

4285

SUPREME COURT OF THE UNITED STATES
No. 142, Original

STATE OF FLORIDA,)
Plaintiff,)
V.) VOLUME XVII
STATE OF GEORGIA)
Defendants.)

TRANSCRIPT OF PROCEEDINGS

The above-entitled matter came on for HEARING before SPECIAL MASTER RALPH I. LANCASTER, held in the U. S. Bankruptcy Court, at 537 Congress Street, Portland, Maine, on December 1, 2016, commencing at 8:40 a.m., before Claudette G. Mason, RMR, CRR, a Notary Public in and for the State of Maine.

APPEARANCES:

For the State of Florida: PHILIP J. PERRY, ESQ.
JAMIE L. WINE, ESQ.
ABID R. QURESHI, ESQ.
NATALIE HARDWICK RAO, ESQ.

For the State of Georgia: CRAIG S. PRIMIS, ESQ.
EMILY K. MERKI, ESQ.
JOSH MAHONEY, ESQ.
BARACK S. ECHOLS, ESQ.
CHRISTIAN REIGSTAD, ESQ.

Also Present: JOSHUA D. DUNLAP, ESQ.

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PROCEEDINGS

1
2 SPECIAL MASTER LANCASTER: Good morning,
3 counsel.
4 MR. PERRY: Good morning, your Honor.
5 SPECIAL MASTER LANCASTER: Thank you
6 all, again, for the rain. It's not only
7 better than the drought, but I'm sure by now
8 you have been here long enough that you're
9 familiar with the Maine Farmers Almanac,
10 which predicted rain for today and most of
11 this month. And having lived here all of my
12 life, I can tell you it's a lot better than
13 snow.
14 MR. PERRY: Thank you, your Honor.
15 Today might be our last day. And
16 that -- that might be true in part because it
17 will be our proposal, whenever Georgia is
18 finished, to submit our proposed rebuttal in
19 writing, mostly deposition designations with
20 a few other things. But we will give Georgia
21 an opportunity to see what that is. And I
22 believe that will not require any live
23 witness testimony. So I believe we might
24 finish today or perhaps tomorrow morning.
25 That's my first item for this morning.

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1 And then, second, if I might, your
 2 Honor, I would like to introduce the backbone
 3 of our Florida legal team today, June
 4 Elliott.
 5 MS. ELLIOTT: Your Honor.
 6 MR. PERRY: And our -- we could not be
 7 here without June Elliott. She has been
 8 essential, as has Mr. Walton, who is not
 9 currently here, but whom you have seen every
 10 day. Aldo Camacho -- I think he just stepped
 11 out; but I can't emphasize enough how
 12 important they have been to us, and we want
 13 to thank them.
 14 The third issue this morning, your
 15 Honor, relates to one of the deposition
 16 designations that Georgia is going to play
 17 this morning, and in particular to an
 18 allegation they have made about a member of
 19 the Florida legal team. They made it in
 20 their opening statement and in their pretrial
 21 brief. It relates to an individual who
 22 hasn't been before you in this trial, a
 23 person from Tallahassee. And that person
 24 wishes to identify his strong objection to
 25 the allegation.

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1 The allegation is that he tried to
 2 persuade one of the University of Florida
 3 professors not to publish. Of course, they
 4 did publish. And we will in our rebuttal
 5 case submit designations of deposition
 6 testimony rebutting that particular
 7 allegation.
 8 I'm not sure if those designations will
 9 be played today. Some of them may not, but
 10 we're certainly happy to submit them as part
 11 of our rebuttal case.
 12 SPECIAL MASTER LANCASTER: Thank you.
 13 MR. PERRY: Thank you.
 14 MR. PRIMIS: Good morning, your Honor.
 15 SPECIAL MASTER LANCASTER: Good morning.
 16 MR. PRIMIS: I have a few housekeeping
 17 matters as well. First, in response to what
 18 Mr. Perry just said, I am aware we do have an
 19 agreement to submit some deposition testimony
 20 from a Dr. Douglass, who is one of their
 21 experts, in lieu of having his expert
 22 testimony -- in lieu of having him come in
 23 and testify live in rebuttal.
 24 I'm not aware of what the other assorted
 25 materials are. I just learned about that a

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1 minute ago. So we'll have to take a look at
 2 it and see if we have an objection. But we
 3 did agree on Dr. Douglass.
 4 Second, with regard to the two videos we
 5 plan to play this morning, one is Dr. Bill
 6 Pine of the University of Florida; and the
 7 other is Dr. Karl Havens. And my colleagues,
 8 Emily Merki and Josh Mahoney, will walk the
 9 Court through those.
 10 With regard to the statement Mr. Perry
 11 just made, all Georgia has ever done is
 12 represent what is in the written
 13 documentation from Dr. Pine and, as you will
 14 see in a few moments, in his sworn testimony.
 15 There is no sworn testimony denying that
 16 this ever happened, certainly not from
 17 Mr. Kise or anybody else. And Mr. Kise has
 18 not put forward sworn testimony that's ever
 19 been tested. So I view that as merely a
 20 lawyer statement. It is not evidence, and we
 21 object to it.
 22 Finally, we have some additional
 23 exhibits that I need to put on the record at
 24 some point. And the first day of trial
 25 before we had all of our systems worked out

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1 with our team, a few documents were
 2 referenced in court without exhibit numbers
 3 on cross-examination. And it's long delayed,
 4 but we do need to put those on the record.
 5 We do not need your Honor to sit here
 6 while I read that if you wish not to be. And
 7 I certainly don't mean to take the Court's
 8 time, but maybe at the lunch break I could
 9 stay with Mr. Dunlap and Claudette and put
 10 those on the record.
 11 SPECIAL MASTER LANCASTER: Fine.
 12 MR. PRIMIS: And the last thing that we
 13 are going to add to the record is we have
 14 used some videos during the course of the
 15 case -- Georgia has -- both for impeachment
 16 purposes and also during the testimony. And
 17 we are going to provide the written
 18 transcript with an exhibit number of that
 19 impeachment material and of the video
 20 material because the court reporter does not
 21 record that, and we want that to be
 22 memorialized for the record.
 23 Once again, that will take me about five
 24 minutes of air time; and the Special Master
 25 need not be present for that.

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1 SPECIAL MASTER LANCASTER: Thank you.
 2 MR. PRIMIS: So Mr. Perry is right;
 3 there is a chance that we could finish today.
 4 We have our two videos prepared and ready to
 5 go. We'll proceed with those now.
 6 We also have Dr. Lipcius, our oyster
 7 expert, here. I think he's in the courtroom
 8 now; or if not, he will be soon. And also,
 9 Dr. Stavins was able to make himself
 10 available today. So if we get that far, we
 11 can get him over here and proceed with him as
 12 well.
 13 SPECIAL MASTER LANCASTER: Thank you.
 14 MR. PRIMIS: Thank you, your Honor.
 15 MR. PERRY: I might be inclined to
 16 respond to one of the things that Mr. Primis
 17 said, but I think I would hold it for our
 18 rebuttal submission, your Honor.
 19 SPECIAL MASTER LANCASTER: Thank you.
 20 MS. MERKI: Good morning, your Honor.
 21 SPECIAL MASTER LANCASTER: Good morning.
 22 MS. MERKI: My name in Emily Merki from
 23 Kirkland & Ellis on behalf of Georgia. And
 24 you may have seen me at counsel table during
 25 the trial.

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1 Before we call our next live witness,
 2 Dr. Lipcius, Georgia would like to play some
 3 excerpts, as my colleague said, from two
 4 University of Florida professors, Bill Pine
 5 and Karl Havens, who have done work for the
 6 State of Florida on the oyster fishery
 7 collapse.
 8 And as you will see, my colleague,
 9 Mr. Mahoney, has just passed out binders
 10 which we created for the Court to make it
 11 easier to follow along with the video. And
 12 in the front of the binder we have provided
 13 the written testimony in the order that it
 14 will be played in the video and, after that,
 15 the documents that are being discussed in
 16 these video clips under numbered tabs.
 17 And several of these documents do not
 18 have page numbers. So to make it easier for
 19 the Court, we have highlighted the relevant
 20 excerpts of the documents and also flagged
 21 the pages that will be discussed.
 22 SPECIAL MASTER LANCASTER: Thank you.
 23 MS. MERKI: With the Court's permission,
 24 we'll begin the video.
 25 SPECIAL MASTER LANCASTER: Please.

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1 MS. MERKI: Your Honor this first set of
 2 clips relates to Dr. Pine's education and
 3 background as well as to his role on the
 4 University of Florida oyster recovery task
 5 force. There are no documents being
 6 discussed in this first clip.
 7 (Whereupon the video was played.)
 8 MS. MERKI: Your Honor, now if you would
 9 please turn to tab 1 of the binder. And
 10 under this tab is an e-mail from Dr. Pine to
 11 Karl Havens on November 14, 2012.
 12 (Whereupon the video was played.)
 13 MS. MERKI: Your Honor, please turn to
 14 tab 2 of the binder. And this is -- this
 15 document is Georgia Exhibit 496. And it's
 16 another e-mail between Dr. Pine and
 17 Dr. Havens dated December 3, 2012.
 18 (Whereupon the video was played.)
 19 MS. MERKI: Your Honor, we'll now be
 20 turning to tab 3 of the binder, which is
 21 Georgia Exhibit 500 under tab 3. And
 22 Dr. Pine will answer questions related to the
 23 highlighted portions on the first page of the
 24 e-mail under tab 3.
 25 (Whereupon the video was played.)

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1 MS. MERKI: Your Honor, we'll now turn
 2 to tab 4 of the binder, Georgia Exhibit 501.
 3 And this is a PowerPoint presentation by
 4 Dr. Pine on behalf of the University of
 5 Florida oyster recovery team environmental
 6 work group. And Dr. Pine will be answering
 7 questions related to slide 13, which is on
 8 page 13 of the document. And we have marked
 9 it with a blue flag in your binder.
 10 (Whereupon the video was played.)
 11 MS. MERKI: Your Honor, please turn now
 12 to tab 5 of the binder, Georgia Exhibit 568,
 13 which is the Apalachicola Bay Oyster
 14 Situation Report produced by the oyster
 15 recovery task force. And the first set of
 16 questions Dr. Pine will be answering relates
 17 to page 3 of the document, which is just
 18 behind the first page of this document.
 19 (Whereupon the video was played.)
 20 MS. MERKI: Your Honor, we're going to
 21 stay in tab 5; but the next part of the
 22 discussion relates to page 10 of this
 23 document, which is marked with a blue flag.
 24 So we'll be turning to that page.
 25 (Whereupon the video was played.)

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4297	<p>1 MS. MERKI: Your Honor, we're still</p> <p>2 under tab 5. The next set of questions</p> <p>3 relates to a section called Statistical</p> <p>4 Catch-At-Age Model on page 14 of this</p> <p>5 document. And on page 14 we'll be looking</p> <p>6 specifically at the last sentence of the</p> <p>7 first full paragraph on that page, which is</p> <p>8 highlighted in your binder.</p> <p>9 (Whereupon the video was played.)</p> <p>10 MS. MERKI: Your Honor, if you would</p> <p>11 just turn to the next page of the same</p> <p>12 document, page 15, Dr. Pine will now answer</p> <p>13 questions about the left-hand column of the</p> <p>14 page under the title Restoration Actions,</p> <p>15 Caution, and Future Work.</p> <p>16 (Whereupon the video was played.)</p> <p>17 MS. MERKI: Your Honor, the last set of</p> <p>18 questions on this document relates to page 29</p> <p>19 of the document under a section titled</p> <p>20 Research.</p> <p>21 (Whereupon the video was played.)</p> <p>22 MS. MERKI: Your Honor, we're now moving</p> <p>23 on to tab 6 of the binder, which is marked as</p> <p>24 Joint Exhibit 91. And this document is the</p> <p>25 Florida Fish and Wildlife Conservation</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4299	<p>1 page.</p> <p>2 (Whereupon the video was played.)</p> <p>3 MS. MERKI: Your Honor, please turn to</p> <p>4 tab 8 of the binder, which is Florida's</p> <p>5 complaint in this matter. And the next part</p> <p>6 of the discussion will relate to paragraph 54</p> <p>7 of the complaint, which is at the top of</p> <p>8 page 19. And we have marked this page with</p> <p>9 another blue flag in your binder.</p> <p>10 (Whereupon the video was played.)</p> <p>11 MS. MERKI: Your Honor, please turn to</p> <p>12 tab 9 of the binder, which is marked as Joint</p> <p>13 Exhibit 167. Dr. Pine will first answer some</p> <p>14 general questions about this paper. And</p> <p>15 then, again, there are no page numbers; but</p> <p>16 he will also answer questions related to the</p> <p>17 fourth page of the document, which we have</p> <p>18 marked with a blue flag.</p> <p>19 (Whereupon the video was played.)</p> <p>20 MS. MERKI: And, your Honor, again,</p> <p>21 there are no page numbers for this document;</p> <p>22 but if you would please turn to the next blue</p> <p>23 flag in the binder, the discussion will</p> <p>24 relate to the highlighted portion of that</p> <p>25 page.</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>
4298	<p>1 Commission Oyster Disaster Report dated May</p> <p>2 2013 which was submitted to NOAA as part of</p> <p>3 the disaster request, and if you would please</p> <p>4 turn to the blue flag on page 5 of the</p> <p>5 document.</p> <p>6 (Whereupon the video was played.)</p> <p>7 MS. MERKI: Your Honor, we're still</p> <p>8 under tab 6, but we'll be turning the page to</p> <p>9 page 6 of this document. And the next clip</p> <p>10 relates to the highlighted portion of this</p> <p>11 page.</p> <p>12 (Whereupon the video was played.)</p> <p>13 MS. MERKI: Your Honor, the next</p> <p>14 discussion relates to tab 7 of your binder,</p> <p>15 which is marked as Georgia Exhibit 789.</p> <p>16 Dr. Pine will first answer some general</p> <p>17 questions about this paper.</p> <p>18 (Whereupon the video was played.)</p> <p>19 MS. MERKI: Your Honor, this document</p> <p>20 does not have page numbers, but the next part</p> <p>21 of the discussion relates to the blue tab</p> <p>22 that we have put in your binder under a</p> <p>23 section titled Discussions. And the</p> <p>24 questions relate specifically to the second</p> <p>25 full paragraph on the second column of this</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4300	<p>1 (Whereupon the video was played.)</p> <p>2 MS. MERKI: Your Honor, we'll turn now</p> <p>3 to tab 10 of the binder, which is Georgia</p> <p>4 Exhibit 1148. And this is an unpublished</p> <p>5 manuscript titled A Complex Relationship</p> <p>6 Between Freshwater Discharge and Oyster</p> <p>7 Fisheries CPUE in Apalachicola Bay, Florida,</p> <p>8 authored by Dr. Pine and Nicholas Fisch. And</p> <p>9 this paper is currently under review for</p> <p>10 publication in the <i>Marine and Coastal</i></p> <p>11 <i>Fisheries Journal</i>.</p> <p>12 Dr. Pine will answer some general</p> <p>13 questions about the paper and then will</p> <p>14 answer questions related to the second page</p> <p>15 of the document. And we have highlighted the</p> <p>16 relevant portions.</p> <p>17 (Whereupon the video was played.)</p> <p>18 MS. MERKI: Your Honor, please turn now</p> <p>19 to tab 11 of the binder, Georgia Exhibit 778,</p> <p>20 which is an e-mail sent from Dr. Pine to</p> <p>21 three of his colleagues. Dr. Pine will</p> <p>22 answer a series of questions about several</p> <p>23 statements in this e-mail, starting with the</p> <p>24 first sentence of the e-mail.</p> <p>25 (Whereupon the video was played.)</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>

4301	<p>1 MS. MERKI: Your Honor, we'll turn now</p> <p>2 to tab 12 of your binder, which is marked as</p> <p>3 Georgia Exhibit 779. And this is a chain of</p> <p>4 e-mails between Dr. Pine and Jack Payne from</p> <p>5 December 20 and 21, 2014, following the</p> <p>6 previous e-mail. And the questions on this</p> <p>7 document will focus on the third e-mail from</p> <p>8 the top, which we have highlighted.</p> <p>9 (Whereupon the video was played.)</p> <p>10 MS. MERKI: Your Honor, please turn to</p> <p>11 tab 14 of the binder, Georgia Exhibit 770,</p> <p>12 which is an e-mail sent from Dr. Pine to Eric</p> <p>13 Hellgren on November 25, 2014. And, again,</p> <p>14 we'll be focusing on the highlighted portion</p> <p>15 of this document.</p> <p>16 I'm sorry, that was an error on my part.</p> <p>17 I skipped over tab 13, which will be the next</p> <p>18 tab that we'll be discussing. And it's</p> <p>19 Georgia Exhibit 782.</p> <p>20 (Whereupon the video was played.)</p> <p>21 MS. MERKI: Your Honor, now we'll be</p> <p>22 turning to tab 14 of the binder and, again,</p> <p>23 focusing on the highlighted portion of this</p> <p>24 document, which is Georgia Exhibit 770.</p> <p>25 (Whereupon the video was played.)</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4303	<p>1 previous video designations, the parties</p> <p>2 have conferred about which portions of</p> <p>3 Dr. Havens's deposition will be played and in</p> <p>4 which order.</p> <p>5 And we have also handed you a binder, as</p> <p>6 we have done with our previous witnesses. I</p> <p>7 will direct the Court, as my colleague</p> <p>8 Ms. Merki did, to certain sections of the</p> <p>9 documents as they come up in the video.</p> <p>10 So with the Court's permission, we will</p> <p>11 begin.</p> <p>12 SPECIAL MASTER LANCASTER: Please.</p> <p>13 MR. MAHONEY: Thank you, your Honor.</p> <p>14 (Whereupon the video was played.)</p> <p>15 MR. MAHONEY: And, I should have said</p> <p>16 this at the beginning, your Honor, but this</p> <p>17 is tab 1 obviously; and the exhibit number is</p> <p>18 GX-1018. And we're now just going to page 2</p> <p>19 of the same exhibit.</p> <p>20 SPECIAL MASTER LANCASTER: Thank you.</p> <p>21 (Whereupon the video was played.)</p> <p>22 MR. MAHONEY: Your Honor, we'll now move</p> <p>23 to tab 2 in the binder, which is GX-1338.</p> <p>24 It's a series of e-mails with Dr. Pine and</p> <p>25 Dr. Havens. The focus of the video pertains</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>
4302	<p>1 MS. MERKI: Your Honor, the final video</p> <p>2 segment that we'll play for Dr. Pine contains</p> <p>3 clips that Florida has requested. And that</p> <p>4 will be the last video segment.</p> <p>5 (Whereupon the video was played.)</p> <p>6 MS. MERKI: Thank you, your Honor. That</p> <p>7 concludes the video designations for</p> <p>8 Dr. Pine.</p> <p>9 SPECIAL MASTER LANCASTER: Thank you.</p> <p>10 MR. PRIMIS: Your Honor, we're now going</p> <p>11 to play some video designations from the</p> <p>12 deposition of Dr. Havens. And my colleague,</p> <p>13 Josh Mahoney, will walk the Court through</p> <p>14 those.</p> <p>15 MR. MAHONEY: Good morning, your Honor.</p> <p>16 SPECIAL MASTER LANCASTER: Good morning.</p> <p>17 MR. MAHONEY: My name is Josh Mahoney</p> <p>18 from Kirkland & Ellis. I represent the State</p> <p>19 of Georgia.</p> <p>20 As my colleague Craig Primis just said,</p> <p>21 Georgia will now play excerpts from the</p> <p>22 videotaped deposition of another current</p> <p>23 University of Florida professor and</p> <p>24 scientist, Dr. Karl Havens.</p> <p>25 And as with the State of Georgia's</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4304	<p>1 to the paragraph in the middle of the first</p> <p>2 page of the document.</p> <p>3 (Whereupon the video was played.)</p> <p>4 MR. MAHONEY: Your Honor, we'll now go</p> <p>5 to tab 3 of the binder, which is GX-491.</p> <p>6 It's another series of e-mails between</p> <p>7 Dr. Havens and colleagues.</p> <p>8 For this clip, we'll start on page 4 of</p> <p>9 the e-mail set and work backwards, as we do.</p> <p>10 But the first set of clips is related to the</p> <p>11 highlighted text on page 4 of GX-491.</p> <p>12 (Whereupon the video was played.)</p> <p>13 MR. MAHONEY: Your Honor, we're staying</p> <p>14 with the same document; but we're moving back</p> <p>15 to page 2 at the top, which is an e-mail</p> <p>16 exchange between Dr. Havens and Dr. Pine as</p> <p>17 well as Dr. Pine's response to Dr. Havens as</p> <p>18 the response in the sequence.</p> <p>19 (Whereupon the video was played.)</p> <p>20 MR. MAHONEY: Your Honor, we'll now go</p> <p>21 to tab 4 in the binder, which is GX-1339.</p> <p>22 It's another series of e-mails among</p> <p>23 Dr. Havens and his colleagues. And the</p> <p>24 discussion in the video will center on</p> <p>25 Dr. Havens's e-mail in the middle of the</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>

4305	<p>1 page.</p> <p>2 (Whereupon the video was played.)</p> <p>3 MR. MAHONEY: Your Honor, we'll now --</p> <p>4 we'll next move to tab 15 of the binder,</p> <p>5 which is a familiar document to the Court.</p> <p>6 It is GX-568, the 2013 University of Florida</p> <p>7 Apalachicola Bay Oyster Situation Report.</p> <p>8 The first series of clips discusses the</p> <p>9 report in general.</p> <p>10 (Whereupon the video was played.)</p> <p>11 MR. MAHONEY: Staying with the same</p> <p>12 document, your Honor, if you will turn to the</p> <p>13 first blue tab. It's on page 13. And the</p> <p>14 discussion here pertains to the penultimate</p> <p>15 sentence in that paragraph on the left column</p> <p>16 of page 13.</p> <p>17 (Whereupon the video was played.)</p> <p>18 MR. MAHONEY: If you will turn one page</p> <p>19 further into the document now, on page 15 the</p> <p>20 discussion continues. And it focuses on the</p> <p>21 section that begins, restoration actions.</p> <p>22 (Whereupon the video was played.)</p> <p>23 MR. MAHONEY: Your Honor, the last</p> <p>24 series of clips related to this document is</p> <p>25 on page 29, which we have marked with the</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4307	<p>1 were just played. In particular, page 171,</p> <p>2 line 17 through 173 -- excuse me, 172, 16 was</p> <p>3 actually designated by Georgia; and then the</p> <p>4 remainder of that clip in red was Florida's</p> <p>5 counter-designation. So I didn't want you to</p> <p>6 have the impression that Florida had</p> <p>7 designated that entire portion.</p> <p>8 So --</p> <p>9 MR. PERRY: Your Honor, might we suggest</p> <p>10 that a break would be appropriate given that</p> <p>11 it's about 10:30?</p> <p>12 I don't mean to interrupt counsel for</p> <p>13 Georgia, but I also want to be cognizant that</p> <p>14 we have been sitting here for a couple of</p> <p>15 hours.</p> <p>16 SPECIAL MASTER LANCASTER: Sure. We'll</p> <p>17 take a brief break.</p> <p>18 (Time Noted: 10:35 a.m.)</p> <p>19 (Recess Called)</p> <p>20 (Time Noted: 10:47 a.m.)</p> <p>21 MR. MAHONEY: Thank you, your Honor.</p> <p>22 We will continue now with the video</p> <p>23 designations of Dr. Havens.</p> <p>24 The next set of clips pertains to tab 8</p> <p>25 in the binder. And the exhibit number is</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>
4306	<p>1 blue tab. And it's under the second bullet</p> <p>2 of the section called Research.</p> <p>3 (Whereupon the video was played.)</p> <p>4 MR. MAHONEY: Your Honor, if you will</p> <p>5 please turn to page -- or to -- excuse me, if</p> <p>6 you will turn to tab 6 in the binder for the</p> <p>7 next series of clips. It relates to GX-649,</p> <p>8 and in particular, at the bottom of the</p> <p>9 second page of the e-mail correspondence</p> <p>10 between Dr. Havens and a man named John</p> <p>11 Cirino, along with several other individuals</p> <p>12 being copied.</p> <p>13 (Whereupon the video was played.)</p> <p>14 MR. MAHONEY: Your Honor, the next</p> <p>15 series of clips is in tab 7 of your binder.</p> <p>16 And it's GX-741 is the document. The</p> <p>17 discussion in the video focuses on page 4,</p> <p>18 which we have marked with a blue tab. And we</p> <p>19 have also highlighted the text that is being</p> <p>20 discussed.</p> <p>21 (Whereupon the video was played.)</p> <p>22 MR. MAHONEY: Your Honor, before we move</p> <p>23 on, I just want to note for the record that</p> <p>24 there appears to be a mix-up in what was</p> <p>25 designated by each party for the clips that</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4308	<p>1 GX-752. And it is an e-mail exchange among</p> <p>2 Dr. Havens and his colleagues. And you will</p> <p>3 see the highlighted text in the document.</p> <p>4 (Whereupon the video was played.)</p> <p>5 MR. MAHONEY: Next, we'll look at tab 9</p> <p>6 of the binder. The exhibit number is GX-799.</p> <p>7 This is an e-mail from Dr. Havens to a NOAA</p> <p>8 official in 2015.</p> <p>9 (Whereupon the video was played.)</p> <p>10 MR. MAHONEY: The next document that the</p> <p>11 video clips will be discussing is in tab 10</p> <p>12 of the binder. And it's Exhibit No. GX-1340.</p> <p>13 This is an e-mail from Dr. Havens to several</p> <p>14 individuals, fall 2014. And they will be --</p> <p>15 the video will be in reference to the fourth</p> <p>16 paragraph of that e-mail.</p> <p>17 (Whereupon the video was played.)</p> <p>18 MR. MAHONEY: Your Honor, the last</p> <p>19 series of Georgia's clips are -- or discuss</p> <p>20 the document that's in tab 11 of the binder,</p> <p>21 which we have already seen earlier this</p> <p>22 morning. It's JX-167 written by Edward Camp</p> <p>23 and colleagues. It's a journal article</p> <p>24 called Collapse of a Historic Oyster Fishery:</p> <p>25 Diagnosing Causes and Identifying Paths</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>

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1 Toward Increased Resilience.

