BY MR. TROSTEN:

7 Q Mr. Clark, on page 4 of your testimony of  
8 October 30, you say:

9 "In tagging studies we have shown that Hudson  
10 breed striped bass furnish a significant portion of the  
11 Atlantic Coast striped bass fishery."

12 Do you see that? The first paragraph on page 4?

13 A Yes, down near the bottom of the page.

14 Q Yes.

15 Now the reference you give for this statement  
16 is your own paper entitled "Seasonal Movements of Striped Bass  
17 Contingents of Long Island Sound and the New York Bight,"  
18 published in the transactions of the American Fisheries  
19 Association, Volume 97, Number 4, October 1968, is that  
20 correct?

21 A Yes.

22 Q What do you mean by New York Bight?

23 Do you mean by New York Bight when you use --  
24 you didn't actually use that phrase in that sentence, excuse  
25 me. I was going back to the summary of your paper.

1 But you said in the abstract of your paper:

2 "The Hudson River is shown to be a major spawning  
3 river and source of recruitment of striped bass  
4 populations of Long Island Sound and the New York  
5 Bight."

6 What do you mean --

7 A. What page is that?

8 Q. It is the first page of your paper.

9 A. 320?

10 Page 320?

11 Q. Yes.

12 Do you presently adhere, when you use the term  
13 "New York Bight" -- and I am pretty sure you have used that  
14 term elsewhere in your testimony here, I am not sure I can  
15 remember where -- but do you adhere to the definition that  
16 is contained in the second column on page 320, where you say:

17 "The New York Bight is the coastal area from  
18 Montauk Point, Long Island to Barnegot Bay, New  
19 Jersey?"

20 A. Yes, that would include the designated areas 7,  
21 8, 9, 10, 11 and 12.

22 MR. MACBETH: Are you referring to a page of your  
23 paper there?

24 THE WITNESS: Yes, shown on any one of the maps  
25 from Figure 4 on.



mm3 1

MR. TROSTEN: Would the Board care to have a copy of this paper to look at?

CHAIRMAN JENSCH: Is there any objection?

MR. MACBETH: No objection.

MR. KARMAN: No objection.

MR. TROSTEN: I am handing the Board a copy of Mr. Clark's 1968 paper.

BY MR. TROSTEN:

Q 7, 8, 9, 10, 11 and 12 is that what you said?

A Yes.

Q 7 being the part that ends just south of the Rhode Island line, or begins south of the Rhode Island line?

A Yes.

Q And 12 extends down somewhere north of Barnegot Bay, is that about right?

A Yes, number 12 ends at the Barnegot Inlet

Q Okay.

Now, I am asking you about the New York Bight simply because I frankly am somewhat confused by terminology that has been used. I think it would be well if we could straighten this out.

Would you say the term New York Bight is a term that is defined elsewhere?

Is it a uniform term?

A Sometimes -- well, I think I can clarify this.

mm4

1           Generally, when the word New York Bight is used,  
2 it refers to the indented area of the coast bordered to the  
3 north by Long Island and bordered to the west by the more  
4 or less straight part of the New Jersey coast, before the New  
5 Jersey coast bends away to the west.

6           Q       All right.

7           By the way, let me put up a map there, because I  
8 think it would be helpful.

9           When you say that it is sometimes used, the way  
10 you describe that, the area bounded on the north by the  
11 western end of Long Island and on the south by the shore of  
12 New Jersey before it turns south, is that right?

13          A       If you look at Figure 6, as an example, you see  
14 just to the right of the initials NJ, meaning New Jersey,  
15 you see to the right of that Barnegot Bay. Barnegot Bay  
16 extends down past that line that is a little bit above and to  
17 the right of New Jersey, and you see that concentration of  
18 red dots --

19          Q       Yes.

20          A       Then there is a river. That area where the river  
21 lies behind the coast almost due east of New Jersey, that  
22 would be the maximum southern extreme of any area called the  
23 New York Bight in any way I have heard it used.

24               And at the north, Montauk Point would be the  
25 farthest to the east that I think anyone would use the

mm5

1 expression New York Bight. Although there are smaller defini-  
2 tions, such as from Shinnecock INlet, indicated by the black  
3 line coming across Long Island, above the number 10, and  
4 where those four red dots are. That black line comes to  
5 Shinnecock Inlet.

6 Q So you would say that the largest definition would  
7 be from Montauk Point down to the area off the New Jersey  
8 coast --

9 A Right.

10 Just about due east of where the NJ is.

11 Q All right.

12 I have in front of me a letter, and I am just  
13 reading from it, it is from the U. S. Department of  
14 Commerce, National Oceanographic and Atmospheric Administration,  
15 addressed to Ichthyologic Associates, and they say in the  
16 letter:

17 "We are concentrating on a program of  
18 identifying marine data holdings relevant to the  
19 New York Bight, which comprises the coastal and  
20 estuarine environment from Point Judith, Rhode  
21 Island to Cape Henlopen, Delaware, extending seaward  
22 to the edge of the continental shelf and landward to  
23 the limit of tidal effects."

24 Have you ever heard such a definition before?

25 A That is all right.

mm6

1 I have never known anyone to go all of the  
2 way down to Delaware Bay. Point Judith, Rhode Island would  
3 be a little off to the east of Montauk Point. It would be  
4 where that first red dot is on Figure 6, by that little  
5 promonotory of land.

6 Q Yes. I see it.

7 A So that what they have done is slightly expanded  
8 what I have always considered to be the appropriate defini-  
9 tion of the New York Bight area.

10 Q They also say landward to the limit of tidal  
11 effects tht would carry it, as far as the Hudson River is  
12 concerned, all the way up to Albany.

13 A Up to the dam, yes.

14 CHAIRMAN JENSCH: I didn't quite get the  
15 definition.

16 Is this something you are now proposing to define  
17 as the New York Bight, is this a new approach to it or  
18 something that has been established previously?

19 MR. TROSTEN: To the best of my knowledge, it has  
20 not been established previously.

21 I assume Mr. Clark is correct when he defines the  
22 New York Bight. I am just trying to get some information  
23 in the record, because I think there is a great problem with  
24 terminology here that I have discerned.

25 CHAIRMAN JENSCH: I had an impression from your

mm7

1 reading of the letter from the Department of Commerce, that we  
2 were kind of making a new run at the whole thing.

3 DR. GEYER: What is the definition of the word  
4 bight?

5 MR. TROSTEN: I think it means bay, inlet, or  
6 gulf. I thought when I first read Mr. Clark's word, before  
7 I read his paper, he was really just talking about what I  
8 would call the Lower New York Bay. But he does not mean that  
9 he means the area he has just described.

10 DR. GEYER: But not the Hudson River, certainly?

11 THE WITNESS: The NOAA definition, obviously,  
12 is meant to include some optional area of theirs, so they can  
13 have a New York Bight program that extends from where they  
14 want to where they want.

15 But in any formal context of the use of the word  
16 New York Bight, it is talking about a coastal situation,  
17 talking about water out on the coast and the fish in it,  
18 from Long Island down to south Jersey, near the coast.

19 I have never heard of the New York Bight area  
20 extending, or anybody using it to extend into the ocean  
21 that far. But it is a definition that is quite useful in  
22 understanding that you are somewhere in the ocean off this  
23 coast, and in that indentation of the shore.

24 I have never heard anybody, any several guys get  
25 together and say, okay, now we will have one definition of the

mm8

1 New York Bight.

2 BY MR. TROSTEN:

3 Q Now, in your paper on page 4, the October 30  
4 testimony, rather, you say:

5 "We have shown the Hudson breed striped bass  
6 furnish a significant portion of the Atlantic Coast  
7 striped bass fishery."

8 What do you mean by Atlantic Coast?

9 A Well, I would mean to include in that  
10 all the striped bass caught in the Atlantic Coast of the  
11 United States.

12 Q Atlantic Coast of the United States?

13 A Yes.

14 Q Extending from Maine to Florida?

15 A Yes.

16 Q What do you mean by the term "significant  
17 proportion" that you use in that sentence?

18 A It means a measurable or substantial, measurably  
19 substantial part of the stock.

20 Q Measurable or substantial?

21 A Right.

22 Q They are quite different words, I think.

23 A I think I said, I don't know how good this is,  
24 measurably substantial. Sufficiently so that there would be  
25 no question about being able to detect its influence within

mm9

1 normal statistical variations you get in sampling.

2 In other words, if you found it was say 32  
3 percent of the Atlantic Coast, under normal controlled  
4 sampling, that would be significant.

5 But if it were, say you were talking about something  
6 that is only 4 percent, that would get lost in the error of the  
7 sampling.

8 Q So you would say the Hudson River contributes  
9 more than 4 percent of the Atlantic Coast striped bass fishery?

10 A Excuse me, I have to be a little careful. I did  
11 not mean to pin that down, to suggest that 4 percent was the  
12 figure I was working from.

13 My experience generally in estimating fishery  
14 populations within the data that we usually work for would  
15 suggest that you have to have something between 10 and 20  
16 percent of a real variation in order to detect it against  
17 the background of random variation in sampling error.

18 So, if it would help you, I could say that  
19 something above 10 percent.

20 Q So, in your opinion, the Hudson River  
21 contributes, the Hudson River spawn striped bass -- when you  
22 say Hudson River bred, you mean Hudson River spawned, is that  
23 correct?

24 A Fish that are spawned, yes, that are spawned  
25 in the Hudson. And then grow up and come out to the outer

10. 1 coast.

2 Q When you say Hudson bred striped bass furnish  
3 a significant proportion of the Atlantic Coast striped bass  
4 fishery, I should understand you to be saying that Hudson  
5 River spawned striped bass contribute something in excess of  
6 10 percent of the striped bass that inhabit the Atlantic  
7 Coast from Maine to Florida?

8 A That would be the very farthest I would dare go  
9 now, with the kind of data we have. We don't have good hard  
10 statistical data on the population composition and the source  
11 of origin of striped bass along this coast.

12 It is something that we have, for some reason,  
13 ignored doing over a lot of years. We just haven't got the  
14 kind of data we need.

15 And so, any time you talk about any part of the  
16 population X, in terms of the whole population, you are  
17 estimating.

18 For example, I can show you the kind of thing that  
19 I am working from on page 340 in this, Table 4. You will see  
20 that from all of that tagging we did, the high proportion of  
21 fish tagged all over that area in the spring -- the spring is  
22 when they spawn, so you go and look and see where the  
23 fish show up in the spring, when you would expect them to be  
24 in the river spawning, and you find 52 out of 78 were in the  
25 Hudson River. That is something on the order of better than



mm11

1 60 or 65 percent, something like that, of the spawning of those  
2 fish that we tagged took place in the Hudson.

3 Q There were 52 recaptures in the spring season of  
4 those fish that you tagged, right?

5 A Yes.

6 Q I see.

7 Now, let me ask you a question.

8 In the Evening News, Newburgh, Evening News of  
9 December 14, 1972, you were quoted as saying:

10 "If ConEd is allowed to operate this plant, you  
11 can kiss goodbye to one half of the striped bass on  
12 this coast."

13 Is that a correct quotation of what you said?

14 A I don't think so.

15 I mean, I don't think I said kiss goodbye.

16 CHAIRMAN JENSCH: Kiss what -- you didn't make  
17 that statement?

18 THE WITNESS: I don't generally use that  
19 expression. I might have said, you could say goodbye.

20 Anyway, let's look at it. What does it say?

21 BY MR. TROSTEN:

22 Q Did you say:

23 "If ConEd is allowed to operate this plant, you  
24 can say goodbye to one half of the striped bass on this  
25 coast?"

mm12

1 A I think I meant to say one half of the fish produced  
2 in the Hudson River. I mean there are estimates of up to 50  
3 percent of the fish being killed by the plant.

4 Q Excuse me. I don't quite understand that. Could  
5 you repeat that?

6 A If you are talking to a reporter, they tend to  
7 get things confused.

8 Q Yes.

9 A And I would say it is quite, it is very definitely  
10 possible, although I don't remember my words, that I would  
11 have said 50 percent of the Hudson River fish, you can say  
12 goodbye to them, because they will get killed in the plant.

13 Q Then you don't think you mentioned anything about  
14 the coast?

15 A I talked about the coast, I am sure, because, you  
16 know, the thing focussed on Phil Goodyear's new finding  
17 showing that the Hudson supplied almost all of the fish in  
18 the middle Atlantic, this kind of thing, and that is what they  
19 were interested in.

20 But, if I made that statement which I don't  
21 think I did, I certainly wouldn't support that now, with  
22 that number. I mean, I wouldn't say 50 percent.

23 CHAIRMAN JENSCH: Are you going to call the reporter  
24 to testify?

MR. TROSTEN: No.

mm13

BY MR. TROSTEN:

Q Now, if we look at your 1968 tagging study, or rather the tagging study that was reported in your 1968 paper is what I mean, and see -- let's look at that and see what we can determine about it concerning the Hudson River's contributions to the Atlantic Coast striped bass fishery.

That is what I would like to do with you now.

A. Yes.

end 10

1 Q Now, was the striped bass tagging that was reported  
2 in your 1968 paper carried out by trained fisheries  
3 biologists?

4 A No.

5 Q Who did the tagging?

6 A Sport fishermen.

7 Q How are these people trained to tag? Could you  
8 tell me how they did that?

9 A They are given verbal and written instructions  
10 on where and how to put the tag in, how to take care of the  
11 fish.

12 Q They are given the tags and they attach the tags?

13 A Yes, and they have a little card, and everytime  
14 they tag a fish, they send the card in and it gives the  
15 information on it.

16 The information they supply on the cards is exactly  
17 the same information that all of us have to go on, which fisher-  
18 men send in when they catch these fish, when they return them.

19 Q Now, if the program was carried out by sportsmen, and  
20 not trained fisheries biologists, how accurate would you  
21 say that the tagging records were?

22 A I would say they are equally as accurate as any  
23 tag return records that we have any place.

24 You see, when you tag a fish and you make a record  
25 of it, and you let it go, then some fisherman catches it;

1 you get a record from him of where it ended up.

2 So you have two records, one that says this fish  
3 was so long, it was tagged in such and such a place, and so  
4 on. The other record says the fish was such and such a size,  
5 and it was recaptured at such and such a place.

6 Now, for all of the years we have been doing this  
7 stuff, we have been depending on commercial and sports-  
8 fishermen to turn in these records of where the fish were re-  
9 captured. We always accept what they say, unless there is  
10 something really weird about it.

11 We accept if they say on the 14th of February  
12 in Barnegot Inlet, I caught a 22-inch striped bass, it weighed  
13 X-pounds; we mark that down and write our papers and make  
14 our bid discoveries on that.

15 This is the same thing you are doing, except that  
16 the people who are working with you to tag the fish are likely  
17 to be more involved, more responsible about data records that  
18 they write down when they tag the fish than just the average  
19 casual guy who got the tag on the other end and filled out  
20 a report and sent it in, because they have already had a  
21 chance to be indoctrinated into scientific approaches to  
22 this thing, indoctrinated into the importance of conservation  
23 and so on.

24 So these guys you have tagging, I would guarantee  
25 you, do a more responsible job than the average guy that

1 recaptures the tag and sends it in.

2 Q Do you think that the fishermen who do the  
3 tagging always estimate the length of the fish correctly?

4 A Here again I would say that they will do it more  
5 correctly than the average guy that recaptures a tag and  
6 sends it in. I know what you are getting at, and I really  
7 want a chance to explain this with a simple diagram --

8 (Witness drawing on blackboard.)

9 The system of fish-tagging is that you have a fish  
10 tagged and then later on you have a fish recaptured. You  
11 have a record of the tagging of the fish and for those that  
12 are ever recovered and get into our scientific records and  
13 in our papers on fish migrations, you have a record of the  
14 thing when it comes back.

15 Now, when this tagging is done by professional  
16 or amateurs, most of the returns come in from amateur people,  
17 run-of-the-mill commercial and sports fishermen, who happen  
18 to get the tag, read what it says on it, and try to send it  
19 back to the laboratory for the reward they get, or  
20 if they don't get a reward, at least they are doing a public  
21 service.

22 So those are on the recaptured fish.

23 Now, on the fish when they are tagged, you also  
24 have a record. In the case of the one that I am working on,  
25 the original record of the tagging is done by the sport

1 fisherman, not a scientist, and this is different from  
2 the kinds of taggings that are done by research personnel.

3 But what I am trying to stress is that the data are  
4 no better than the information that you get on their  
5 recapture. The data you have are no better than the  
6 quality of the records that you get when they are  
7 recaptured. What I am saying is, I would expect these records,  
8 the tagging, to be better, more responsibly done, more accurately  
9 done, than the recapture.

10 So in this particular tagging, the quality of the  
11 tagging records is as good or probably better than the  
12 quality of the recapture records.

13 Q Excuse me.

14 I just am hearing what you say, and it strikes me that  
15 in a situation where you have the normal kind of scientific  
16 tagging, where you have trained research people doing the  
17 tagging, and then you get the recaptures from casual sports-  
18 men and so forth, you could assign a certain error to the whole  
19 situation, as a result of the type of recapture work that is  
20 done.

21 Maybe they might not know where it is picked up,  
22 they might make errors and so forth. So there is a certain  
23 error associated with the whole process.

24 A Yes, sir.

25 Q When you have the sort of tagging and recapture

1 study you have described, you not only have the  
2 error we just mentioned, you have another error, which is the  
3 greater error associated with the tagging by untrained people

4 Would you agree with that?

5 A It is all speculative, and there is not any, the  
6 slightest bit of evidence any place of the degree of error in  
7 these experiments that is entrained into the work by any  
8 lack of accuracy by amateurs.

9 I have seen no statistical analysis of this factor.

10 Q Well, it doesn't strike me, or does it strike you  
11 -- it doesn't strike me, I should say, that this is the sort  
12 of thing you would have a lot of statistics on. It doesn't  
13 strike you just as a matter of common sense that this  
14 would be the case?

15 A I think Dr. Raney and I both have looked into this  
16 and both decided there was sufficient accuracy in these kind  
17 of things so we both published what I think are important  
18 contributions based upon angler tagging.

19 Q Wouldn't you say there is a difference between  
20 taking what you have got, for whatever reasons you got it,  
21 and going ahead and publishing conclusions, because that is  
22 the best data you have got, and then assigning a certain  
23 measure of accuracy to those conclusions, or extrapolating  
24 from those conclusions to something else?

25 Would you say there is a difference between those



1 two processes? After all, there are limitations on  
2 scientific research. You can't spend as much money on these  
3 things as you think might be necessary. But you do what you  
4 can.

5 Now isn't there a difference between taking what  
6 you have got and publishing the scientific findings on the  
7 basis of that, and then drawing conclusions that ascribe a  
8 certain measure of accuracy to it?

9 A I can explain that best by saying that any one  
10 of us research guys gets into two kinds of situations:  
11 one where your conclusions are more or less voluntary; another  
12 where you are asked to give your best judgment about a  
13 situation upon which you have to rally, then, the very  
14 best extrapolation or very best generalization that you can  
15 make from your data.

16 If you are strictly, if you are in a situation  
17 where you are not required or requested in any way to  
18 try to make a conclusion from your experiments, then you can  
19 be as absolutely reserved as possible.

20 But there are times, particularly in hearings like  
21 this, where important issues are at stake, that we get  
22 forced to make the very best generalized conclusions we can  
23 from our specific studies.

24 Q In other words, this is something that where  
25 the people who are responsible for deciding this just have

1 to look at the facts and draw the best conclusions they can  
2 on the basis of what those facts are?

3 A Yes, do what you can.

4 Q Now, do you think that, just to turn to one  
5 further question about the level of accuracy you would ascribe  
6 to the tagging effort in 1959 and 1963 study, do you think  
7 the fishermen who were doing the tagging were always able  
8 to correctly locate the specific place where the fish were  
9 tagged?

10 A You mean did they know where they were?

11 *a*  
*@* Yes. Specifically where?

12 How do you know exactly where you are when you  
13 are out fishing? I have done a little fishing; but how do  
14 you know exactly where you are?

15 A If you are out in the middle of the ocean fishing  
16 for tuna, it would be difficult. But striped bass live  
17 along close to the shore. You are always close enough  
18 to the shore to know where you are in relation to the shore.

19 Q What do you do, just look over there and sort of  
20 figure out where you are?

21 A You do it sort of the way Columbus got around the  
22 world, I guess; you do it by navigation principles the best  
23 you know them.

24 These guys know where they are when they are out  
25 in the boat; they are not likely to end up in Portugal.

1 It is just navigation.

2 Q Do these fellows carry navigational instruments on  
3 their boats?

4 A Sure, they have depth sounders, they know the  
5 depth. They have compasses so they can sight and see the  
6 shore. They see some vital point, they find it is  
7 a bearing of 262-1/2 degrees from it; they look at the chart  
8 and see if that is that bearing. I am at 22 feet depth.  
9 I know I am here.

10 They also run time and distance. They know where  
11 they are. There are buoys all over the place out there, too.

12 Q I am not really familiar with the tagging effort  
13 here.

14 Were these casual fishermen going out and fishing?  
15 What sort of boats were they in?

16 A No, I don't recall of the top of my head what the  
17 proportions are; but many, a large number of them, just  
18 do it right off the beach. They walk down, drive down to 125<sup>th</sup>  
19 street, to the end, to the jetty; park their car, and walk  
20 out on the jetty and cast out and catch a fish and put a tag  
21 on it.

22 They know where they are.

23 Q The fellows out in boats, do they carry logs with  
24 them and log their movements, take depth soundings, make  
25 sure they know exactly where they are?

Feb 9

1           A     The guys who don't know where they are do that.  
2     The guys who know where they are don't have to bother with it  
3     they just keep track of themselves on their chart. Like  
4     most of the guys are experienced fishermen who have been  
5     out fishing time after time, and they know if they run  
6     southwest from a certain point for 22 minutes, they will end  
7     up at a certain place, the same as you know how to get to the  
8     local drug store; it is just simple.

9           Q     Do they stop fishing and take note of where they  
10    are, make a note in their log, and tag the fish --

11          A     In relation to the tagging, I can really simplify  
12    it for you. When they tag the fish, at that moment the fish  
13    is tagged they make a note of where they are. They either  
14    write it down on the card at the time or make a note on a  
15    piece of paper, or make a note in their head where they are.  
16    They tag the fish and let it go and keep on fishing.

17                Now, if the guy is going to tag several fish that  
18    day, we would have to keep track as he went along, so he  
19    wouldn't get them mixed up.

20          Q     So did they keep logs of exactly where they were,  
21    the time of day, the place and write this down and submit  
22    this to the people, or do they just recall this and submit it  
23    to you?

24          A     No. The tag records don't ask for all that. They  
25    just say where were you, what day, what time, you know,

1 like where were you.

2 The tag records don't ask a guy for an itinerary of  
3 what he did all day or all week or anything.

4 Q Did they keep -- so they weren't required to keep  
5 a log?

6 Do you know whether any of them did keep logs of where  
7 they were when they tagged?

8 A Some do. Some don't. I don't have any knowledge  
9 of that.

10 Q Let me ask you this:

11 How do they identify the place where they were?

12 Did they say I was off the big rock boulder, something like  
13 that?

14 How did they identify it?

15 A By geographical names. Sometimes the approved  
16 geographical names, and sometimes by locations known  
17 principally to people in the local area.

18 Q Do they identify it by meters and bounds or  
19 longitude and latitude?

20 A They say 2-1/2 miles south of Harboe Buoy No. 14,  
21 or they would use on the Beacon Street breakwater. Whatever  
22 a fisherman normally would tell another fisherman where  
23 he was when he was fishing.

24 That is the way they would work on this.

25 Q If you look at some of the tagging studies there

1 are these various release points that appear on Figure 1,  
2 page 322. If you are off the south shore of Long Island,  
3 somewhere out in Naussau County, how did you identify where  
4 you are?

5 What do you do? Just use a local name and say, I  
6 was off -- somewhere off Rockaway Beach at such and such a  
7 time? How do these fellows actually identify these places?

8 Q I am trying to think of some special way they  
9 might do it which would satisfy you, because it is obviously  
10 important to you; but I can't think of any special way.

11 I mean, there is no mystique or special language  
12 they have. It is just like if your kid came home from a  
13 ballgame and you said, where did you play, and he said I played  
14 at Ebbets Field, or I played at 14th and E Street diamond  
15 or something.

16 Q Did these reports, these cards that were mailed  
17 in -- they filled out a card and mailed it in; is that  
18 right?

19 A Yes.

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1 Q Did they come into Sandy Hook Marine Laboratory  
2 and you or your staff looked at the reports that came in and you  
3 had a chart and you said this guy was here, and you filled  
4 a point in on the chart? Is that pretty much how it was done?

5 A Yes.

6 Q In other words, you didn't talk to these people to  
7 see where they were, you just took their cards and they wrote  
8 something down where they thought they were, and then you  
9 identified it on your charts?

10 A Yes, then we scrounged around with various charts  
11 and maps and stuff until we are satisfied we found the right  
12 place.

13 CHAIRMAN JENSCH: Are you going to leave that subject?

14 MR. TROSTEN: For a moment, yes.

15 CHAIRMAN JENSCH: In this wide open ocean, do they  
16 drop in one fish at a time or do they tag one after another  
17 and drop maybe 10 or 12 at one location, and maybe the boat  
18 is kind of idling along, keeping into the wind a bit, is that  
19 reasonably accurate for the purposes of the tagging program as  
20 you understand the tagging program to be?

21 THE WITNESS: Yes. I would say that in your scenario  
22 situation, you could depend that the fellow would be within  
23 a quarter of a mile of where he thought he was.

24 DR. GEYER: How close do you care about his knowing  
25 where he is.

1 THE WITNESS: Anywhere within several miles would  
2 be good enough for us, because we generally have to combine  
3 these into segments.

4 DR. GEYER: So you are saying he knows probably  
5 within a quarter of a mile, and several miles  
6 would be good enough.

7 THE WITNESS: He knows a lot closer than we need to  
8 know.

9 CHAIRMAN JENSCH: You don't need a computer model, an  
10 "F" factor to get the precise horizontal and vertical lines, do  
11 you?

12 THE WITNESS: Not to know where a fish goes, sir,  
13 no, we do not.

14 BY MR. TROSTEN:

15 Q Mr. Clark, in view of these various tagging factors  
16 that we were discussing, we have been discussing, do you have  
17 any way of estimating how great the errors, the various  
18 errors we have been talking about might be?

19 CHAIRMAN JENSCH: Estimating errors of what? If he  
20 said it is good within three or four miles, you would want  
21 to know the error within the three or four miles, is that the  
22 question?

23 MR. TROSTEN: No, he has indicated on Figure 1 where  
24 the tagging locations were of the 1959, 1963 study. And in  
25 view of the various factors of error that we have been talking



1 about, the fact that men don't keep logs, the fact that  
2 they are untrained men, the fact that they are not required  
3 to note these things at the time they do it, and that  
4 they depend on their recollection, the fact that there is no  
5 firm way for them to know exactly where they are, and the various  
6 other factors we have been discussing for the last 10 minutes,  
7 I wanted to know if there was any way of Mr. Clark knowing  
8 whether these dots were in the right place.

9 CHAIRMAN JENSCH: I think your question was, you were  
10 trying to get him to give a margin of error, and I wonder if that  
11 premise is established. He said they generally know within a  
12 quarter of a mile and it is good enough for him within five  
13 or six miles, so there is no error, as I understood his answer.

14 MR. TROSTEN: Mr. Chairman, Mr. Clark, in that par-  
15 ticular instance, just gave an opinion estimate as to what the  
16 margin of error would be, for that particular aspect of the  
17 problem.

18 CHAIRMAN JENSCH: I didn't understand it was an  
19 error.- He said it was good enough for him if it was within  
20 five or six miles, so there is no error there, that that is  
21 satisfactory for a reasonable tagging operation, they don't look  
22 for the precision of a piece of metal going into a tube,  
23 a control rod drift not working, or that type of thing.

24 MR. TROSTEN: Perhaps if I took the word error  
25 out. Do you know what the precision of the estimate is?

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1 THE WITNESS: It would be equally as good as any  
2 biologist would do. Probably better, because the fishermen  
3 are a lot better navigators than biologists. So I don't  
4 think a guy driving a car along the beach and stopping to fish  
5 at a particular place would know equally as well as a guy  
6 driving up the Hudson River, trying to keep with the tide.  
7 It is the same thing. A guy drives along the beach and he gets  
8 out and goes fishing, and if he doesn't know where he is, he  
9 is a bum fisherman and these weren't, they were good fishermen.

10 BY MR. TROSTEN:

11 Q Apart from whether it is as good, better or worse  
12 than other tagging studies, can you tell me if you have any way  
13 of estimating what the precision of the tagging, of these  
14 statements of the tagging locations is?

15 A Let me say I would be satisfied that the actual  
16 location in 95 percent of the cases was inside the area of that  
17 black dot on the map on Figure 1, which is approximately one  
18 nautical mile in diameter.

19 Q And you would say that that is --

20 A That is the best I can say to you.

21 Q Best estimate, okay.

22 A And that is an estimate.

23 Q Right. Now, in the 1968 paper you talk about several  
24 different contingents of striped bass. Is that correct?

25 A Yes.

1 Q Three of these contingents, you say evidently occur  
2 in the Hudson River in the Spring, and you presume that they  
3 spawn there, is that correct?

4 A Where is this please? Would you refer me to the  
5 page?

6 Q I refer you to the following pages, pages 337 and  
7 following. It starts out by saying, "Three contingents evidently  
8 occur in the Hudson River during the Spring and are presumed  
9 to spawn there."

10 A Where is that?

11 Q Page 337, the second column, third line under  
12 Hudson River.

13 A Okay. All right.

14 Q Now, the first contingents you mention on page 338  
15 are the Hudson West Sound contingent. Do you see that?

16 A Yes.

17 Q From your study, Mr. Clark, did you not conclude  
18 that this contingent resides primarily in the western part of  
19 Long Island Sound and does not take the oceanic pathway around  
20 Long Island when it is moving into the Hudson to spawn. Is that  
21 correct?

22 A Where is that, please.

23 Q I draw this conclusion, Mr. Clark, from the second  
24 sentence on page 338.

25 A Yes.

1 Q Now, if this is the case, would you say that this  
2 contingent, which you designate the Hudson West Sound contingent,  
3 contributes significantly to the striped bass fishery in areas  
4 other than the Hudson River and Long Island Sound?

5 A No, I think -- I do not think that that contributes --  
6 I have no reason to think that that contributes heavily beyond  
7 Long Island and the Hudson River estuary.

8 Q By Long Island -- did you say Long Island Sound?

9 A Long Island Sound.

10 Q By Long Island Sound you mean the western part  
11 of Long Island Sound, is that right?

12 A When I say Long Island Sound, I mean Long Island  
13 Sound. If I meant western, I would have said western.

14 Q You designated it as the western contingent.

15 A Right. Would you read me that question again?

16 (The reporter read the record as requested.)

17 THE WITNESS: No, it doesn't. I have no reason to  
18 think it does, might be better.

19 BY MR. TROSTEN:

20 Q Then when you said Long Island Sound, I asked you  
21 if you meant the western part of Long Island Sound.

22 A That was your question. You asked me did they con-  
23 tribute outside of Long Island Sound and I said no.

24 MR. MACBETH: When you said Long Island Sound, did you  
25 mean western Long Island Sound.

1 MR. TROSTEN: No, I had two questions. First I said  
2 Long Island Sound and then I asked another question, I said  
3 do you mean by Long Island Sound the western part, then I  
4 said do you mean the western part of Long Island Sound. My  
5 question originally meant Long Island Sound.

6 CHAIRMAN JENSCH: What is the present situation of  
7 western Long Island Sound and --

8 MR. MACBETH: If all Mr. Trosten is driving at  
9 is do they contribute significantly to western Long  
10 Island Sound, it would be simpler to ask that.

11 MR. TROSTEN: Yes, I am sorry, I should have asked  
12 the question more precisely. I should have said would you  
13 not agree, or would you say that this contingent contributes  
14 significantly to the striped bass fisheries in areas other than  
15 the Hudson River and the western quarter of Long Island  
16 Sound?

17 THE WITNESS: Yes, it does.

18 BY MR. TROSTEN:

19 Q In what respect does it contribute significantly  
20 to Long Island Sound, other than the western quarter of Long  
21 Island Sound?

22 A The other western quarter.

23 Q In other words --

24 A You see if you want to look at one of these

25 figures, in this paper of mine and see where this No. 8 area is,

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1 you see that area.

2 Q Yes.

3 A That goes way out, that is more than half the Sound  
4 included in that 8 area. I can't pin it down to some part of that  
5 area.

6 Q So that we can move on and not quibble about this,  
7 when you refer to the -- when I am referring to the western part  
8 of Long Island Sound -- I will use that phrase now -- I am  
9 referring to the area that you have where all of the heavy  
10 black dots are in Figure 1. That is the part of Long Island  
11 Sound that I am calling western, and that you say contributed to  
12 it. Is that right?

13 A Why don't we just all look at Figure 1, where each  
14 area is rather carefully defined. Figure 1, page 322, just look  
15 at those definitions I have there. West Sound, the north shore  
16 of Long Island Sound from New Haven Harbor west to Hell Gate, and  
17 the south shore of Long Island Sound east to Montauk.

18 Q Yes. That talks about the south shore of Long  
19 Island.

20 A The south shore of Long Island Sound is different  
21 from the south shore of Long Island.

22 MR. TROSTEN: Excuse me, I am sorry. I thought  
23 he said the south shore.

24 BY MR. TROSTEN:

25 Q Now, the second contingent you mentioned spawning in

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1 Hudson River is the Hudson estuary contingent. Is that right?

2 I am back on page 338.

3 A Yes, Hudson estuary.

4 Q Don't you say this contingent is comprised of striped  
5 bass that confine their seasonal movements almost wholly  
6 to the Hudson Estuary system?

7 A That is Dr. Raney's Hudson race.

8 Q With regard to your Hudson estuary contingents,  
9 would these fish contribute to the fishery in areas other than  
10 the Hudson River itself?

11 A I have a problem that I should describe, so we will  
12 all understand the limitations of my answers. These fish that  
13 we have tagged, most of them, are of a substantial size. They  
14 are perhaps two year olds or large one year olds. And what is  
15 really missing from all of this is what happens to the early  
16 stages of fish. If it was a recurrent event that  
17 small fish, the size we don't normally tag, were leaving the  
18 Hudson estuary in large quantity, and colonizing some other  
19 area, we wouldn't have any record of this from tagging in the  
20 river. Now, on the other hand, when you tag outside, such as most  
21 of these records represent, we are not tagging on the spawning  
22 grounds or in the nursery areas, tagging out in the ocean,  
23 you have this problem that you don't know where those fish came  
24 from, you only know where they are going.

25 Q So you would say then that there is a need for more

1 study in this area, won't you?

2 A There surely is.

3 Q And we would have a much better understanding of the  
4 contribution of the Hudson River to the Atlantic coast fishery  
5 if we had more studies?

6 A If you are prepared to tag simultaneously from  
7 Maine to the Virginia coast, all sizes of fish during all seasons  
8 and do it intelligently and effectively, a proper design, a  
9 proper system of analysis set up, yes. But it won't do you  
10 any good to tag outside, inside, just in the Hudson, we have  
11 to look at the whole fishery up and down the coast.

12 Q Would you say an intelligently conceived research  
13 and tagging program could contribute significantly to the  
14 knowledge of the contribution of the Hudson River to the coastal  
15 fishery?

16 A It could conceivably do so. The tagging studies done  
17 to date, including mine, are nothing but hodge-podge and patch-  
18 work of miscellaneous attempts that are uncoordinated.

19 CHAIRMAN JENSCH: Excuse me, if I may understand the  
20 last answer, is it your thought, or do you know of  
21 any program to simultaneously tag from MAine to the Virginia  
22 coast with trained engineers or biologists and helmsmen at the  
23 wheel? Do you know of any such program to do all this?

24 THE WITNESS: I was on a striped bass research  
25 committee for a number of years during the '60s and we always



1 got together and talked about doing that, but nobody ever did it.  
2 They just couldn't get themselves together enough to carry out  
3 any cooperative program that had any meaning. In a moment I could  
4 just explain basically what I mean by this, looking at this  
5 map.

6 CHAIRMAN JENSCH: What I had in mind, as far as you  
7 know, there has been nothing in this case that anybody  
8 will carry on such a program?

9 THE WITNESS: No, sir.

10 CHAIRMAN JENSCH: It doesn't look like it would be  
11 worthwhile to wait and see if any such program will be set up.

12 THE WITNESS: That kind of program would take five  
13 years to get going, 10 years to run and 5 years afterwards  
14 to analyze the data and probably cost \$10 million, 15. I  
15 mean a real good program. Anything short of that is just  
16 throwing your money down a rat hole.

17 CHAIRMAN JENSCH: I think we are putting some of that  
1.2 18 money into radiological research.  
19  
20  
21  
22  
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1 BY MR. TROSTEN:

2 Q Mr. Clark, would you say that the best way to  
3 organize a study of tagging would be to get the best experts  
4 that you can find together, including representatives of the  
5 federal and state agencies, and people who have really studied  
6 this problem, and determine what was really needed in order  
7 to derive this information?

8 A No. I think that is counter-productive and would  
9 be a disaster. I think the only way you can do it is get  
10 the Federal Government to do it, period. Just take the program  
11 on and do it. By the time all of the different guys up and  
12 down the coast with all of their different ideas, different  
13 constraints, different budget problems, people in their  
14 states or the universities and all this, ever got together,  
15 you would never get out of the talking stage. We already  
16 tried this once on a little tiny program, which was to try  
17 to get up \$20,000 for a guy to run a computer in Rhode Island  
18 to put in some tag returns we had and try to get it out.  
19 And this would only be about \$2000 of state from 10 different  
20 states. And that took about a year to get going and then  
21 all of the states wouldn't contribute. They wouldn't even  
22 contribute \$2000 to a program to learn about the fate of  
23 the striped bass off their own coast. Frustrating.

24 Q Would you say if there were funding provided, but  
25 you had appropriate representatives from the Federal Government

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1 involved in supervising the conduct of the study, that this  
2 would be adequate?

3 A Absolutely not.

4 Q You think the Federal Government has to spend the  
5 money in order to do this?

6 A I think the Federal Government has to do it. Where  
7 they get the money, I don't care. But it has to be a  
8 coordinated program of people who are responsible, one element  
9 of government, yes, that is the easiest way to say it, so you  
10 have direction over the whole thing from a central point.  
11 Dr. Raney had the same experience. There was a cooperative  
12 striped bass program going in 1950, the same as in 1965.  
13 Nothing ever happens with these things.

14 Q Do you think there is one particular  
15 agency that has to spend the money, or do you think  
16 it could be several agencies that could spend money?

17 MR. MACBETH: Aren't we moving rather far afield?  
18 I object to the question on the grounds that it is irrelevant.

19 CHAIRMAN JENSCH: What does the inquiry into  
20 the political organizations have to do with it? Would you  
21 prefer the department of fisheries over Geodetic Survey?

22 MR. TROSTEN: I am exploring the basis for the  
23 witness' opinion about how a research program could be properly  
24 organized and conducted here. I think he has indicated he  
25 feels in order to be properly done, it has to be conducted by

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1 the Federal Government, and that the money has to be actually  
2 expended by the Federal Government. I wanted to know why he  
3 felt that way, and in particular how he felt this should be  
4 accomplished.

5 MR. MACBETH: I think that is moving beyond the  
6 scope of the direct testimony. The witness did not offer  
7 testimony on how to produce a research program. I see some  
8 point in going into this on cross-examination, but when we  
9 get into questions of this or that federal agency directing  
10 it, I really think that is moving beyond the issues before the  
11 Board and don't think it will help this record.

12 CHAIRMAN JENSCH: I do think the record has gone  
13 into the kind of research program that would be desirable,  
14 that that was included in his direct testimony. Objection  
15 overruled.

16 MR. TROSTEN: Would you read the question back.

17 (The reporter read the following question:

18 "Do you think there is one particular agency that  
19 has to spend the money, or do you think it could be several  
20 agencies that could spend money?")