2 Dr. Havens will be answering a set of

3 questions about the abstract of the paper at

4 the top of the first page.

5 (Whereupon the video was played.)

6 MR. MAHONEY: Your Honor, that concludes

7 the set of designations that Georgia has

8 selected to play for the Court.

9 The final video that we will show now is

10 additional designations that Florida has

11 requested. And this will be the final set of

12 clips.

13 (Whereupon the video was played.)

14 MR. MAHONEY: Thank you, your Honor.

15 SPECIAL MASTER LANCASTER: Counsel,

16 before you leave, I'm sure that this is of no

17 importance to anyone except me and that

18 probably I'm the only one who noticed it. We

19 have had dozens of experts with degrees up

20 the wazoo here testifying in writing, orally,

21 and video; and not one of them understood

22 that when you're dealing with three or more

23 matters, you should use the word among and

24 not between.

25 But I heard you today do it, and I

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1 wanted the record to reflect that. Thank

2 you.

3 MR. MAHONEY: Thank you, your Honor.

4 MR. PERRY: Your Honor, I just have a

5 ministerial issue, if I might. We have a

6 confidentiality order in this case that

7 requests that both parties redact e-mail

8 addresses. And I would like to request that

9 Georgia do that with respect to some of the

10 exhibits here.

11 One is in the tab set we just looked at,

12 GX-649. There are quite a number of personal

13 e-mail addresses that, for various reasons, I

14 think should be redacted.

15 There was at least one of those

16 occurrences regarding a document from 2014

17 that involved lawyers who were involved for

18 Florida back in 2014 at that time. They had

19 a couple e-mail addresses for those lawyers.

20 I would like to ask that those be redacted.

21 And then, finally, with respect to the

22 clips that were just played that were

23 attributed to Florida, I'm not sure I tracked

24 all those; but there was a lack of text

25 showing on the screen. And so I would like

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1 to refer the Court, if I could, to a set of

2 textual comments by Mr. Pine -- Dr. Pine,

3 excuse me, and Dr. Havens that were read by

4 Mr. Prins from Florida's team. They are in

5 tab 11, JX-167. The pages are unnumbered,

6 but I believe it's the sixth page. It's the

7 first paragraph under Discussion.

8 Mr. Prinz read that, and I just wanted

9 to point out where it appears because it

10 didn't appear on the screen when the clip was

11 played.

12 Thank you, your Honor.

13 SPECIAL MASTER LANCASTER: Mr. Primis,

14 do you have any problem with the request for

15 the redaction?

16 MR. PRIMIS: No, of course, not, your

17 Honor. It was inadvertent. It just hadn't

18 come up between the parties previously. So

19 we'll do that and submit a redacted copy to

20 the Court.

21 SPECIAL MASTER LANCASTER: Thank you.

22 MR. PRIMIS: Thank you.

23 My colleague, Mr. Echols, has returned

24 in light of the oysters being discussed.

25 And we'll now hand it over to him and

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1 Dr. Lipcius.

2 MR. ECHOLS: Good morning, your Honor.

3 SPECIAL MASTER LANCASTER: Good morning.

4 MR. ECHOLS: Barack Echols from Kirkland

5 & Ellis on behalf of the State of Georgia.

6 And at this point, the State would call

7 our oyster expert, Dr. Romuald Lipcius, who

8 is the fisheries management and marine

9 ecology professor at the Virginia Institute

10 of Marine Science for the College of William

11 & Mary and will be available to answer every

12 and any question you have regarding oysters.

13 SPECIAL MASTER LANCASTER: Thank you.

14 THE CLERK: Please raise your right

15 hand.

16 Do you solemnly swear that the testimony

17 you shall give in the cause now in hearing

18 shall be the truth, the whole truth, and

19 nothing but the truth, so help you God?

20 THE WITNESS: I do.

21 THE CLERK: Please be seated.

22 Pull yourself right up to the microphone

23 and please state your name and spell your

24 last name.

25 THE WITNESS: Thank you. My full name

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1 is Romuald Nelson Lipcius, R O M U A L D,
 2 N E L S O N, L I P C I U S.
 3 MR. ECHOLS: Your Honor, may I approach?
 4 SPECIAL MASTER LANCASTER: Please.
 5 DIRECT EXAMINATION
 6 BY MR. ECHOLS:
 7 **Q.** Professor Lipcius, I have handed you what is the
 8 direct testimony you have submitted in this case.
 9 Would you please take a look at that and confirm
 10 if it is a true and accurate copy of your direct
 11 testimony?
 12 **A. Yes, it is.**
 13 **Q.** And do you, sir, adopt this as your sworn direct
 14 testimony for purposes of this case?
 15 **A. I do.**
 16 **Q.** Thank you.
 17 MR. ECHOLS: I now tender the witness.
 18 THE WITNESS: Am I being heard without
 19 equipment?
 20 MR. ECHOLS: Sure.
 21 MR. QURESHI: Good morning, your Honor.
 22 SPECIAL MASTER LANCASTER: Good morning.
 23 MR. QURESHI: Before I begin, I would
 24 like to introduce my colleague who is
 25 assisting me with today's examination,
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1 Ms. Natalie Rao of Latham & Watkins.
 2 SPECIAL MASTER LANCASTER: Welcome.
 3 MS. RAO: Thank you.
 4 MR. QURESHI: With your permission, your
 5 Honor, I would like to distribute the
 6 cross-examination binders.
 7 SPECIAL MASTER LANCASTER: Certainly.
 8 CROSS-EXAMINATION
 9 BY MR. QURESHI:
 10 **Q.** Good morning, Dr. Lipcius.
 11 **A. Good morning, Mr. Qureshi.**
 12 **Q.** Sir, I would like to begin by reviewing the
 13 principal conclusions that you have reached in
 14 your direct testimony. I would like you to
 15 confirm for me that I am reading those
 16 accurately.
 17 **A. Yes.**
 18 **Q.** You will find that direct testimony behind tab 1
 19 of the binder I provided you. And it was also
 20 provided to you by Georgia's counsel.
 21 Sir, in paragraph 3 on page 1 you state that
 22 you were retained by the State of Georgia to
 23 analyze two issues, whether Georgia's water
 24 consumption caused the collapse of the
 25 Apalachicola Bay oyster fishery in 2012 and, two,
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1 whether there was scientific evidence that low
 2 flows from the Apalachicola River otherwise
 3 reduced biological productivity in the bay.
 4 Is that right?
 5 **A. Yes.**
 6 **Q.** In paragraph 8(c) on page 2 you conclude that
 7 there is no scientific evidence that oyster
 8 mortality in Apalachicola Bay was abnormally high
 9 prior to or during the oyster collapse. Is that
 10 right?
 11 **A. That is correct. I was referring to natural**
 12 **mortality, yes.**
 13 **Q.** And then on paragraph 8(d), which starts on
 14 page 2 and carries over to page 3, you conclude
 15 that there is no evidence that an abnormal
 16 increase in the level of predation of oysters by
 17 rock snails that prefer conditions of high
 18 salinities could have caused the collapse. Is
 19 that correct?
 20 **A. Yes.**
 21 **Q.** Paragraph 9(a), page 3, you conclude that the
 22 hypothesis that low Apalachicola River flow was
 23 the cause of the oyster fishery collapse is
 24 contrary to all available scientific evidence.
 25 Is that correct?
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1 **A. Yes.**
 2 **Q.** Okay. Sir, I want to review some of the things
 3 that you did to inform the conclusions in your
 4 expert report that you prepared in this
 5 litigation. I also want to review some of the
 6 things that you did not do to inform your expert
 7 report.
 8 You did not conduct any field experiments.
 9 Correct?
 10 **A. Not in Apalachicola Bay, no. But I did in**
 11 **Chesapeake Bay.**
 12 **Q.** And I'm talking about Apalachicola Bay, the
 13 subject of this lawsuit, sir.
 14 **A. Yes.**
 15 **Q.** You did not conduct any laboratory experiments?
 16 **A. I did not.**
 17 **Q.** You did not do any independent data collection?
 18 **A. If you mean by going out in the field and**
 19 **collecting data, no. But I was collecting in the**
 20 **sense of integrating a number of data sources**
 21 **that had not been examined previously.**
 22 **Q.** Sir, you relied on data that had been collected
 23 by others. Correct?
 24 **A. Correct.**
 25 **Q.** You did not run a population model with data from
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1 Apalachicola Bay?

2 **A. I did not.**

3 **Q.** And before you were hired by an expert -- I'm

4 sorry. Before you were hired as an expert by the

5 State of Georgia in March 2015, you had not

6 visited Apalachicola Bay to conduct scientific

7 research; is that correct?

8 **A. No, I had not.**

9 **Q.** But before you submitted your expert report in

10 this case, you did visit Apalachicola Bay in --

11 on one occasion; is that right?

12 **A. Yes.**

13 **Q.** That was in --

14 **A. Well --**

15 **Q.** -- late April or early May 2016. Correct?

16 **A. Yes. And I had also visited it while I was at**

17 **Florida State University.**

18 **Q.** Right. But not to conduct scientific --

19 **A. No.**

20 **Q.** -- research, sir?

21 **A. No.**

22 **Q.** That's what I asked.

23 **A. Correct.**

24 **Q.** The one visit you did make in late April or early

25 May, 2016, was approximately half a day?

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1 **A. Yes, it was.**

2 **Q.** And during that trip, the lawyers for the State

3 of Georgia arranged a boat trip for you?

4 **A. Correct.**

5 **Q.** That boat trip lasted about two to three hours?

6 **A. Approximately.**

7 **Q.** And during that three-hour tour, you spoke to the

8 captain of the boat, a gentleman named Captain

9 Coy Shiver?

10 **A. I did.**

11 **Q.** And when you met Captain Shiver, you did not

12 inform him that you were working as an expert on

13 behalf of the State of Georgia for this

14 litigation?

15 **A. That I don't recall.**

16 **Q.** Perhaps I can show you your deposition; and that

17 might refresh your recollection, sir.

18 **A. Okay.**

19 MR. QURESHI: Your Honor, may I approach

20 Dr. Lipcius?

21 SPECIAL MASTER LANCASTER: Please.

22 BY MR. QURESHI:

23 **Q.** Sir, I'll request that you turn to page 99 of

24 your deposition. And in particular, look at line

25 24 and read through line 11 on page 100.

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1 And, again, my question you should keep in

2 mind is when you met Captain Shiver, you did not

3 inform him that you were working as an expert on

4 behalf of the State of Georgia in connection with

5 this litigation?

6 **A. Correct. As I said, I didn't recall doing that.**

7 **Q.** Understood. And now you do recall?

8 **A. No. I'm saying I don't recall doing that. I --**

9 **that's what I said in my deposition. And I don't**

10 **recall whether I said that to him at the time. I**

11 **didn't -- I wasn't really thinking about that.**

12 **Q.** Do you recall that during your boat tour, you

13 visited four different locations in the bay?

14 **A. Approximately. Yes.**

15 **Q.** One location was a spot at the Cat Point oyster

16 bar. Correct?

17 **A. Yes.**

18 **Q.** And another location was at the East Hole oyster

19 bar?

20 **A. Yes.**

21 **Q.** And the other two locations you were unable to

22 identify in your deposition. Do you have any

23 recollection of them now?

24 **A. I don't know what their actual names were, but**

25 **they were in the northern part of Apalachicola**

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1 **Bay on the west side of the bridge. And so they**

2 **were, I would say, closer to north -- the**

3 **Norman's north site, Lighthouse site; but I**

4 **don't -- I don't recall their exact names, no.**

5 **Q.** And you -- during this three-hour tour, you

6 stayed on the boat? You didn't dive into the

7 water. Correct?

8 **A. No. No, it was too cold.**

9 **Q.** No, you did not dive into the water?

10 **A. I did not dive into the water.**

11 **Q.** And you did not speak to any oystermen other than

12 Captain Shiver during this trip; correct?

13 **A. Well, not in terms of the context of the oyster**

14 **resource. I did stop at some seafood markets**

15 **where there were oystermen there.**

16 **Q.** Yes. And we're going to talk about that. My

17 question was when you were on the boat, you

18 didn't talk to any oyster fishermen?

19 **A. No, I did not.**

20 **Q.** But you did go to two different seafood markets,

21 and you spoke to some people there?

22 **A. That's correct.**

23 **Q.** And you asked -- you met two different people at

24 these two different seafood stores?

25 **A. Right. The ones behind the counter, yes.**

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<p>4321</p> <p>1 Q. And you asked them how are things going?</p> <p>2 A. Yes, I did.</p> <p>3 Q. And one of the fellows that you met, he enjoyed</p> <p>4 meeting you so much that he gave you a bottle of</p> <p>5 crab dip. Right?</p> <p>6 A. He did, yes.</p> <p>7 Q. And you also spoke to a woman who owned a hotel</p> <p>8 that you were staying at. Is that correct?</p> <p>9 A. I did.</p> <p>10 Q. And these discussions that you had with all of</p> <p>11 these individuals were general conversations</p> <p>12 about the hardship caused by the collapse of the</p> <p>13 oyster fishery in Apalachicola Bay, sir?</p> <p>14 A. Yes.</p> <p>15 Q. Okay. But the boat trip and these discussions,</p> <p>16 they did not inform the expert report that you</p> <p>17 prepared in this matter?</p> <p>18 A. No. They did not.</p> <p>19 Q. Okay. I want to talk now about the work that you</p> <p>20 did that you performed that did inform your</p> <p>21 conclusions. You testified that you reached your</p> <p>22 conclusions based on your experience and by</p> <p>23 analyzing different types of information</p> <p>24 available to you at paragraphs 5 and 7 of your</p> <p>25 direct testimony, sir, on pages 1 and 2, sir?</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	<p>4323</p> <p>1 Q. And, sir, did you explain in your direct</p> <p>2 testimony at paragraph 163 on page 49 that</p> <p>3 contemporaneous observations by those in the</p> <p>4 field and from state officials are commonly</p> <p>5 considered by marine scientists. Is that right?</p> <p>6 A. Yes. They are considered. Certainly.</p> <p>7 Q. And you note that reports that are made</p> <p>8 contemporaneously reflect knowledge from people</p> <p>9 who have the most interaction with the resource</p> <p>10 and the fishery?</p> <p>11 A. Correct.</p> <p>12 Q. But you do warn that these contemporaneous</p> <p>13 discussions need to be read with caution?</p> <p>14 A. Correct.</p> <p>15 Q. And one of the sources of contemporaneous</p> <p>16 information you reviewed are reports prepared by</p> <p>17 Mr. Mark Berrigan; isn't that right?</p> <p>18 A. Yes.</p> <p>19 Q. And you believe he's a reliable source of</p> <p>20 information on the status of the oyster resource</p> <p>21 and what is going on in Apalachicola Bay?</p> <p>22 A. Yes.</p> <p>23 Q. Sir, now I would like to talk about some</p> <p>24 principles of agreement or some basic principles</p> <p>25 about oyster ecology. You agree that the eastern</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>
<p>4322</p> <p>1 A. Yes.</p> <p>2 Q. You also reviewed data and information from the</p> <p>3 State of Florida as well as federal agencies; is</p> <p>4 that correct?</p> <p>5 It's on paragraph 5, page 1.</p> <p>6 A. Yes.</p> <p>7 Q. You also reviewed the testimony of Florida state</p> <p>8 officials responsible for fishery management?</p> <p>9 A. Yes. I did.</p> <p>10 Q. You also reviewed testimony from oyster</p> <p>11 biologists at the University of Florida who</p> <p>12 researched the decline of the Apalachicola Bay</p> <p>13 oyster population?</p> <p>14 A. Yes, I did.</p> <p>15 Q. You saw some of that this morning. Right?</p> <p>16 A. Yes.</p> <p>17 Q. And at the time of your deposition, you also</p> <p>18 reviewed certain deposition transcripts?</p> <p>19 A. Correct.</p> <p>20 Q. Okay. Some you had read in their entirety, but</p> <p>21 for others you had read only portions?</p> <p>22 A. Yes. Correct.</p> <p>23 Q. You also reviewed other documents and exhibits</p> <p>24 that were produced during discovery in this case?</p> <p>25 A. Yes.</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	<p>4324</p> <p>1 oyster has an optimal salinity range?</p> <p>2 A. It does have an optimal salinity range, yes.</p> <p>3 Q. And the optimal salinity range for the eastern</p> <p>4 oyster in Apalachicola Bay, according to you, is</p> <p>5 about 12 or 14 to about 22 or 23 parts per</p> <p>6 thousand?</p> <p>7 A. Approximately, yes.</p> <p>8 Q. You also agree that the amount and timing of</p> <p>9 freshwater flow are critical to the long-term</p> <p>10 survival of an oyster community?</p> <p>11 A. Yes, I would agree.</p> <p>12 Q. Sir, you also agree that high salinity conditions</p> <p>13 can cause localized mortality events?</p> <p>14 A. Yes.</p> <p>15 Q. One example of how high salinity can result in</p> <p>16 localized mortality events is that it may lead to</p> <p>17 an increase in predation?</p> <p>18 A. Yes.</p> <p>19 Q. And one of the predators you may see an increase</p> <p>20 in would be snails. Correct?</p> <p>21 A. That's correct.</p> <p>22 Q. High salinity can also impact the physiology of</p> <p>23 the organism itself. Right?</p> <p>24 A. Yes.</p> <p>25 Q. High salinity can lead to localized</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>

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1 disease-related mortality?

2 **A. It can at extreme levels, yes.**

3 **Q.** And you would agree that while it generally

4 depends on the size or age of the oyster, oyster

5 disease is more prevalent at high salinity

6 conditions?

7 **A. Yes. Certainly for dermo.**

8 **Q.** Sir, I'm now going to talk about one of the

9 documents that we spent some time looking at

10 particular excerpts from. And that is behind

11 tab 2 of your binder.

12 You're familiar with this document, sir?

13 **A. I am.**

14 **Q.** Okay. This is the Apalachicola Bay Oyster

15 Situation Report designated as GX-568. You're

16 aware, sir, that in 2012 the scientists who

17 prepared the Apalachicola Bay Oyster Situation

18 Report determined that low river flows and low

19 rainfall caused high salinity in Apalachicola

20 Bay. Correct?

21 **A. Yes.**

22 **Q.** Okay. And that particular finding is the second

23 bullet on page 4. Do you see it, sir?

24 **A. Yes, I do.**

25 **Q.** And you analyzed river flow in 2012; didn't you?

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1 **A. I did.**

2 **Q.** And you don't quarrel with the observation that

3 the years 2011 and 2012 witnessed low flow from

4 the Apalachicola River into Apalachicola Bay?

5 **A. Yes.**

6 **Q.** Yes, you do not quarrel with that?

7 **A. Yes, I do not quarrel with it.**

8 **Q.** In fact, you plot river flow against oyster

9 landings on page 18 of your direct testimony?

10 **A. Yes.**

11 **Q.** And in preparing that plot, you relied on data

12 from the Sumatra Gage; is that correct?

13 **A. That's correct.**

14 **Q.** The Sumatra Gage is a USGS gage, sir?

15 **A. Yes.**

16 **Q.** And you know where that's located in the

17 Apalachicola River system?

18 **A. Yes. It's -- it's down near the lower reaches of**

19 **the river shortly before it enters the bay.**

20 **Q.** Have you ever heard of any measurement issues

21 associated with the Sumatra Gage?

22 **A. I have heard at times that there's some minor**

23 **measurement issues. I don't recall exactly what**

24 **they are. But they generally reflect, as far as**

25 **I have read, the conditions -- well, the flow**

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1 **going into the bay, yes.**

2 **Q.** Did you review a letter by USGS from earlier this

3 year, sir?

4 **A. I'm not sure.**

5 **Q.** Okay. We can come back to that.

6 **A. Okay.**

7 **Q.** I now want to talk about one of the possible

8 adverse effects of high salinity conditions, and

9 that is oyster disease.

10 **A. Okay.**

11 **Q.** In early 2015 you determined that disease was

12 eliminated as a cause of the oyster collapse by

13 other investigators. Isn't that right?

14 **A. I did. Yes.**

15 **Q.** And in making that determination, you relied in

16 part on the document behind tab 2, the

17 Apalachicola Bay Oyster Situation Report --

18 **A. I did.**

19 **Q.** -- GX-568?

20 **A. Yes.**

21 **Q.** Okay. Can you please turn with me to page 14 of

22 this document, sir. In particular, I would like

23 you to read the second full paragraph in the

24 right column that begins, the main findings.

25 Please read that to yourself.

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1 **A. Certainly. The main findings from the stock**

2 **assessment model --**

3 **Q.** Sorry, Dr. Lipcius. It's efficient if you read

4 it to yourself.

5 **A. Oh, sorry.**

6 **I have read it.**

7 **Q.** And you had reviewed this finding when you

8 submitted your expert report in this case?

9 **A. I did.**

10 **Q.** And can you also turn to page 22, sir. And here,

11 I would like you to read the last bullet point

12 that begins, dermo infections may be higher.

13 **A. I have.**

14 **Q.** Okay. Do you see the reference to the oyster

15 sentinel program?