21 THE WITNESS: I would see no hope whatsoever in  
22 any cooperative program to effectively conduct a tagging and  
23 population study of the striped bass. And from 20 years of  
24 experience along this Atlantic coast in research management,  
25 in trying to get cooperative things going and so on, I would

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1 say if there were money to be spent, it ought to be spent by  
2 the Federal Government, which is the only organization that  
3 can move, the only public organization that can move across  
4 state lines and has a responsibility broad enough so they can  
5 take on a thing like this. Now people who have the great breadth  
6 of experience in striped bass, such as Dr. Raney and others,  
7 could be brought in on the basis of advice, consultant help,  
8 and so forth, which whoever tried to do it would certainly  
9 need.

10 But there is something called the Atlantic States  
11 Marine Fisheries Commission -- would you believe it? -- on the  
12 Atlantic coast, that has operated since the late '40s, that  
13 has had the role of trying to stimulate cooperative research.  
14 Now that is a lot of years of trying and so far they have  
15 done nothing effective in terms of stimulating a program of  
16 cooperative research. And it just doesn't work.

17 BY MR. TROSTEN:

18 Q Is your statement just based on your personal  
19 experience that cooperative ventures of this sort don't work?

20 A A lot of experience, a lot of heartbreak and  
21 waste of time and discouragement in trying to get these people  
22 working together.

23 Q Let me go back to the question that I am not sure  
24 you ever really answered, Mr. Clark. Would you say that the  
25 fish which comprise your Hudson estuary contingents contribute

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1 to the fishery in areas other than the Hudson River itself?

2 You then went into a discussion of the lack of information,

3 but we never got an answer to that question.

4 A To try to give a simple answer, it gets so complex  
5 -- I am sorry. Those fish go up and spawn in that river,  
6 along with the rest of the fish --

7 Q May I interrupt you? You say they go up and spawn  
8 in the river. They are presumed to go up and spawn in the  
9 river, isn't that correct?

10 A That is the basis of my whole thinking on this.

11 Q That is the hypothesis that this paper develops?

12 A That this Hudson estuary -- I guess they have to  
13 spawn there; I mean if we are doing an analogy with the  
14 Hudson race of Dr. Raney, who was quite sure they were con-  
15 fined principally to that estuary, living in that estuary.  
16 That means they don't come out, so they have to spawn there,  
17 if they are going to spawn at all. Well, what happens is  
18 this group would be contributing to a pool of young fish  
19 that grow up in the river. And then these young would, in  
20 the course of time, spread out from their nursery grounds to  
21 wherever they are going to live as adolescents and again  
22 as adults. It is not shown by any, in any way I could find  
23 out, although I did try, that there are mechanisms, within  
24 the Hudson River, whereby the individual stocks of fish,  
25 such as defined here or in other studies, maintain a separate

6mil 1 spawning and growing and living experience that would keep  
2 them from being mixed up. Now, by discussing this in terms  
3 of contingents, I am not getting into the genetic problem  
4 at all, which race implies. The fish that are identified  
5 here as contingents are those which I believe have, if they  
6 are related to the Hudson, have been produced in the Hudson,  
7 will most likely return to the Hudson and spawn again, but  
8 not necessarily that a fish comes from Long Island Sound  
9 and goes into the Hudson to spawn, that doesn't mean he is  
10 going to spawn only fish that go back to Long Island Sound.  
11 There is a sorting out of the little fish that come down that  
12 river and move out and they go different directions when they  
13 come out the river. And they sort themselves out into these  
14 contingents, and from then on, I believe that they maintain  
15 some integrity to their group, then they go up the river and  
16 down the river.

17 So what I am getting to is saying this, the Hudson  
18 estuary could contribute substantially, the Hudson estuary  
19 contingents here could contribute substantially to fish  
20 throughout the Atlantic by virtue of producing young that would  
21 then leave the river, and go to these various parts of the  
22 coast.

23 Q But I guess I don't quite understand really the  
24 concept of the Hudson estuary contingents, which you describe  
25 on page 338 as "a contingent which is comprised of striped bass

7mil 1 that confine their seasonal movements almost wholly to the  
2 Hudson estuary system, wintering and spawning in the Hudson  
3 and moving down river into the base to feed in the summer."  
4 That sounds like you are describing a body of fish that has  
5 spawned in the Hudson, moves down the base of their second  
6 year, shall we say, into the lower bay, then they move back  
7 into the river, to over-winter. It sounds like, as you say,  
8 confining their movements almost wholly to the Hudson  
9 estuary system. It sounds as if they just sort of move back  
10 and forth.

11 A Right.

12 Q Some of them might swing out, I imagine, into  
13 different contingents, but it sounds like it is a body of  
14 fish that maintains an integrity.

15 A Right. It is like an army. You know the guys  
16 come from wherever, but once they are in the army, they stay  
17 in some kind of confines. These fish, I am not saying that  
18 the -- ascribing the origin of Hudson estuary contingents  
19 fish to a previous generation of Hudson estuary contingents  
20 fish, nor to any other. I believe there is a common  
21 pool of young produced in that river, which spread out along  
22 the coast into various areas, and once they are in that area,  
23 they become what is known as imprinted to the conditions of  
24 that particular area. Now that becomes their home, because  
25 they are there. In the winter they go up the river; in the



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1 spring maybe they come back into the sound. But forevermore  
2 -- I mean in a broad sense -- it overlaps and you can't be  
3 that definite, but substantially that will be their life,  
4 back and forth in that sense. But the young that they produce  
5 may go south on the Jersey coast, on the south shore of Long  
6 Island, up to New Hampshire and Massachusetts; some of our  
7 tag recoveries have shown Hudson River fish swimming up to  
8 New Hampshire and Massachusetts, or wherever they get  
9 established, and then that establishes their nativity,  
10 in a sense, at the point that they move out and take up  
11 home in some particular part of the Atlantic coast.

12 Q Does not the dispersal of these young fish, in any  
13 event, cause them to fall into one of your three Hudson  
14 spawning contingents, the West Sound, estuary, and the  
15 so-ca-led Hudson-Atlantic?

16 A Yes, their existence as a group with definable  
17 habits, is what I have called a contingent. That is what  
18 the definition is all about.

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1 Q Is there any evidence for this sort of dispersal  
2 of the young that you described before? I thought really that  
3 the basis for your views on the origin and dispersion of  
4 Hudson River -- I am sorry, the basis for your views for the  
5 dispersion of Hudson River spawned fish is contained in this  
6 salt water angling survey. Is there any evidence for the  
7 sort of dispersal of the young you just described, where you  
8 said the fish swing out and appear up in the North Atlantic,  
9 down off the north shore of New Jersey and so forth? Is that  
10 all shown on -- are you drawing that conclusion from what  
11 appears in the 1968 paper?

12 A That, plus a little bit of general knowledge and  
13 some logic. I can explain it very simply by saying that  
14 you have a breeding area of the Hudson River where from  
15 various studies that have been done, this is the primary  
16 area of breeding within the river. We all have studied this  
17 by now and know that there is some places in the river where  
18 the fish go to spawn. Now if a fish were to spawn here  
19 (drawing on board) or here or here, or wherever you threw out  
20 there, because of the mixing characteristics, temperature of  
21 the river, the dispersion caused by tide, the normal diffusion  
22 properties of water and all of these other factors operating,  
23 density-induced currents and so on, these fish we have to think  
24 of as one large pool. Those that are down here in this  
25 primary area. Now as these fish grow up, they change their

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1 habits, as they get larger and older, they tend to move out  
2 of the river and to appear along the coast in various places.

3 So one group of young fish splitting off from its  
4 nursery area and going on out into the ocean then takes up  
5 life in a particular habitat that has specific characteristics  
6 of shape and form and bottom type and chemistry and so forth  
7 and so on, et cetera.

8 Then what I am saying is these fish become a  
9 contingent, by virtue of their having established a habit of  
10 living in a particular area with other fish of that same  
11 contingent.

12 Another group will come out and establish itself  
13 as another contingent and yet another will come out and  
14 establish itself as another contingent. But they are in a  
15 sense loyal to the river, like salmon, they tend -- not all  
16 do, but there is a tendency for them to return here to the  
17 safe harbor of the Hudson River during the winter and also  
18 to spawn there before they leave and return to go out into the  
19 ocean for the summer, the feeding period.

20 These various contingents we must hypothesize now,  
21 unless someone can show otherwise, come from a common genetic  
22 pool. I have looked for things in time and space that could  
23 separate these into separate genetic stocks and I haven't  
24 found it. So that my idea of contingents is not to say  
25 races, or imply there is any genetic property of this group

ar3

1 of fish that will continue generation by generation. A  
2 common pool, splitting off, forming contingents, each of  
3 which has a pattern of migration in and out of the river  
4 during the course of the season.

5 I hope that is helpful.

6 Q Mr. Clark, I have been trying to understand your  
7 hypothesis here, and let me ask you a few questions about it.

8 Have there ever been tagging studies done of the  
9 young fish that you report come out at the age of say, about  
10 two years? Have they been tagged to show how they come out?

11 A If you will look at this paper which you asked me  
12 to get out, the one about migratory fish of the Hudson  
13 Estuary --

14 Q The Hudson River ecology paper?

15 A Yes, from the symposium. I think we have a map  
16 in here -- yes, on page 309, figure 2.

17 Q Yes, I have that.

18 A That shows the kind of pattern that we got from  
19 admittedly very limited tagging in the Hudson, and those  
20 that went to Massachusetts I remember as being young fish  
21 of the size that you would expect to first migrate and to  
22 form these migratory contingents of fish.

23 Q Mr. Clark, do you have the data showing the  
24 size, any data you might have on the physical characteristics  
25 of these three -- there are three fish, is that correct, here?

ar4

1 Or are those dots not intended to indicate actual numbers of  
2 fish?

3 A The dots on the chart each represent a recapture  
4 location. These are the fish that we tagged when we were  
5 aboard the DOLPHIN. Only two of those were recovered -- that  
6 was that March 6 to 8, whatever it was, tagging aboard the  
7 DOLPHIN in the Hudson River. We only got two of them returned  
8 to us in the Hudson River, and we got 28 or 25 maybe from other  
9 places. We got them from Massachusetts, from Montauk Point,  
10 from down the Jersey coast, from all around Long Island and  
11 in Long Island Sound. Some of these -- I can't tell you by  
12 looking at this what the sizes of the fish are. So the best  
13 answer I could give you to the question of whether I tagged  
14 young fish that would be leaving the river to form these  
15 contingents is that I believe in my recollection that these  
16 fish, part of these fish, at least on this particular chart, are  
17 the young fish leaving the river.

18 To be certain, I would have to check the records and  
19 see if I could find the actual lengths and so forth. I am no  
20 longer in possession of those data, because I am no longer  
21 with the lab, and the records are there and it would require  
22 doing something with the laboratory to try to get the data  
23 from them. I don't see why you can't get it as easy as I.

24 Q The tagging that you did on the DOLPHIN, this was  
25 the tagging that you did from March 6 through 8, 1968, is that

ar5

1 right?

2 A Yes.

3 Q And what you are relying upon for your theory that  
4 these fish sweep out up the northeastern coast is the  
5 tagging that you did during those three days, and you got  
6 three fish that were away from, well, I will say the western  
7 part of Long Island Sound, and further east than Great  
8 South Bay. Is that right?

9 A No, that is not right. This paper we are talking  
10 about here, about the contingents, came out before this other  
11 one.

12 Q I am talking about figure 2, page 309, I am sorry.

13 A You asked me if this followed, if my idea about  
14 the formation of contingents and so forth followed on this.  
15 No, the other way around. This research was done after this  
16 paper was completed.

17 Q But the point is the particular tagging that you  
18 are relying upon, other than the tagging that appears in the  
19 1968 paper, which in your opinion justifies your conclusion  
20 that these fish do appear along the northeastern coast, is  
21 the tagging that is reported in figure 2. Is that correct?  
22 It is the tagging in figure 2, page 309 --

23 A No, you shouldn't get that idea. This is something  
24 that happened later which confirms what we were able to  
25 deduce and detect by other means.

ar6

1 Q I understand that. I am just trying to identify  
2 for myself and the record that the tagging studies that you  
3 are relying upon for your theory that the fish move out along  
4 the northeastern shore are the tagging studies that are  
5 reported in your 1968 paper, which are the results of the '59  
6 and '63 study and the additional tagging that was done from  
7 March 6 through March 8, 1968. Am I wrong about that?

8 A Yes.

9 Q How am I wrong?

10 A It is not that simple. For instance, there is a  
11 fellow who has been tagging fish up in Great Bay, New  
12 Hampshire, and those fish have come back in the Hudson, little  
13 guys, for the winter.

14 Q Would you provide me a reference to this tagging  
15 study?

16 A I don't have any information on that. What I had is  
17 at Sandy Hook, and it is not published, to my knowledge. If  
18 you get ahold of the New Hampshire Fish and Game Department,  
19 ask for Mr. Newell. I am sure he would see that you would be  
20 supplied with the records, which would include the appearance  
21 of at least two small fish in the Hudson from his taggings in  
22 New Hampshire. So I can't be pinned down that easily, because  
23 there is that and there is other experience, and other data  
24 we have which tie together.

Q I understand that you formed an opinion here, based

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1 upon your experience. But I am just trying to identify what  
2 the basis for your opinion is. And the basis for your  
3 opinion, I gather, is the tagging that was done in '59 and  
4 '63, the tagging that you did in March of 1968, and you  
5 mentioned another tagging that was done by somebody in  
6 Massachusetts which I guess we will try to look for. Was  
7 there anything else that you relied on?

8 A Well, lots of field evidence, for example, there  
9 hardly ever seem, almost never seem to be young fish of zero  
10 age out in the Sound, or on the south shore or any place else  
11 that could indicate any origin of striped bass any place  
12 outside of the Hudson River in this general area, which  
13 suggests then that the origin of the fish has to be from the  
14 Hudson River, and since they begin to show up out there as  
15 one-year-olds and then two-year-olds, it begins to suggest to  
16 you that the origin has to be elsewhere, and the fish are one  
17 and two-year-old fish and they are coming out of the Hudson  
18 and spreading out, like these in the tagging thing. So there  
19 are many, many ingredients in a theory like that.

20 Q You say you are finding one and two-year-old fish  
21 off the south shore -- off where?

22 A You find them outside of the area of the Hudson  
23 estuary itself, occurring in traditional habitats, where  
24 fish of one or two years old occur, that were not there as  
25 younger fish.



ar8

1 Q The fish have been spawned somewhere else?

2 A You can go down to one of the bays and sit around  
3 and do what you want to do to find out what fish there are,  
4 and you will find there are no zero year old striped bass  
5 there.

6 Q I am just asking, could those young fish have been  
7 spawned somewhere other than in the Hudson River?

8 A They aren't spawned there, that is what we know.

9 Q Where you find them?

10 A Yes. Their origin is not where they are found as  
11 one year olds.

12 Q I can understand that, yes.

13 A So there is all of this stuff that goes in and  
14 sends you on a search for data that will bear on your problem.

15 Q So you have formed a hypothesis on the basis of  
16 the data you have seen that they must come from the Hudson  
17 River. Is that right?

18 A Yes, and after tagging them up there and seeing  
19 they come out of there and go up and down the coast.

20 CHAIRMAN JENSCH: Is this a convenient place to  
21 interrupt your examination?

22 MR. TROSTEN: Yes.

23 CHAIRMAN JENSCH: Would an hour -- was there  
24 anything further you wanted him to review?

25 MR. TROSTEN: If Mr. Clark will go back and review

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1 these two papers, I think it would help us move along.

2 CHAIRMAN JENSCH: What time would you suggest we  
3 reconvene?

4 MR. TROSTEN: I would suggest 2:15, Mr. Chairman.

5 CHAIRMAN JENSCH: At this time let us recess to  
6 reconvene in this room this afternoon at 2:15.

7 (Whereupon, at 12:52 p.m., the hearing was recessed,  
8 to reconvene at 2:15 p.m., this same date.)

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Reba 1

## AFTERNOON SESSION

2:15 P.M.

CHAIRMAN JENSCH: Let's please come to order.

Mr. Clark has resumed the stand. Applicants, are you ready to proceed?

MR. TROSTEN: Yes. May we confer briefly at the bench first?

CHAIRMAN JENSCH: Surely.

(Discussion off the record.)

## CROSS-EXAMINATION (Resumed)

BY MR. TROSTEN:

Q Mr. Clark, I want to see if I can recapitulate the record a little bit with regard to the contingents. You did say, did you not, that the Hudson West Sound Contingents did not contribute to the fishery other than in the western part of Long Island Sound. Is that correct?

A No. This is the problem area I described before we had the break, where there is a common spawning pool there, and a fish from any of these contingents could contribute to any other simply by spawning and proliferating young which would join any one of a number of these contingents later on.

Q Did you enunciate this theory of the common spawning pool in your 1968 paper?

A No.

Q Where is this theory enunciated, other than your

# 15 1 having done it right now?

Reba 2 2 A It is not written down anyplace. It is just what  
3 I have deduced from all of this, and the other taggings and  
4 other studs and other struggles around to try to to understand  
5 these populations. This is my own personal opinion based  
6 on my work with these fish and on my general knowledge.

7 Q Would you provide me with the precise data upon which  
8 you rely for this opinion? You say it is not based on the  
9 1968 paper and it is not enunciated in the 1968 paper.

10 A Can I take issue with you now?

11 Q I thought that is just what you said.

12 A It is not enunciated in the paper, but it is based  
13 very strongly upon these results.

14 Q Would you tell me the precise data upon which you  
15 base this theory?

16 A The theory is not based on precise data. The theory  
17 is based on integrating and synthesizing tagging data, general  
18 knowledge and experience, et cetera, including this paper,  
19 but including the other things, too. It is the only hypothesis  
20 that fits to the known facts.

21 Q It is your only hypothesis that fits the known facts?

22 A It is the only hypothesis I can find that fits  
23 the known facts.

24 Q I will ask you again, could you tell me the data  
25 upon which this hypothesis rests?

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Reba 3

1 A On this paper that you have been talking about,  
2 principally.

3 Q I have read this paper, so I am familiar with  
4 what is in here. What other data does your hypothesis rest  
5 on?

6 A A wide array of data concerning the knowledge of  
7 migratory fishes and their behavior, general data, not any  
8 specific one individual paper or one single paper.

9 Q Mr. Clark, I am not familiar with what general  
10 data are. I can only grapple with specific data.

11 A I have a box here. That is a little sampling of  
12 the literature that is available on striped bass on this coast  
13 and there are about, I guess, 80 different papers in here which  
14 I have become familiar with more or less in the course of this  
15 activity.

16 There are libraries full of information on other fishes  
17 that have behaviors and habits that have analogs to what the  
18 striped bass does and so on. That is what I am trying to say.

19 Q I notice there has been a lot of material written  
20 on the striped bass, Mr. Clark. But what I am asking you for  
21 are the precise data that led you to that theory that you  
22 enunciated that the striped bass that are spawned in the Hudson  
23 spill out all over the Atlantic Coast, as you drew on that map?

24 A I guess you can get it from here most simply. You  
25 could definitely, if you knew a little bit about fish, you

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Reba 4

1 could develop that theory from this paper alone.

2 Q Mr. Clark, is that most northerly circle there,  
3 is that intended to represent the Hudson West Sound contingent?

4 A This or this? (Indicating)

5 Q The one farthest to the east, northeast.

6 MR. MACBETH: We should establish first whether this  
7 is an attempt to draw a scaled diagram. I was not under the  
8 impression this was an attempt to indicate precise geographic  
9 areas.

10 THE WITNESS: (Drawing on Blackboard) There is no  
11 -- intended no pattern or any geographic order of any kind  
12 to that. It is just simply to show that there is a movement  
13 out from that nursery area up there, and since your minds  
14 automatically think of the river as opening to the south, I just  
15 sort of put the arrows down to the south.

16 BY MR. TROSTEN: those are

17 Q So those are not intended to represent contingents  
18 or groups or identifiable groups of fish of any sort?

19 A They are intended to represent the contingents  
20 of striped bass that would be born or produced by the Hudson  
21 River some of which I have attempted to identify in this paper  
22 and given names to them.

23 Q Would you identify what these other contingents are?

24 A Well, there is the Hudson West Sound contingents,  
25 the Hudson Estuary contingents, the Hudson Atlantic contingents,

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Reba 5

1 and the Hudson Long Island contingents, and a number of southern  
2 southern contingents.

3 Q Now taking your paper, let us concentrate on what  
4 you said in 1968, and not on the new theory you enunciated  
5 in the hearing room today. Is it not true that you said in  
6 1968 on the basis of your study that the Hudson West Sound  
7 continents contributed to the western Long Island Sound and  
8 there is no indication in this paper that this contingent  
9 contributed to the Atlantic Coast, other than the west Sound,  
10 West Long Island Sound.

11 A Would you read me the particular basis of your  
12 premise?

13 Q I infer this from your statement on page 336, "This  
14 contingent occurs in Long Island Sound from summer to fall  
15 and moves into the Hudson River to spend the winter. This  
16 group remains there in the spring for spawning and then returns  
17 to the Sound in the summer, apparently by way of the Harlem  
18 River and East River or around Manhattan Island and up the  
19 East River to the Sound, but not via an oceanic pathway around  
20 Long Island."

21 A Now would you ask the question, please?

22 Q Is it correct that you concluded in this 1968 paper  
23 and stated in the language I just read to you that this group  
24 of fish contributed to Western Long Island Sound and not to  
25 any other place on the Atlantic?

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Reba 6

A Mr. Trosten, I don't want to be difficult, but you see you are not asking the right kinds of questions that I can answer. Let me simplify it. These fish confine their movements and activities to that area of Long Island Sound and the Hudson River.

That is where they live. And they confine their existence to this area.

Q In other words, you don't find them in any other place, is that right?

A Right.

Q Thank you very much.

That answers my question.

A Not to be confused with what they contribute to.

Q No, I asked you if you don't find them in any other place and you just said you don't. Is that correct?

A That is correct.

CHAIRMAN JENSCH: Is there something we should be noting that we perhaps are missing? Didn't we go over this this morning? Is there some new facet you are developing now?

MR. TROSTEN: What I am trying to do, Mr. Chairman, is make sure the record is clear on the basis of what it is that we were saying this morning.

CHAIRMAN JENSCH: Let's wait until the transcript comes out and you can examine it and perhaps that will solve it.

MR. TROSTEN: If I may ask one more question -- I



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Reba 7

1 didn't realize this background material would take so long.

2 CHAIRMAN JENSCH: I thought the same question  
3 you last propounded was discussed this morning.

4 BY MR. TROSTEN:

5 Q Is it correct you said -- I am using this purely  
6 for a basis for moving on to the next question that has to do  
7 with the Hudson Atlantic -- is it correct with regard to the  
8 Hudson Estuary contingents, you said this contingent is  
9 comprised of striped bass that confine their seasonal movements  
10 almost wholly to the Hudson Estuary system, wintering and  
11 spawning in the Hudson and moving down river and into the  
12 base to feed in summer.

13 Do I infer correctly that these fish which comprise the  
14 Hudson Estuary contingents are not found outside the Hudson  
15 Estuary?

16 A They appear to confine themselves wholly to the  
17 estuary.

18 Q Now the third contingent you mention is the Hudson  
19 Atlantic contingent. Is that correct?

20 A Yes.

21 Q Now in the section of your 1968 paper entitled  
22 "Recommendations for Research" you say "the most critical gap  
23 in our knowledge of Atlantic Coast striped bass populations  
24 concerns the areas of their origin. However, neither tagging  
25 of young fish in the rivers and estuaries nor tagging the

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Reba 8

1 mature fish along the coast has yet provided a means to deter-  
2 mine the proportions of the coastal migratory stock that  
3 originate in the various spawning rivers." Do you see that  
4 part?

5 A It would be awfully helpful when you are reading  
6 if you would guide me to a paragraph or line, because by the  
7 time I find it you are usually through reading it.

8 Q Excuse me, I am sorry. Page 342, the first  
9 column, under the heading, "Recommendations for Research",  
10 about the middle of the paragraph. Would you like to take a  
11 moment and look at it?

end

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1 CHAIRMAN JENSCH: Take time to read it and get the  
2 context of it and then proceed.

3 THE WITNESS: Yes, I am ready.

4 BY MR. TROSTEN:

5 Q Now, with regard to the study that you refer to or  
6 rather the lack of study, has such a quantitative study been  
7 performed, Mr. Clark, to provide a basic foundation for  
8 understanding the dynamics of Atlantic striped bass populations  
9 and the contributions made to coastal populations by the various  
10 spawning rivers?

11 CHAIRMAN JENSCH: I wonder if that could be read.

12 (The reporter read the record as requested.)

13 THE WITNESS: The first part of your question I  
14 would say definitely not. That is the one that has to do with  
15 the dynamics of the striped bass populations.

16 BY MR. TROSTEN:

17 Q In other words, a quantitative study has not been  
18 performed to provide a basic foundation for understanding  
19 the dynamics of the Atlantic striped bass population.

20 A Yes.

21 Q The second part of the question?

22 A I would like to have it reread, just the last few  
23 words.

24 (The reporter read the record as requested.)

25 THE WITNESS: No, that hasn't been done.

1 BY MR. TROSTEN:

2 Q That has not been done either?

3 A In sufficient detail to do what you asked.

4 Q To do what you suggested needed to be done in your  
5 paper, is that right?

6 A Oh --

7 CHAIRMAN JENSCH: I think your question was had a  
8 quantitative study been done to understand the basics for  
9 dynamics of striped bass population. As I understood the  
10 question, it didn't relate to the paper. You added the paper  
11 to it. I wonder if you could restate the question.

12 MR. TROSTEN: I added the paper phase of it, Mr. Chair-  
13 man, only because my question, which had to do with the  
14 quantitative study needed to determine its contributions made  
15 to coastal populations by the various spawning rivers --

16 CHAIRMAN JENSCH: I understood the reason. Please  
17 state your next question including the paper aspect.

18 BY MR. TROSTEN:

19 Q Is it correct that the study referred to in your  
20 paper, namely, a study of fish to determine the proportions of  
21 the coastal migratory stock that originate in the various  
22 spawning rivers, has not yet been performed?

23 A True.

24 Q Thank you. Now, if such studies have not been  
25 made, on the basis of your own statement, do you not lack the

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1 information, Mr. Clark, necessary to evaluate the contribution  
2 of the Hudson River to the Atlantic coast fishery?

3 A To the extent that I have suggested that it should  
4 be done here, no, we do not have that kind of data that would  
5 give it to us within very, very close proportion at divisions  
6 of the coast.

7 In other words, there isn't the kind of data available  
8 to cut this thing down and pin it down to one percent this  
9 way or that way. What we do have is only good enough to suggest  
10 in a broad way what parts of the coastal population may originate  
11 from certain areas.

12 Q Mr. Clark, in your 1968 paper, you said that --

13 CHAIRMAN JENSCH: What page?

14 MR. TROSTEN: Page 342, Mr. Chairman, the paragraph  
15 I was discussing with Mr. Clark before.

16 CHAIRMAN JENSCH: Thank you.

17 BY MR. TROSTEN:

18 Q You said that the study had not been conducted  
19 to determine the proportions of the coastal migratory stock,  
20 et cetera?

21 A Right.

22 Q Now, you did not indicate this was a matter of not  
23 being able to cut it down to one percent or two percent, something  
24 like that, you simply said the proportions of the coastal  
25 migratory stock. Are you saying that that was an incorrect

1 conclusion?

2 A No, I think we are just splitting hairs on it.

3 Q And you now say that we do not have enough information  
4 or we do have information enough, I am sorry, I don't know what  
5 you mean when you say just splitting hairs.

6 CHAIRMAN JENSCH: I think he said it only suggested  
7 it in a broad way? Wasn't that his answer.

8 MR. TROSTEN: I really don't know.

9 CHAIRMAN JENSCH: Let's have the answer. I think the  
10 question is how can you evaluate the contribution of the Hudson  
11 River to the Atlantic coast fishery and I think he explained it  
12 only suggested it in a broad way. Would you reread that answer.  
13 We seem to be going over and over some of these phases.

14 (The reporter read the record as requested.)

15 CHAIRMAN JENSCH: Now, what is your question based  
16 on, that indication that it is only a broad generalization?

17 MR. TROSTEN: I think it would be well to move on,  
18 Mr. Chairman.

19 CHAIRMAN JENSCH: Very well.

20 MR. BRIGGS: Could I ask just one or two  
21 questions. Mr. Clark, you agreed that these various groups  
22 of fish confine their movements to particular areas, but you  
23 have excluded the word "contribution" from the discussion.  
24 By this do you mean that these various groups of fish then  
25 contribute to a pool of spawn that then can divide themselves

1 among all of the groups. Is that what you meant?

2 THE WITNESS: Yes, sir.

3 MR. BRIGGS: So they all contribute to all of the  
4 groups, is that the idea?

5 THE WITNESS: That is my best understanding of the  
6 situation, that the allocation from the nursery pool to the  
7 contingents may be almost random.

8 MR. BRIGGS: In that way, each contingent can con-  
9 tribute to each other contingent at that stage.

10 THE WITNESS: Yes, through the breeding cycle.

11 MR. BRIGGS: Thank you.

12 DR. GEYER: While we are discussing this problem of  
13 contingents, do these contingents represent a blend of  
14 fish from different nursery, spawning and nursery areas? In  
15 other words, there are other major spawning and nursery areas,  
16 the bay being one, some in the Delaware I presume. What  
17 happens? Do they set up separate contingents or  
18 the young of those are part of these contingents.

19 THE WITNESS: Would it be worthwhile just to go into  
20 a little detail on this?

21 DR. GEYER: I would appreciate it, because there  
22 seems to be some difference as to where people think the fish  
23 come from in these areas.

24 THE WITNESS: Unfortunately it doesn't have a real  
25 simple explanation. But basically the major spawning areas

1 along the Atlantic coast are separated sufficiently  
2 geographically and, geographically, yes, from each other, so that  
3 the likelihood of the young spilling out from one spawning  
4 river to another spawning river at those young ages, when I  
5 believe they adopt their permanent home, the probability of  
6 their spilling over, the probability of a fish coming out of  
7 the Delaware Bay when it is scarcely a year old or a little  
8 more, say in his first or second year of life, the possibility  
9 of his coming out of Delaware Bay and getting in up in that  
10 area, I believe, would be very slight, also the James River.  
11 We have seen that the fish don't tend to leave those  
12 areas until they reach a certain size.

13 Then they leave the nursery area and move into  
14 habitat that is adjacent to the spawning river, and there  
15 become indoctrinated to a place that establishes the bounds  
16 of the contingents.

17 So that these areas that are in the proximity of the  
18 Hudson River, where the fish naturally would move off to as  
19 they came out of that river, would be the places then that they  
20 would adapt to or become imprinted to, and then become part  
21 of that contingent of fish that swings back and forth.

22 The chance of a fish coming out of the Hudson  
23 and going down to the Chesapeake Bay, say, when it is very young,  
24 would be limited in my opinion.

25 Therefore, the mixing between this, say, western Sound.



1 contingent or the others that I have, the opportunitites  
2 for mixing would come at a later age, when the fish have become  
3 fully migratory, the fish that are in the Sound, such as might  
4 come up this way. They would mix in the areas with these contin-  
5 gents from the Hudson, but part company when it came to winter.

6 DR. GEYER: So the contingent doesn't last for  
7 the full life of the fish?

8 THE WITNESS: The contingent does, but you can  
9 imagine two contingents of fish with the same habitats mixing  
10 to some degree --

11 DR. GEYER: That is occupying the same area?

12 THE WITNESS: Occupying the same space, but then  
13 continuing, following their own destiny and not joining  
14 each others company, so they can occupy the same space and still  
15 be separate contingents.

16 DR. GEYER: As a rule, the contingent that is  
17 established from, say, the Delaware, will go back to the  
18 Delaware, they won't involve --

19 THE WITNESS: I really hate to even try to talk about  
20 this outside of the Hudson and the area of influence of these  
21 contingents and so on and get involved outside, because my per-  
22 sonal experience in tagging has mostly to do with this, and in  
23 my mind, as I tried to derive this hypothesis and I tried to  
24 explain it to Mr. Trosten, has to do really with the Hudson area.

DR. GEYER: I think I get the general picture.

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1 Thank you.

2 THE WITNESS: It is complicated to me.

3 CHAIRMAN JENSCH: Will you proceed, please.

4 BY MR. TROSTEN:

5 Q Mr. Clark, I would like to move on to a more  
6 later publication of yours, the 1969 study that you did with  
7 Susan Smith that appears in the Hudson River Ecology and  
8 particularly to page 306. I am using the Hudson River  
9 Ecology volume, so I am using those pages.

10 A I have the same pages.

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Q Relative to your article here and your reference to the 60 fish that were recaptured in the Hudson, were any of these fish, these 60 fish, tagged from further north or east than the northern tip of Long Island?

A Just give me a minute to check in the other paper and make sure that everything is together.

I am quite sure the answer is going to be yes, but I want to make sure.

MR. TROSTEN: Mr. Chairman, I think it might be helpful if I produced for the Board's inspection, this figure that appears -- I will pass it out to the parties, simply for following the discussion.

(Handing to the Board.)

CHAIRMAN JENSCH: Very well, thank you.

Is this a copy of a figure from the last paper to which you referred?

MR. TROSTEN: Yes, it is.

CHAIRMAN JENSCH: Any objection to our using this copy from any of the parties?

MR. MACBETH: No objection.

MR. KARMAN: No objection.

CHAIRMAN JENSCH: Very well, proceed.

THE WITNESS: Would you ask the question again?

BY MR. TROSTEN:

Q Were any of the 60 fish that were recaptured in the

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1 Hudson River tagged from farther north or east than the  
2 northern tip of Long Island?

3 The reference, by the way, to the 60 recaptures in  
4 the Hudson River appears on page 305 of your article.

5 A. I think that -- yes. Wait a minute, I am  
6 agreeing with what you are saying and I don't know whether  
7 the question was in a negative or positive sense.

8 Q. I asked if any of the 60 fish later recaptured in  
9 the Hudson were tagged farther north or east than the  
10 northern tip of Long Island?

11 A. No.

12 Q. So the answer is no. Thank you.

13 Now, as I just said, there was one fish that was  
14 way off from the others in Long Island Sound, and that was  
15 tagged off on the northeastern tip of Long Island.

16 A. Right.

17 Q. All of the others were clustered, I will call it,  
18 over in the western part of Long Island Sound?

19 A. Right.

20 Q. Thank you.

21 Now, of those --

22 CHAIRMAN JENSCH: Except there are a couple down  
23 on the Jersey coast.

24 MR. TROSTEN: I was just about to get to that,  
25 Mr. Chairman.

1 CHAIRMAN JENSCH: Excuse me.

2 BY MR. TROSTEN:

3 Q How many were tagged off the New Jersey coast,  
4 Mr. Clark?

5 A Do you want North Jersey, or South Jersey or what?  
6 Both of them together?

7 Q I am looking in Figure 1 and I see only two -- I  
8 see two fish tagged off Staten Island and two fish tagged off  
9 New Jersey.

10 Q Are there others not shown here?

11 A You asked me how many fish were tagged.

12 Do you want to know how many fish were tagged  
13 that were later recovered in the river?

14 Q Of the 60 later recovered in the Hudson River,  
15 how many were tagged off the New Jersey coast?

16 A Two.

17 Q Thank you.

18 MR. TROSTEN: Mr. Chairman, I would like to ask that  
19 Figure 1 from Mr. Clark's 1969 paper be received in evidence  
20 in this proceeding.

21 CHAIRMAN JENSCH: I think that it is illustrative.  
22 I wonder if you have enough copies for the  
23 transcript?

24 MR. TROSTEN: I will see to it that enough copies  
25 are made.

mm4

1 CHAIRMAN JENSCH: I think that would be helpful.

2 Is there any objection to the request that the  
3 transcript contain Figure 1?

4 MR. KARMAN: No objection.

5 MR. MACBETH: No objection.

6 CHAIRMAN JENSCH: Very well, Figure 1 as identified  
7 by Mr. Clark, will be included and incorporated in the  
8 transcript at this point.

9 (Figure 1 follows:)

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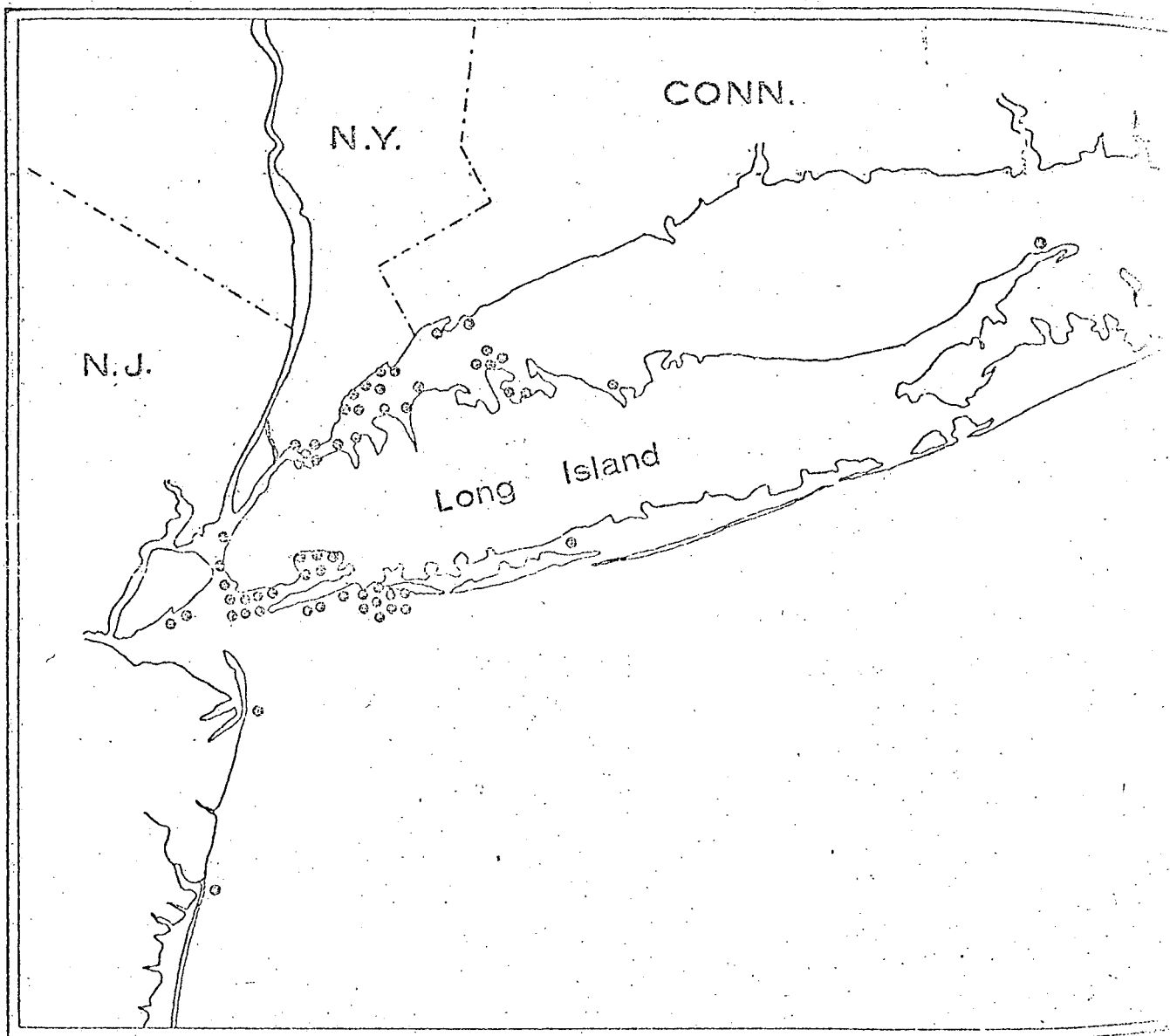
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FIGURE 1 Tagging locations of striped bass that were later recaptured in the Hudson River (1959-1963 tagging)



mm5

1 BY MR. TROSTEN:

2 Q On page 307 of your article you say -- excuse me,  
3 before I go on to that, relative to your 1969 paper, page 305,  
4 you say in the middle of the first full paragraph; "Very few  
5 were tagged in the Hudson."