16 **A. Yes.**

17 **Q.** And you're familiar with the oyster sentinel

18 program. Right?

19 **A. Well, I'm familiar with the mussel sentinel**

20 **program, which also includes oysters. But I'm**

21 **not familiar in-depth with that program, no.**

22 **Q.** Do you know that one of your colleagues at the

23 Virginia Institute of Marine Sciences is on the

24 oyster sentinel program?

25 **A. That's correct, yes.**

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1 Q. Roger Mann. Right?

2 A. Yes.

3 Q. And you had reviewed this particular bullet point

4 when you had prepared your direct testimony in

5 this case, sir?

6 A. **I had; but I mainly relied on the levels of**

7 **weighted prevalence of dermo, of the disease,**

8 **that were presented in this document by**

9 **Dr. Petes.**

10 Q. We will certainly look at the report and memo by

11 Dr. Petes. But let's turn first to another

12 document you relied on when you said that other

13 investigators had eliminated disease as a cause

14 of the collapse. And that document is behind

15 tab 3.

16 A. Yes.

17 Q. Designated as GX-789. Have you seen this

18 document before, sir?

19 A. **Yes, I have.**

20 Q. This is a document authored by several

21 individuals, including Dr. Pine. Correct?

22 A. **Correct.**

23 Q. You cite this document in your direct testimony?

24 A. **Yes.**

25 Q. Now, there's no page numbers on this, as we

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1 A. **I do.**

2 Q. Okay. And you focus on rock snails. Did you

3 consider conchs as well?

4 A. **I did not consider the conchs because those are**

5 **not as prevalent as the rock snails. And, also,**

6 **mainly because the State of Florida had**

7 **identified rock snails and stone crabs as the two**

8 **predators that were most important to the**

9 **collapse and predation.**

10 Q. Had you ever heard anyone associated with the

11 State of Florida talking about conchs being a

12 predator of oysters in 2012?

13 A. **I had in some cases.**

14 Q. Did that factor at all into your analysis?

15 A. **No. Again, because they're not as prevalent.**

16 Q. Okay. In your direct testimony, sir, you

17 testified that if there were marine predators

18 that were responsible for the crash of the

19 Apalachicola Bay oyster population, then you

20 would expect to see a significant density of dead

21 oyster shells. Isn't that right?

22 A. **Correct.**

23 Q. And when you say you would expect to see, you're

24 referring to the oyster surveys that were done by

25 the Florida Department of Agriculture and

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1 discovered earlier this morning. But if you turn

2 to the sixth page with me.

3 A. **I'm there.**

4 Q. If you could read the paragraph that begins with,

5 overall the key results. And what I'm

6 particularly interested in is the last sentence

7 here that says, there are multiple factors that

8 could lead to low recruitment.

9 And then I'm interested in factor No. 3. So

10 if you might read that to yourself.

11 A. **Yes.**

12 Q. And you were aware of this factor, sir, when you

13 submitted your expert report in this case?

14 A. **Yes.**

15 Q. And you were aware of it when you submitted your

16 direct testimony?

17 A. **I was.**

18 Q. I also want to talk about one of the other

19 possible adverse effects of high salinity

20 conditions, and those are oyster predators. You

21 conclude in your direct testimony, sir, that

22 there is no evidence that there was an abnormal

23 increase in the level of predation of oysters by

24 rock snails that could have caused this -- the

25 collapse. Correct?

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1 Consumer Services. You would expect to see the

2 dead shells in those surveys. Correct?

3 A. **Both those and in Dr. Kimbro's surveys, yes.**

4 Q. Okay. Let's talk about the Florida data first.

5 You understand that the purpose of collecting

6 the -- or the purpose of undertaking the surveys

7 was to provide a predictive index of the oyster

8 population?

9 A. **A relative index, yes.**

10 Q. Okay. And so you know that Florida would not

11 sample areas where there were no live oysters?

12 Are you aware of that?

13 A. **No, I don't think that's -- that's true.**

14 **Where -- they sampled the oyster bars where they**

15 **expected to see oysters. And there might or**

16 **might not be oysters where they sampled depending**

17 **on harvest rates, mortality, and so on.**

18 Q. Sir, were you in court for Mr. Mark Berrigan's

19 testimony?

20 A. **No, I was not.**

21 Q. Have you read his trial transcript?

22 A. **I have.**

23 Q. And do you recall him saying that we did not --

24 that the Florida Department of Agriculture and

25 Consumer Services did not survey bars where they

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1 did not expect to find live oysters?

2 **A. I don't recall that; but that's not your -- the**

3 **typical protocol here. They would sample all the**

4 **oyster bars from what I read about the**

5 **description of the survey. You go to each of the**

6 **different oyster bars, and you sample them to**

7 **assess whether or not they can support fishing**

8 **pressure.**

9 **Q.** All right. And I'm talking about specifically

10 what the Florida Department of Agriculture and

11 Consumer Services did according to Mr. Mark

12 Berrigan. Are you aware of what they did?

13 **A. Well, what I'm saying is, is that when I read the**

14 **FDACS reports which were done by Mark --**

15 **Mr. Berrigan, their goal and the goal in most**

16 **oyster fisheries when you have surveys, you**

17 **survey all the different oyster bars to assess**

18 **density at the bars. You -- how can you know if**

19 **there are no oysters there without surveying**

20 **them?**

21 **So you have to survey them to assess how many**

22 **oysters are on the bars.**

23 **Q.** But you don't recall reading Mr. Berrigan's trial

24 testimony --

25 **A. That --**

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1 **Q.** -- that's inconsistent with what you just said?

2 **A. I'm sorry. I did not recall that particular**

3 **sentence. And that makes no sense in terms of an**

4 **oyster survey.**

5 **Q.** And when you concluded that there was no evidence

6 of conch predators in Apalachicola Bay, you were

7 familiar with Mr. Berrigan's deposition

8 testimony, sir?

9 **A. I was familiar with very specific parts. And I**

10 **should say that some refer to the rock snail --**

11 **it's referred to as oyster drill. It's also**

12 **referred to as conch. So you have to be pretty**

13 **clear on what you mean by conch.**

14 **Q.** Okay. And when you said in your direct testimony

15 to this Court that there was no evidence that

16 predation by rock snails had occurred, did you

17 inquire as to what Mr. Berrigan meant in his

18 deposition when he used the term conch?

19 **A. No, because I was looking at hard data on this.**

20 **And at the time I just did not recall that**

21 **particular part.**

22 **Q.** Okay. Perhaps we can refresh your recollection,

23 sir.

24 **A. Okay.**

25 **Q.** Can you turn to tab 4. Here, you will find

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1 Mr. Berrigan's deposition transcript. And you

2 reviewed this before you submitted your expert

3 report; didn't you?

4 **A. I reviewed it. I scanned parts where I don't**

5 **recall as much, and then there were certain other**

6 **parts where I read them in-depth. Yes.**

7 **Q.** Okay. Because when you wanted to inform this

8 Court that there was no evidence of predation by

9 rock snails, you wanted to make sure that you

10 considered the different areas of evidence.

11 Right?

12 **A. So the different hard data, yes.**

13 **Q.** All right. And you, as you explained in your

14 prefiled direct, consider contemporaneous

15 observation by state officials to be the types of

16 data that marine experts consider?

17 **A. Correct.**

18 **Q.** Correct?

19 **A. Correct.**

20 **Q.** Let's turn to page 160. Starting at line 1,

21 that's where the question starts. The answer

22 begins on line 4 of 160. It actually runs all

23 the way to page 165.

24 **A. I'm on that page. And you want me to read --**

25 **Q.** You're welcome to read it. The part I want to

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1 highlight for you, sir, is at the bottom of page

2 161 at line 13. And while we typically don't

3 read documents out loud, with the Court's

4 permission, I would like to read this short

5 excerpt.

6 Mr. Berrigan testified under oath, sir,

7 quote, after I looked -- after I saw these

8 reports, I went back out there with a crew. And

9 we started in the Miles. And we came all the way

10 through for a few days. And the mortality in

11 these outer bars was substantial, if not 100

12 percent. I have never seen natural mortality

13 like that. These conchs were more abundant than

14 you can imagine. It's almost like a science

15 fiction movie how many conchs there were out

16 there. Conch eggs. And these animals are going

17 through their entire life cycle in that

18 environment, which is not good for oysters,

19 because they will eat them. Every one. Every

20 size.

21 Mr. Berrigan then goes on for several other

22 pages. And if you would like to, sir, you're

23 welcome just to read that. But my question for

24 you is you were aware of this testimony when you

25 submitted your prefiled direct to this Court?

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1 **A. I had -- I had not scanned this in-depth until we**
 2 **had my deposition. And that's where we discussed**
 3 **this.**
 4 **Q.** So the answer to my question is, yes, when you
 5 submitted your direct testimony to this Court,
 6 you were aware of this excerpt?
 7 **A. I would say that, no, when I submitted my**
 8 **original expert report, I hadn't looked at this**
 9 **in-depth.**
 10 **Q.** Actually, Dr. Lipcius, I want to pause you
 11 because I think we're talking past each other.
 12 **A. Okay.**
 13 **Q.** The expert report that you submitted earlier in
 14 the summer in May, that's separate from your
 15 direct testimony --
 16 **A. Correct.**
 17 **Q.** -- that Georgia counsel handed you.
 18 **A. Correct.**
 19 **Q.** That direct testimony was submitted on
 20 October 26.
 21 **A. Yes.**
 22 **Q.** So my question, again, is when you submitted your
 23 direct testimony to this Court, you knew about
 24 the excerpt that I just read?
 25 **A. Yes, of course.**

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1 **Q.** And you also knew that Mr. Berrigan had spoken
 2 publicly about the oyster collapse when it
 3 occurred?
 4 **A. I was aware that he had spoken publicly, yes.**
 5 **Q.** In fact, he had made a presentation to the
 6 community of Apalachicola Bay as well as the
 7 Board of County Commissioners in September 2012.
 8 Right?
 9 **A. Yes.**
 10 **Q.** Okay. And that presentation was videotaped, and
 11 a copy of that video was provided to Georgia in
 12 this litigation. Right?
 13 **A. I assume so.**
 14 **Q.** You don't cite to that video in your expert
 15 report; do you?
 16 **A. I don't believe so.**
 17 **Q.** And you don't cite to it in your direct
 18 testimony; do you?
 19 **A. No, I don't.**
 20 **Q.** Have you watched the video in its entirety, sir?
 21 **A. No, I have not.**
 22 **Q.** Have you read the transcript?
 23 **A. No, I have not.**
 24 **Q.** Okay. So before you submitted to this Court your
 25 statements that there is no evidence that

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1 predation caused the collapse, you didn't read
 2 the transcript; and you didn't watch the video.
 3 Correct?
 4 **A. Not the two that you're speaking about, but I did**
 5 **read this. Yes.**
 6 **Q.** Okay. Well, let's look at portions of the
 7 transcript from Mr. Berrigan's presentation to
 8 the Apalachicola Bay community behind tab 5.
 9 **A. Right.**
 10 **May I add some context to the statement made**
 11 **by Mr. Berrigan here?**
 12 **Q.** Dr. Lipcius, when you submitted your direct
 13 testimony, that was your opportunity to provide
 14 context. After I finish, counsel for Georgia
 15 will question you --
 16 **A. Okay.**
 17 **Q.** -- on redirect; and you will, again, have an
 18 opportunity to provide context.
 19 **A. Thank you.**
 20 **Q.** But right now, I need you to answer my questions.
 21 Behind tab 5, sir, there's a transcript of
 22 Mr. Berrigan's presentation to Apalachicola Bay.
 23 That's designated as FX-875.
 24 **A. Yes.**
 25 **Q.** Sir, I'll ask you to refer to page 2 and read the

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1 last paragraph that begins, the bay thrives on
 2 fresh water.
 3 **A. I'm sorry. You said --**
 4 **Q.** I'm sorry. I gave you the wrong page.
 5 If you go to page 2 and read the last
 6 paragraph starting with, going into the western
 7 portion of the Apalachicola Bay, and read the
 8 entirety of that paragraph on this page.
 9 **A. I have read it.**
 10 **Q.** And, sir, can I request that you look to page 3
 11 and read the paragraph at the bottom that begins,
 12 this bay thrives on fresh water.
 13 **A. I have read it.**
 14 **Q.** Okay. Did you see the portion that states --
 15 where Mr. Berrigan states, predation is
 16 unbelievable. Do you see that?
 17 **A. I did.**
 18 **Q.** Sir, do you know who Mr. Tommy Ward is?
 19 **A. I do.**
 20 **Q.** Who is he?
 21 **A. He is an oysterman and a seafood processor.**
 22 **Q.** Okay. You never mention him in your direct
 23 testimony. Correct?
 24 **A. I don't believe so.**
 25 **Q.** Okay. And you never mention him in your expert

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1 report; do you?

2 **A. No, I did not.**

3 **Q.** Okay. In fact, in your expert report when you

4 list the depositions that you read either fully

5 or partially, you don't mention Mr. Ward's

6 deposition; did you?

7 **A. I don't believe so.**

8 **Q.** Okay. You know that he has private oyster leases

9 in Apalachicola Bay?

10 **A. Yes, I do.**

11 **Q.** Okay. Did you know that he testified that before

12 the oyster collapse, he witnessed a ratio of 1

13 conch to 100 oysters on his leased oyster bars?

14 Did you know that?

15 **A. I'm not -- I don't recall that.**

16 **Of course, when you say conch, you mean rock**

17 **snail?**

18 **Q.** During the crash do you understand that Mr. Ward

19 testified that the ratio flipped to 100 conchs

20 for 1 oyster? Do you recall that?

21 **A. Yes, I do believe I recall that.**

22 **Q.** Okay.

23 MR. QURESHI: Your Honor, I have a

24 breaking point now. I think I have perhaps

25 20 minutes more. I'm happy to do whatever

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1 you like, if we should break for lunch or if

2 we should continue.

3 SPECIAL MASTER LANCASTER: Can you give

4 me an estimate of redirect?

5 MR. ECHOLS: Your Honor, I would

6 anticipate 40 minutes.

7 SPECIAL MASTER LANCASTER: We'll take a

8 break.

9 MR. QURESHI: Thank you, your Honor.

10 (Discussion off the record.)

11 MR. PRIMIS: Thank you, madam court

12 reporter.

13 For the record, I'm just going to

14 identify certain exhibits that have been used

15 in the trial or exhibits that would reflect

16 the video portions that were played that were

17 not transcribed.

18 With regard to certain documents that

19 were used early in the trial before our

20 exhibit marking convention was established,

21 I'm going to identify the following, I think

22 primarily from the testimony of Mr. Hoehn and

23 perhaps Dr. Allan.

24 There's a document titled State of

25 Florida's Third Amended and Supplemented

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1 Complaint in the litigation captioned State

2 of Alabama and State of Florida versus United

3 States Army Corps of Engineers. The case

4 number is 90-1331 in the Northern District of

5 Alabama. This complaint is ECF Docket No.

6 339 and was used with Mr. Hoehn. It has been

7 marked as GX-1270 and was tab No. 4 in the

8 Hoehn cross documents binder that was handed

9 out in court.

10 The next document we have marked as

11 GX-1271. It's titled Declaration of Theodore

12 S. Hoehn Supporting State of Florida's Motion

13 For Preliminary Injunction in the same case I

14 just identified. The docket number on the

15 ECF for the Hoehn declaration is 384-1. And

16 it was tab 5 in the Hoehn cross-examination

17 binder used in court.

18 The next document is GX-1280. It was a

19 deposition transcript of Mr. Hoehn from the

20 same State of Alabama and State of Florida

21 versus United States Army Corps of Engineers

22 case. The docket number for Mr. Hoehn's

23 deposition transcript was 414-1. The

24 transcript is dated February 14, 2006, and

25 was filed on the docket in the Alabama

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1 litigation on March 10, 2006. The document

2 was not in the binder, but was handed to

3 Mr. Hoehn on the stand.

4 The next document is GX-1272. It was

5 the document behind tab 7 in the Hoehn

6 cross-examination binder. It's a July 18,

7 2006, e-mail from Ted Hoehn to Gary Warren

8 with a subject line: Swift Slough letter.

9 That e-mail and its attachments have a

10 Bates range of FL-ACF-03671820 through

11 FL-ACF-03671829. It was behind tab 2 of the

12 Dr. Allan cross-examination binder.

13 GX-1273 was behind tab 8 in the Hoehn

14 cross-examination binder. It is captioned

15 Declaration of Theodore S. Hoehn from the

16 Tri-State water rights litigation case in the

17 Middle District of Florida. The declaration

18 was signed on November 1, 2007, by Mr. Hoehn

19 and has Bates stamps FL-ACF-03638114 through

20 FL-ACF-03638141. And, again, that's GX-1273.

21 The next document is GX-1274. It was

22 behind tab 9 in the Hoehn cross-examination

23 binder. It is titled State of Florida and

24 City of Apalachicola's Joint Motion and

25 Memorandum in Support of Joint Motion for

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<p style="text-align: right;">4345</p> <p>1 Summary Judgment on Phase 2 Claims filed in 2 the Tri-State water rights litigation case in 3 the Middle District of Florida. It has ECF 4 Docket No. 309 in the Tri-States water 5 litigation. It was also behind tab 7 in 6 Dr. Allan's cross document binder. 7 The next document is GX-1275. It is 8 behind tab 10 in the Hoehn cross-examination 9 binder. It is titled Factual Appendix in 10 Support of the State of Florida and City of 11 Apalachicola's Joint Motion For Summary 12 Judgment on Phase 2 Claims. This document 13 was also filed in the Tri-State water rights 14 litigation case before the Middle District of 15 Florida and bears ECF Docket No. 310. 16 So the next document is GX-1276. It was 17 behind tab 11 in the Hoehn cross-examination 18 binder. It is the Declaration of Douglas E. 19 Barr in the Tri-State water rights litigation 20 case in the Middle District of Florida and 21 has ECF Docket No. 311-4 and was filed on 22 December 9, 2009, in that case. 23 The next document is GX-1281. It is the 24 Supplemental Declaration of Theodore S. Hoehn 25 Supporting Florida's Motion For Preliminary</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	<p style="text-align: right;">4347</p> <p>1 GX-1284. It was behind tab 11 in the 2 cross-examination binder used with Dr. Allan. 3 It is the November 11, 2008, letter from Mike 4 Sole, to the U.S. Fish and Wildlife Service 5 and the Army Corps. It bears Bates No. 6 FL-ACF-02427204 through 206. 7 The next set of documents I want to 8 identify for the record are deposition 9 excerpts that reflect impeachment material 10 that was used in court but was played by 11 video and, therefore, was not transcribed on 12 the record. We also have created exhibits 13 for deposition testimony that were submitted 14 by video and will provide an exhibit number 15 for those as well. 16 We have highlighted in yellow the actual 17 specific questions and answers that were used 18 as impeachment and will provide that to the 19 Court as part of the exhibit set. 20 The first is Exhibit GX-1345. It's the 21 impeachment material for Dr. Allan and 22 contains excerpts from the June 2 and June 3, 23 2016, deposition transcript of Dr. Allan that 24 were used as impeachment during his 25 examination.</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>
<p style="text-align: right;">4346</p> <p>1 Injunction on Endangered Species Act Claims 2 filed in the case captioned State of Alabama 3 and State of Florida versus United States 4 Army Corps of Engineers in the Northern 5 District of Alabama. The document was filed 6 in that court on April 10, 2006, and has ECF 7 Docket No. 437 in that case. 8 The next document is GX-1282. This 9 document is titled Joint Agreement Extending 10 Time to Agree Upon an Equitable Apportionment 11 of the Surface Waters of the 12 Apalachicola-Chattahoochee-Flint River Basin. 13 It was provided to Mr. Struhs during his 14 cross-examination. 15 The next document is GX-1283. It was 16 behind tab 4 in the cross-examination binder 17 used with Dr. Allan. It is titled Complaint 18 For Declaratory and Injunctive Relief in the 19 State of Florida versus United States Fish 20 and Wildlife Service, case No. 06-CV-410 in 21 the Northern District of Florida. The 22 document was filed in that court on 23 September 6, 2006. 24 The last document from the first two 25 days of trial that we want to mark is</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	<p style="text-align: right;">4348</p> <p>1 GX-1346 contains excerpts from the 2 February 24, 2016, deposition transcript of 3 Rob Beaton, B E A T O N, that were used as 4 impeachment during his examination. 5 Exhibit GX-1347 is the impeachment from 6 Dr. Glibert. This contains excerpts from the 7 June 1 and June 2, 2016, deposition 8 transcript of Patricia Glibert that were used 9 as impeachment during her examination. 10 GX-1348 is the Greenblatt impeachment 11 and contains the excerpts from the May 19, 12 2016, deposition transcript of Marcia 13 Greenblatt that were used as impeachment 14 during her examination in court. 15 Exhibit GX-1349 contains the excerpts of 16 the December 1, 2015, deposition transcript 17 of Karl Havens that were played in court on 18 December 1. 19 GX-1350 is the Hoehn impeachment and 20 contains the excerpts from the February 18, 21 2016, deposition transcript of Theodore Hoehn 22 that were used as impeachment during his 23 examination in court. 24 GX-1351 is the Hornberger impeachment. 25 This exhibit contains excerpts from the</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>

4349	<p>1 May 11, August 4, and August 5, 2016, 2 deposition transcripts of George Hornbergerer 3 that were used as video impeachment during 4 his examination in court. 5 GX-1352 contains the excerpts from the 6 May 24 and 25, 2016, deposition transcript of 7 Kenneth Jenkins that was played as video 8 during the examination of Patricia Glibert. 9 GX-1353 is the Kondolf impeachment and 10 contains the excerpts from the June 21, 2016, 11 deposition transcript of G. Mathias Kondolf 12 that were used as video impeachment during 13 his deposition. 14 GX-1354 is the Leitman deposition 15 designations and contains the excerpts of the 16 February 3, 2016, deposition transcript of 17 Steve Leitman that were played by video in 18 court. 19 GX-1355 is the Pine video deposition and 20 contains the excerpts of the November 10, 21 2015, deposition transcript of William Pine 22 that were played in court on December 1. 23 GX-1356 is the Sunding impeachment and 24 contains the excerpts from the June 9 and 10, 25 2016, deposition of -- transcript of David</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4351	<p>1 MR. PRIMIS: Yes. Our understanding is 2 objections are reserved to the exhibit list, 3 and the Court will deal with those in due 4 course. 5 MR. FAWAL: Absolutely. Just so we have 6 the opportunity to object to new exhibits. 7 MR. PRIMIS: Thank you. 8 MR. FAWAL: Thanks. 9 (Time Noted: 12:12 p.m.) 10 (Recess Called) 11 (Time Noted: 12:50 p.m.) 12 MR. QURESHI: Good afternoon, your 13 Honor. 14 BY MR. QURESHI: 15 Q. Good afternoon, Dr. Lipcius. 16 A. Good afternoon, Mr. Qureshi. 17 Q. Sir, I would now like to talk about the 18 relationship between flow and oyster mortality as 19 you evaluated it in your direct testimony. 20 Paragraph 60 and 61 of your direct testimony 21 on page 19, sir, you conclude that there was no 22 relationship between river flow and natural 23 mortality; is that correct? 24 A. I'm sorry. You said on page -- oh, paragraph. 25 Q. Yes, sir. Paragraph 60 and 61.</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>
4350	<p>1 Sunding that were used as video impeachment 2 during his examination in Court. 3 GX-1357 contains the excerpts of the 4 video played in court from the September 6, 5 2012, Franklin County Commissioner's meeting 6 where Mark Berrigan spoke. And those were 7 the excerpts played by Georgia. 8 These exhibits have been provided 9 electronically to Florida, and we will 10 include them in the supplemental exhibit 11 binders that we intend to provide the Court 12 when both sides finalize and clean up their 13 respective exhibit lists. 14 Thank you. 15 MR. FAWAL: I'll just note one thing for 16 the record that I think the parties have 17 agreed to handle observations at a later time 18 for any new exhibits. 19 MR. PRIMIS: Yes. 20 MR. FAWAL: But we just want the 21 opportunity to object to some of the use of 22 impeachment testimony that was used with a 23 different deponent to the extent that 24 constitutes hearsay. 25 That's all.</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>	4352	<p>1 A. Yes, sir. 2 Q. On page 19. 3 A. I'm sorry. I thought you said page. 4 Yes. 5 Q. And your conclusion was based on your analysis of 6 the same data as Dr. Pine used in the Curious 7 Case paper we looked at parts of earlier this 8 morning? 9 A. Yes. 10 Q. That paper is actually behind tab 3 of your 11 binder, sir. 12 A. If you don't mind, I need to just make sure it's 13 clear what I did is I analyzed the same data, not 14 his dataset. So I downloaded the landings data 15 from the FWC website, and I downloaded the 16 Sumatra Gage data from the USGS website. 17 Q. I understand that, sir. And, again, your 18 opportunity to provide context was in your direct 19 testimony; and you'll have another opportunity to 20 do that. I'm focused on getting answers to my 21 questions. 22 A. That wasn't context. I was just trying to make 23 sure that I was saying the truth. 24 Q. It's important for you to have said the truth now 25 and in your direct testimony.</p> <p style="text-align: center;">THE REPORTING GROUP Mason & Lockhart</p>

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1 MR. ECHOLS: Your Honor, I object.
 2 Dr. Lipcius was simply trying to explain the
 3 data, and I object to the additional
 4 commentary by counsel.
 5 MR. QURESHI: Your Honor, I'm ready to
 6 move on.
 7 BY MR. QURESHI:
 8 Q. Dr. Lipcius, your evaluation of the Curious Case
 9 publication behind tab 3, did you understand at
 10 the time you submitted your direct testimony that
 11 the authors of that document had not studied or
 12 reached any conclusions about the effect of water
 13 withdrawals on the Apalachicola Bay or the oyster
 14 population? Did you know that?
 15 A. I did.
 16 Q. And in particular, you were familiar with the
 17 language on the second page in the paragraph that
 18 begins, note that we did not study? You had
 19 reviewed that, sir?
 20 A. Yes.
 21 Q. Okay. But you looked at the data that you
 22 described, the data from Dr. Pine, as well as the
 23 FWC data that you downloaded; and you did make
 24 certain conclusions. Correct?
 25 A. I did make certain conclusions, yes.