6 Do you see that statement there, toward the lower  
7 part -- about the middle of the first full paragraph?  
8 Referring to the tagging program in the Hudson River?

9 A Yes, I have it.

10 Q How many fish were tagged in the Hudson in 1959  
11 through 1963?

12 A In the experiment I reported on there were between  
13 1 and 6 fish. I don't know exactly.

14 Q That is between 1 and 6 fish during the years 1959  
15 through 1963?

16 A If you look at Figure 1 of the other paper, there  
17 is a chart that shows where they were tagged, and actually I  
18 guess there are a lot more, if you want to include the --  
19 there is another dot I didn't see there. But in the river, you  
20 see one open circle up there, which is 1 to 6 fish and down  
21 lower in the river there is a black dot, which indicates  
22 25.

23 Somewhere around 30 or 31, I would guess. Just  
24 taking the Hudson River from the Battery, River Mile 1, on up.

25 Q Up in the area north of the Tappan Zee Bridge, or



mm6

1 what would you say, the 1 to 6 fish refers to an area from  
2 where to where, would you say, Mr. Clark?

3 A. Somewhere up above the New York line.

4 Q That is about River Mile what, do you remember  
5 off hand?

6 Never mind.

7 Now, on page 307, you say the heavy concentration  
8 of spring recaptures in the Hudson River from tagging  
9 previously described -- are you with me?

10 It is the last paragraph on the page.

11 A. The last full paragraph?

12 Q Yes, it starts:

13 "The heavy concentration of spring recaptures in  
14 the Hudson River from the tagging previously described  
15 suggests that the Hudson is the most important  
16 spawning river for the striped bass of Western  
17 Long Island and the Hudson lower estuary."

18 Do you see that statement?

19 A. Yes.

20 Q Do you disagree with that statement?

21 A. No.

22 Q Is that what you meant when you said on page 4  
23 of your testimony that "in tagging studies we have shown  
24 that Hudson bred striped bass furnish a significant portion  
25 of the Atlantic Coast striped bass fishery?"

mm7

1 A No, you have it all wrong.

2 This says that Western Long Island and the  
3 Hudson lower estuary have as the most important spawning river,  
4 the Hudson River.

5 It doesn't say anything about other areas, New  
6 Jersey, New England or Maryland or any other place. It just  
7 says that for those two areas the Hudson River is the  
8 most important spawning grounds.

9 Q Are you saying that this statement that I read to  
10 you from your 1969 study was intended to mean that there are  
11 other important spawning -- I am sorry -- that the Hudson is  
12 important to other areas, that you just didn't mention in  
13 this, but it is important to these?

14 A Sure, all of those contingents.

15 Q No, I am trying to focus on what you said here in  
16 1969.

17 A All right.

18 Q In 1969 you said:

19 "The heavy concentration of spring recaptures in  
20 the Hudson River from the tagging previously described  
21 suggests that the Hudson is the most important spawning  
22 river for the striped bass of Western Long Island  
23 and the Hudson lower estuary."

24 A Right, true.

25 Q Are you saying that in your opinion now, it is

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1 also an important spawning river for other areas which you  
2 just didn't mention in 1969?

3 A Oh, sure.

4 That doesn't mean to exclude any other areas.

5 Q But there is no mention of the other areas in the  
6 '69 paper.

7 A No.

8 Q And there is no mention of them in your 1968 paper.

9 A I think you will find fish from other areas are  
10 thought to spawn there.

11 Q But there is no mention of these other areas in  
12 your 1968 or your 1969 paper with respect to which the  
13 Hudson was an important spawning river?

14 A No, I wouldn't agree to that. Not at all.

15 Q Would you show me someplace in your 1969 paper  
16 where you identified another area, other than Western Long  
17 Island and the Hudson lower estuary to which you claimed in  
18 1969 that the Hudson was an important spawning river?

19 A I may not have. That doesn't have anything to do  
20 with my answer to your question.

21 Q Is it true in fact there are no other areas in your  
22 1969 paper that you identified with respect to which the Hudson  
23 was an important spawning river?

24 A You want to look at the Hudson-Atlantic contingents,  
25 page 338, second column, two-thirds of the way down?

mm9

1 Q 338, second column?

2 Are you referring now back to your 1968 paper?

3 A Yes, the one with the colored maps in it, red  
4 dots and so on. Page 338.

5 It says:

6 "After spawning in the Hudson, this contingent  
7 presumably spends summer in the New York Bight area  
8 and Southern New England. These fish may winter in  
9 south coast areas or off shore."

10 South coast areas are all of the way down the coast.

11 Q Is it the Hudson-Atlantic contingents, Mr. Clark,  
12 that you say is the other area you identified with  
13 respect to which the Hudson was an important spawning river?

14 A Well, it is an area. There you are talking about  
15 fish from New England all of the way down south.

16 Q Was there any other group, other than the so-  
17 called Hudson-Atlantic contingent that you identified in  
18 your 1968 or 1969 paper, with respect to which the Hudson  
19 was an important spawning river?

20 A No.

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17-2

1 Q Thank you.

2 Let's talk about the Hudson-Atlantic contingent  
3 then. Did you say on the bottom of page 338 and the top  
4 of page 339:

5 "After spawning in the Hudson, this contingent  
6 presumably spends summer in the New York Bight area  
7 and in southern New England."

8 What did you mean by the word "presumably?"

9 A I presume they do.

10 Q What was the basis on which you presumed that?

11 A Tag returns.

12 Q Which tag returns?

13 A The ones in here.

14 Q Would you identify the particular tag returns in  
15 here for me so I can examine them?

16 A We are going to have to take sometime on this now,  
17 because there is also literature behind this, which you  
18 recognize from the literature cited. I used studies by many  
19 other people.

20 I don't want to be pressured into giving you a  
21 quick answer on this, because I sense it is important to  
22 you, so I want to give you the right answer.

23 I want to have time to study this.

24 Q All right.

25 A And I want to make sure I know exactly what the

mm2

1 question is, too.

2 Q I would suggest that the reporter -- I don't  
3 want to pressure you into a quick answer, and I want you  
4 to take all of the time you feel you need to study the  
5 record.

6 I think it is important that we all understand  
7 what we are talking about here. Would the reporter read the  
8 question back, and would it be soon enough, would tomorrow  
9 be soon enough for you to study these data, or would you  
10 rather do it -- if we could do it this afternoon, it would  
11 be helpful, but if you prefer not to, that is fine.

12 A I would be happy to try to see if I can satisfy  
13 myself at an afternoon recess.

14 But if not, I would appreciate having this evening  
15 to look into it also.

16 Q That would be fine.

17 (The reporter read the record as requested.)

end 17-2

#18

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1 BY MR. TROSTEN:

2 Q Let us move on to another portion of your 1968  
3 paper, Mr. Clark, page 338. Do you agree, Mr. Clark, that  
4 during the summertime striped bass contingents which spawn  
5 south of the Hudson estuary predominate from the North  
6 Jersey sector described in your 1968 paper downward?

7 A In the summer, in the coastal areas?

8 Q In the coastal areas -- well, I would say from  
9 the North Jersey sector, described in your 1968 paper, further  
10 south?

11 A Let's see if we can this straight, too. From, say,  
12 that --

13 Q From sector 12 downward. Southward.

14 A In the summer?

15 Q Yes. Do you want the question read back, Mr.  
16 Clark?

17 A Yes.

18 (The reporter read the record as requested.)

19 THE WITNESS: Are you meaning to refer only to  
20 the coast? Or are you also talking about bays and so on,  
21 or what? I mean if you are going to throw the Chesapeake Bay  
22 into that pot --

23 BY MR. TROSTEN:

24 Q No, I was talking about the coast.

25 A Not the Delaware or Chesapeake Bay?

ar2

1 Q No.

2 A There are so few fish there in the summer that we  
3 get very few tag returns from any place. I am really not  
4 prepared to answer that question. Its answer doesn't derive  
5 out of this paper of mine. You have asked me to suggest  
6 something which is quantitative in a sense, to decide which  
7 group of fish may be in a greater abundance, a higher proportion  
8 of the total stock in that area. And I don't think we can do  
9 that with the data that are here. Because I have so little  
10 tagging evidence from the south. You know, this is mostly  
11 from tagging in the northern area.

12 Q Mr. Clark, I was reading from the bottom of page  
13 339 of your 1968 paper, the first column, last paragraph on  
14 the page. "Within our study area" -- excuse me. Would  
15 the Board find it convenient to have this document back to  
16 look it?

17 CHAIRMAN JENSCH: Yes, I think it would. Any  
18 objection?

19 MR. MACBETH: No, sir.

20 BY MR. TROSTEN:

21 Q I was reading from the section that says, "Within  
22 our study area the southern contingents are found in the  
23 summer in the following places: 1. North Jersey and East  
24 Sounds, where they are the predominant groups; southwest Long  
25 Island, where they mingle with the Hudson estuary contingents;



ar3

1 West Sound, where they mingle with the Hudson West Sound and  
2 Long Island Sound contingents; northern areas from Rhode  
3 Island to Canada, where they predominate;" and then you go  
4 on to discuss various things. I was asking you whether,  
5 with respect to what you said there, striped bass contingents  
6 which spawn south of the Hudson estuary predominate from the  
7 North Jersey sector described in your 1968 paper southward?

8 A I have no reason to change that.

9 Q To disagree with what I said?

10 A No, I would stay with what this says.

11 Q Do you agree with -- is the answer to my question  
12 yes, you agree with what I said?

13 A I have to be very careful about that.

14 Q Would you like the question reread?

15 A Yes, the predominant group of fish in North  
16 Jersey -- no. I will have to say it my own way.

17 Q Could you try a yes or no answer?

18 CHAIRMAN JENSCH: Let him try it his way.

19 THE WITNESS: Yes, I have no reason to change my  
20 opinion as stated here in this paper.

21 MR. TROSTEN: That doesn't answer my question.

22 MR. MACBETH: I think the question referred to  
23 areas south of North Jersey. I think it would be best if the  
24 question were reread. The quotation didn't deal with anything  
25 south of North Jersey.

ar4

1 MR. TROSTEN: I think I understand what is confusing  
2 the witness. But let me restate the question.

3 BY MR. TROSTEN:

4 Q I asked him whether he agreed that during the  
5 summertime striped bass contingents which spawn south of the  
6 Hudson estuary predominate from the North Jersey sector  
7 described in his 1968 paper southward.

8 A To the best of my knowledge.

9 Q Mr. Clark, do you agree that during --

10 MR. MACBETH: Could I have the question and answer  
11 reread? I think I lost it that time.

12 (The reporter read the record as requested.)

13 CHAIRMAN JENSCH: Now that you have had it reread,  
14 I don't understand how predominate southward -- maybe I missed  
15 some words in there.

16 MR. TROSTEN: There are no words missed, Mr.  
17 Chairman. I was simply asking Mr. Clark whether he agreed  
18 that during the summertime striped bass which were spawned  
19 south of the Hudson River predominated on the coastal area,  
20 which is what we were talking about before, from the North  
21 Jersey sector described in his 1968 paper, which is this area  
22 up here (indicating) southward, and he said, "To the best of  
23 my knowledge, yes." Is the question clear, Mr. Chairman?

24 CHAIRMAN JENSCH: Dr. Geyer points out that he  
25 thought the witness had answered differently in an earlier

ar5

1 version of the question. Maybe we should get some clarification  
2 about it. The problem I have is that they are spawning in  
3 the Hudson River, and they get located in the North Jersey  
4 area and that area, is it your question, it extends southward,  
5 too?

6 MR. TROSTEN: No, Mr. Chairman. There are massive  
7 spawning areas in the Chesapeake Bay, there is also spawning  
8 in the Delaware River. These fish do migrate up and down  
9 the coast. What I was asking Mr. Clark was whether he agreed  
10 that in the summertime fish which were spawned in areas  
11 south of the Hudson River -- the two examples I gave, the  
12 Chesapeake Bay and Delaware River, and there are other rivers  
13 where they spawn, too -- predominated in the coastal areas  
14 from the North Jersey shore southward. And I didn't put any  
15 limit on how far southward, I just said southward, starting with  
16 the North Jersey shore and southward.

17 CHAIRMAN JENSCH: I think the trouble I am having  
18 is the word "predominate." In other words, they are located  
19 there, are spread out through the area from the North Jersey  
20 site southward.

21 MR. TROSTEN: By the word "predominate," I meant  
22 they were the dominant numerical group.

23 CHAIRMAN JENSCH: Your question is if they spawned  
24 in the Chesapeake Bay or Delaware River, when they start to  
25 migrate, they only go as far north as the --

ar6

1 MR. TROSTEN: No. I was simply talking about  
2 what coastal fishery is like, what the numerical contribution  
3 of various spawning areas are to this coastal fishery, Mr.  
4 Chairman. On the basis of Mr. Clark's answer, we have  
5 established here that in the summertime from the North  
6 Jersey coast southward the striped bass fishery is numerically  
7 predominated by striped bass that are spawned in areas south of  
8 the Hudson River.

9 CHAIRMAN JENSCH: And you so understood the question,  
10 and do you agree, Mr. Witness?

11 THE WITNESS: Give me about another 60 seconds to  
12 get that straightened out in my mind.

13 You are going beyond what I said in the paper, and  
14 that is why I have had to give considerable thought to this.  
15 I think that is a fair statement and I would agree, yes.

16 BY MR. TROSTEN:

17 Q Thank you. Now would you say, Mr. Clark, that  
18 during the summertime striped bass contingents which spawn  
19 south of the Hudson estuary predominate from the east Long  
20 Island Sound area northward along the Atlantic coast? Just  
21 to be sure we know what we are talking about, I am talking  
22 about the spawning of fish which takes place in rivers, areas  
23 south of the Hudson River, and I am talking about predominating  
24 from east Long Island Sound northward along the Atlantic  
25 coast.

ar7

1           A       Do the southern contingents? I have to have  
2 the question again.

3           (The reporter read the pending question.)

4           THE WITNESS: I don't know how to handle this on  
5 the stand in this setting. You are asking some very, very  
6 weighty questions based upon some very, you know, slim  
7 evidence for those southern contingents, because this is,  
8 after all, one experiment. It is limited to a certain extent,  
9 it is concentrated in a particular area around the Hudson,  
10 and I would be reluctant to make that kind of sweeping judg-  
11 ment now based upon this evidence.

12           BY MR. TROSTEN:

13           Q       Mr. Clark, on the bottom of page 339, the last  
14 full paragraph on that page --

15           A       The left or right?

16           Q       Left-hand column.

17           A       Yes.

18           Q       Let me read this again. "Within our study area,  
19 the southern contingents are found in summer in the following  
20 places: North Jersey and East Sound, where they are the  
21 predominant groups; southwest Long Island, where they mingle  
22 with the Hudson estuary contingents; West Sound, where they  
23 mingle with the Hudson West Sound, and Long Island Sound  
24 contingents; northern areas from Rhode Island to Canada, where  
25 they predominate."

ar8

1       A       Well, I have to explain a little bit here,  
2       so this can get into the right context. We can be most  
3       confident about the areas where we have the best data. This  
4       particular study is targeted at that area around the Hudson  
5       estuary and so on. Now when I start talking about this  
6       southern contingent and what they may do, the pattern of all  
7       of this in my thought and interpretation is governed by the  
8       results of other researchers, and as you will see in the  
9       next sentence or so, I was influenced in this by Merriman  
10      and by Raney and so forth, people who had studied this  
11      before, people who had established a pattern into which most  
12      of us had adhered in our thinking.

13             And what I did, when I analyzed these data, was to  
14      analyze them for some kind of conformance with the previous  
15      work and with the thinking of Merriman and so forth. It is  
16      not the kind of statement, all of that about the southern  
17      contingent, that could possibly stand on its own based upon  
18      these data alone. So that that has to be taken into account,  
19      this background, including Merriman's classic study and so on.  
20      Those are the things that give it substance and conformity  
21      with other studies and so on.

22             From that standpoint, if I am asked, if I were  
23      asked to, just on my own, without anybody else's results and  
24      knowledge and thought, I wouldn't have been able to have  
25      expressed myself as that shows there.

ar9

1 Q Well --

2 A Now at this juncture, if I had these data now, five  
3 years later, to analyze and think about, I would have the  
4 results of some later opinions of other people like Phil  
5 Goodyear, who have looked into it analytically, and stood  
6 apart from the tag returns and taken an entirely different  
7 look at it. Then I would find there was a conflict of  
8 opinion, and at that point I would have to have dropped this  
9 whole idea or gone off in another direction or tried to bridge  
10 between the two or what-not.

11 Q Are you relying on Dr. Goodyear's opinion for your  
12 opinion with regard to the contribution of the Hudson River to  
13 the Atlantic fishery?

14 A No, what I said was now, today, if I had to do this.  
15 I would know that.

16 Q On the basis of your analysis that you performed  
17 in 1968, did you conclude that in the summertime striped bass  
18 contingents which spawned south of the Hudson estuary  
19 predominate from the east Long Island Sound areas northward  
20 along the Atlantic coast?

21 A Yes.

22 CHAIRMAN JENSCH: Within the limitations that you  
23 just gave, relying upon the work of Merriman and Raney, is  
24 that correct?

25 THE WITNESS: Yes, sir.

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1 Q Mr. Clark, do you agree that the Delaware River  
2 and the other river's tributary to Delaware may make a  
3 substantial contribution to the coastal migratory population?

4 A Here we have to worry about the word "substantial!"  
5 They contribute something. Nobody knows how much.

6 Q I agree that the word "substantial" is subject to  
7 some adjustments. But do you agree that the Delaware River  
8 and the other river's tributary to the Delaware Bay make  
9 a substantial contribution to the coastal migratory population?

10 A Just the Delaware Bay and its rivers?

11 Q Delaware River and the river's tributary to  
12 Delaware Bay.

13 CHAIRMAN JENSCH: Isn't that the question you just  
14 asked? You just read it again.

15 MR. TROSTEN: Yes. I read it to him again because  
16 he didn't answer the question.

17 CHAIRMAN JENSCH: He said he worried about the word  
18 "substantial." He said it made some contribution, but he  
19 didn't know how much.

20 BY MR. TROSTEN:

21 Q Mr. Clark, what did you mean when you said it is  
22 probably the Delaware River and the other river's tributary  
23 to Delaware may make a "substantial" contribution to the  
24 coastal migratory population on page 341 of the '68 paper?

25 A This is expressing my concern over the fact that



sw2 1 the Chesapeake Bay was for many, many years thought to be the  
2 major producer of the striped bass all of the way up the  
3 coast to New England. And almost to the elimination of any  
4 serious thought that the Delaware River, Delaware Bay, might  
5 also contribute something substantial.

6 And I found quite a few fish, as I remember, going  
7 in the Delaware Bay area, and this suggested to me that maybe  
8 the Delaware is more important than we thought.

9 So, I just suggested that maybe that had been over-  
10 looked.

11 Q And, indeed, you also pointed out that observations  
12 by DeSilva in 1961, and Merman, 1941, and Walter Murawski  
13 of the New Jersey Division of Fish and Game -- I am reading from  
14 page 341 of your paper -- indicate that there is spawning  
15 both in the Delaware River and in Delaware Bay tributaries, and  
16 that juvenile striped bass are common in the Delaware estuary.

17 A Let me just elaborate on that.

18 CHAIRMAN JENSCH: Excuse me a minute. I don't have  
19 the statement, but your statement was this is what he said those  
20 people said?

21 MR. TROSTEN: Yes.

22 CHAIRMAN JENSCH: What is your question. Those  
23 people having said it, he reported it as their words, what is  
24 it you want to test him on?

Whether he copied it correctly from them?

sw3

1 MR. TROSTEN: Actually, I was merely reading that  
2 additional portion of the paper to help refresh Mr. Clark's  
3 memory on this. I am about to ask another question about it.

4 CHAIRMAN JENSCH: My thought was, as I understood  
5 your question, you said didn't Jones and Smith and so forth  
6 say this.