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1 Q. And those conclusions were that there is no
 2 correlation between oyster landings and river
 3 flow; is that right?
 4 A. Correct.
 5 Q. And that conclusion is on paragraph 56 that's on
 6 page 17 of your direct testimony, sir?
 7 A. Yes.
 8 Q. Your testimony -- your direct testimony does not
 9 advise the Court that there was a scholar who did
 10 find a correlation between landings and river
 11 flow; that's right?
 12 A. Correct. For a different time period.
 13 Q. Right. And that different time period was the
 14 time period before the time period you looked at.
 15 Right?
 16 A. Yes.
 17 Q. And that study is behind tab 14 of your binder,
 18 sir. It's FX-953. And the study was the
 19 analysis undertaken by Dr. Dara Wilber entitled
 20 Associations Between Freshwater Inflows and
 21 Oyster Productivity in Apalachicola Bay, Florida.
 22 You're familiar with this article. Right?
 23 A. I am.
 24 Q. Okay. The article at FX-953 relies on landings
 25 data, sir?

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1 A. Yes, it does.
 2 Q. And it relies on landings data from a period of
 3 time when there was voluntary reporting of
 4 landings data. Right?
 5 A. That's correct.
 6 Q. And the period of time that you examined involved
 7 mandatory reporting of landings data. Right?
 8 A. Correct.
 9 Q. And the landings data we're talking about are in
 10 your field generally referred to as
 11 fishery-dependent data. Right?
 12 A. Yes.
 13 Q. And fishery-dependent data is not collected by
 14 scientists. Right?
 15 A. Not usually. In most cases, not.
 16 Q. And in another portion of your direct testimony,
 17 you rely on another fishery-dependent metric.
 18 That metric is CPUE, catch per unit effort.
 19 Correct?
 20 A. Correct.
 21 Q. And you explained that catch per unit effort is a
 22 measure of fishing efficiency calculated as
 23 oyster landings harvested per one fishing trip?
 24 A. Correct.
 25 Q. And you agree that there are potential biases

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1 with fishery-dependent data. Right?
 2 A. Yes.
 3 Q. And fishery-dependent data can be influenced by
 4 other factors such as size and bag limits, season
 5 closures, or socioeconomic factors. Right?
 6 A. Yes.
 7 Q. Okay. Can you please turn to tab 19 in your
 8 binder, sir. And there you will find a document
 9 designated as FX-951. This is an article
 10 entitled Current and Future Trends in Fisheries
 11 Stock Assessment and Management. It's by R.
 12 Hilborn.
 13 You're familiar with Ray Hilborn. Correct?
 14 A. Very much so.
 15 Q. In fact, you cite some of his work in your expert
 16 report?
 17 A. Yes.
 18 Q. Can you please turn to page 979.
 19 A. I'm there.
 20 Q. And I want you to read to yourself the
 21 paragraph on fishery-dependent versus
 22 fishery-independent data that starts on the
 23 bottom of 979 and continues onto page 980.
 24 A. Okay.
 25 Q. When you submitted your direct testimony, were

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1 you aware of this provision that provided that

2 many stock assessment biologists were suspicious

3 of fishery-dependent data and preferred to rely

4 on fishery-independent data? Were you aware of

5 that?

6 **A. Yes. Of the opinion as far as fishery-dependent**

7 **data as a measure of stock abundance, yes.**

8 **Q.** And you also knew about the almost unanimous

9 agreement that fishery-independent data is

10 superior to fishery-dependent data? Were you

11 aware that this study found that as well?

12 **A. Yes.**

13 **Q.** Can you now please turn to tab 20, FX-956. This

14 is an article entitled Interpreting Catch Per

15 Unit Effort Data to Assess the Status of

16 Individual Stocks and Communities.

17 Have you seen this article before, sir?

18 **A. I have.**

19 **Q.** Okay. Do you know the author?

20 **A. I don't know him personally, but I know of him.**

21 **Q.** All right. Do you know any of the individuals

22 listed at the top as authors?

23 **A. I know of John Sibert, but that's it. I don't**

24 **know them personally.**

25 **Q.** Sir, can you please read the abstract that's on

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1 the first page of FX-956.

2 **A. Okay.**

3 **Q.** Sir, when you submitted your direct testimony,

4 were you aware that certain scholars had

5 characterized CPUE, catch per unit effort, data,

6 as, quote, notoriously problematic? Did you know

7 that?

8 **A. Yes. I would say most scholars felt that way,**

9 **including myself, to estimate abundance.**

10 **Q.** I would like to now talk about documents that you

11 relied on in forming your conclusions that are

12 behind tab 6 and 7 of your binder. These are the

13 2011 and 2012 oyster assessment reports. You're

14 familiar with these documents, sir?

15 **A. Yes, I am.**

16 **Q.** In fact, in your direct testimony, you explained

17 that the types of reports embodied in tab 6 and

18 7, JX-50 and JX-77, reflect contemporaneous

19 knowledge and they, quote, capture critical

20 information that is not otherwise reflected in

21 abundance surveys. Do you recall writing that?

22 **A. I don't recall exactly, but I trust you in that**

23 **regard.**

24 **Q.** Okay. I can certainly refer you to paragraph 167

25 of your direct testimony on pages 49 and 50. But

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1 I will represent to you that is what you wrote.

2 In fact, you cite JX-50 and JX-77 in your

3 testimony when you discussed harvesting pressure;

4 is that correct?

5 **A. Yes, I did.**

6 **Q.** Let's take a look at JX-50, the document behind

7 tab 6. Can you please turn to page 4, sir.

8 **A. Okay.**

9 **Q.** I would like you to read the first paragraph to

10 yourself under Fishery Trends in Apalachicola

11 Bay.

12 **A. Okay.**

13 **Q.** All right. Now, if you could kindly turn to

14 tab 7. This tab is JX-77. And it contains the

15 2012 oyster assessment report. But that appears

16 not on the -- not until the fourth page.

17 So if you could turn to page 3 of the 2012

18 oyster resource assessment report and read to

19 yourself the bottom of page 3 that begins, the

20 Dry Bar and St. Vincent Bar, and continues onto

21 the top of page 4.

22 **A. Yes.**

23 **Q.** Okay. When you had submitted your direct

24 testimony, you were aware of these statements in

25 the August 2012 oyster assessment report?

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1 **A. Yes, I was.**

2 **Q.** Now, on the next page, page 5, in a section

3 entitled Prolonged Drought and Elevated Salinity,

4 may I request that you read those -- that -- that

5 you read that section to yourself.

6 **A. Okay.**

7 **Q.** Sir, when you wrote in your direct testimony that

8 all scientific evidence proves that low river

9 flow did not cause the oyster collapse, you were

10 aware of these sections?

11 **A. I was.**

12 **Q.** Now, can you turn to the next section entitled

13 Natural Mortality and Predation and review that

14 to yourself -- read that to yourself.

15 **A. Okay.**

16 **Q.** Sir, in your direct testimony when you write that

17 there was no evidence of increased mortality due

18 to predation, you were aware of this section of

19 the August 2012 oyster assessment report?

20 MR. ECHOLS: Objection, your Honor.

21 That mischaracterizes what his direct

22 testimony states. It states leading to the

23 collapse.

24 BY MR. QURESHI:

25 **Q.** Can you answer my question?

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1 **A. Sir, I would like to, if we can, refer to my**
2 **statement because I believe I said abnormal**
3 **mortality.**
4 **Q.** Why don't you look at the table of contents.
5 **A. I'm sorry?**
6 **Q.** Look at the table of contents --
7 **A. Yes.**
8 **Q.** -- of your direct testimony.
9 **A. Oh, sure.**
10 **Q.** Roman numeral IID that begins on page 19, no
11 evidence of increased mortality due to predation.
12 Did I read that correctly, sir?
13 **A. Okay. Yes.**
14 **Q.** I did read it correctly?
15 **A. You did read it correctly. Yes.**
16 **Q.** Okay. Let's now go to tab 8. Tab 8 is an e-mail
17 that you cite portions of in your direct
18 testimony. It's designated as GX-486. And it's
19 an e-mail exchange with Dr. David Kimbro and
20 Dr. Bill Pine.
21 You're familiar with these individuals;
22 right, sir?
23 **A. Yes.**
24 **Q.** I would like to turn you to the e-mail on the
25 second page from Dr. Kimbro to Dr. Pine that's
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1 section I want you to focus on is where
2 Dr. Havens says, here is what I think the answer
3 is. And, Bill, you can correct if this is wrong.
4 **A. Yes.**
5 **Q.** Sir, you cite to Dr. Havens's deposition
6 testimony; but you don't cite to this particular
7 e-mail. Were you aware of it?
8 **A. I'm not sure.**
9 **Q.** Sir, you're based in the Virginia area and do a
10 lot of work in Chesapeake Bay; is that right?
11 **A. I do.**
12 **Q.** Okay. I want to switch topics a little bit and
13 talk a little bit about that work in connection
14 with your opinion that all scientific evidence
15 proves that low river flow from the Apalachicola
16 River did not cause the oyster collapse in the
17 bay. In connection with that opinion, you write
18 in paragraph 30 on page 8 of your direct
19 testimony that there's no instance in the
20 scientific literature of drought-induced high
21 salinity in an estuary having caused a
22 population-wide collapse of an entire eastern
23 oyster fishery.
24 **A. I'm sorry. Could you refer me to a paragraph?**
25 **Q.** Sure. Paragraph 30.
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1 dated Thursday, October 25, 2012, at 10:02 p.m.
2 It's a relatively short e-mail, so I would ask
3 you to read it to yourself, sir.
4 **A. Okay.**
5 **Q.** Sir, when you write in your direct testimony that
6 there was no evidence of increased mortality due
7 to predation, you were familiar with Dr. Kimbro's
8 observations about the subtidal and intertidal
9 reefs being infested with a carnivorous snail?
10 **A. Yes, I was aware he made that statement.**
11 **Q.** Okay. Sir, now, I'm going to ask you to look at
12 an e-mail on your screen in front of you.
13 Everyone else will have this in a binder,
14 because it was passed out this morning. It was
15 the Havens binder. And tab 4 in the Havens
16 binder -- we'll put it up on the screen -- it's
17 GX-1339.
18 MR. QURESHI: And the version that will
19 be in everyone's binder will have particular
20 language from Dr. Havens highlighted in
21 yellow, but not all of it.
22 BY MR. QURESHI:
23 **Q.** And I would like to ask you to read to yourself
24 the language that's not highlighted in yellow.
25 So if you could scroll up a little bit, and the
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1 **A. 30.**
2 **Q.** Page 8.
3 **A. Okay.**
4 **Q.** Okay. And in connection with your work on the
5 Chesapeake Bay, have you come across the article
6 that's behind tab 9 and marked FX-949?
7 The title of this article is Unusual
8 Intensification of Chesapeake Bay Oyster Disease
9 During Recent Drought Conditions.
10 **A. Yes.**
11 **Q.** Can you take a moment to read the abstract to
12 yourself.
13 **A. Yes.**
14 **Q.** Okay. Sir, you were familiar with this article
15 when you submitted your direct testimony, sir?
16 **A. I was familiar with the work and probably came**
17 **across the article as well, I believe.**
18 **Q.** We talked about Dr. Petes earlier today. And I
19 said we would come back to her, and now is the
20 right time. Do you know Dr. Petes?
21 **A. Not personally, no.**
22 **Q.** Okay. You're aware that she works at the -- or
23 she did work at the NOAA climate program office?
24 **A. Yes.**
25 **Q.** Okay. Do you know what she's doing currently?
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1 **A. I do not.**
 2 **Q.** All right. So you don't know that she currently
 3 works at the White House in part of the Climate
 4 and Ecosystems Science and Technology Policy
 5 Center?
 6 **A. No.**
 7 **Q.** You don't cite her work in your direct testimony;
 8 do you?
 9 **A. I don't believe so.**
 10 **Q.** Let's look at tab 8, a document that is
 11 designated as GX-4 -- I'm sorry, tab 10. I
 12 apologize, Dr. Lipcius. It's tab 10, FX-412.
 13 **A. Okay.**
 14 **Q.** This is an e-mail from NOAA personnel that
 15 contained both a memo from Dr. Petes as well as
 16 an article that she wrote.
 17 Let's start with the memo. And I'll ask you
 18 to turn to page 8 of the memo FX-412, and read
 19 the second to last paragraph to yourself, the one
 20 that begins however.
 21 **A. Okay.**
 22 **Q.** So when you wrote in your direct testimony that
 23 all scientific evidence proves that low river
 24 flow did not cause the oyster collapse, you were
 25 aware of Dr. Petes's memo?

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1 **A. Yes.**
 2 **Q.** And if you advance several pages on FX-412, you
 3 will see Dr. Petes's article entitled Impacts of
 4 Upstream Drought and Water Withdrawals on the
 5 Health and Survival of Downstream Estuarine
 6 Oyster Populations. You have seen this before;
 7 haven't you?
 8 **A. Yes, I have.**
 9 **Q.** And so, again, when you wrote in your direct
 10 testimony that all scientific evidence proves
 11 that low river flow did not cause the oyster
 12 collapse, you were aware of Dr. Petes's article?
 13 **A. Yes.**
 14 **Q.** Let's look at another article that we looked
 15 at -- we saw a videotape about earlier today.
 16 That's behind tab 13. Are you there?
 17 **A. Yes.**
 18 **Q.** Okay. This is an article designated as JX-167
 19 and entitled Collapse of a historic oyster
 20 fishery: Diagnosing causes and identifying paths
 21 toward increased resilience.
 22 Now, you cited this document in your expert
 23 report, but it's not cited in your direct
 24 testimony?
 25 **A. Correct.**

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1 **Q.** And you had reviewed the entirety of this article
 2 before submitting your direct testimony?
 3 **A. Yes, I had.**
 4 **Q.** Okay. One of the parts of the article that was
 5 not displayed on the screen this morning was on
 6 page 6 underneath the discussion section. It's
 7 the first paragraph under the section that is
 8 titled Changes in Stressors to the Apalachicola
 9 Bay System.
 10 Can you take a moment to read that to
 11 yourself. If you're familiar with it, I can just
 12 ask the question.
 13 **A. I'm familiar with it, yes.**
 14 **Q.** So when you wrote in your direct testimony that
 15 all scientific evidence proves that low river
 16 flow did not cause the oyster collapse, you were
 17 aware of this article?
 18 **A. Very much.**
 19 **Q.** Okay. Now, this article actually references
 20 other studies as well on page 6, further down
 21 from the paragraph I asked you to look at; isn't
 22 that right?
 23 **A. It does reference other publications, yes.**
 24 **Q.** And one of those publications is a publication by
 25 Dr. Petes in 2012?

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1 **A. Yes.**
 2 **Q.** And it references a study by Menzel in 1966,
 3 which the article explains documented increased
 4 abundance of oyster predators on higher salinity
 5 bars in Apalachicola Bay during drought
 6 conditions, 1955 through 1957. Right?
 7 **A. Correct.**
 8 **Q.** And there's a reference to a 1997 Livingston
 9 study discussing noted widespread changes in
 10 trophic structure in Apalachicola Bay resulting
 11 from low river flow.
 12 Now, trophic structure means feeding and
 13 nutrition, sir?
 14 **A. No. It means the food web basically. The**
 15 **different levels in the food web, that's the**
 16 **trophic structure.**
 17 **Q.** Okay. And there's also references to the
 18 Livingston studies in 2002 and 2015 that discuss
 19 reductions of freshwater flow. Correct?
 20 **A. Yes.**
 21 **Q.** And, again, when you wrote your direct testimony
 22 and stated that all scientific evidence proves
 23 that low river flow did not cause the collapse,
 24 you were aware of all of these?
 25 **A. Very much.**

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1 Q. Sir, are you familiar with the Magnuson-Stevens
 2 Fishery Conservation and Management Act?
 3 A. Yes.
 4 Q. Are you also familiar with the
 5 InterJurisdictional Fisheries Act?
 6 A. Yes.
 7 Q. And so you know that -- the requirements
 8 necessary to receive federal disaster funds for a
 9 commercial fishery, you're familiar with those
 10 requirements?
 11 A. Yes.
 12 Q. And you're aware that the State of Florida did in
 13 fact receive federal disaster funds for the
 14 disaster in 2012?
 15 A. Yes, I am.
 16 Q. Okay. Please turn with me to -- I think it's
 17 tab -- tab 12, sir, the document designated as
 18 FX-413.
 19 A. Okay.
 20 Q. And you will see that there's an e-mail in the
 21 first couple of pages; but then on -- I think
 22 it's the fourth page you get to a NOAA memo.
 23 Have you seen this memo before, sir?
 24 A. Yes.
 25 Q. Okay. I'll ask you to read to yourself, sir, the
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1 paragraph on -- the second paragraph on page 3
 2 that begins with, the DACS report acknowledges.
 3 A. Yes.
 4 Q. Okay. And when you wrote in your direct
 5 testimony that all scientific evidence proves low
 6 river flow did not cause the collapse, you were
 7 aware of this particular statement in this study?
 8 A. Yes.
 9 Q. Sir, the last thing I want to cover with you
 10 relates to opinions you make about
 11 overharvesting. You, in your direct testimony,
 12 point to specific contemporaneous documents that
 13 you believe reveal observations that harvest
 14 caused the Apalachicola Bay fisheries to collapse
 15 in 2012; is that right?
 16 A. Okay. Yes.
 17 Q. Can you please turn to tab 15. There is a
 18 document that's designated as GX-459. And
 19 it's an e-mail. Do you recognize this e-mail,
 20 sir?
 21 A. If I could just take a quick look at it.
 22 Q. Certainly.
 23 A. Yes.
 24 Q. Okay. And you cite this e-mail in your direct
 25 testimony as one of the contemporaneous
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1 observations that excess harvesting in
 2 Apalachicola Bay caused that fishery to collapse.
 3 Right?
 4 A. Yes.
 5 Q. Okay. And if you turn to the second page of the
 6 e-mail, you will see a reference to Chaires
 7 Creek. Right?
 8 A. Yes.
 9 Q. And in this e-mail, which is from Harvey Kent at
 10 Florida Fish and Wildlife Conservation
 11 Commission, to a gentleman named Captain Rob
 12 Beaton, there is a complaint about night
 13 oystering arrests. Right?
 14 A. Yes.
 15 Q. And, sir, when you cited this in your direct
 16 testimony, you knew that Chaires Creek was not in
 17 Apalachicola Bay. Right?
 18 A. Yes.
 19 Q. It was in Ochlockonee Bay, not Apalachicola?
 20 A. Right.
 21 MR. QURESHI: I have nothing further,
 22 your Honor.
 23 SPECIAL MASTER LANCASTER: Thank you.
 24 Redirect?
 25 MR. ECHOLS: May I proceed, your Honor?
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1 REDIRECT EXAMINATION
 2 BY MR. ECHOLS:
 3 Q. Professor Lipcius, I would just like to dispense
 4 with a couple of things right off the bat related
 5 to counsel for Florida's questioning. Now, there
 6 was as lot of discussion of the conch. Do you
 7 recall questions relating to conchs?
 8 A. Yes.
 9 Q. And that -- what is another name for conch, as
 10 far as the type of species that is referenced?
 11 A. Another name for conch is commonly used to refer
 12 to rock snail.
 13 Q. And is that also used to refer to oyster drill?
 14 A. Yes.
 15 Q. And when you -- actually, if we could look at
 16 tab 7 of your binder that counsel provided you,
 17 JX-77.
 18 A. Okay.
 19 Q. And if I could direct you, please, sir, back to
 20 the August 2012 DACS report on page 6. This is a
 21 page that counsel asked you some questions about.
 22 A. Okay.
 23 Q. The second paragraph, if you would take a look,
 24 do you see at the end of that paragraph
 25 references there to stone crabs and Florida rock
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1 snails, open paren, oyster drills?
 2 **A. Yes.**
 3 **Q.** Are those also, as you testified a moment ago,
 4 commonly known as conchs?
 5 **A. Yes.**
 6 **Q.** And if you go down further to the bottom
 7 paragraph there, there is a sentence that begins,
 8 observations and sampling confirm the presence
 9 and abundance of the Florida rock snail.
 10 And it has the Latin name for the species.
 11 Do you see that?
 12 **A. Yes.**
 13 **Q.** And that also is commonly known as a conch?
 14 **A. That's correct.**
 15 **Q.** When Mr. Berrigan was testifying about the
 16 prevalence of conchs, did you understand him to
 17 be referring to oyster drills, these rock snails?
 18 **A. Yes.**
 19 **Q.** When Mr. Ward was testifying as to the prevalence
 20 of conchs, did you similarly understand him to be
 21 referring to the presence of oyster drills or
 22 rock snails?
 23 **A. Yes. Because he also showed pictures of the**
 24 **oyster drill.**
 25 **Q.** And -- exactly. And Florida's expert -- oyster

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1 outer portions of the bay at the Miles and
 2 proceeding inward. Do you recall that?
 3 **A. Yes, I do.**
 4 **Q.** And you had wanted to explain what your
 5 understanding of that testimony was to which you
 6 had already explained once to counsel for Florida
 7 in your deposition, but didn't have the
 8 opportunity to. Would you please explain to the
 9 Court what Mr. Berrigan was referring to there to
 10 your understanding.
 11 **A. If you could just rephrase that question, please.**
 12 **Q.** Sure. Do you recall the testimony that you were
 13 referred to by Mr. Berrigan about the conchs
 14 coming in from out at the Miles and proceeding
 15 inward --
 16 **A. Right.**
 17 **Q.** -- in great abundances?
 18 And you had intended to explain, you know,
 19 what that meant based on your understanding of
 20 the environmental circumstances and the predators
 21 at that point.
 22 **A. Right. So there are actually two parts to that.**
 23 **One is the fact that the Miles are very close to**
 24 **the entrance to Apalachicola Bay from the west,**
 25 **from the Gulf of Mexico. So that's where you**

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1 expert in this case, Dr. Kimbro, when he pointed
 2 to what he claimed was the primary predator in
 3 Apalachicola Bay of oysters, what species was
 4 that?
 5 **A. That was the rock snail.**
 6 **Q.** And similarly Dr. White, the other oyster expert
 7 for the State of Florida who did a model, the IPM
 8 model, what was the species that Dr. White used
 9 as the indicator of predation in his model?
 10 **A. It was the rock snail as well.**
 11 **Q.** So would it be accurate to suggest in any respect
 12 that there's some other conch species out there
 13 that you entirely ignored from your analysis --
 14 **A. No.**
 15 **Q.** -- as far as being the predator that was
 16 referenced in Apalachicola Bay?
 17 **A. No.**
 18 **Q.** In fact, it would be fairly quite misleading to
 19 leave the Court with that impression, would it
 20 not, based on everything you know about the
 21 record?
 22 **A. That's correct.**
 23 **Q.** At one point in your cross-examination there was
 24 a reference to some testimony by Mr. Berrigan
 25 where he describes the conchs coming in from the

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1 **have the highest salinities. That's where you**
 2 **would expect localized increases in the abundance**
 3 **of rock snails and relatively high mortality at**
 4 **times.**
 5 **The other reference pertains to the fact that**
 6 **Mr. Berrigan was talking about the depletion of**
 7 **oyster reefs, of the oyster bars. And the way**
 8 **that I understood his testimony or deposition**
 9 **statements is that the fishery had depleted the**
 10 **oyster bars to the degree where there were very**
 11 **few oysters, very little structure out there.**
 12 **It's almost like having a football field that's**
 13 **just flat. And then you have very few oysters;**
 14 **and then -- then you would have the rock snails**
 15 **that are killing what few oysters remain after**
 16 **the intensive harvest.**
 17 **Q.** And is that consistent, sir, with your conclusion
 18 that overharvesting, unsustainable harvesting was
 19 the cause of the collapse?
 20 **A. Yes, it is.**
 21 **Q.** All right. I would like to just flip now back to
 22 the beginning here. Could you please tell the
 23 Court where you currently work.
 24 **A. I'm at the Virginia Institute of Marine Science**
 25 **of the College of William & Mary.**

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1 Q. And what position do you hold there?

2 A. **I'm a professor of marine science.**

3 Q. And does that include marine ecology?

4 A. **Yes.**

5 Q. Could you explain to the Court, please, what

6 marine ecology is.

7 A. **So marine ecology deals with -- in marine**

8 **systems, the relationships between the**

9 **environment and species. That's in the broadest**

10 **sense.**

11 **And in the broadest sense, the environment**

12 **means all elements of the environment, whether it**

13 **includes anthropogenic, human cause factors, or**

14 **natural factors.**

15 Q. And what types of species would be included in

16 the category of marine ecology that you

17 specialize?

18 A. **The species would include things like crabs,**

19 **lobsters, marine fish, oysters, clams, queen**

20 **conch, and the like.**

21 Q. And, sir, are you also a professor in fisheries

22 management?

23 A. **I'm formerly a professor in marine science; but**

24 **one of my specializations is fishery management.**

25 Q. And would you please explain to the Court what

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1 **Order to restore 20 tributaries -- restore the**

2 **eastern oyster in 20 tributaries in the bay by**

3 **2020.**

4 **We have made some great strides in that**

5 **regard. My role has been to conduct scientific**

6 **studies to support the restoration effort as well**

7 **as to advise federal, state, and nongovernmental**

8 **agencies such as the Nature Conservancy on**

9 **restoration efforts.**

10 Q. And how has that restoration effort been

11 proceeding?

12 A. **We are now at a point where we feel that we're**

13 **on the cusp of restoring the Chesapeake Bay's**

14 **oyster population. In one of the tributaries --**

15 **it's called the Great Wicomico River -- we**

16 **initiated -- we, I mean federal agencies, state,**

17 **and the like, initiated a restoration effort that**

18 **led to the most successful oyster -- native**

19 **oyster restoration anywhere in the world. We**

20 **were able to restore 200 million -- a population**

21 **of about 200 million oysters by a major**

22 **restoration effort, meaning reshell, shelling**

23 **the prime oyster bars in good locations. And**

24 **that -- and I have been monitoring that effort**

25 **since 2006. And it remains as a successful**

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1 fishery management is.

2 A. **So fishery management is simply the management of**

3 **exploited or harvested species, how to manage**

4 **them. Generally you want to manage them so that**

5 **they're sustainably harvested over the long term.**

6 Q. And would that also include management of an

7 oyster fishery?

8 A. **Of course.**

9 Q. Now you, sir, have done work related to the

10 Chesapeake Bay; is that correct?

11 A. **Extensively, yes.**

12 Q. And is it the case that the Chesapeake Bay oyster

13 fishery experienced a collapse?

14 A. **Yes. It has.**

15 Q. Would you please describe for the Court what your

16 involvement has been with respect to the

17 restoration of the Chesapeake Bay oyster fishery.

18 A. **Well, as the Court may not know, the Chesapeake**

19 **Bay oyster fishery basically collapsed in the**

20 **early to mid-1900's. It is now at about 1**

21 **percent of its historical abundance. And there**

22 **are major efforts underway to restore the eastern**

23 **oyster population, the native oyster in the**

24 **Chesapeake Bay.**

In fact, President Obama signed an Executive
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1 **restoration effort except for in a couple places**

2 **where the oyster reefs have been poached. But,**

3 **otherwise, it remains as really the gold standard**

4 **in my view of oyster restoration.**

5 Q. And overall, sir, how long have you personally

6 been studying and working with respect to issues

7 related to the eastern oyster?

8 A. **I actually initiated that when I was at Florida**

9 **State University pursuing my Ph.D. and off and**

10 **on, but since 2004 that's been a major focus of**

11 **my research.**

12 Q. And you received your Ph.D. in what year?

13 A. **1984.**

14 Q. I'm sorry. So this is over three decades now?

15 A. **Yes.**

16 Q. Let's turn to the conclusion that you were asked

17 about. And as a -- you have in your written

18 direct testimony that low flows did not cause the

19 2012 Apalachicola Bay oyster collapse. Now, sir,

20 did low flows cause the collapse?

21 A. **No. Most definitely not.**

22 Q. I would like to walk briefly through a couple of

23 the analyses that you did to explain to the Court

24 how you reached that determination. And if I

25 could refer in your written direct, please -- and

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1 the Court -- to page 12 of the written direct
 2 testimony. And there is a demonstrative number 3
 3 there.
 4 And, now, you were here when Dr. White, the
 5 expert for the State of Florida, testified; were
 6 you not?
 7 **A. Yes, I was.**
 8 **Q.** And so you probably recall that I put this up on
 9 the screen and asked him some questions about it.
 10 Does this reflect one of the analyses you did to
 11 reach the conclusion that low flows did not cause
 12 the collapse of the oyster fishery?
 13 **A. Yes, it was.**
 14 **Q.** Would you please explain to the Court what is the
 15 analysis that you conducted underlying this
 16 demonstrative and how it supports your
 17 conclusion.
 18 **A. Certainly. So the approach I took was a basic**
 19 **scientific method, which is that you pose**
 20 **alternative hypotheses. It's not unlike the**
 21 **causal analysis that was referred to earlier by**
 22 **Dr. Menzie. Effectively what you do is you set**
 23 **up multiple working hypotheses, positions about**
 24 **the cause. And then from each of those,**
 25 **predictions stem. And you assess whether or not**

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1 **not arbitrarily selected. I selected the bars**
 2 **that had the data available to perform an**
 3 **analysis on the heavily-fished and on the**
 4 **lightly-fished bars. And that's why the time**
 5 **periods were selected and why those bars were**
 6 **selected.**
 7 **As you can see, for each of the graphs that**
 8 **you see there, either in red or blue, the bar on**
 9 **the left is what was the oyster abundance on the**
 10 **bar prior to the collapse. And the bar on the**
 11 **right is what was there after the collapse.**
 12 **Q.** I just want to make sure that we keep the Court
 13 with us here. So is it correct then what you
 14 were referring to here is we have East Hole, for
 15 instance, which is in red. And that's one of the
 16 more commercially-harvested bars; is that right?
 17 **A. That's correct.**
 18 **Q.** And so then this bar on the left-hand side that
 19 says pre, this is a measure of the abundance
 20 before the collapse took place?
 21 **A. Correct.**
 22 **Q.** And then the smaller bar shows that there were
 23 fewer oysters after the collapse; is that right?
 24 **A. That's correct.**
 25 **Q.** Then, similarly, we have got another oyster bar

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1 **the available evidence, the data, supports them.**
 2 **And it allows you then to go one by one to the**
 3 **different hypotheses, whether it's low flow,**
 4 **predation, overharvest, and so on.**
 5 **And so one of the key predictions from the**
 6 **hypothesis that low flow and high salinity caused**
 7 **high predation or triggered high predation and/or**
 8 **disease is that you would have a bay-wide**
 9 **decline. And so what I did is I looked at the**
 10 **fishery-independent data provided by FDACS to the**
 11 **State of Florida's main survey agency. And I**
 12 **looked at the bars that were heavily fished. And**
 13 **those are indicated in red in this particular**
 14 **graph. And I looked at the bars that were**
 15 **lightly fished or were -- had been reshelled.**
 16 **And I looked at two periods. I looked at the**
 17 **time period from 2008 through 2012 as prior to**
 18 **the collapse, and the time period from October**
 19 **2012 to August 2014 as the period after the**
 20 **collapse.**
 21 **And what I would have expected to see across**
 22 **these nine bars is I would have expected to see**
 23 **the same pattern; that is, a major decline in**
 24 **abundance of oysters on all the oyster bars.**

As an aside, I need to add that these were
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1 here, Hotel, in blue, which is relatively close
 2 to East Hole. And this is one of the, you said,
 3 lightly harvested or reshelled bars?
 4 **A. Yes.**
 5 **Q.** And then if you just explain to the Court then
 6 why is there -- what the contrast is here with
 7 the pre and the post, how that relates to your
 8 conclusion.
 9 **A. Okay. So as I said, what I expected to see, had**
 10 **there been a bay-wide collapse due to low river**
 11 **flow and high salinity and predation, all those**
 12 **bars should have looked like the red bars; but**
 13 **they didn't. The five that were lightly fished**
 14 **or reshelled didn't show that. In fact, some of**
 15 **them actually increased in abundance.**
 16 **So this is the legal-size oysters. I saw**
 17 **exactly the same pattern for sub-legal-size**
 18 **oysters.**
 19 **And one of the interesting points about**
 20 **this, a point that was raised by Dr. White and**
 21 **Dr. Kimbro, they felt that there may be a**
 22 **confounding factor; that is, that maybe there**
 23 **were different environmental conditions at the**
 24 **red bars than the blue bars, and in particular,**
 25 **salinity. And that's not the case. I did the**

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1 **statistical analyses of it, and there is no**
 2 **relationship between salinity and the change in**
 3 **abundance.**
 4 **And, in fact, Hotel Bar has probably the**
 5 **highest salinity of any of the bars there. And**
 6 **Hotel Bar is the one on the lower right; it's one**
 7 **of the blue ones. And as you can see, that**
 8 **actually showed an increase in abundance.**
 9 **So, to me, this was fully inconsistent with**
 10 **the position that low river flow, high salinity,**
 11 **and predation or disease caused bay-wide decline,**
 12 **bay-wide collapse of the oyster population. This**
 13 **data alone allows me to reject that absolutely.**
 14 **Q.** And, Professor, is this data that you used for
 15 that analysis fishery-dependent or
 16 fishery-independent data?
 17 **A. This is fishery-independent data. So this is**
 18 **data collected by Mr. Berrigan and the staff at**
 19 **FDACS.**
 20 **Q.** I would like to turn to another analysis that you
 21 did that relied on fishery-dependent data. If I
 22 could refer you and the Court, please, in your
 23 written direct to page 18. And there is a
 24 demonstrative No. 6 there.
 25 Are you there, sir?

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1 **A. Yes.**
 2 **Q.** Okay. And, now, this demonstrative refers to
 3 annual oyster landings and mean daily river flow.
 4 Oyster landings there, is that fishery-dependent
 5 or independent data?
 6 **A. That is fishery-dependent data. That is the data**
 7 **actually collected and downloaded by me from that**
 8 **FWC website.**
 9 **Q.** Could you explain to the Court, please, what is
 10 the analysis that you did here that led then to
 11 your conclusion that there -- that low flows did
 12 not cause the oyster collapse?
 13 **A. Well, one of the other potential predictions from**
 14 **the position that low flow and high salinity**
 15 **caused the collapse would be that there would be**
 16 **some relationship -- some statistical**
 17 **relationship between flow, as indicated in the**
 18 **blue line. And that's fishery-independent data**
 19 **from the USGS Sumatra Gage -- that there would be**
 20 **some relationship between flow and landings. And**
 21 **it could be at a time period, a lag of one, two,**
 22 **three years.**
 23 **What that simply means is that the flow in a**
 24 **given year, if it were to affect the spat, their**
 25 **survival, then you wouldn't see that in the**

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1 **landings until about two years later.**
 2 **So what I did is I conducted a number of**
 3 **different analyses, different time lags,**
 4 **different time periods of flow. And they all --**
 5 **all came up with the same result, whether it's**
 6 **average annual flow or any of the other**
 7 **variables, that there is absolutely no**
 8 **statistical relationship between river flow and**
 9 **landings.**
 10 **And I did this because Dr. Pine had conducted**
 11 **a similar analysis; and I wanted to validate for**
 12 **myself with the data that there was no**
 13 **relationship -- no relationship between landings**
 14 **and river flow.**
 15 **Q.** Now, Professor Lipcius, this covers the entire
 16 period from 1986 through 2014. But even if you
 17 were to look only at, say, 2002 to 2014, would it
 18 still be your conclusion that there is not a
 19 correlation relationship between the river flow
 20 and landings?
 21 **A. There would be, because the data were so**
 22 **uncorrelated that it pertains to the full time**
 23 **period or subsets of it.**
 24 **Q.** Changing topics then, sir, so now you conducted
 25 your analysis and concluded that low river flows

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1 did not cause the collapse. Were you able to
 2 reach a conclusion to a reasonable degree of
 3 scientific certainty with respect to what did
 4 cause the collapse of the fishery?
 5 **A. Yes. I certainly did. And it's what has caused**
 6 **collapse in oyster fisheries across the country,**
 7 **throughout the Atlantic coast, and worldwide as**
 8 **to native oysters; and that is that it was**
 9 **unsustainable harvest, which includes both**
 10 **harvest of the live animals as well as a lack of**
 11 **or degradation of the habitat, the resource, the**
 12 **substrate, or shell that oysters require.**
 13 **And that's because, if I could just go --**
 14 **oysters are unique in that in order to manage**
 15 **them correctly, that you have to consider both**
 16 **the live animal as well as the habitat, the shell**
 17 **resource on which it lives.**
 18 **Q.** And is one set of the data that you looked at
 19 to reach the conclusion there was unsustainable
 20 harvest, the landings data we referred to
 21 before?
 22 **A. Yes. It was.**
 23 **MR. ECHOLS:** And I would like to -- we
 24 have got some demonstratives I would like to
 25 hand out, if the Court would permit.

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1 BY MR. ECHOLS:

2 **Q.** Now, Professor Lipcius, what I have put up here

3 and provided to you as demonstrative No. 1, this

4 is a chart that the Court has seen a number of

5 times before that we used with the Florida

6 witnesses, which sets out the official FWC oyster

7 landings over the period of time from 1988 to

8 2015. What, if any, information can you draw or

9 did you draw from this landings data that relates

10 to your conclusion that it was unsustainable

11 harvest?

12 **A.** Well, one of the elements of my analysis was to

13 examine fishing pressure on the resource. And

14 one of the measures of fishing pressure is, of

15 course, landings. There are other measures such

16 as effort, such as the number of trips taken, and

17 so on.

18 And what I noted is that the landings in

19 2012, 2011 were the highest on record since the

20 contemporary reporting -- mandatory reporting

21 period. And this indicated to me that there was

22 massive extraction of the live organisms as well

23 as the shell from those organisms in that time

24 frame.

25 **Q.** And you had mentioned that the other side of

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1 **harvest. And that's because you need to put back**

2 **some of the habitat that you have extracted by**

3 **taking out all the live animals.**

4 **And to sort of set a reference for the blue**

5 **bars, the amount of reshelling that was done**

6 **after the collapse of the oyster fishery after**

7 **Hurricane Elena was between 200 and, I believe,**

8 **over almost 400 acres; whereas here, immediately**

9 **prior to and during the collapse, it was a fairly**

10 **small, 35 acres you see for 2012, 16 acres for**

11 **2013.**

12 **So it was in my view from the contemporary**

13 **record, a negligible amount of reshelling when**

14 **you're extracting so much of the live animals**

15 **and, therefore, the habitat, the shell.**

16 **Q.** Now, if we could turn to the next demonstrative,

17 Professor Lipcius, you asked if we could provide

18 the Court something other than a bar or line

19 graph. And, therefore, I have selected these two

20 photographs here of a live and shell. Would you

21 please explain why did you want the Court to see

22 this?

23 **A.** Yes. So -- you know, when you see bar graphs,

24 line graphs, or so on, for technical folks, like

25 myself, those are adequate. But I think for your

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1 unsustainable harvest is not only the removal of

2 the oysters, but also the need to reshell; is

3 that correct?

4 **A.** That's correct.

5 **Q.** If we could look at the next demonstrative, what

6 we have done there is we have just combined two

7 demonstratives that the Court has seen

8 previously. So on the landings side, we turned

9 this into a line. And then we have the shelling

10 information from before, which is an exhibit

11 that's been used multiple times.

12 Would you please explain to the Court what is

13 the significance, if any, of the relationship

14 between the shell planting and the landings

15 during this period?

16 **A.** Okay. So, first of all, just to orient you, the

17 landings is on the right Y axis, vertical axis;

18 and that's the red line. The landings is just

19 what was just previously shown, 2.81 million,

20 3.04 million. So that's the harvest rate.

21 And the blue bars indicate the level of

22 reshelling. That's an activity that's been

23 conducted for more than a century. It's

24 recognized by all oyster fisheries and management

25 agencies and such as a requisite for sustainable

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1 **Honor and for the audience to really grasp what's**

2 **going on, you want to actually see it.**

3 **So on the left side is a live large mature**

4 **oyster, well over legal-size. You can't see it,**

5 **however, because it's covered by spat. So that's**

6 **the natural state of things. You have live**

7 **organisms, live oysters. They serve as habitat,**

8 **as the home, for the spat.**

9 **And in fact, on that one single live oyster**

10 **there are probably around 10 spat or so.**

11 **Q.** And the spat are baby oysters?

12 **A.** The spat are baby oysters.

13 **On the right side, you have a shell. So no**

14 **longer a live oyster, just one-half of the oyster**

15 **shell. And, similarly, you see on that -- and**

16 **you can see it's on someone's hand. It gives you**

17 **a sense of size. You can also see there are**

18 **about 10 or more spat there.**

19 **So when you remove those live oysters on the**

20 **left, you have to put back the substrate, the**

21 **reshelling, and sufficiently to provide a home,**

22 **to provide habitat for the baby oysters.**

23 **Otherwise they swim in the currents and are lost**

24 **in the system or die. They only have a week's**

25 **window when they can actually find habitat and**

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1 **settle. If they don't settle on that habitat, if**
 2 **they don't do that in that time period, they're**
 3 **gone. They're dead.**
 4 **Q.** I would like to turn back to your written direct,
 5 if we could, please.
 6 MR. ECHOLS: And I direct the Court up
 7 to page 36, the demonstrative No. 12.
 8 BY MR. ECHOLS:
 9 **Q.** Okay. Are you there, sir?
 10 **A. Yes.**
 11 **Q.** Now, this, sir, this demonstrative No. 12, is
 12 this another part of the analysis you conducted
 13 to determine that there was unsustainable harvest
 14 leading to the collapse of the oyster fishery?
 15 **A. Yes, it is.**
 16 **Q.** And just a moment or so ago, Mr. Qureshi
 17 mentioned CPUE, which is referenced here.
 18 **A. Correct.**
 19 **Q.** Would you please explain to the Court what this
 20 analysis consisted of?
 21 **A. Okay. So as I mentioned before, we use in**
 22 **fishery management these two types of data. We**
 23 **use the fishery-dependent; that is, landings data**
 24 **and the like. Fishery-independent data, surveys.**
 25 **This is fishery-dependent data. And on the**
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1 **left side, and which is the bars, those -- that's**
 2 **the number of fishing trips. That's a measure of**
 3 **the effort exerted by the fishery. The other**
 4 **measure, of course, is the landings. The CPUE is**
 5 **simply the landings divided by the number of**
 6 **fishing trips. And we use this as a measure of**
 7 **fishing effort and fishing -- actually fishing**
 8 **performance or efficiency.**
 9 **And what it shows you is that starting at**
 10 **around 2009, there was decline in CPUE. If you**
 11 **look at that purplish rectangle and you look at**
 12 **the CPUE, you look; and it had dropped below the**
 13 **levels last seen since 1992. And it continued to**
 14 **drop.**
 15 **This is a warning sign. This is a clear**
 16 **warning sign for fishery management that you need**
 17 **to examine this much more carefully. What's**
 18 **going on with CPUE? Why is it that you're**
 19 **getting such a lower catch? Is it because the**
 20 **population is lower, and you had the same number**
 21 **of fishers; or is it because you have the same**
 22 **population abundance, but fishing effort has**
 23 **increased dramatically?**
 24 **And so what we -- what I got from this is two**
 25 **things. No. 1, the fishing -- sorry. The**
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1 **population abundance on the bars was not**
 2 **increasing. So what this meant is that the CPUE**
 3 **drop was happening because there was equal**
 4 **abundance of oysters; but the effort, the**
 5 **pressure on the oyster resource had increased**
 6 **significantly.**
 7 **And, again, as I mentioned, this alone is a**
 8 **caution; it's a symptom that there may be a**
 9 **collapse underway. This has happened with many**
 10 **fisheries that have collapsed. You see this**
 11 **decline in CPUE.**
 12 **And I need to also address the fact that this**
 13 **is how I used it. I used it as a measure of**
 14 **fishing performance, fishing effort, not of**
 15 **population abundance.**
 16 **Q.** And in laymen's terms, so a trip is -- correct me
 17 if this is wrong -- is the oysterman going out on
 18 their boat to harvest that particular day?
 19 **A. One day's fishing trip, yes.**
 20 **Q.** And if the CPUE is going down, there are more
 21 trips, but fewer oysters per trip being
 22 harvested?
 23 **A. That's correct.**
 24 **Q.** And, now, there is another analysis you did on
 25 the topic -- a subject called exploitation rate?
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1 **A. Yes.**
 2 **Q.** If we could turn in your written direct to
 3 page 37, the next page, would you explain to the
 4 Court, please, what is exploitation rate.
 5 **A. Okay. So in fishery management, in stock**
 6 **assessment, we have what are called reference**
 7 **points, meaning these are the measures that we**
 8 **use to assess the status of the fishery. And**
 9 **there are two key ones. One is abundance or**
 10 **biomass; how much oysters are out there as you**
 11 **can detect from population surveys. The second**
 12 **one is what fraction of the population is being**
 13 **taken out by the fishery. And this is what this**
 14 **is.**
 15 **Annual exploitation rate simply says that**
 16 **it's on a scale from zero to one. And, for**
 17 **instance, if you look at the horizontal dotted**
 18 **line, that's almost at .4. And what that is**
 19 **saying is if the exploitation rate is .4, that**
 20 **means that every year the fishery is taking out**
 21 **40 percent of all the oysters out there.**
 22 **So, again, it's a measure of the effort and**
 23 **the landings that are being brought back and the**
 24 **mortality due to the fishery.**
 25 **So I analyzed this to see had the**
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1 exploitation rate remained constant or so. And
 2 what I did was I looked at Dr. Pine's -- I used
 3 Dr. Pine's data from this; and I calculated the
 4 annual exploit -- he had monthly exploitation
 5 rates. I calculated the annual exploitation
 6 rates from those. And that's what you see
 7 graphed here.