7 All right, if they did, maybe it is a correct  
8 transcription or not.

9 But are you asking is this his judgment or their  
10 judgment?

11 BY MR. TROSTEN:

12 Q Was it your judgment in '68 that it was probable  
13 that the Delaware River and the other rivers make a substantial  
14 contribution to the coastal migratory population?

15 A Excuse me, are you asking me if I said it? Yes, I  
16 said it.

17 Are you asking me if I believe it today?

18 Q Did you believe it when you said it?

19 A Yes.

20 Q On page 4 of your testimony of October 30, 1972 --

21 CHAIRMAN JENSCH: Excuse me, did you want to get  
22 that further? I think the rules kind of ask you to clear up  
23 everything at one time.

24 Is it your judgment today that that is the situation.

25 MR. TROSTEN: I will bring that out right now, Mr.

sw4

1 Chairman.

2 BY MR. TROSTEN:

3 Q On page 4 of your testimony, you say, "There are no  
4 breeding rivers north of the Hudson and the nearest significant  
5 ones to the south are in the Chesapeake Bay, the Delaware being  
6 too polluted to support a significant nursery ground."

7 What data have caused you to change your opinion  
8 as you expressed it in your 1968 paper? Does that bring out  
9 the question? MR. TROSTEN: Does that bring out the question, Mr.  
10 Chairman?

11 CHAIRMAN JENSCH: Yes.

12 THE WITNESS: There was a study conducted in the  
13 Delaware River about striped bass spawning there by Walter  
14 Murawaki of the New Jersey Division of Fish and Game subsequent  
15 to the report of which, and part of the work which, were  
16 done after this paper that I wrote here. So that I had no  
17 access to his recent findings when this paper was put out that  
18 showed that the spawning of striped bass in the Delaware River  
19 now is blocked by the pollution in the Philadelphia.

20 If I remember it right, there is about a 30-mile  
21 strip of that river which is destroyed of larvae and eggs,  
22 and which would interfere with and kill off any that tried to  
23 come down the river, come floating down the river, like the  
24 larvae do through there. And this has caused me to think that  
25 the spawning in the Delaware River has become greatly reduced.

sw5

1 since 1941, and perhaps since the 1950's, when DeSilva was  
2 doing his work there.

3 In any event, the probable reaction to all of this,  
4 it seems to me, is for those fish to go into the Chesapeake  
5 Bay and spawn in there. Now, this is not my theory, it is  
6 somebody else's. But there is a canal that connects, a ship-  
7 ping canal, Corps of Engineer's shipping canal, that connects  
8 the Chesapeake with Delaware Bay in this area here (indicating),  
9 and there are eggs and larvae of striped bass in there, and  
10 a suggestion of rather dense spawning in that area, which makes  
11 me want to believe theories I have heard about the fish  
12 deserting the Delaware River and spawning there instead.

13 In any event, however it happens, there is spawning  
14 in that area. And it suggests to me that the Delaware, if I  
15 understand it right, the Delaware River is no longer so  
16 important, I mean it just got wiped out.

17 It might recover beautifully if they could get it  
18 cleaned up and maybe the fish would do all right up there.

19 BY MR. TROSTEN:

20 Q Mr. Clark, would you provide us with the report or  
21 data on which you relied for your later opinion having to do  
22 with the Delaware? If you could give us a reference --

23 A I think I have it here. If we are going to have a  
24 break some time, I can get it out for you.

25 Q All right, thank you.

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1 Mr. Clark, would you say that there is unanimous  
2 opinion among experts that support your view that one half of  
3 the sports catch of the north and middle Atlantic States, that  
4 is from Delaware to Maine, is "influenced" by the Hudson?  
5 And I am referring there to page 4 of your testimony.

6 CHAIRMAN JENSCH: Of October 30?

7 MR. TROSTEN: Of October 30, page 4, toward the  
8 upper third of the page, right after the footnote 22 reference.

9 THE WITNESS: I have no way of knowing.

10 BY MR. TROSTEN:

11 Q. You have no way of knowing whether this is unanimous  
12 opinion?

13 A. No, no way of knowing.

14 Q. Do you know that there are people who disagree with  
15 you?

16 A. No.

17 Q. You are not aware that witnesses for the Applicant  
18 have disagreed with you?

19 A. I am sorry, I don't remember any specific examples,  
20 but I will accept that they have.

21 Q. All right.

22 Let me ask you, are you specifically aware that  
23 Witness Raney in his October 30 testimony disagreed with you?

24 A. Oh, I do seem to remember that.

25 Q. Is it not correct that investigators who have

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1 studied --

2 A. Excuse me, I don't see how he could -- he didn't  
3 disagree with me, he just said something else, something  
4 contrary.

end 19

5 MR. TROSTEN: Something <sup>Contrary</sup>~~contrary~~ to that.

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1 CHAIRMAN JENSCH: I wonder if we could have a  
2 reference to the testimony on that.

3 MR. TROSTEN: Yes, just a moment, Mr. Chairman.  
4 I will read to you the particular portion that I was referring  
5 to. On page 9 of Witness Raney's testimony, the following  
6 statement appears ---

7 CHAIRMAN JENSCH: Do you have that before you, Mr.  
8 Witness? If you don't, when he finishes reading he will show it  
9 to you.

10 THE WITNESS: All right.

11 MR. TROSTEN: Page 9, bottom part of the page,  
12 paragraph B.

13 "The Staff estimate of the great impact of entrain-  
14 ment and impingement at Indian Point Plants 1 and 2 on the middle  
15 Atlantic fishery is inaccurate and greatly exaggerated. The  
16 bulk of the middle Atlantic fishery for striped bass (outside  
17 of the Hudson River, the western quarter of Long  
18 Island Sound and the New York Bay area), is supported by  
19 striped bass production in areas to the south of New Jersey and  
20 mainly by the Chesapeake and Delaware Bays."

21 Do you see that. It was on the basis  
22 of that portion of Witness Raney's testimony I asked whether  
23 you were aware that there was unanimous opinion that supported  
24 your view that one-half of the sports catch of the north and  
25 middle Atlantic states, that is Delaware to Maine is "influenced"

1 by the Hudson.

2 THE WITNESS: Those are not incompatible, without  
3 numbers.

4 CHAIRMAN JENSCH: Did I hear your reading of  
5 Dr. Raney to say is supported by Chesapeake Bay and Delaware  
6 Bay and his statement is one-half of the sports catch is influenced  
7 to what extent, I don't know, by the Hudson River. Is that  
8 the comparison you seek, between the supported and influenced?

9 MR. TROSTEN: No. I wasn't seeking that comparison.  
10 I did want to ask Mr. Clark what he meant by the word "influenced"  
11 on page 4.

12 CHAIRMAN JENSCH: You withdraw the last question then,  
13 is that it?

14 MR. TROSTEN: I thought the witness answered the  
15 question.

16 THE WITNESS: No, I said our two views are not incom-  
17 patible, this that I said can be compatible with what  
18 Dr. Raney said, it is just a matter of what numbers you plug  
19 into what areas.

20 BY MR. TROSTEN:

21 Q I am going to inquire about what you just said.  
22 First, I want to ask you what you mean by the term "influenced"  
23 on page 4?

24 A It means there are some fish there that were  
25 spawned in the Hudson, born in the Hudson, bred in the Hudson,



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1 raised there.

2 Q Without any numbers at all, without any quantifica-  
3 tion of this at all, is that right?

4 A Well, I really don't want to say it is 100 percent,  
5 because you can't cut anything that clean. I don't have any  
6 grounds for saying it is any other specific number less  
7 than that. I think -- let me explain a little about this so we  
8 start from the top.

9 (Indicating on blackboard.)

10 If we just take as a rough coastline from Maine down  
11 to the coast, Cape Cod, and then south to Long Island and  
12 Delaware and Chesapeake Bay and North Carolina. The area that  
13 I am speaking of there extends from Hatteras, North Carolina  
14 to the Canadian border.

15 Q When you say the area you are speaking of there, are  
16 you not referring to the Delaware to Maine area you refer  
17 to on page 4 of your testimony?

18 CHAIRMAN JENSCH: What is his testimony?

19 MR. TROSTEN: His testimony says, Mr. Chairman,  
20 "One may estimate that one-half the sport catch is influenced  
21 by the Hudson." REading further up it says, "to eliminate  
22 the Maryland, Virginia and North Carolina catches, and refine  
23 the estimate more nearly to the segments of the coast  
24 supported by the Hudson breeding grounds," and you eliminated  
25 Maryland, Virginia and North Carolina from the discussion, you have

1 to go back to the preceding page in order to see the whole  
2 thing, but what you are left with is Delaware to Maine.

3 CHAIRMAN JENSCH: I guess I misunderstood your  
4 question. I had it written that you talked about the middle  
5 Atlantic coastal area.

6 MR. TROSTEN: At the moment, Mr. Chairman, I am talking  
7 about Mr. Clark's testimony.

8 CHAIRMAN JENSCH: Then we will just take what his state-  
9 ment is on page 4.

10 MR. TROSTEN: Yes.

11 CHAIRMAN JENSCH: Proceed.

12 THE WITNESS: Now, I am trying to clarify this. The  
13 boundary between the North Atlantic and the Middle Atlantic  
14 sectors in our sport fish catch statistics program which I  
15 was in charge of in 1965, in 1970, and 1960 when I was also  
16 in charge of the collection program along the coast, the split  
17 into two areas of which I am speaking are these two areas, one  
18 from the Canadian border to New York Harbor, the second from  
19 New York Harbor to Cape Hatteras, North Carolina.

20 BY MR. TROSTEN:

21 Q These were the 1960 and '65 salt water angling  
22 surveys, is that what you are referring to?

23 A Yes, and I think I am also referring to the results  
24 of the 1970 one which is the most recent one.

25 Q That Mr. Newell is conducting now?

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1 A Yes.

2 Q Okay, fine.

3 A Now, the area that has been used a number of times  
4 to separate the Chesapeake Bay influenced area from the  
5 area to the north has just arbitrarily been the border  
6 between Delaware and Maryland and where that Delaware-Maryland  
7 border hits the coast about here.

8 (Indicating.)

9 Unfortunately, in our sport fish statistics which  
10 the Bureau of Census did for us, we were not able to refine the  
11 data down to any smaller unit than all the fish, in the case  
12 we are interested in striped bass, that were caught in this area  
13 reported in one group, one statistical group, and the fish from  
14 here on up reported in again.

15 MR. MACBETH: Would you indicate the areas for the  
16 record again?

17 THE WITNESS: The North Atlantic area and the  
18 Middle Atlantic area. So in the North Atlantic sector we  
19 have all of the fish catches grouped together, and for the  
20 Middle Atlantic sector, we have all of the fish catches grouped  
21 together.

22 Now, in order to make a separation between the fish,  
23 the Chesapeake Bay situation and this area to the north, I  
24 used a dividing line of Delaware state line. Now, all of the  
25 fish south of that line, in trying to draw this thing, I am

1 saying the fish south of there are primarily under the influence  
2 of the Chesapeake Bay. I am saying that the fish that are in  
3 this sector here, in the northern part, principally New Jersey  
4 and New York, being under the influence of the Hudson, brings  
5 you across into the North Atlantic sector and takes it, at least  
6 from my tagging records, into this area here, New Jersey and  
7 New York area.

8 CHAIRMAN JENSCH: Including the Long Island area?

9 THE WITNESS: Including Long Island. So what I  
10 have attempted to do is partition these national sport fish  
11 statistics in that report to exclude this area to the south  
12 that we know is heavily influenced by the Chesapeake Bay  
13 and to include the area in the environs of the Hudson River and to  
14 allow some influence in New England from the Chesapeake  
15 fish, because to the best of my knowledge, there is a  
16 connection between, a rather strong and well demonstrated  
17 connection, between the northern New England fish and the  
18 Chesapeake Bay.

19 So, I have taken half of the catch in those  
20 two areas and ascribed it to Hudson influence, and I haven't  
21 tried to resolve this problem completely, I put all of these,  
22 or left all of those out. So the area I am talking about would  
23 be the northern part of the Middle Atlantic and the western  
24 part of the North Atlantic section. That is the best you  
25 can do with those fishery statistics, because there is no

1 breakdown whatsoever of them.

2 And because sport fish statistics, I mean this is  
3 the important economic segments of industry based on the  
4 striped bass; it is not commercial fishing, where we have  
5 detailed records, but sport fishing, where the best thing  
6 we have are quinquennial surveys based on a kind of census sampling,  
7 people knocking on doors asking did you catch any fish last  
8 year.

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1 BY MR. TROSTEN:

2 Q What is the northern terminus of the area covered  
3 there, please?

4 A Canada.

5 Q In other words, the border between Maine and  
6 Canada, is that right?

7 A YEs.

8 CHAIRMAN JENSCH: That is for the North Atlantic  
9 Fishery Sector, not the northern terminus of the area he is  
10 trying to depict as shown in his statement on page 4, as I  
11 understand it.

12 The northern area there ends in Long Island, is that  
13 correct?

14 MR. TROSTEN: No, sir, it ends in Canada.

15 CHAIRMAN JENSCH: Is that correct, Mr. Clark?

16 THE WITNESS: If that 50 percent influence that I  
17 put down there is low, it coulbe because I have excluded fish  
18 from here that should more properly be ascribed to the Hudson.

19 I have no set boundary here, because there is no  
20 spawning river or estuary situation, striped bass production  
21 area up here.

22 These fish come from either Hudson, Deleware or  
23 Chesapeake, primarily. We just don't have the data to know  
24 what the percentage and proportion and contributions of these  
25 stocks are.

1 I believe that there is a contribution that is  
2 important -- I wouldn't want to say it is substantial,  
3 significant, or what -- of the Chesapeake to this area.

4 BY MR. TROSTEN:

5 Q Let me see if I understand what you have done and  
6 the explanations you have offered for what appears on page  
7 4 of your testimony.

8 You have taken the coastal area from Cape Hatteras  
9 to Canada and you have arbitrarily divided it into two  
10 areas, a southern area, running from Cape Hatteras to the  
11 Delaware line, and a northern area from the Delaware line  
12 to the Canadian-U.S. border.

13 And on the basis of the -- is that correct?

14 MR. MACBETH: I object to the question, the use of  
15 the word "arbitrarily". I think the witness explained the  
16 choice was not entirely arbitrary, and he gave some basis  
17 for it.

18 BY MR. TROSTEN:

19 Q I will delete the word "arbitrarily".

20 You have drawn a line between the two areas, the  
21 southern area running from Cape Hatteras to the Delaware line  
22 and the northern area running from the Delaware line to the  
23 Canadian-U.S. border.

24 If I am wrong, please tell me where I am wrong?

25 A I think I will have to explain a little bit more.

1           These sport fish statistics which are the only  
2 thing we have got to make any kind of opinion about the  
3 economic value ascribed to the recreational fishery for striped  
4 bass, are described by virtue of the method of collection  
5 into large segments of the coastline.

6           There are no breakdowns in between. One is  
7 the North Atlantic. Two is the Middle Atlantic.

8           Those are the actual numbers used in the report.  
9 This Northern Atlantic Sector between 1965 and 1970, the years  
10 we are most concerned with in our study of the river, averaged  
11 for the North Atlantic 8.7 million fish. That is the number  
12 of striped bass estimated to have been caught throughout the  
13 whole North Atlantic Sector, regardless of source of origin  
14 or anything -- just the number of fish that fishermen are  
15 supposed to have caught depending on the U.S. Bureau of  
16 Census Survey.

17           The Middle Atlantic area, the catch was 6.3 million  
18 striped bass reported by the fishermen that were surveyed.

19           I spent 10 years at Sandy Hook involving myself  
20 with matters of the distribution of sport fishermen and  
21 sport fishing activities along the coast, and in designing  
22 and carrying out these surveys and generally being snoop  
23 and nosey about what fishermen were doing everywhere, and  
24 learning as much as I could.

25           I had a sense and an idea of the distribution



1 of striped bass along this coast and where people go  
2 to fish for them, at what times of the year, and so forth.

3 In my opinion, all of this -- I have come up with  
4 what I consider to be a reasonable or the best projections  
5 that can be made as any utility to us here about the proper-  
6 tion of these values to anything we now know about the origin  
7 of the fish.

8 Now, when I say that it was half and half, it is  
9 based on prorating this 6.3 and 8.7, in my best judgment, the  
10 part of this catch that could be ascribed proportionately to  
11 the Chesapeake and to the Hudson would be something on the  
12 order of four million for the southern part of my middle  
13 Atlantic region from the Delaware-Maryland border south,  
14 and 2.3 from the Delaware-Maryland border north to New  
15 York Harbor.

16 MR. TROSTEN: May I ask what he is reading from,  
17 Mr. Chairman.

18 Could you tell me what you are reading from?

19 THE WITNESS: This is an average of the reports  
20 of this published '65 survey, and the published results of  
21 the 1970 survey, the reported numbers of striped bass caught  
22 in the North Atlantic and the Middle Atlantic area.

23 If it would be helpful to you --

24 BY MR. TROSTEN:

25 Q Would you write these down for us?

1           A       I, North Atlantic, II, Middle Atlantic, 1965, 1970.  
2                   (Witness writing on blackboard.)

3           Q       Is that 2.8 at the top, Mr. Clark?

4           MR. MACBETH: Perhaps he can read them all  
5 off for the record in a moment.

6           CHAIRMAN JENSCH: We will soon take a break  
7 and perhaps someone can copy it and Xerox it.

8           THE WITNESS: What I am showing here are the pub-  
9 lished results of the survey for 1965 -- I think you have a  
10 copy of that, if not I can give you a copy or the reference  
11 -- and the 1970 unpublished data that are obtainable from  
12 the National Marine Fisheries Service in Narraganset,  
13 Rhode Island.

14           The data show that in the North Atlantic section,  
15 in 1965, 13.2 million striped bass were caught by fishermen.

16           In the middle Atlantic area in 1965, 2.8 million.

17           In the North Atlantic area in 1970, 4.3 million,  
18 and in the middle Atlantic area in 1970, 9.9 million.

19           Now, you can average these out so that you get an  
20 average for both years. If I have done the arithmetic right,  
21 that should come out to --

22           CHAIRMAN JENSCH: Let's take a break and you can  
23 work it out during the break. At this time let us recess  
24 to reconvene in this room at five minutes after four.

(Recess.)

DORA #22  
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1 CHAIRMAN JENSCH: Please come to order.

2 BY MR. TROSTEN:

3 Q Mr. Clark, I appreciate your summarizing some of  
4 the calculations that underlay your testimony on page 4.

5 Actually, I had not intended to delve at this time  
6 into the testimony on the angling surveys, so what I  
7 would like to do is defer further questioning on that until  
8 tomorrow, or this afternoon, if we can reach it. And your  
9 counsel has been kind enough to consent to the two of us  
10 meeting after the hearing is over and discussing the calcula-  
11 tions which should help us to move along, I think, when we  
12 get to it.

13 Is that all right with you?

14 A What time would you propose to do that?

15 Q Immediately after the hearing is over. It  
16 shouldn't take but a few minutes.

17 A Fine.

18 Q Mr. Clark, is it correct that the investigators  
19 who have studied the subject have concluded that Chesapeake  
20 Bay supplies most of the coastal stock along the Middle and  
21 North Atlantic coasts?

22 CHAIRMAN JENSCH: Do you have a document that  
23 summarizes that position?

24 MR. TROSTEN: I am drawing for that conclusion  
25 from Dr. Goodyear's analysis which appears on page 1236 of the

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1 Final Environmental Statement, in the first six lines.

2 Mr. Clark, do you have that handy?

3 DR. GEYER: Which lines?

4 MR. TROSTEN: Lines 3 through 6:

5 "Thus it has become a common believe that the  
6 Chesapeake supplies most of the coastal stock along  
7 the Middle and North Atlantic coasts."

8 THE WITNESS: Yes, I agree with that.

9 BY MR. TROSTEN:

10 Q You agree that the investigators who have studied  
11 the subject have concluded that the Chesapeake Bay supplies  
12 most of the coastal stock along the Middle and North Atlantic  
13 coasts?

14 MR. MACBETH: Could I be clear about one thing?

15 Does that imply all investigators concluded that?

16 It is perfectly obvious from the documents that  
17 there are investigators who reached a somewhat different  
18 conclusion.

19 A MR. TROSTEN: As a matter of fact, I infer from

20 Dr. Goodyear's paper that all of the investigators have  
21 reached this conclusion with the exception of Dr. Goodyear.

22 And we talked about this, we began to talk about this during the  
23 last session of the hearing, and to the best of my knowledge

24 Dr. Goodyear is the only investigator who disagrees with  
25 what he characterizes as a common belief.

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1 I am not aware of any other investigator who  
2 shares Dr. Goodyear's belief. I wanted to find out if  
3 Mr. Clark agrees with me.

4 THE WITNESS: I agree that a number of research  
5 people who have studied the situation have concluded that --  
6 I want to use your words to answer your question -- concluded  
7 that most of the coastal stock of the Middle and North  
8 Atlantic coasts originate in the Chesapeake Bay.

9 Is that a suitable answer?

10 BY MR. TROSTEN:

11 Q I think it is.

12 I just have one clarification to ask you.

13 Do you know any investigator who does not agree  
14 that the Chesapeake supplies most of the coastal stock along  
15 the Middle and North Atlantic coasts?

16 A Present company excluded?

17 Q Yourself excluded.

18 A And Dr. Goodyear excluded?

19 Q And Dr. Goodyear excluded.

20 A All right.

21 CHAIRMAN JENSCH: While we are excluding them, we  
22 infer both Dr. Goodyear and Mr. Clark are excluded and the  
23 next sentence is tagging studies in the Chesapeake Bay area  
24 fail to confirm this belief.

25 So you would infer excluding the present company

mm4

1 and Dr. Goodyear, they both disagree with this common  
2 belief, but how widespread is common I don't know.

3 MR. TROSTEN: I understand Dr. Goodyear does not  
4 share the belief that he characterizes as a common belief.

5 I gather Mr. Clark does not share that belief  
6 either.

7 THE WITNESS: If you would be willing to give me  
8 names of the people who have done this, I will be glad to  
9 give you my opinion as to whether they do or don't. I am not  
10 I am sitting here, trying to think of all of the guys I know  
11 who studded striped bass and what may be in all of their  
12 papers, and what each and every one of them concluded.

13 It would be far too dangerous for me right now to  
14 say, well, there isn't anybody who does not agree, other than  
15 Goodyear and Clark, because there may very well be. There  
16 are a lot of papers on this subject, a lot of people have  
17 looked into it.

18 It is quite one thing to say it is a common  
19 belief, but it is too much of a burden for me to assume  
20 without some kind of system of checking it out, that nobody  
21 else ever went against this theory.

22 CHAIRMAN JENSCH: Do the preceding persons agree,  
23 for instance?

24 It says, "For example, Raney, Tiller and  
25 Nansueti and Koo have described the occurrence of

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1 extensive recruitments in northern areas from the  
2 Chesapeake Bay spawning."

3 That doesn't say they agree the Chesapeake  
4 supplies most of the coastal stock. Just extensive  
5 recruitments.

6 How much that is, I don't know. Maybe they  
7 disagree with it. Maybe Dr. Goodyear inferred incorrectly  
8 from those whom he reviewed, these persons, that they think it  
9 is. But his statement is extensive recruitments.

10 MR. TROSTEN: Mr. Chairman, I am simply asking  
11 Mr. Clark whether he believes that there is any investigator  
12 other than Dr. Goodyear and Mr. Clark, who disagree that the  
13 Chesapeake supplies most of the coastal stock along the  
14 Middle and North Atlantic coasts.

15 Now, Mr. Clark can answer several ways. He can say  
16 I don't know. Or he can say there is someone who disagrees  
17 and then I will ask him who that is.

18 Or, he can tell me they all agree.

19 I am simply asking him to answer my question.

20 CHAIRMAN JENSCH: I just wondered how you were  
21 phrasing it.

22 Proceed.

23 THE WITNESS: I am not able to answer that.

24 BY MR. TROSTEN:

25 Q. All right, thank you Mr. Clark.

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1 Mr. Clark, is it correct that you, yourself,  
2 concluded on page 2 of your April 5, 1972 testimony, which  
3 was the predecessor of the October 30, 1972 testimony:

4 "In tagging studies we have shown that  
5 Hudson bred striped bass are caught principally  
6 around Long Island (both in the Sound and along the  
7 South Shore), New York Harbor and the Norther New  
8 Jersey shore?"

9 A. Yes.

10 Q. Now --

11 A. I can explain that, too, if you want an explanation.

12 It is because that is the area of major concentra-  
13 tion of fish. I mean that is where they are. So that is where  
14 they are principally caught.

15 The fact that they may spread out to the north or  
16 the south, in somewhat smaller numbers, does not say that they  
17 are not principally caught there.

18 I mean, that is the area where the big abundance of  
19 rather small striped bass is.

20 The areas to the north we are talking about, are  
21 areas where there are a lot fewer fish but they are big.

22 So if you are talking about numerical abundance,  
23 all of that area is a very, very heavily fished area. The fish  
24 are very abundant and I would still stand with the statement  
25 that they are principally caught in that area, by numbers.



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Q Am I to infer from that statement that there are very few striped bass caught other than in the areas you designated that are Hudson bred striped bass?

A We are always dealing with words like "principally" and "substantially" and so forth.

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1 Q These are your words, Mr. Clark?

2 A Principally is the best I could do. In view of the  
3 fact that we don't have anyway of dividing these stocks up  
4 in proportion that come from here, there, or elsewhere. It  
5 is my judgment that the heaviest part of the fishing on the  
6 Hudson produced stock is in that area. I can't assign any  
7 numbers to it.

8 Q You can't assign any numbers to it?

9 A No.

10 Q Am I to infer, then, that as opposed to this map  
11 which shows an area from Cape Hatteras to the Canadian Border,  
12 that you testified on April 5, 1972, of this year that the  
13 Hudson-bred striped bass are sought principally here. Is  
14 that right? (indicating.)

15 A From Mattituck and the Rhode Island Border, west.  
16 That is Western Long Island, Northern New Jersey -- is that  
17 what we are talking about?

18 Q Northern New Jersey?

19 A That is from Barnegat Bay north to the harbor, plus  
20 the harbor area and this south shore of Long Island. I think  
21 that is the area you are referring to. That is a bad map.

22 Q This map admittedly is somewhat out of scale, shall  
23 we say, but this is a rather constricted area, isn't it,  
24 relative to the whole Atlantic coast? Would you agree?

25 A Yes. I don't see why not -- rather constricted.

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1 I can add a little explanation to that, while you  
2 are pondering things. What is happening here, I sense, is that  
3 that the Hudson River has no, or has not the kind of shallow  
4 water, wide bay area attached to it that the Chesapeake has.

5 In any terms of the area there, but nevertheless,  
6 the fish are doing the same thing, which is moving out of the  
7 river and spreading out to a certain degree, into it, while  
8 they are young, as the Chesapeake fish do; living close to the  
9 coast in shallow waters.

10 So, they are coming out of the river and spreading  
11 out, and inhabiting this area. Now, as they grow and get  
12 larger, they behave as striped bass might in the Chesapeake Bay,  
13 which is to move farther and farther from their spawning  
14 stream in their search for food and whatever.

15 And that leads them to use this area in much the  
16 way that the striped bass in the Chesapeake would use the  
17 immediate environs of the Chesapeake Bay, at the mouth of their  
18 spawning stream. And, so what you get, would expect to get  
19 here is a concentration, a high numerical concentration of  
20 very young fish, and then spreading farther and farther out  
21 and getting larger, and larger.

22 The ones that go south for the winter, often North  
23 Carolina, are very large fish. The ones that come up to Cape  
24 Cod and go north toward Maine will tend to be larger fish on  
25 the average than the ones that stay here.

ter-3

1           So you get a very much denser, higher numerical con-  
2           centration of fish in this area and the catching reflect this  
3           in terms of fish of three, four, or five years of age; as  
4           opposed to eight, nine, ten -- the big fish farther away.

5           That is why you get the much higher numerical catch  
6           in this area than you would as you extend out to a distance.

7           Q       You have just enunciated, again, the theory that  
8           you gave us, earlier today, when you drew the diagram before.  
9           And it is an interesting theory, and I have already asked  
10          you for the data that support that theory and I gather you are  
11          going to supply that to us, so we can examine the data base  
12          for that theory?

13          A       May I clarify one point?

14          Q       May I continue, please?

15          A       Sure.

16          Q       Am I correct in inferring that you testified in  
17          April of '72 that the Hudson-bred fish were being caught  
18          principally in this constricted area? Is that correct?

19          A       I think your circle is getting smaller all of the  
20          time.

21                   (Drawing on the board.)

22                   That would be the area.

23          MR. MACBETH: Could you reflect that for the record?

24                   THE WITNESS: The last from the Rhode Island Border  
25                   to the southern extreme of Barnegat Bay, New Jersey.

1 BY MR. TROSTEN:

2 Q Are you changing the testimony that you offered  
3 in evidence in this proceeding on April 5th?

4 A I am not.

5 CHAIRMAN JENSCH: Which says what?

6 MR. TROSTEN: "In tagging studies, we have shown  
7 that Hudson-bred striped bass are caught principally along  
8 Long Island, both in the sound and along the south shore,  
9 New York Harbor, and the Northern New Jersey shore."

10 Page two, April 5th testimony.

11 CHAIRMAN JENSCH: Barnegat is in Northern New  
12 Jersey, isn't it?

13 MR. TROSTEN: I don't believe so, sir. As I con-  
14 ceive of New Jersey, it is down about the middle -- well,  
15 you can see it on the map.

16 CHAIRMAN JENSCH: It is halfway between Atlantic  
17 City and Sandy Hook, isn't it?

18 THE WITNESS: Again --

19 CHAIRMAN JENSCH: I got Dr. Raney's agreement with  
20 that, I believe.

21 THE WITNESS: May I read you my definition of North  
22 Jersey?

23 Sandy Hook Bay from Leonardo east to and including  
24 Sandy Hook and the Northern New Jersey shore, south to, but  
25 not including Barnegat Inlet."

ter-5

1 I will stand on that particular definition, if it  
2 will simplify everything, as North Jersey.

3 BY MR. TROSTEN:

4 Q You are referring back to your 1968 paper, now?

5 A That is North Jersey.

6 Q Mr. Clark, did you refer, on the same page of your  
7 April 5th testimony, to the fact that 200,000 anglers fished  
8 for striped bass in 1965, as opposed to the 613,000 you now  
9 cite as having fished for striped bass in '65, in your most  
10 recent testimony?

11 A Do you have the passage?

12 Q Yes, let me give you both page references. On  
13 page two of your April 5th testimony, the first full paragraph,  
14 you say, "For example, over 200,000 anglers fished for striped  
15 bass in New York, New Jersey, and Connecticut waters each year,  
16 catching an estimated 29 million pounds."

17 Now, did you say, on page two of your October 30th  
18 testimony that the most recent published survey of Atlantic  
19 Sports Fishery for 1965 shows that in '65, 613,000 persons  
20 fished for striped bass in the Middle and North Atlantic states?

21 A Yes.

22 Q Is there any inconsistency between those two numbers?

23 A No, they are different numbers for different areas  
24 of consideration.

Q Do you mean you have to divide 613,000 by two?

1 MR. MACBETH: Wouldn't it be easier to ask him  
2 where the numbers came from?

3 There are two numbers, one referring to the Middle  
4 and North Atlantic area, the other to the smaller area.  
5 Instead of guessing, why don't we ask him?

end 23

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1mil

1 BY MR. TROSTEN:

2 Q Mr. Clark, you said 200,000 persons fished in 1965  
3 for striped bass. I gave you the reference to page 2 of your  
4 testimony. Now would it be correct to infer that half that  
5 number fished for striped bass of the 613,000, or would you  
6 say it would be a smaller number?

7 A In New York, New Jersey, and Connecticut, we have  
8 an estimate of 200,000 anglers fishing per year. Now, what  
9 did you want to know beyond that?

10 Q You estimate that half of the 613,000 anglers  
11 were fishing for striped bass?

12 A I am estimating that about half of the number of  
13 striped bass caught are in the area influenced by the Hudson.  
14 But I am not prepared to try to decide what the average catch  
15 of those people was in different areas, and so on. One is  
16 part of the other. There are 613,000 people fishing for  
17 striped bass throughout this area from the Canadian border  
18 to Cape Hatteras, North Carolina, according to our survey.  
19 In that April 5 testimony you are talking about, I was talking  
20 about the number of people just from New York, Connecticut,  
21 and New Jersey that fished for striped bass.

22 Q Where did you get the 200,000 number from?

23 A Reference 10. I am sorry. My copy doesn't have  
24 the literature also with it; it is lost or something. I can't  
25 tell you what reference 10 means in that April 5 testimony.



2mil

1 Q Reference 10 in the April 5 testimony is the Duel  
2 and Clark 1965 Salt Water Angling Survey, 51 pages.

3 A Yes, that is this paper here.

4 Q Could you tell me where you got the 200,000 number  
5 from and that would help us move along?

6 A I would have to go back and find the piece of  
7 paper that I did the calculating on.

8 Q Could you let us look at that? Could you find  
9 that and let us see it?

10 A Yes.

11 Q Thank you.

12 Now, I have just a final question with regard  
13 to this matter. In your 1969 paper on migratory fish of the  
14 Hudson estuary, page 305, did you report that the locations  
15 of the tagging of these Hudson recaptures -- let me give  
16 you the exact place on the page -- it is the first full para-  
17 graph, fifth line from the bottom. Do you see that  
18 sentence there?

19 A Yes.

20 Q Take a look at it, if you would, please.

21 A Fifth line from the bottom?

22 Q Fifth line from the bottom of the first full  
23 paragraph.

24 A "The locations of the tagging --"

25 Q Yes.

3 mil

1 A What did you want to know now?

2 Q I am asking you, with regard to the sentence, "The  
3 locations of the tagging of these Hudson recaptures shown in  
4 Figure 1 indicates the primary areas of influence of the  
5 Hudson," do you agree with that sentence?

6 CHAIRMAN JENSCH: Does he have the document before  
7 him?

8 MR. TROSTEN: Yes, he does.

9 THE WITNESS: I am just trying to find Figure 1.  
10 Here it is.

11 BY MR. TROSTEN:

12 Q This is the figure I gave you before, Mr. Clark.

13 A I think I would want to think a little bit about  
14 this.

15 Q All right. Do you want to think about it now or  
16 later?

17 A Are we going to come back to this whole general  
18 subject?

19 Q I hadn't planned to except insofar as we have the  
20 data that support your theory about the sweeping out of the  
21 Hudson spawned striped bass into areas of the Hudson, or  
22 into areas of the Atlantic. With respect to that, yes, I  
23 definitely want to come back to that.

24 A I am just having a little problem thinking this  
25 through and making sure I am going to be able to tell you

4mil

1 exactly what I think and not have to qualify or change my  
2 mind later or something, because those are the areas of the  
3 fish that went up there to spawn and it is not the area  
4 that is necessarily the whole area that is affected by the  
5 results of that spawn. I have got to make sure I know  
6 what I am saying here. See the primary areas of influence  
7 of the Hudson interpreted as the primary source of the breed-  
8 ing stock for the Hudson would follow from this, but not  
9 necessarily interpreted to mean the proliferation of young,  
10 which I think is the most important aspect of this. I need  
11 to think about this.

12 Q All right, Mr. Clark. When you have given us the  
13 data -- it seems to me that this question is intimately  
14 related to the theory that you enunciated about the contribution  
15 of the Hudson to the Atlantic. So when we see the data, and  
16 you have had a chance to think about this, we will have to  
17 return to the subject.

18 MR. TROSTEN: Is that all right with you, Mr. Chairman?

19 CHAIRMAN JENSCH: Surely.

20 MR. TROSTEN: Mr. Chairman, that concludes my  
21 examination on this topic, for the time being, of Mr. Clark.  
22 What I would like to do, Mr. Chairman, if it is satisfactory  
23 to you now, is to turn to the matter of the thermal model  
24 which the Board expressed an interest in. Would that be  
25 satisfactory?

(Witness Clark temporarily excused.)

5mil

CHAIRMAN JENSCH: Yes, if it suits your schedule.

MR. TROSTEN: Is that all right with you, Mr. Macbeth?

MR. MACBETH: Certainly.

MR. BRIGGS: While Dr. Raney is here, may I ask one question?

MR. TROSTEN: Certainly.

MR. BRIGGS: Just to refresh my memory, clarify my understanding of what Dr. Raney said in his testimony, as I understood this testimony, he said that enormous numbers of striped bass were spawned in the tributaries of the Chesapeake Bay and that a small fraction of these fish spilled out of the Chesapeake Bay and migrated up along the Atlantic Coast and possibly south down along the Atlantic Coast. And that these fish were sometimes tagged and that some tags were recovered from along the coast, but that the largest number of tags by far were recovered from Chesapeake Bay. Now, am I wrong in assuming that the striped bass that are spawned in the tributaries of the Chesapeake are principally caught in the Chesapeake?

DR. RANEY: I think the largest percentage of striped bass which are produced in the rivers tributary to the Chesapeake Bay are actually caught either in the rivers or in the bay.

MR. BRIGGS: Thank you.

6mil 1

CHAIRMAN JENSCH: Thank you, Dr. Raney.

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Mr. Grob -- do you desire to have Mr. Grob interrogated? Mr. Grob, having been previously sworn, need not be sworn again.

Whereupon,

JOHN J. GROB, JR.,

was recalled as a witness on behalf of the Applicant, and, having been previously duly sworn, was examined and testified further as follows:

MR. TROSTEN: Actually, I had not planned any formal interrogation of Mr. Grob. I assumed the Board itself would desire to question Mr. Grob with regard to the purpose of the thermal modeling testing that is described in the technical specifications and the duration of time involved. Now Mr. Grob can simply address himself to those matters if that is responsive to the Board's question. Is that satisfactory?

MR. BRIGGS: I believe we understand the purpose of the testing. I think the main concern is the time required for the testing. As we explained before, the initial decision was based primarily on a testing program not to exceed 100 days. And the technical specifications indicate that that time would be exceeded, I believe, and it doesn't give any indication at all of by how much it would be exceeded.

MR. GROSTEN: Mr. Grob can address himself to the

7mil

1 estimated time required for the combined testing for  
2 radiological purposes and also for the thermal model.

3 DIRECT EXAMINATION

4 BY MR. TROSTEN:

5 Q Would you do that, Mr. Grob?  
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A Yes, for the radiological testing, we had previous testimony which contained the schedule, October 19, 1971 I believe it was, where there was a chart which showed the various power levels that we would be going through and a table which included the nature of the tests which would be performed.

The time shown on the chart, assuming that everything went ideally and there was no need to stop along the way or there weren't plant trips or other factors which interfered with the testing program, came up to between zero power, the beginning of the test at zero power testing, up to 50 percent testing, at 45 days, which in turn Mr. Cahill testified that a realistic assumption, based upon our experience that these things don't always go well and there are reasons to stop, evaluate data, or make certain corrections in plant parameters, came up to it, what was brought us up to the 100 days of testing for radiological purposes.

Subsequent to this, based upon requirements of New York State regulatory agencies, the Department of Environmental Conservation and also recommendations contained by the AEC staff in their environmental impact statement, there is a need to do certain testing to verify the mathematical model and the hydraulic model under various conditions over various times of the year, which the AEC staff thought should preferably start during the 50 percent testing period.

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I believe there is reference to this in the environmental impact statement on page 3-49 which indicates their preference that such testing start during the 50 percent testing period. The time duration for this environmental testing again predicated on no contingencies would be in the order of 38 days total.

This includes eight days which are estimated, based on a transients calculation done by Quirk Lawler and Matusky for the plants to reach or approach an equilibrium condition after getting up to the 50 percent power level.

The nature of the test, there are essentially four, plus some additional sets of data or configurations which we want to obtain test data on the river temperature distribution, three dimensional temperature profiles, we want to obtain the velocity information on the river, and we would want to be obtaining coincident with this information on the net non-tidal flow and the meteorological conditions and ideally the testing would go along with these various conditions, including power level, units in operation, meteorology, net non-tidal flow in a hopefully more or less constant condition.