8 Now, the exploitation rates, again, were at
 9 the highest level; so the fraction that's being
 10 extracted is at the highest levels. And it's at
 11 a time, especially in 2012-2013, when the
 12 population is down. So what that means is that
 13 they're taking out a higher fraction of the
 14 oysters just when the population is in decline.
 15 And that is definitely one of the elements of
 16 extraction that -- of the population that can
 17 lead to collapse.

18 Q. What, if any, relationship does the need for
 19 reshelling have to do with exploitation rate?

20 A. Well, as I mentioned, what -- to maintain a
 21 sustainable fishery, if you're taking out more
 22 oysters, more of those live animals that provide
 23 substrate for the spat, you have to put back
 24 more. So you have to reshell at higher levels.
 25 And the problem is -- and that's actually what

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1 the State of Florida did, as I believe you will
 2 see in a bit, after Hurricane Elena. They
 3 reshelled at record levels, and the population
 4 recovered.

5 Here, in contrast, they were extracting at
 6 record levels, but reshelling at some of the
 7 lowest levels in the record.

8 Q. Let's actually turn to that so that the Court can
 9 look at the specific numbers.

10 MR. ECHOLS: If we go to the
 11 demonstratives, your Honor. And this would
 12 be demonstrative -- is it 5 -- 4,
 13 demonstrative 4.

14 BY MR. ECHOLS:

15 Q. And here, we have graphed your -- based on the
 16 joint exhibits of the states, the amount of
 17 reshelling that was done by the State of Florida
 18 during this period.

19 And would you explain to the Court what you
 20 were just referring to there with the
 21 post-Hurricane Elena reshelling activity?

22 A. Sure. What I was referring to is that this is a
 23 really good example of an effective response to
 24 a -- in this case a natural disturbance. And
 25 after the passage of Hurricane Elena, basically

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1 the fishery collapsed. Most of the oysters were
 2 killed either because of too much fresh water,
 3 low salinity -- they're called freshets in the
 4 oyster literature -- or siltation, basically just
 5 covering the oysters. And so the fishery
 6 collapsed. And the response of the State of
 7 Florida was quite effective. They reshelled, as
 8 I said, at record levels. They imposed
 9 management actions, restrictions.

10 And so with those two items, that allowed the
 11 oyster population to basically recover from the
 12 resource and have the sufficient habitat for the
 13 spat to settle on.

14 Q. Do you have an opinion, sir, whether the oyster
 15 fishery would have recovered more by today, by
 16 2016, had the levels of reshelling been done at
 17 the same amount as Hurricane Elena, if in 2013
 18 and 2014 Florida had reshelled to that extent?

19 A. Most definitely. I'm convinced that given what
 20 we have seen in other oyster fisheries, that's
 21 exactly what happened in the Great Wicomico River
 22 that I mentioned. We didn't put out live
 23 oysters. All we did was reshell on that system.
 24 And there were sources of larvae; that is, the
 25 spat that settled on there in record numbers.

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1 And they just needed the substrate.

2 Same thing here. There are sources of
 3 larvae, sources of the spat, the baby oysters,
 4 just like we see after Hurricane Elena. So had
 5 there been sufficient substrate and effective
 6 management actions, there clearly would have
 7 been, I think, an almost immediate recovery in
 8 2014 and '15 because oysters are fecund. That
 9 is, they put out a lot, a lot of larvae. And one
 10 oyster can release a couple million larvae, a
 11 single oyster.

12 And they are out there. They're looking for
 13 the habitat. When you don't have it, that's it.
 14 You're going to collapse.

15 Q. You mentioned a couple of other management
 16 actions that the State of Florida took after
 17 Hurricane Elena.

18 MR. ECHOLS: If we could have the next
 19 demonstrative, please.

20 BY MR. ECHOLS:

21 Q. You already touched on the habitat restoration.
 22 But would you mind just briefly describing for
 23 the Court what these other management actions
 24 were.

25 A. Right. So they actually covered three of the key

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1 parts. If you look at Hurricane Elena, the first
 2 part, it prohibited all harvesting in the bay for
 3 eight months. They were allowing it to sort of
 4 refresh itself.
 5 They added the habitat; that's in the second
 6 part. They reshelled, as I said, at record
 7 levels, 345 and 220 acres.
 8 Thirdly, they also wanted to make sure that
 9 people weren't harvesting illegally. So they
 10 established check stations to monitor and ensure
 11 compliance. And this is essential, because
 12 worldwide, one of the biggest problems to manage
 13 oysters is, in fact, illegal activity. And, of
 14 course, they prohibited all sub-legal oyster
 15 harvest.
 16 And contrast that to what happened after
 17 the -- during and after the 2012-'13 collapse,
 18 the bay was never fully closed. Restore --
 19 restoration was only 16 acres in 2013. And then
 20 it did increase to 100, 135. However, they need
 21 more. They're -- that needs to be more
 22 reshelling to provide the habitat. There were no
 23 check stations in place.
 24 And though this isn't quantitative,
 25 fishery-independent data, there were many reports

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1 of unsustainable harvest and overharvesting of
 2 illegal and sub-legal oysters, including oysters
 3 as small as 1 inch. The legal size is
 4 approximately 3 inches. And you're seeing these
 5 tiny oysters out there.
 6 THE WITNESS: Most of which are males,
 7 by the way, your Honor.
 8 BY MR. ECHOLS:
 9 Q. I'll let the Court ask you that at the end there,
 10 Professor.
 11 SPECIAL MASTER LANCASTER: Thank you.
 12 BY MR. ECHOLS:
 13 Q. Changing topics, you were here a couple of weeks
 14 ago, sir, were you not, when Mr. Tommy Ward
 15 testified?
 16 A. Yes, I was.
 17 Q. And you understand that Mr. Ward had -- has a
 18 couple of private leases that are not publicly
 19 harvested?
 20 A. Correct.
 21 Q. Could you -- and could you explain to the Court,
 22 you know, why is it, given that these were
 23 private leases that he controlled the level of
 24 harvesting, why were Tommy Ward's leases harmed,
 25 you know, if -- to the extent he says that they

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1 were during the collapse?
 2 A. Well, it's -- in my view, it's quite unfortunate.
 3 MR. ECHOLS: If we can put up the next
 4 demonstrative here, that may assist.
 5 A. So this is a -- a view -- a map of the bay. And
 6 Tommy Ward's leases are in that westernmost part
 7 of the bay. You have them circled in red. And
 8 they're only about, I believe, four leases; and
 9 they're all in that area. In other oyster
 10 fisheries, you have leases throughout the system.
 11 But, in any case, as I mentioned earlier,
 12 the -- that part of Apalachicola Bay is -- has
 13 some of the highest salinities. And so what I
 14 would expect is that -- as I mentioned, you
 15 expect localized mortality in certain places.
 16 And if I were to predict where you're going to
 17 have the highest levels of mortality, it would be
 18 exactly in those areas in the high salinity
 19 areas. And that was really an unfortunate issue.
 20 And then that was compounded by the fact that
 21 Mr. Ward did not just harvest from there. In
 22 fact, I believe from his numbers, he would get
 23 approximately 10 percent of his product. The
 24 rest of it he would buy from -- from the
 25 oystermen throughout the bay. And that's what

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1 actually works in many oyster fisheries is they
 2 have a diverse portfolio. They have leases in
 3 low salinity, moderate salinity, and high
 4 salinity areas.
 5 This is, for instance, the way the State of
 6 Louisiana's oystermen worked. I have talked to
 7 them directly about that. They have that because
 8 there are some years when you have too much fresh
 9 water coming into the bay. And the oysters that
 10 are close to the river mouth will die, but the
 11 ones that are at moderate salinity or high
 12 salinity will do very well. And that's what they
 13 harvest.
 14 And in years of very high salinity, you're
 15 going to have localized mortality in the high
 16 salinity areas. So there, they get their product
 17 from moderate and low salinity areas.
 18 And that's what Mr. Ward had, sort of that
 19 portfolio that he had prior to the collapse.
 20 After the collapse, then he no longer had a
 21 source from the rest of the bay; plus his leases
 22 are in those high salinity areas that are prone
 23 to higher mortality.
 24 So in my view it was just an unfortunate
 25 situation. Were he to have leases in lower

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1 **salinity areas, he would have done -- sorry --**
 2 **yes, in lower salinity areas, he would have done**
 3 **fine.**
 4 MR. ECHOLS: We can take that down.
 5 BY MR. ECHOLS:
 6 **Q.** If I could refer you, changing topics here, sir,
 7 to the tab 10 of the binder that counsel for
 8 Florida gave you. This was the Laura Petes memo,
 9 FX-412.
 10 And, sir, you're familiar with this document?
 11 **A. Yes, I am.**
 12 **Q.** And if I could ask you to turn to page 7 of the
 13 memo in the section that says, Conclusions and
 14 looking to the future.
 15 **A. Yes.**
 16 **Q.** And if you look at the very bottom of that page,
 17 please, now, a number of Florida witnesses have
 18 testified that the Petes memo, this particular
 19 document, supports the conclusion that
 20 overharvesting was not a cause of the collapse.
 21 Is that how you read this, sir?
 22 **A. No. Not at all. I read this as saying that**
 23 **overharvesting was -- her -- according to**
 24 **Dr. Petes, that she believes that overharvesting**
 25 **had a major effect or significant effect on the**

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1 **population in the bay.**
 2 **Q.** Now, one thing I think that is probably important
 3 for the Court to understand, when you have
 4 testified earlier and in your written direct
 5 testimony that predation did not cause the
 6 collapse, what are you using as the definition of
 7 collapse there?
 8 **A. Right. So the definition of collapse is when you**
 9 **have a substantial reduction in the population.**
 10 **It's not going to be a 20 percent reduction, a 10**
 11 **percent; it's going to be generally an 80 to 95**
 12 **percent reduction in the population. And,**
 13 **therefore, it can no longer support an**
 14 **economically viable fishery.**
 15 **And as I mentioned, Chesapeake Bay,**
 16 **throughout most of the bay the population is down**
 17 **to 1 percent. That's why it's still considered**
 18 **collapsed. So --**
 19 **Q.** Are you -- are you offering, sir, the opinion
 20 that increased predation did not cause any
 21 additional oyster mortality?
 22 **A. No, I'm not. Not at all. That -- that would be**
 23 **biologically unsound, yes.**
 24 **Q.** If you could just explain very briefly the
 25 difference for the Court. It seemed like we were

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1 talking past each other, at least with counsel
 2 for Florida.
 3 **A. Right. So I -- I do not disagree with the fact**
 4 **that higher -- in higher salinities, you're going**
 5 **to have an increase in the abundance of marine**
 6 **predators such as the rock snail. And they are**
 7 **going to have higher -- exert a higher effect in**
 8 **terms of mortality on oysters. But that's very**
 9 **different than collapse. That is simply one of**
 10 **the factors that changes naturally in the system,**
 11 **in an estuarine ecosystem.**
 12 **The estuary is a dynamic system where you**
 13 **have different factors affecting it at different**
 14 **times. And you naturally see changes. You**
 15 **naturally see increases or declines in the**
 16 **populations in the system. But that's very**
 17 **different than -- or is fundamentally different**
 18 **from a collapse where you see the population**
 19 **decline to such low levels that it's no longer**
 20 **economically viable.**
 21 **Q.** And, sir, based on all of your experience, your
 22 over 30 years of studying oysters and fisheries,
 23 have you ever identified an instance where
 24 predation has caused a fishery-wide collapse of
 25 an oyster fishery?

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1 **A. No. Never. It hasn't been the -- the only**
 2 **causes that I have identified from the literature**
 3 **are two main ones. One is unsustainable harvest.**
 4 **That has happened all along the Atlantic coast;**
 5 **and, unfortunately, now may have happened in the**
 6 **Gulf.**
 7 **And the second one is from massive**
 8 **disturbances -- environmental natural**
 9 **disturbances. And the two that have been**
 10 **typically documented are hurricanes and what are**
 11 **called freshets. So hurricanes -- you know what**
 12 **a hurricane is, a massive storm increases silt,**
 13 **sediment, covers the oysters, suffocates them.**
 14 **Or you can have a massive river flow, for**
 15 **whatever reason, storm or otherwise; and that**
 16 **causes what we call freshets, very low salinities**
 17 **that come in and literally decimate -- can**
 18 **decimate a bay-wide population.**
 19 **Q.** But as far as drought, increased salinity,
 20 predation, has there ever been an instance where
 21 that has caused a fishery-wide collapse?
 22 **A. No. Never a bay-wide, fishery-wide collapse**
 23 **other than in local areas such as in Mr. Ward's**
 24 **lease, yes.**
 25 **Q.** All right. The second to last brief topic here.

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1 Now, sir, as part of your work, do you -- you

2 also evaluated the expert opinions offered by

3 Drs. Kimbro and White; is that correct?

4 **A. That's correct.**

5 **Q.** And in your direct testimony -- and we don't need

6 to go into detail -- you identify a number of

7 flaws that you found in those analyses. Just at

8 the highest level, do you recall that Dr. Kimbro

9 said that the methodology included his

10 observations, experts, and then the mathematical

11 modeling that Dr. White did?

12 **A. Yes.**

13 **Q.** And let's look, if we could, please, at -- in

14 Dr. White's written direct. And if I could refer

15 you and the Court, please, to page 50 and

16 paragraph 153. The paragraph 153 starts on page

17 49, and then the figure is on page 50 there.

18 Now, sir, you understand Dr. White used an

19 IPM model?

20 **A. Yes.**

21 **Q.** And are you familiar with IPM models?

22 **A. I'm quite familiar with it. I'm a co-author on**

23 **an IPM model for the Pacific oyster, yes.**

24 **Q.** Could you explain to the Court, please, what is

25 the conclusion that is reflected here in

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1 **experiences in the environment just due to all**

2 **different sources of mortality.**

3 **Q.** And what percent would you expect to have found

4 if the lower flows had caused a collapse?

5 What percent of variation would you expect to

6 find?

7 **A. I would have expected to see no less than 50, 60,**

8 **80 percent or so. It definitely would have been**

9 **an order of magnitude -- well, I would have**

10 **expected to have good evidence that I would have**

11 **seen something around 80 percent, a little**

12 **higher, a little lower. And, instead, I saw 1**

13 **percent. So --**

14 **Q.** Finally, Professor Lipcius, now, we had

15 Mr. Berrigan here on behalf of the State of

16 Florida and Mr. Sutton a couple of weeks ago.

17 And I know you saw part of that testimony.

18 Correct?

19 **A. Yes, I did.**

20 **Q.** And those -- both Mr. Berrigan and Mr. Sutton

21 testified that they believed that it was an

22 inevitable consequence that all the oysters were

23 going to die from predation or disease and that,

24 therefore, it made sense for the fishery to allow

25 the oystermen to continue harvesting.

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1 Dr. White's analysis based on his IPM model?

2 **A. You will have to excuse me. I'm laughing**

3 **because when I first saw this, I had already**

4 **read Dr. Kimbro's conclusions and then**

5 **Dr. White's. And then I saw the graph, and I**

6 **had to do a double-take. And I say that because**

7 **the maximum difference in the population that you**

8 **see here under the remedy scenario -- so instead**

9 **of the normal conditions, the drought conditions**

10 **that we have, one of the remedy scenarios**

11 **requested by the State of Florida, the maximum**

12 **difference in the population would be**

13 **approximately 1.1 percent, around 1 percent,**

14 **meaning that there would be a 1 percent, not**

15 **90 percent, not 80 percent decline in the**

16 **population, basically a 1 percent decline**

17 **difference between the two.**

18 And that, to me, actually supports the

19 position that river flow did not -- low river

20 flow did not cause the collapse. It's just the

21 opposite. And, literally, I had to look at this

22 two or three times to make sure that I was

23 reading it because it was so surprising.

24 So a 1 percent -- 1.1 percent difference is

25 negligible. It's what the oyster routinely

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1 Now, is it your opinion that it was an

2 inevitable consequence that the oysters were

3 going to die from predation or disease in 2012?

4 **A. No. That -- that was an absurd statement.**

5 **Basically the oyster has evolved with these**

6 **organisms, with the drought conditions, and so**

7 **on. And, yes, you might see a slight dip; but it**

8 **has never caused a collapse. And that -- that is**

9 **just a ridiculous statement to make.**

10 **Q.** And having reviewed the DACS reports with the

11 independent fishery data, are you aware or did

12 you find any instance in any contemporaneous

13 document of the State of Florida where it was

14 indicated that they believed all the oysters were

15 going to die anyway; and so the fishery allowed

16 them to be harvested?

17 **A. No. Never did.**

18 And if I might add one other thing that -- I

19 think something that wasn't cleared up, the

20 disease element of -- during the drought

21 conditions. And this is one of the reasons why I

22 didn't focus as much on Dr. Petes's work, as her

23 work came up with a similar result as the

24 University of Florida report, is that the disease

25 levels were -- for dermo were at about 1 to 1.5.

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1 **That is on a scale that has been specifically set**
 2 **up for dermo disease; and it ranges from zero to**
 3 **5. And the level at which you begin to see**
 4 **oyster mortality is around 3. And what they saw**
 5 **at that time was somewhere around 1 to 1.5.**
 6 **Oysters live with that. They have evolved to**
 7 **live with that amount of prevalence of dermo. So**
 8 **that's why I basically felt that the disease**
 9 **element was not an issue whatsoever.**
 10 **Q.** And, actually, you reminded me, sir, of a couple
 11 other things or one other thing I should clear
 12 up. Now, when you went and visited Apalachicola
 13 Bay and went on the boat with Captain Coy Shiver,
 14 did you lie to him or mislead him about what your
 15 purpose was for the visit?
 16 **A. No. No.**
 17 **Q.** Was there any lawyer from the State of Georgia on
 18 the boat with you and Captain Shiver?
 19 **A. Yes. You were.**
 20 **Q.** I was?
 21 **A. Yes.**
 22 **Q.** And, finally, having reviewed all the
 23 materials, heard the testimony of Dr. White
 24 and Dr. Kimbro, and the NOAA memos, have you seen
 25 anything that would lead you to revise your

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1 conclusion that unsustainable harvest caused the
 2 fishery collapse?
 3 **A. No. Not at all.**
 4 MR. ECHOLS: Thank you, your Honor.
 5 SPECIAL MASTER LANCASTER: Recross?
 6 RECCROSS-EXAMINATION
 7 BY MR. QURESHI:
 8 **Q.** Dr. Lipcius, true or false. Apalachicola Bay,
 9 2012, no evidence of increased predation -- I'm
 10 sorry, no evidence of increased mortality due to
 11 predation. Do you agree with that statement or
 12 did you disagree with it?
 13 **A. I'm just thinking about it for a second.**
 14 **No, that's false.**
 15 **Q.** Sir, you talked about Chesapeake Bay. In the
 16 last 50 years, have any of the states that
 17 administer portions of Chesapeake Bay allowed
 18 mechanical dredges to harvest oysters in the
 19 Chesapeake Bay?
 20 **A. Yes, they have.**
 21 **Q.** And in the last 50 years, has the State of
 22 Florida allowed mechanical dredges of --
 23 mechanical dredges to harvest oysters on public
 24 reefs?
 25 **A. No.**

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1 **Q.** Okay. You were talking about the restoration
 2 project you were involved in, and you mentioned
 3 that one of the things that is considered is
 4 whether they're good spots for restoration. And
 5 by good spots, you meant identifying locations
 6 that are suitable for restoration. Is that
 7 correct?
 8 **A. Correct.**
 9 **Q.** And one of the ways you do that is by using
 10 something called a habitat suitability index,
 11 sir?
 12 **A. Yes.**
 13 **Q.** Okay. You have written an article on the habitat
 14 suitability index. Right?
 15 **A. Yes, I have.**
 16 **Q.** And if you turn with me to tab 24 of your binder,
 17 sir, I would ask you if that's the article you
 18 have written.
 19 **A. Yes, it is.**
 20 **Q.** Okay. And if you turn to page 2 of tab 24, which
 21 is FX-955, there's a table, actually, on that.
 22 **A. Yes.**
 23 **Q.** It's actually on page 3.
 24 **A. Oh, page 3. Yes.**
 25 **Q.** Yes. There's a table listing the various factors

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1 that are considered in the habitat suitability
 2 index; is that correct?
 3 **A. Correct.**
 4 **Q.** And there's X's in difference boxes under 11
 5 columns. And those 11 columns represent
 6 different models that are used to evaluate
 7 habitat -- or for different habitat suitability
 8 models?
 9 **A. They represent whether or not each of the 11**
 10 **published models had used any of the different**
 11 **variables along -- in the first column, yes.**
 12 **Q.** And what's the first variable that's considered?
 13 **A. Average salinity.**
 14 **Q.** Okay. And do all 11 use that --
 15 **A. Yes.**
 16 **Q.** -- variable?
 17 Including the model that you described in
 18 this article; is that correct?
 19 **A. Yes. Definitely.**
 20 **Q.** Okay. Sir, you talked about the resource
 21 management of the oyster reefs by the State of
 22 Florida. And would you agree that the oyster
 23 managing entity, Fish and Wildlife Conservation
 24 Commission, does a highly effective job of
 25 managing the resource?

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- 1 **A. It would depend on the time period.**
- 2 **Q.** 2012.
- 3 **A. At that time, no, I don't.**
- 4 **Q.** Okay. Can you turn with me to tab 23, sir.
- 5 There you will see a document designated as
- 6 FX-957. And it's a report by Seafood Watch for
- 7 the Gulf coast region. Do you see that?
- 8 **A. Yes, I do.**
- 9 **Q.** And have you seen this before?
- 10 **A. I'm sorry?**
- 11 **Q.** Have you seen this before?
- 12 **A. No. I'm aware of the program Seafood Watch, but**
- 13 **I haven't seen this particular document.**
- 14 **Q.** Okay. And you see that it's dated October 23,
- 15 2012?
- 16 **A. Yes.**
- 17 **Q.** Can you see on the first page there's a
- 18 disclaimer that says, Seafood Watch strives to
- 19 ensure that all of our seafood reports and the
- 20 recommendations contained therein are accurate
- 21 and reflect the most up-to-date evidence
- 22 available at time of publication.
- 23 Do you see that?
- 24 **A. Yes.**
- 25 **Q.** Okay. Sir, now, if you turn with me to the first

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- 1 **A. Okay. I'm -- I'm not seeing -- oh, recovery of**
- 2 **stocks of concern?**
- 3 **Q.** That's correct. It says Florida-low concern, as
- 4 the title of the table we're looking at?
- 5 **A. Oh, yes. Thank you.**
- 6 **Q.** Okay. And where it says Florida, tong, if you
- 7 read across the row, under management strategy
- 8 and implementation, Florida is given highly
- 9 effective status. Do you see that?
- 10 **A. I do.**
- 11 **Q.** And what other Gulf state is given that status?
- 12 **A. It doesn't look like any other.**
- 13 **Q.** And under enforcement, what is Florida's status?
- 14 **A. Highly effective.**
- 15 **Q.** Okay. You talked a little bit, sir, about your
- 16 analysis of oyster abundance; and we looked at
- 17 the graph displaying the public -- or the major
- 18 reefs, as you described them, and the minor
- 19 reefs. Do you recall that?
- 20 **A. Yes.**
- 21 **Q.** And you conclude that the oyster abundance did
- 22 not decline throughout the entirety of
- 23 Apalachicola Bay either during or after the
- 24 collapse. Right?
- 25 **A. Right.**

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- 1 page, you will see the various Gulf states
- 2 ranked. Do you see there is a ranking associated
- 3 with the State of Florida, sir?
- 4 **A. It's on page 2?**
- 5 **Q.** Yes. There's a chart with green and yellow on
- 6 it.
- 7 **A. Yes. I see it.**
- 8 **Q.** And which state is assigned the highest
- 9 recommendation score by Seafood Watch?
- 10 **A. Looks like Florida, tong.**
- 11 **Q.** Florida. And tong there, you understand refers
- 12 to the method of harvest allowed in the state?
- 13 **A. Yes.**
- 14 **Q.** Okay. Now, turn with me to page 24, sir, of
- 15 FX-957.
- 16 **A. Okay.**
- 17 **Q.** Do you see there's a table there entitled
- 18 Management of Fishing Impacts on Retained
- 19 Species. Florida, dash, low concern. All other
- 20 states, dash, moderate concern.
- 21 Do you see that?
- 22 **A. I'm sorry. You're looking where?**
- 23 **Q.** At the table on page 24.
- 24 **A. Where it says factor 3.1?**
- 25 **Q.** That's correct.

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- 1 **Q.** And to make that determination, you analyzed the
- 2 abundance of legal and sub-legal oysters at nine
- 3 different oyster bars throughout the bay from
- 4 2008 through 2014?
- 5 **A. Correct.**
- 6 **Q.** And based on that analysis, you concluded that
- 7 substantial declines had occurred only on the
- 8 major fished bars, and that the other bars
- 9 remained healthy or actually increased in oyster
- 10 abundance. Right?
- 11 **A. Right.**
- 12 **Q.** Okay. And you talked about Dr. White's criticism
- 13 of that analysis where he alleges you confounded
- 14 the distance from the mouth of the river and,
- 15 therefore, confused the amount of salinity that
- 16 would impact each respective oyster reef.
- 17 **A. Yes.**
- 18 **Q.** Do you recall that?
- 19 **A. Yes, I do.**
- 20 **Q.** And you disagree with that; don't you?
- 21 **A. Yes.**
- 22 **Q.** And, in fact, you performed an analysis to
- 23 evaluate salinity at these different oyster bars;
- 24 is that correct?
- 25 **A. I did.**

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1 Q. And you present that analysis in your prefiled
 2 direct testimony on page 15 in a table. Right?
 3 A. Yes.
 4 Q. And the salinity that you display there you
 5 obtained from -- is it Dr. McAnally?
 6 A. Correct.
 7 Q. And you actually averaged the salinities over
 8 different months, and you provide one figure for
 9 each season; is that right?
 10 A. That's correct.
 11 Q. And then you take all the major bars, and you
 12 group them together. And you take all the minor
 13 bars, and you group them all together. Isn't
 14 that right?
 15 A. Yes. You separate them out that way, yes. Yes.
 16 Q. You have the major and minor. All major bars are
 17 considered --
 18 A. Yes.
 19 Q. -- collectively?
 20 A. Yes.
 21 Q. And all minor bars are considered collectively --
 22 A. Yes.
 23 Q. -- is that right?
 24 Okay. And then if you noticed, in the summer
 25 months for 2010 and 2011 and 2012, the summer

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1 salinities for each of those years is lower than
 2 the salinities for the winter and spring period
 3 and the fall period; is that right?
 4 A. Yes.
 5 Q. Okay. And you were aware, sir, that in
 6 Apalachicola Bay the summers tend to have lower
 7 flows and higher salinities than the other
 8 seasons?
 9 A. They tend to, yes.
 10 Q. Okay. Dr. Lipcius, you talked about the NOAA
 11 determination of the oyster fishery collapse in
 12 2012.
 13 A. Yes.
 14 Q. And you're familiar with NOAA's findings and
 15 conclusions. Right?
 16 A. Yes, I am.
 17 Q. And you disagree with them?
 18 A. No. I -- it's not -- it was not an unreasonable
 19 conclusion to reach. I don't.
 20 Q. Okay. So if you look with me to tab 12,
 21 page 4 -- page 4 of the memo, the NOAA memo,
 22 sir, FX-413.
 23 A. Yes.
 24 Q. There is a recommendation and a listing of three
 25 factors that NOAA determined caused the fishery

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1 resource disaster in Apalachicola Bay in 2012.
 2 A. That's correct.
 3 Q. So is it your testimony that you agree with this?
 4 A. No. I agreed with the conclusion to approve the
 5 disaster relief declaration. That's what I
 6 agreed with.
 7 Q. But you disagree that these three factors
 8 identified by NOAA were the cause of the oyster
 9 fishery collapse?
 10 A. Yes.
 11 Q. Okay. Do they have scientists at NOAA, sir?
 12 A. Yes, there are.
 13 Q. Okay. Thank you.
 14 MR. QURESHI: I have nothing further.
 15 MR. ECHOLS: Very briefly, judge, if I
 16 could.
 17 REDIRECT EXAMINATION
 18 BY MR. ECHOLS:
 19 Q. I would like to -- staying on exactly the same
 20 document and the page there, could you explain,
 21 please, to the Court why you disagree with the
 22 conclusion here of the NOAA disaster declaration?
 23 A. Well, I specifically disagreed with the -- those
 24 three points because NOAA did not conduct any
 25 further analyses of any of the data. And they

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1 certainly -- I conducted much more -- many more
 2 extensive analyses of the data that basically
 3 disproved that.
 4 NOAA relied upon the existing documents, the
 5 statements made by Florida scientists and
 6 managers and such. So they didn't do -- in order
 7 to reach this declaration, they didn't conduct
 8 any new analyses.
 9 And then the other part of this is -- why I
 10 said that it's not unreasonable that NOAA reached
 11 this decision to approve the request is that the
 12 disaster relief is meant to help those in most
 13 need, which are the fishing community, the
 14 oystermen, the industry that they support, and
 15 the like. And so that's a socioeconomic issue.
 16 And if you're not absolutely certain of the
 17 cause, which is what NOAA was, then you tend to
 18 be liberal in trying to help out these fishing
 19 communities.
 20 These are hard-working people, most -- the
 21 majority, as I know from Chesapeake Bay, are
 22 honest, hard-working individuals; and they
 23 deserve some relief when a collapse like this
 24 occurs. So --
 25 Q. Do you, sir, have personal experience of having

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1 worked with NOAA scientists in connection with
 2 other disaster declarations?
 3 **A. I do. I worked directly with them. We had a**
 4 **blue crab fishery disaster declaration in 2008.**
 5 **I was part of that. I was funded to work to**
 6 **provide jobs for the -- in Chesapeake Bay the**
 7 **fishers are called watermen. I worked with them**
 8 **to conduct surveys to help in the recovery and so**
 9 **on.**
 10 **So yes, I was directly involved with that.**
 11 **Q.** Lastly, sir, if I could ask you to please just
 12 open your written direct testimony to the very,
 13 very first page that has the little Roman
 14 numeral i at the bottom -- Roman i.
 15 **A. Yes.**
 16 **Q.** And would you mind, please, reading into the
 17 record what the top of this page says in the
 18 three bolded words up there?
 19 **A. Table of contents?**
 20 **Q.** Yes, table of contents. And then below the table
 21 of contents, are these items listed here
 22 typically things that we might call as headers of
 23 various sections?
 24 **A. Yes.**
 25 **Q.** Now, did you have any intention for the Court to

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1 reach -- for the Court to understand your
 2 conclusions -- your scientific conclusions and
 3 analysis to be limited to the headers in the
 4 table of contents?
 5 **A. No. Not -- not at all.**
 6 **Q.** Thank you.
 7 SPECIAL MASTER LANCASTER: Further
 8 recross?
 9 MR. QURESHI: No, your Honor.
 10 SPECIAL MASTER LANCASTER: Doctor, do
 11 you know what I mean by a meander bend?
 12 THE WITNESS: Yes, I do, your Honor.
 13 SPECIAL MASTER LANCASTER: Are you
 14 familiar with meander bends on these rivers?
 15 THE WITNESS: Yes. I know that they are
 16 there, yes.
 17 SPECIAL MASTER LANCASTER: Do you know
 18 where they are?
 19 THE WITNESS: Not exactly.
 20 SPECIAL MASTER LANCASTER: Approximately?
 21 THE WITNESS: All along the river.
 22 That's what I -- along the Apalachicola
 23 River?
 24 SPECIAL MASTER LANCASTER: Yes.
 25 THE WITNESS: Yes.

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1 SPECIAL MASTER LANCASTER: What would
 2 happen if the meander bends were disengaged
 3 or closed off?
 4 THE WITNESS: You mean as far as getting
 5 water from the meander bends?
 6 If they were permanently closed off, and
 7 given that the amount of rainfall that falls
 8 on the surface and then comes in outside of
 9 the meander bends, the Gulf of -- the
 10 Apalachicola Bay probably would over time
 11 become a marine system.
 12 SPECIAL MASTER LANCASTER: Become what?
 13 THE WITNESS: A marine system, meaning
 14 the salinity would be much higher. And as
 15 Dr. Livingston has suggested, that if that
 16 were to happen, then you would have a more,
 17 what we call diverse community. It would
 18 become a marine community, which has more
 19 species of fish and other organisms.
 20 Certain species would be eliminated;
 21 other species would come into the system, be
 22 more prevalent.
 23 SPECIAL MASTER LANCASTER: As I have
 24 gone along, my vocabulary has increased. My
 25 pronunciation of words has gotten worse.

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1 So if I ask you what a LOESS curve is --
 2 L O E S S --
 3 THE WITNESS: Right.
 4 SPECIAL MASTER LANCASTER: -- what is a
 5 LOESS curve?
 6 THE WITNESS: All that is is it's an
 7 average that for a particular point in
 8 time -- let's look at it in time. If you
 9 have a data point for 1989 and then you have
 10 another one for 1988, 1987, and if you want
 11 to come up with an average for 1988, then
 12 instead of simply taking the value to look at
 13 the long-term trend, you take the averages of
 14 multiple data points. So for 1988, you would
 15 take 1988 and then '89, '87, and do that.
 16 And you can do that with different numbers of
 17 data points. So instead of '87, '88, '89,
 18 you might take '86, '87, '88, '89, '90. And
 19 that's a statistically sound way in what we
 20 call time-series analysis of looking at a
 21 long-term trend in the data.
 22 SPECIAL MASTER LANCASTER: Is use of a
 23 LOESS curve a form of statistical analysis?
 24 THE WITNESS: Yes. It's an objective
 25 way that is routinely used in time-series

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1 analysis, yes.
 2 And the reason we like it so much is
 3 that we -- the only thing we do is to chose
 4 the extent of the time series and how those
 5 points are averaged; but then we let the
 6 analysis tell us what the pattern is. We
 7 don't force an analysis. We don't force a
 8 pattern into the data. The data tells us
 9 what the pattern is.
 10 SPECIAL MASTER LANCASTER: You probably
 11 can't answer this question, but I'm going to
 12 ask it anyway. And I don't know whether you
 13 were here when I asked another witness.
 14 But there are models and there are
 15 models. And if you take a certain model and
 16 put certain information into it, whether you
 17 create the model or you use someone else's
 18 model, you're going to get a certain result?
 19 THE WITNESS: Yes.
 20 SPECIAL MASTER LANCASTER: Now, the
 21 question which I'm having trouble with is why
 22 is it that almost uniformly in this case
 23 every time a Georgia witness or a Florida
 24 witness used a particular model and put the
 25 same information in, they got a result that

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1 favored their state?
 2 THE WITNESS: Well, typically they
 3 didn't put the same information in. So from
 4 some of the examples that I can recall --
 5 it's just like when you're cooking. You have
 6 a stove. You put certain ingredients in; you
 7 get something out. You put different
 8 ingredients in; you're going to get something
 9 very different out.
 10 So in my experience of looking at some
 11 of the differences in results, it's not the
 12 model per se. It's what you put into the
 13 model that gives you the different results.
 14 And I mentioned that in -- when you were
 15 talking about the LOESS curve. I think in
 16 part of the reshelling program, to me it was
 17 inappropriate to put in 2014 reshelling. It
 18 drove the curve up. But without that, it
 19 remained low, below the average. That's it.
 20 So it's really what you put into the model.
 21 And in the extreme, we say garbage in,
 22 garbage out. But it's really what's being
 23 put into the model that determines what comes
 24 out of it.
 25 SPECIAL MASTER LANCASTER: I'm an expert

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1 on microwaves, but not on ovens; so I can't
 2 comment on that.
 3 My assumption was that they were putting
 4 the same information into the same model.
 5 And if that assumption were correct, then why
 6 would they all come out favoring a client who
 7 hired them?
 8 THE WITNESS: I think if that were
 9 correct, I would expect to see -- if you're
 10 correct that we're using the same model, the
 11 same information, then we would see the same
 12 results. And --
 13 SPECIAL MASTER LANCASTER: You would
 14 expect the same results?
 15 THE WITNESS: You would expect that.
 16 And you also expect the conclusion to be
 17 substantiated. I think that's another
 18 difference that you can also just say, oh,
 19 hey, this is this way. But you would have to
 20 substantiate why you're concluding something.
 21 SPECIAL MASTER LANCASTER: I'm sure you
 22 have been warned that I'm going to ask this
 23 question, but I have read in the materials
 24 that male oysters become female oysters.
 25 THE WITNESS: Yes.

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1 SPECIAL MASTER LANCASTER: How is that
 2 possible?
 3 THE WITNESS: It's actually -- well,
 4 they're born with both types of physiology,
 5 both organs. And what they do is they first
 6 become a male when they're small. And then
 7 they switch over to female.
 8 And there's actually a fairly simple
 9 reason why they do that. A small oyster can
 10 have a lot of sperm, but a small oyster can't
 11 have a lot of eggs. And so through
 12 evolution, they have become adapted to the
 13 point where there are enough sperm in the
 14 small males; and for there to be sufficient
 15 eggs for those sperm to fertilize, you want
 16 to have the big oysters. And that's
 17 generally why they shift.
 18 And, in fact, even more interesting is
 19 that there are certain species where the only
 20 job of a male is to be a sperm. That's it.
 21 They go; they fertilize the egg, and the
 22 sperm dies. And then the female, the egg,
 23 develops into the organism.
 24 SPECIAL MASTER LANCASTER: Am I correct
 25 that sometimes the females become males?

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1 THE WITNESS: That's been suggested,
 2 yes. Some of the females will revert back to
 3 males. And that part we don't understand as
 4 much. It -- there's also not as much
 5 evidence for that.
 6 SPECIAL MASTER LANCASTER: Thank you.
 7 MR. ECHOLS: No questions, your Honor.
 8 MR. QURESHI: Nothing further, your
 9 Honor.
 10 SPECIAL MASTER LANCASTER: Thank you.
 11 THE WITNESS: Thank you, your Honor.
 12 MR. PRIMIS: Your Honor, Georgia is
 13 prepared to call Dr. Stavins. He's here in
 14 the courtroom. And we are also prepared to
 15 make a concerted effort to finish today.
 16 That said, we usually do take a short
 17 break at this time; and it might be an
 18 appropriate time.
 19 SPECIAL MASTER LANCASTER: Short is the
 20 important word.
 21 MR. PRIMIS: Five minutes.
 22 SPECIAL MASTER LANCASTER: Sure.
 23 MR. PRIMIS: And obviously I can't
 24 control Mr. Perry's cross-examination, but
 25 would it be possible to stay a little later

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1 than 4:30?
 2 SPECIAL MASTER LANCASTER: Absolutely.
 3 MR. PRIMIS: Okay. Then we can do this.
 4 MR. PERRY: Okay.
 5 (Time Noted: 2:43 p.m.)
 6 (Recess Called)
 7 (Time Noted: 2:50 p.m.)
 8 MR. PRIMIS: The State of Georgia will
 9 call its final witness, Dr. Robert Stavins.
 10 THE CLERK: Please raise your right
 11 hand.
 12 Do you solemnly swear that the testimony
 13 you shall give in the cause now in hearing
 14 shall be the truth, the whole truth, and
 15 nothing but the truth, so help you God?
 16 THE WITNESS: I do.
 17 THE CLERK: Please be seated.
 18 Pull yourself right up to the microphone
 19 and please state your name and spell your
 20 last name.
 21 THE WITNESS: My name in Robert Stavins,
 22 and my last name is spelled S T A V I N S.
 23 MR. PRIMIS: Your Honor, before I begin
 24 with Dr. Stavins, since he's the last
 25 witness, I just wanted to take the

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1 opportunity to thank your Honor, to thank
 2 Mr. Andrews, and Mr. Dunlap -- I'm sorry,
 3 Mr. Richards, Mr. Dunlap, and our court
 4 reporter for your hospitality and for making
 5 this court available to us. I also want to
 6 thank Judge Cary and the Bankruptcy Court.
 7 We sincerely appreciate it.
 8 DIRECT EXAMINATION
 9 BY MR. PRIMIS:
 10 Q. Mr. Stavins -- Dr. Stavins, do you have your
 11 written testimony in front of you?
 12 A. Yes, I do.
 13 Q. And, sir, would you please take a look at that
 14 and tell us if you would adopt that as your sworn
 15 testimony in this case?
 16 A. Yes, I will.
 17 MR. PRIMIS: Okay. We'll tender the
 18 witness; and I'll hand out the testimony.
 19 MR. PERRY: Good afternoon, your Honor.
 20 SPECIAL MASTER LANCASTER: Good
 21 afternoon, Mr. Perry.
 22 MR. PERRY: I would like to extend the
 23 same thank you that Mr. Primis just did.
 24 And we will be prepared at an opportune
 25 time to respond to the comment on restaurants

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1 and hotels. We really enjoyed our time here,
 2 and we have had some terrific experiences.
 3 CROSS-EXAMINATION
 4 BY MR. PERRY:
 5 Q. Dr. Stavins, it's nice to see you again.
 6 A. Nice to see you.
 7 Q. Thank you so much.
 8 I have prepositioned the binders. I
 9 hope to go through as few of the documents as
 10 I can with those binders. I have another
 11 binder; but, hopefully, we won't need to get
 12 through all of it, sir.
 13 MR. PERRY: Your Honor, actually I would
 14 like to introduce Laura Glickman, if I might.
 15 And she's terrific. I would like to have her
 16 recognized on the record, if I could.
 17 SPECIAL MASTER LANCASTER: Certainly.
 18 MS. GLICKMAN: Good afternoon, your
 19 Honor.
 20 BY MR. PERRY:
 21 Q. Dr. Stavins, are you familiar with the University
 22 of Georgia's Agricultural Extension Service?
 23 A. I am aware of the existence of it, certainly.
 24 Q. Can you describe what it does?
 25 A. So in general an Agricultural Extension Service

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1 **is typically -- is affiliated with the Land Grant**
 2 **colleges in their respective states and carries**
 3 **out activities of giving advice and sometimes**
 4 **doing analysis as well of farming within the**
 5 **respective states.**
 6 **Q.** And do you know a Dr. John Beasley affiliated
 7 with the University of Georgia's Extension
 8 Service?
 9 **A. So as I sit here now, to be honest, that name**
 10 **does not ring a bell.**
 11 **Q.** He's a professor of crop and soil science at UGA.
 12 You don't know him?
 13 **A. I don't believe so.**
 14 **Q.** Do you know a Dr. Scott Tubbs, also a professor
 15 of crop and soil sciences at UGA?
 16 **A. Again, as I sit here now, I don't remember the**
 17 **name.**
 18 **Q.** Are you familiar with a study involving those two
 19 individuals with Harvard University and
 20 University of Florida on rotations and how they
 21 can save water?
 22 **A. No. I haven't heard about that.**
 23 **Q.** Can you describe for the Court what a sod-based
 24 rotation is, please?
 25 **A. Well, I would be speculating if I did that.**

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1 **Q.** Okay. Could you open your binder to tab 1,
 2 please.
 3 **A. Yes.**
 4 **Q.** And, sir, for the first part of my exam today I
 5 would like to understand what you did to prepare
 6 your analyses in your prefiled direct and,
 7 indeed, in your expert opinion. So let's start
 8 with this document, if we might, please. Have
 9 you ever seen this document before?
 10 **A. No. I don't believe I have.**
 11 **Q.** And you don't know what, if any, role Georgia
 12 Extension Services had in the preparation of this
 13 document?
 14 **A. No. The -- just to be clear, the document I'm**
 15 **looking at says University of Florida.**
 16 **Q.** Sir, are sure you don't know of a joint study by
 17 University of Georgia in Auburn and University of
 18 Florida as to ways to save water in the Flint
 19 River Basin?
 20 **A. I don't recall having reviewed such a study.**
 21 **Q.** Sir, I invite your attention in this document,
 22 tab 1, which is FX-960, to page 5, please.
 23 **A. Yes, sir.**
 24 **Q.** And do you see there it says, sod-based tri-state
 25 project, Georgia, Florida, and Alabama?

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1 **A. Yes, I see that.**
 2 **Q.** Could you turn with me, please, now to page 44 of
 3 this same presentation, again, FX-960.
 4 **A. Yes. I see that.**
 5 **Q.** And now, on that page, could you read to yourself
 6 the contents of page 44 of FX-960.
 7 **A. Yes, I read it.**
 8 **Q.** Would you know what other crops are meant to be
 9 rotated in the sod-based rotation being studied
 10 here?
 11 **A. I couldn't say beyond what's stated here.**
 12 **Q.** Cotton and peanuts, would that make sense to you
 13 given your experience with agriculture?
 14 **A. Well, given my experience and my review of the**
 15 **materials in this case, I would anticipate that**
 16 **if it's within the Lower River Flint Basin, it**
 17 **might well be cotton and peanuts.**
 18 **Q.** You have never seen any study that anticipates
 19 that a sod-based rotation could save 70 to 80
 20 percent of irrigation water used on cotton and
 21 peanuts?
 22 **A. Including grazing and variable rate irrigation**
 23 **and the others that are listed here?**
 24 **Q.** Sure. You're aware, aren't you, that there are a
 25 number of farmers in the Flint River Basin that

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1 have farm ponds and also cattle. Right?
 2 **A. So I'm certainly -- I'm aware of farm ponds. I**
 3 **haven't been looking at anything with livestock.**
 4 **Q.** You're not familiar with the practices of raising
 5 livestock in connection with farming various
 6 crops in the Flint River Basin?
 7 **A. No. I can't say that I am.**
 8 **Q.** So you don't know how many farmers do or don't
 9 have livestock operations?
 10 **A. That's correct.**
 11 **Q.** Okay. So, sir, if you could look now at page 45
 12 of --
 13 **A. Yes.**
 14 **Q.** -- this particular document. And there, do you
 15 see the word Bainbridge on the title of the
 16 slide?
 17 **A. Yes, I do.**
 18 **Q.** You know Bainbridge is in the Flint River Basin;
 19 don't you?
 20 **A. Yes.**
 21 **Q.** And you know there's a gage that measures the
 22 flow of the Flint River at Bainbridge. Right?
 23 **A. Yes.**
 24 **Q.** All right. And it doesn't include all of the
 25 flows in the Flint River Basin; does it?