The four situations we would want to test would be with the plant at full flow, run tests to obtain data both near and far field under at least two outlet port configurations, which provide the submerged jet mixing at the discharge canal on Indian Point.



kar 3 1

2 Again, we would want to run these two types of  
3 outfall port configurations with the plant at the reduced  
4 circulating water flow and it is estimated by the consultants  
5 we have discussed this with, we have proposals from Quirk  
6 Lawler and Matusky who are here and others, that they would  
7 want to get at the full flow condition up to as many as four  
8 sets of data, each one set of data being a tidal cycle and  
9 under the reduced flow conditions at least two sets of data.

10 In our discussions with them, they indicate that  
11 this should take between set up time, obtaining the data,  
12 which would be obtained in the daylight hours, something in  
13 the order of a month. This leads us to our total estimate,  
14 if everything works well, if Indian Point unit 1 or Indian  
15 Point unit 2 doesn't trip during the course of the runs, which  
16 then requires some repeat time to get back to equilibrium  
17 again, depending on how long the plant is down, -- there might  
18 be a need to start from scratch again or some previous data  
19 would be useful, but there would be a need to get back to more  
20 or less equilibrium temperature rise in the river -- why then  
21 if we had such interference the time required to do the  
22 testing could be more.

23 There is a desire, if it is possible, to arrange  
24 it, to get some additional data from these four sets of data  
25 which presumably would be obtained with the Lovett plant in  
operation, to obtain some additional data, if the Lovett plant

kar 4 1 should be off, again to help us verify some of the character-  
2 istics and parameters of the hydraulic model, Alden Hydraulic  
3 model and the Quirk, Lawler and Matusky model. This is the  
4 time period that we have come up with based upon estimates  
5 of our consultants as to how long it would take them to  
6 undertake such a program.

7 DR. GEYER: Is the proposal to do all of this in  
8 one month in a given season or to scatter it across several  
9 seasons and conditions?

10 THE WITNESS: Eventually we would like to get data  
11 at full load, as a matter of fact we need to get data at  
12 full load, according to requirements of the Environmental  
13 Conservation Department of the State of New York, over a  
14 number of seasons.

15 This particular data is to be gotten at 50 percent,  
16 whenever we get there, whatever the season is, assuming we  
17 don't have ice on the river or something to give us an  
18 initial verification of our hydraulic model and mathematical  
19 model at at least one point, so to speak.

20 DR. GEYER: What measurements will you make in  
21 the field studies?

22 THE WITNESS: There will be near field measurements  
23 of the velocity and temperatures, three dimensional temperature  
24 distributions. There will be far field three dimensional  
25 temperature measurements made throughout the plume area with

kar 5 1 a cross section at various steps.

2 DR. GEYER: And you will measure salinities?

3 THE WITNESS: Salinities will be measured and we  
4 would be obtaining some supporting data, perhaps from some air-  
5 plane overflights on temperature, surface temperatures.

6 DR. GEYER: Is there any discussion of using  
7 dyes to supplement this, dye tracers?

8 THE WITNESS: Yes, the thought was on the near  
9 field testing.            would perhaps use dyes for the distribution  
10 coming out of the ports.

11 DR. GEYER: Thank you.

12 MR. BRIGGS: These tests that you will run in  
13 verifying the model then will tend to tell you whether at full  
14 power you will be able to save the New York State criteria or  
15 you will not be able to save it, is that right?

16 THE WITNESS: Yes, we would use this to make such  
17 extrapolations and give us more confidence in our model for  
18 utilizing it to develop such.

19 MR. BRIGGS: Suppose you didn't run these tests  
20 at this time. What would be the consequences, if you were to  
21 have to run them, just not run them now, run them at some later  
22 time, and what is the degree of uncertainty in the model?

23 That is, what is the likelihood that you will not  
24 be able to save the criteria of New York State?

25 THE WITNESS: Well, I think we are confident that

kar 6 1 we can save the New York State criteria with Indian Point  
2 units 1 and 2 at full load operation and with Lovett in operation,  
3 too, for that matter. The concern about or the desire for  
4 this initial data and the real concern that we should preferably  
5 get such confirmation during the 50 percent testing came about  
6 as a result of AEC staff who, I don't know, perhaps have  
7 indicated in their environmental statement questions about  
8 uncertainties that they see in the modeling which might lead  
9 one to evaluations that we are less favorable.

10 MR. BRIGGS: Do you recall whether their testimony  
11 indicated that there was a very high probability of your  
12 exceeding the New York State criteria, or was it only  
13 likely that you would exceed them under rather special conditions?

14 THE WITNESS: I can't recall the exact wording.

15 MR. TROSTEN: I think it is the latter. I would  
16 say they indicated some concern --

17 CHAIRMAN JENSCH: Did they put their concerns in  
18 writing so we could see what they were?

19 MR. TROSTEN: Yes, we can find that for you.

20 CHAIRMAN JENSCH: Not now. Excuse me.

21 MR. BRIGGS: Well, I don't recall the staff's exact  
22 words. As I recall it, too, they did indicate there was some  
23 possibility of exceeding the New York State criteria under  
24 rather special conditions.

MR. TROSTEN: I can read one statement and there is

kar 7 1 one other one. Page 3-49 the staff is of the opinion that  
2 the best and perhaps only way to resolve this uncertainty--  
3 referring to a series of uncertainties -- "Is by obtaining  
4 accurate temperature maps of the plumes when ~~plant~~ <sup>plant</sup> discharges  
5 and runoff flows are relatively constant. It is under that  
6 the Applicants obtain such sets of measurements as soon as  
7 possible perhaps the first set during the 50 percent testing."

8 I can go back and read you the other uncertainties  
E # 25 9 if you wish. The whole thing is on page 3-48 and 3-49.

1 MR. BRIGGS: Thank you.

2 How many days of 50 percent testing are involved  
3 in the original test program?

4 THE WITNESS: The radiological?

5 MR. BRIGGS: Yes.

6 THE WITNESS: Actual testing days added up to  
7 about 45 - 49, I am sorry.

8 MR. BRIGGS: That wasn't at 50 percent power,  
9 though?

10 THE WITNESS: No. That was various power levels, up  
11 to 50 percent.

12 MR. BRIGGS: About how much time at 50 percent  
13 power, do you recall?

14 THE WITNESS: The October 19 testimony, 1971,  
15 showed that -- let me check.

16 Looking at the chart which is not a very fine  
17 scale, it looks like the time at 50 percent power is about  
18 four or five days.

19 MR. BRIGGS: And if one then assumed that things  
20 go like they do sometimes, and that that is only half of  
21 the time that would be required, then we are talking about like  
22 eight or ten days at 50 percent power, possibly.

23 THE WITNESS: Excuse me.

24 MR. BRIGGS: I said if one doubled that as has  
25 been customary in looking at the test programs, then that

1 would be like eight or ten days at 50 percent power,  
2 possibly?

3 THE WITNESS: Well, the double contingency was to  
4 have kind of a general catch-all thing.

5 MR. TROSTEN: The actual days are in here.

6 THE WITNESS: Yes.

7 On page 1 of the testimony, under "Scope of  
8 Activities," it shows -- no, sorry.

9 It shows 42 additional days at up to 50 percent  
10 power, but it doesn't say how much -- it shows seven days, 20  
11 percent power, 42 additional days at up to 50 percent power.

12 And in this 42 days are days which are spent at other  
13 power levels than 50 percent.

14 MR. BRIGGS: What you have talked about originally  
15 was something like four or five days at 50 percent power?  
16 Maybe eight or ten days at 50 percent power, and now you are  
17 talking about adding on to that 38 days or more at 50 percent  
18 power?

19 THE WITNESS: Correct.

20 MR. BRIGGS: Which vastly expands the operating  
21 time at the 50 percent power level?

22 THE WITNESS: That is correct.

23 MR. BRIGGS: I don't believe I have any more  
24 questions.

25 MR. MACBETH: Could I ask questions about this?

## CROSS-EXAMINATION

BY MR. MACBETH:

Q Am I correct in taking your last answer to me that the company would intend to run the plant at 50 percent of power for approximately 38 days beyond the radiological testing period?

A That is correct.

Q And that would be a continuous period at the end of the radiological testing period?

A Yes, probably at the end of the radiological testing period there might be some need to come down, but then we would intend to go back up again as soon as possible to go through this 38-day run, assuming all went well and it was completed within the 38 days.

Q What if everything does not go well?

A Well, then one has a need to perhaps, if one gets shut down for a while, one has a need to lose several days in getting back up to equilibrium conditions again, and then, hopefully, catch your points, additional points that you require.

Q On the other hand, other things could go wrong, could they not? Perhaps the boats won't be working and so on. Would that mean the plant would go on running at 50 percent and you would eventually have the boats fixed and get out and make the test, or have the airplane on a day it



1 wasn't cloudy?

2 A There could be contingencies on equipment failures  
3 and such that might delay a planned day's run and require --  
4 yes, one would want to stay at this constant condition  
5 which is part of the requirements for the test.

6 MR. MACBETH: Mr. Chairman, the Hudson River  
7 Fishermen's Association did not oppose the application for  
8 a 50 percent testing license, and we reached a stipulation  
9 with the other parties, including the Applicant, but not the  
10 Staff on that point.

11 It was our understanding throughout the  
12 negotiations for the stipulation and the signing of the stipu-  
13 lation that we were discussing radiological testing to 50  
14 percent.

15 I remember in June a colloquy between the Board  
16 and some of the witnesses for the Applicants which  
17 indicated at that point that they, too, were discussing  
18 radiological testing at 50 percent.

19 There was discussion about door handles and things  
20 of that sort, and we were assured that wasn't involved. I  
21 think I would want to review this testimony this afternoon  
22 and I think I will then have to file some kind of formal  
23 paper, but I think I can say now the Hudson River Fishermen's  
24 Association will object to the lengthening of this testing  
25 period beyond the 100 days.

1 That was not contemplated in the stipulation which we entered  
2 into. I think we are entitled to a hearing on that  
3 additional period of time. And I think we will probably  
4 demand a hearing on that additional period of time.

5 I frankly am somewhat taken aback by this. But  
6 I do want some time to read over the testimony. But I think  
7 there is no question that my clients will want to file a  
8 formal objection and bring this period back to the 100 days  
9 that certainly was contemplated by us at the time the  
10 stipulation was signed.

11 CHAIRMAN JENSCH: Is it your thought that there would  
12 be a different environmental impact by extending the option  
13 for these three months to nine months, as proposed?  
14 And there should be some examination of the environmental impact  
15 depending upon the time that these nine months testing would  
16 go on?

17 MR. MACBETH: I think there is no question that  
18 when the 38 days fall makes a good deal of difference.  
19 Or it may be a considerably longer period than 38 days,  
20 depending on the weather and the boats and the shape of the  
21 plant and so on.

22 If it were two or three days beyond the 50 percent  
23 testing period, the 100 days that were discussed, I don't  
24 think my clients would have any objection to that. A best  
25 estimate of 38 days -- we know that generally these tests

1 have run to twice that period -- is a very substantial period.

2 Should that fall, let us say, in September or  
3 October, times that are not particularly bad for either  
4 kills by entrainment or impingement, I think that my  
5 clients would probably have less objection than if they fell,  
6 say, in June and July, when they could expect the worst  
7 kinds of results.

8 The problem of not making an objection, though,  
9 is that the history of this plant is you never know when  
10 those 38 days are going to fall until the plant is ready  
11 for them.

12 We took our chances on that when we signed the  
13 stipulation. It looked at that time as if the whole 100  
14 day period would go through the late winter and early part  
15 of the spring, and we all know that didn't happen; we are  
16 here a year later, and the plant is not ready to go critical  
17 yet.

18 But I don't think my clients can accept an  
19 additional minimum period of 38 days at any time of the year  
20 without having some further hearing on that. I haven't  
21 gone back and reviewed in great detail the initial decision of  
22 the Board on this. But I don't think, frankly, it was  
23 in the contemplation of the Board when it signed the decision,  
24 either.

25 I think that Applicants and the Staff in proposing

1 this are passing beyond what this Board ruled on.

2 CHAIRMAN JENSCH: You are saying the foundation  
3 for your stipulation appears to be absent and the matter will  
4 have to be reconsidered entirely at this time by your clients.  
5 is that correct?

6 MR. MACBETH: Yes.

7 CHAIRMAN JENSCH: Therefore you consider the matter  
8 presently open for full review because the basis of the  
9 stipulation is different?

10 MR. MACBETH: That is right.

11 CHAIRMAN JENSCH: Did you have a statement?

12 MR. TROSTEN: Well, Mr. Chairman, I would merely  
13 say I hope Mr. Macbeth will reconsider his tentative position  
14 here. I think that the Staff's position was well taken. I  
15 think it is a highly useful thing from an environmental  
16 standpoint to obtain this information.

17 I think basically that it is a good idea, as the  
18 Staff indicated on page 3-49, to get this information as  
19 early as possible.

20 The Staff has indicated there is some uncertainty  
21 about the thermal model. In the past there have been  
22 criticisms of the fact that these data are not being collected  
23 rapidly enough. It is important from the standpoint of  
24 this proceeding, from the standpoint of other proceedings,  
25 that the data of this sort be collected, so we will all have

1 a better understanding of the model predictions that are  
2 being made, so we are not faced in the future with the sort  
3 of questions that we have had to confront in this hearing.

4 And I just think that-- I sincerely hope Mr. Macbeth  
5 will think better of this when he has had a chance to  
6 reflect on this matter.

7 I think, also, it has been pointed out to me,  
8 that the Staff's recommendation is that by the first of July,  
9 1973, we provide them with an economic-environmental analysis  
10 of alternative closed cycle cooling systems. I think  
11 this sort of information, which is a tight schedule that the  
12 Staff has proposed, emphasizes the importance that everybody  
13 has in mind here of trying to collect data about this plant  
14 as soon as we can.

15 Now, Mr. Macbeth is correct: at the time the stipu-  
16 lation was signed in the fall of 1971, we didn't have this  
17 point in mind. This is something that developed in the  
18 summer of 1972. It was an idea that the Staff felt that we  
19 ought to obtain this information rapidly, and we agreed.

20 The Staff has written a considerable amount of  
21 Section 3, Mr. Siman-Tov has explained on the stand here his  
22 feelings that there are uncertainties about the thermal model  
23 and we feel these uncertainties ought to be resolved at the  
24 earliest date so this information will be available for every-  
25 body in this context, and in every other context.

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1 CHAIRMAN JENSCH: I don't think that is really  
2 the question that is being considered here, what the  
3 environmental impact is of this different approach, and  
4 whether there is a basis for expecting that the stipulation  
5 still prevails. Now the collection of data, I think, like  
6 motherhood, everybody is for it, let's have it. I think before  
7 that process can be undertaken, there might be considerations  
8 to be presented in that regard. I think the Board would  
9 also be interested in getting a legal brief in the course  
10 of this proceeding as to not only the legality, but the  
11 propriety of taking an initial decision for 100 days at  
12 50 percent operation and without notice or indication of a  
13 change or the necessity or advisability of a change, suddenly  
14 there appear a facility operating license that is proposed  
15 to be issued that changes it to nine months. I think there  
16 is a serious question that might well be considered as to  
17 whether that constitutes a distortion of the initial decision  
18 and whether the matter almost gets automatically opened  
19 when the parties, the Applicant and the Staff, decide it shall  
20 be a nine-month arrangement.

21 There was consideration, as I recall, it, are you  
22 sure you can do this in 100 days, or are you going to keep  
23 testing every 100 days, oh, it was a horrible suggestion,  
24 and there was a resentment expressed that even such a  
25 horrible thought would be entertained, that there would be

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1 any repetition of a hundred days and a hundred days, it  
2 was just firm, nothing would ever vary the hundred days  
3 when this proposed thing came up.

4 In September, September 25, 1972, two months after  
5 the issuance of the license for 50 percent power, I notice  
6 there is a nine-month provision and no explanation. Take  
7 it this way, this is the way it is. I think it raises a  
8 pretty serious legal question, and I think the Board will  
9 want to hear from both the Applicant and the Staff as to the  
10 propriety of this.

11 MR. TROSTEN: As far as the colloquy that took  
12 place back in June, it was strictly related, as Mr. Macbeth  
13 correctly stated, the context in which all of the discussion  
14 was going on, the stipulation and the discussion that took  
15 place in June in the mind of the Applicant, in the mind of  
16 the Intervenor and in the mind of the Staff --

17 CHAIRMAN JENSCH: Then you agree the basis for  
18 the stipulation is now gone.

19 MR. TROSTEN: No, I don't say the basis is now  
20 gone. What I am saying is that there is a new situation which  
21 has developed here as a result of the Staff's further thinking  
22 about this subject which I think warrants further consideration  
23 on behalf of the Intervenor and the Board, of course, as  
24 well.

25 As far as the matter of the interpretation of the

1 initial decision, Mr. Chairman, as I stated when you raised  
2 this matter earlier, we did not, neither the Applicant nor  
3 the Staff, interpret the Board's decision as placing a  
4 100 day restriction on the period of the license. We  
5 interpreted that as being a reflection of the Board's interest  
6 in this matter and a reflection of the fact that the Board  
7 did not wish to see that the testing for radiological  
8 safety purposes be extended for frivolous or unnecessary,  
9 or reasons that were not fully justified by the record. That  
10 is exactly the way we interpreted it.

11 CHAIRMAN JENSCH: We requested in the initial  
12 decision the technical specifications and they dealt with  
13 100 days in the initial decision, and it might be a fair  
14 inference that when we discussed the 100 days for the  
15 testing license, it was assumed that the technical specifica-  
16 tions would conform to that discussion of 100 days. This  
17 is wholly aside from necessity, the advisability of collecting  
18 data. Everybody is for data, we want more data, everybody  
19 wants data, it is just a question of the process by which you  
20 determine what days and times you will undertake this effort.

21 As I infer from the Hudson River Fishermen's  
22 Association, all things are off, and they have a right --  
23 whether they will assert it or not is under consideration --  
24 but they have to reconsider this matter, and I think you may  
25 want to consider it in a brief.



1 MR. BRIGGS: It seems to me also that there will  
2 be places you will see in the initial decision where there  
3 is mention of the short operating time, or there is reference  
4 to the proposed testing program and implicit in some of the  
5 statements is there is not really going to be a great deal of  
6 radioactivity present in the plant if the plant only operates  
7 for a short time at 50 percent power, and at lower power  
8 levels. But now one is talking about changing the time at 50  
9 percent power from the order of four or five days to the  
10 order of 40 days, which does make a difference in those  
11 considerations also. So this is part of our problem in  
12 trying to decide whether the new testing program resembles  
13 in any way the testing program that we looked at when we wrote  
14 the initial decision.

15 MR. KARMAN: Mr. Chairman, it seems quite evident  
16 that the Regulatory Staff, in proposing these environmental  
17 technical specifications, indicated that we required some  
18 additional testing. Now I believe it will be the position  
19 of the Staff, should Mr. Macbeth raise these issues in a  
20 formal manner, to respond to them with respect to the matters  
21 that the Chairman just raised as to the legality or propriety  
22 of any additional period over and above the 100 days cited  
23 in the initial decision for the radiological testing. I  
24 don't wish to take a position at this time.

25 DR. GEYER: My reading of the sentences at the

1 top of page 3-49 in the Staff's Environmental Statement  
2 didn't lead to any interpretation that a long time at  
3 50 percent power was to be added, but simply to get started  
4 early, even while 50 percent power was going on. Is this  
5 correct?

6 MR. KARMAN: This is why I wanted to respond.  
7 There are several items I would like to check out, Dr.  
8 Geyer, and I really want to get the full impact of what we  
9 really intended. This I can do by consulting.

10 DR. GEYER: Clarification would be helpful.

11 (Witness excused.)

12 CHAIRMAN JENSCH: Is there any other matter to  
13 be considered this evening? If not, let us recess to  
14 reconvene in this room tomorrow morning at 9:00 o'clock.

15 (Whereupon, at 5:10 p.m., the hearing was adjourned,  
16 to reconvene at 9:00 a.m., Friday, January 12, 1972.)

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