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1 **A. No. No.**

2 **Q.** Bainbridge is on the Flint River, but there are

3 other creeks and tributaries that empty into Lake

4 Seminole from the Flint River Basin. Right?

5 **A. That empty in directly.**

6 **Q.** They empty in --

7 **A. Directly, yes.**

8 **Q.** Now, have you seen this chart on page 45 before?

9 **A. You know, I don't recall as I look at it. But to**

10 **be honest, I have seen so many graphics of flow**

11 **rates that it's possible, but I don't recall it.**

12 **Q.** And do you remember during your deposition we

13 talked about the amount of water that might be

14 saved at Bainbridge by reducing agricultural

15 irrigation?

16 **A. I certainly remember discussing the amount of**

17 **water passing at Bainbridge.**

18 **Q.** And you recognize that a thousand cfs is a

19 significant amount of water flowing down the

20 Flint at Bainbridge; isn't it?

21 **A. A thousand cfs in the context of this case is**

22 **significant.**

23 **Q.** Yes. And do you see here on this chart the

24 difference between flows at various levels, and

25 do you see also that it exceeds 1,000 cfs in July

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1 and August?

2 **A. I'm trying to -- I don't actually know what the**

3 **meaning is of the different numbers. There are a**

4 **lot of lines that are also color-coded.**

5 **Q.** All right, sir. There's a table on this chart;

6 but in the interest of time and that you're the

7 last witness in our five-week trial --

8 **A. Yes.**

9 **Q.** -- I'm going to move to a different page.

10 **A. Yes.**

11 **Q.** Could you please turn to page 47.

12 **A. Yes. I'm there.**

13 **Q.** And do you see there a chart of different

14 rotational crops along with acres, costs,

15 revenue, and profit from different rotations?

16 **A. So three-year rotation of these three crops and**

17 **then so on and so forth down the page?**

18 **Q.** It appears that there's at least a three-year and

19 perhaps a four-year rotation.

20 **A. Yes.**

21 **Q.** Do you see that?

22 **A. The bottom one is a four year.**

23 **Q.** And could you follow with me, please, looking at

24 profit with the cotton/peanut rotation on the

25 first line there. Do you see that, sir?

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1 **A. The first line of which segment?**

2 **There are five.**

3 **Q.** Yes, fair question. It's the top left set of

4 lines under conventional three-year cotton,

5 cotton, peanut rotation. Do you see that, sir?

6 **A. Yes.**

7 **Q.** And do you see the profit at 20,000 in the total

8 profit line item there?

9 **A. 20,793 you're referring to?**

10 **Q.** Yes.

11 Now, if you will follow with me down to the

12 bottom of the page, do you see after a series of

13 different years, year four, full sod-based

14 rotation?

15 **A. Yes. I see that.**

16 **Q.** And do you see the profit at the bottom of the

17 page, 125,270?

18 **A. Yes. The last two years the profit jumps up.**

19 **Livestock are added.**

20 **In fact, the last three years there is the**

21 **addition of livestock bringing the bulk of the**

22 **profit, it appears.**

23 **Q.** Well, do you see that cotton and peanut profits

24 on year four are both higher than cotton and

25 peanut profits in the first year in the top line?

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1 **A. In year four --**

2 **Q.** To the conventional on the top line.

3 **A. Yes. Yes. Less in year three and less in year**

4 **two; but, yes, you're right, more in year four.**

5 **Q.** You didn't analyze this in your report or in your

6 prefiled direct testimony; did you?

7 **A. No. I was essentially basing my work upon**

8 **Dr. Sundig's work. And he didn't look at such**

9 **rotations, so I didn't.**

10 **Q.** All right, sir. So you didn't look at what

11 amounts of water might be saved from changing

12 rotations or using lower water crops; did you?

13 **A. No. I focused on exactly the set of measures**

14 **that Dr. Sundig proposes in various combinations,**

15 **and this was not one of them.**

16 **Q.** So if -- if we were to look through your prefiled

17 direct, we wouldn't find a section that

18 identifies what, if any, economic impact there

19 were from forcing farmers to change the types of

20 crops they use. Right?

21 **A. From forcing farmers to change the type of crops?**

22 **Q.** Change their rotation or types of crops, you

23 didn't do that; did you?

24 **A. No.**

25 **Q.** Okay. Sir, can you turn with me, please, to

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1 tab 3 of your binder. And there you will find a
 2 press release from yesterday.
 3 **A. Yes.**
 4 **Q.** By Governor Deal of Georgia?
 5 **A. Uh-huh.**
 6 **Q.** Have you seen this before?
 7 **A. I don't believe so, no.**
 8 **Q.** Could you read the second and third paragraphs of
 9 this story, please.
 10 I called it a press release. I was mistaken.
 11 It's actually a story about a press conference.
 12 **A. Do you mind if I read from the beginning just so**
 13 **I understand the context?**
 14 **Q.** Yes, please. Sir, anytime you want to do that,
 15 you're welcome to.
 16 **A. Thank you.**
 17 **Okay. I'm not going to read the entire thing**
 18 **unless you want me to.**
 19 **Q.** No. Actually, I'm going to focus with you, if I
 20 can, on the second and third paragraphs of this
 21 document. And in particular in the second
 22 paragraph where it says, Deal set limits on water
 23 use could be a disaster that could force farmers
 24 to change the types of crops by restricting
 25 irrigation. Do you see that, sir?

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1 **crop choice.**
 2 **Q.** There is no restriction at all in the amount of
 3 irrigation water they can apply to a particular
 4 acre of crop land; is there?
 5 **A. No. What I was referring to is permitting.**
 6 **Q.** All right. So they have to have permits; right?
 7 **A. Correct.**
 8 **Q.** And there are thousands of permits that have been
 9 granted in the Flint River Basin. Right?
 10 **A. That's fair to say.**
 11 **Q.** Right. And the grandfathered permits in
 12 particular have very few, if any, limitations on
 13 any aspect of irrigation; do they?
 14 **A. Right. And the most recent permits are defined**
 15 **in accordance with different areas of**
 16 **connectivity and impact on the river.**
 17 **Q.** And there are about 30 of those?
 18 **A. There are a very small number; it may well be 30.**
 19 **I don't recall the exact number; that are in the**
 20 **most critical area of the three types of areas,**
 21 **the ones with greatest connectivity. And then --**
 22 **Q.** Well, there are certainly many --
 23 **A. -- there are --**
 24 **Q.** I'm sorry to interrupt you.
 25 **A. I was going to say there are more permits in the**

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1 **A. Yes.**
 2 **Q.** All right. You didn't do any analysis of that
 3 possibility; did you?
 4 **A. No. I -- but I looked at this analogous to what**
 5 **Dr. Sundig did. I looked at reductions in yields**
 6 **of existing crops.**
 7 **Q.** Now, sir, do you see the next line where the --
 8 the next paragraph where in the second sentence
 9 there's a reference to, quote, an artificial
 10 process that would be imposed on farmers?
 11 **A. I see that, sir.**
 12 **Q.** And then the line before that, there's an
 13 indication that farmers should be allowed to make
 14 the calls about what they do on their own, basing
 15 that on market prices and the commodities they
 16 produce. Do you see that, sir?
 17 **A. I do, except it doesn't say should. It just says**
 18 **farmers are allowed.**
 19 **Q.** Oh, fair enough. Farmers are allowed. They are
 20 allowed under Georgia law to make all those
 21 choices right now without any restrictions.
 22 Right?
 23 **A. Well, there are certainly restrictions they face**
 24 **in terms of, as you know, irrigation water and**
 25 **other things, but I don't believe in terms of**

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1 **areas that do not have significant impact on the**
 2 **river.**
 3 **Q.** Even in the sensitive -- particularly sensitive
 4 areas, there are far, far, far more grandfathered
 5 permits than new permits with limitations.
 6 Right?
 7 **A. That's right.**
 8 **Q.** Okay. Now, I want to focus for a moment on an
 9 artificial process, the phrase that I called out
 10 a minute ago from the second paragraph we were
 11 reading, third paragraph of this document.
 12 You're aware, aren't you, that there is, indeed,
 13 an artificial limit on the amount of water that
 14 can be used in Florida's part of the ACF basin by
 15 farmers. Right?
 16 **A. So I'm aware -- I have become aware of the**
 17 **permitting system there.**
 18 **Q.** Oh, you have become aware. Is that since your
 19 prefiled direct testimony?
 20 **A. No. It's actually since you and I spoke at my**
 21 **deposition.**
 22 **Q.** Okay. So you are aware of that.
 23 Let's turn, if we could, to JX-45, which is
 24 at tab 2, please.
 25 **A. Yes.**

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1 Q. Now, sir, you have seen this document before;
 2 haven't you?
 3 A. **Well, let me look at the cover to make sure what**
 4 **that is.**
 5 **Yes.**
 6 Q. It's titled Georgia's Water Conservation
 7 Implementation Plan from 2010?
 8 A. **Yes.**
 9 Q. About seven years ago?
 10 A. **Uh-huh.**
 11 Q. Okay. Could you turn with me, please, to page 11
 12 and 12 of this document.
 13 A. **Yes.**
 14 Q. Now, you see the section titled Acknowledgment on
 15 page 11. I just want to very briefly identify
 16 for you some of the participants in composing
 17 this document, because they testified here in
 18 this case. On page 11, do you see Mark Master --
 19 I'm sorry, page 12, do you see Mark Masters
 20 listed?
 21 A. **Yes, I do.**
 22 Q. And you know Mr. or Dr. Masters; don't you?
 23 A. **I can't say that I know Mr. Masters, but I have**
 24 **read material.**
 25 Q. And he has some expertise in agricultural

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1 A. **Well, it rings a bell; but I would have to see it**
 2 **in front of me, and maybe I would be able to be**
 3 **definitive.**
 4 Q. Well, maybe we'll do that if we have time, sir.
 5 A. **Okay.**
 6 Q. So let's just focus back on page 45 --
 7 A. **Yes, sir.**
 8 Q. -- if we might. Do you see there it says under
 9 goal No. 4, farmers should minimize water loss
 10 from farm ponds?
 11 A. **Yes.**
 12 Q. And if you could, I just ask you to scan down the
 13 next paragraph and look for the word evaporation
 14 and seepage.
 15 A. **Just one second, please.**
 16 **Yes.**
 17 Q. Do you see the word evaporation?
 18 A. **Yes, I do.**
 19 Q. Losses from farm ponds, and then later it says,
 20 evaporation and seepage?
 21 A. **Right.**
 22 Q. Right. Now, benchmark 4B is what I'm
 23 particularly interested in here. Goal 4,
 24 benchmark 4B. By January 15, farmers should
 25 implement one or more practices to reduce water

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1 matters; doesn't he?
 2 A. **That's my understanding.**
 3 Q. Of course. He testified about that in this
 4 trial.
 5 And I would invite your attention to page 41
 6 of this same document, please, sir.
 7 A. **Yes.**
 8 Q. So, sir, are you familiar with these goals and
 9 benchmarks that the State of Georgia issued in
 10 2010 for agricultural irrigation?
 11 A. **I can't say that I'm familiar with them, no.**
 12 Q. All right. Well, let's just look at a couple. I
 13 won't drag you through the entire 12-page section
 14 of benchmarks, goals, and requirements; but
 15 let's -- let's look first at page 45. Could we?
 16 A. **45?**
 17 Q. Yes, please.
 18 Now, sir, were you here for the testimony
 19 over the last several days about losses from
 20 evaporation from farm ponds?
 21 A. **No. I just arrived today.**
 22 Q. And -- well, thank you for coming up.
 23 Are you aware of the UIF report by Georgia
 24 Water Resources Institute and its discussion of
 25 farm pond issues?

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1 loss from 50 percent of all farm ponds used in
 2 irrigation.
 3 Were you familiar with that benchmark, sir?
 4 A. **I don't think I was familiar with the benchmark.**
 5 **These are goals and benchmarks, not requirements,**
 6 **as I understand it.**
 7 Q. So, sir, did you do any analysis on what, if any,
 8 impact some type of requirement similar to that
 9 benchmark would involve?
 10 A. **Well, I did, not to this specific benchmark, but**
 11 **the fact that Dr. Sundig in one of his more**
 12 **recent analyses -- in fact, it may have been his**
 13 **direct testimony -- commented on additional**
 14 **savings that would be achieved from farm ponds.**
 15 **And so I did take a look at that.**
 16 Q. But you didn't look at a 50 percent cut in
 17 evaporation from farm ponds; did you?
 18 A. **I did not look at this specific benchmark, no.**
 19 Q. Okay. Now, if I can invite your attention now to
 20 page 44. And, again, we're moving quickly.
 21 There are many, many benchmarks and so forth in
 22 this document. But here, particularly I'm
 23 interested in goal 3, farmers should consider
 24 crop varieties, cropping systems, and irrigation
 25 systems. Do you see that, sir?

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1 **A. Yes, I do.**
 2 **Q.** And then if you scan that first paragraph there,
 3 do you see an indication that farmers can
 4 significantly reduce the amount of water needed
 5 by planting water-efficient crop varieties?
 6 **A. I'm sorry. Would you tell me again where that**
 7 **text is?**
 8 **Q.** Sure. I'm very happy to. The first paragraph of
 9 text -- not the title, but the first paragraph of
 10 text under goal 3.
 11 **A. Oh.**
 12 **Q.** It says, while goal 2; and then it moves on from
 13 there.
 14 **A. Yes, I see it now.**
 15 **Q.** And did you see the language I read just a moment
 16 ago?
 17 **A. Yes. By planting water-efficient crop varieties.**
 18 **Q.** Now, sir, you didn't do any analysis on the
 19 economic impact of planting water-efficient crop
 20 varieties; did you?
 21 **A. No. Again, I -- I followed on what Dr. Sundig**
 22 **had done. And since, you know, farmers are**
 23 **trying to make a living, indeed, to probably**
 24 **maximize their profits. And the water costs**
 25 **something, so I'm assuming that given the**

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1 **A. I'm aware of variable-rate irrigation and other**
 2 **practices that we have discussed in the past,**
 3 **including those that Dr. Sunding and I both**
 4 **assessed.**
 5 **Q.** Thank you, sir. I'm sorry for mentioning that
 6 before.
 7 So on variable-rate irrigation, you're aware,
 8 aren't you, that Dr. Irmak, who is not going to
 9 testify in this trial who was an agricultural
 10 expert for Georgia, opined that it's possible
 11 that variable-rate irrigation could lead to
 12 savings of more than 15 percent in water use.
 13 Right?
 14 **A. So I don't -- I'm not aware of that specific. Is**
 15 **that from the text here?**
 16 **Q.** It's from his report.
 17 **A. Oh.**
 18 **Q.** And, sir, it's -- in particular, it's from
 19 page 77 of his report.
 20 Now, you're aware that he also evaluated
 21 intelligent irrigation scheduling. Can you
 22 describe for the Court what that is.
 23 **A. Scheduling irrigation so that the water is going**
 24 **on when the needs of the crop are greatest so it**
 25 **will go into production of plant material.**

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1 **benefits and costs they face, that they would**
 2 **tend to be planting relatively efficient**
 3 **varieties.**
 4 **Q.** And we're talking about Dr. Sunding. Right?
 5 **A. Oh, did I say --**
 6 **Q.** You said Sundig, but --
 7 **A. Oh, I apologize.**
 8 **Q.** No, I know. We have been through this before.
 9 So I am sorry to correct you, but I won't do it
 10 again. So thank you.
 11 Now, there are water-efficient varieties of
 12 corn, for instance; right?
 13 They have been bred to use less water?
 14 **A. So there's -- there's been breeding of varieties**
 15 **of all of these crops, some to be more resistant**
 16 **to insects, some to be more resistant from**
 17 **competitive vegetation, and some to perhaps**
 18 **require less water.**
 19 **Q.** Now, you're aware, in addition to using
 20 water-efficient crops or choosing different
 21 rotations or different water -- more
 22 water-efficient crops, that there are a whole
 23 range of practices that can be adopted to use
 24 less irrigation water, like variable-rate
 25 irrigation. Right?

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1 **Q.** And you're aware that Dr. Irmak described pilot
 2 programs and projects that looked at the
 3 potential and, indeed, demonstrated the potential
 4 of saving an additional 30 or 20 percent of water
 5 used through irrigation -- through intelligent
 6 irrigation scheduling?
 7 **A. Again, without seeing the document, I apologize,**
 8 **I don't want to validate the specific numbers.**
 9 **Q.** All right. Well, we covered some of these issues
 10 with Dr. Masters; so I won't go through them in
 11 detail.
 12 **A. Okay.**
 13 **Q.** Sir, are you aware of Georgia's Environmental
 14 Protection Division at any point in time
 15 considering implementing a 15-inch cap on the
 16 amount of irrigation water that can be used in
 17 the Flint River Basin per acre?
 18 **A. My only recollection of the discussion of a cap**
 19 **was with you in deposition, I believe.**
 20 **Q.** And you recall, don't you, that at -- in 1999
 21 that Georgia's Environmental Protection Division
 22 believed that imposing a 15-inch cap of
 23 irrigation per acre was, quote, the best way to
 24 manage water, unquote?
 25 **A. Again, I don't have recollection of that specific**

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1 **language from a document.**

2 **Q.** All right, sir. Can you turn with me, please, to

3 Exhibit 6 -- I'm sorry, tab 6, Exhibit FX-874.

4 And in the interest of time, I'll refer you

5 directly to the next to last page at the bottom.

6 **A. Yes, sir.**

7 **Q.** And this is a little bit tricky to read because

8 the text for item 6 at the bottom of that page

9 carries over to the next page. And so I think

10 the word for each of these different vertical

11 columns is cell. And if you read -- for example,

12 it says pass a bill allowing the EPD to -- you

13 have to turn to the next page to read the rest of

14 this sentence.

15 **A. Yes.**

16 **Q.** And if I could ask you, please, sir, to focus on

17 that sentence, both on the next to last page and

18 the last page of FX-874, and just read it to the

19 end, please.

20 **A. Pass a bill allowing?**

21 **Q.** Yes. And if you could just to yourself read that

22 text down to the end.

23 **A. Yes.**

24 **Q.** All right. Do you see the reference there to 15

25 inches per acre per year?

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1 **A. Yes.**

2 **Q.** All right. Now, if we could turn to the prior

3 page and do the same thing with the next column

4 to the right, best way to manage water.

5 **A. Uh-huh.**

6 **Q.** You see you have to turn the page to get that.

7 Does this refresh your recollection of our

8 discussion during your deposition, sir?

9 **A. Yes. We discussed precisely this.**

10 **Q.** Okay. And you didn't analyze what the economic

11 impacts would be of a cap on irrigation water

12 applied at 15 inches per year per acre; did you?

13 **A. No. So my economic analysis, like Dr. Sunding's,**

14 **focuses on the economic cost of particular**

15 **changes in cfs impacts of different measures.**

16 **Q.** All right, sir. Are you familiar with the

17 National Environmentally Sound Production

18 Agriculture Laboratory at the University of

19 Georgia?

20 **A. I'm aware of it.**

21 **Q.** All right. Could you turn, please, to tab 7,

22 which is FX-686. And it's also FX-886. I'm

23 sorry.

24 There's two documents here. And it will be

25 just a momentary time until we describe what

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1 these are.

2 Are you with me?

3 **A. Yes.**

4 **Q.** All right. Do you see the word NESPAL --

5 **A. Yes.**

6 **Q.** -- under Dr. Jim Hook?

7 I think I just read what that acronym meant.

8 And do you recognize NESPAL now?

9 **A. Yes.**

10 **Q.** Okay. And do you see the water planning regions

11 here?

12 **A. Yes. I do.**

13 **Q.** And the Lower Flint-Ochlockonee on the map?

14 **A. Yes, I do.**

15 **Q.** Okay. If you just turn a couple pages into this

16 tab, you will find FX-886.

17 **A. Yes.**

18 **Q.** And this, sir, is a list of monthly irrigation

19 amounts for individual crops. And it's a range

20 created by NESPAL from the University of Georgia

21 for very wet years and very dry years. Do you

22 see that, sir?

23 **A. Yes. I do.**

24 **Q.** And do you see that there are counties listed in

25 each of the various sets of data on FX-886?

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1 **A. Yes.**

2 **Q.** And do you see there under P 90, which is

3 very dry years, a total number per county per

4 crop?

5 **A. Yes, I do.**

6 **Q.** So, for example, for Mitchell County for the

7 crop corn, the very dry year number is 14.7.

8 That's inches of irrigation water per year.

9 Right?

10 **A. This is average or total across --**

11 **Q.** For a very dry year.

12 **A. But what are -- I don't know what the rows are in**

13 **this that lead to that total.**

14 **Q.** Okay. Well, there are indications of how severe

15 a drought year would be. So P 10 would be not

16 a severe drought, and P 90 would be severe

17 drought.

18 **A. I understand that that's the columns. I don't**

19 **understand what the rows are, approximately 10,**

20 **that lead to LW total 14.70.**

21 **Q.** Okay. Those are months.

22 **A. Those are the months of the year?**

23 **Q.** That's right. The months of the irrigation

24 season.

25 **A. Right.**

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1 Q. And in some cases the year.
 2 But corn has a longer season, of course, than
 3 some other crops.
 4 A. Uh-huh.
 5 Q. So there's irrigation earlier in the year.
 6 But do you see that there is corn, and then
 7 there's Mitchell County peanuts and Miller County
 8 corn, and so forth throughout this exhibit?
 9 A. Yes, I see it.
 10 Q. And then there are totals for irrigation amounts.
 11 Do you see those?
 12 A. Yes.
 13 Q. For the -- for a very dry P 90 year?
 14 A. Yes.
 15 Q. Now, you haven't done any analysis of the
 16 economic impact of imposing caps at these levels
 17 on these crops in these counties; have you?
 18 A. No. Again, I followed Dr. Sunding's approach.
 19 Q. Okay. So you did, however, spend some time
 20 analyzing what I think you called the net -- the
 21 Shellman Farm study. Is that right?
 22 A. Well, I used data from the Shellman experimental
 23 farm.
 24 Q. And the Shellman experimental farm is the
 25 National Peanut Research Laboratory; is that

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1 right?
 2 A. That's correct, of USDA.
 3 Q. And -- and this has been the subject of
 4 Dr. Masters's testimony earlier in this trial.
 5 Do you know that?
 6 A. I -- I read his report; and I believe I saw parts
 7 of his examination in court.
 8 Q. All right, sir. Could you turn with me to tab 8,
 9 please, which is JX-169.
 10 And I'll be very brief about this. I have
 11 really one point to make.
 12 This is a modified exhibit that was used with
 13 Mark Masters in his testimony. But do you see
 14 here where it says Shellman Farm Cotton Yield at
 15 the top of this first page?
 16 A. The first one for me is peanut yield, but I can
 17 find cotton yield.
 18 Q. Okay. Well, I have peanut yield, too.
 19 A. So should I stay with the Shellman Farm peanut
 20 yield?
 21 Q. We can go with peanut yield.
 22 A. Okay.
 23 Q. And do you see sprinkler 100 percent, 66 percent,
 24 33 percent, and then nonirrigated in the column
 25 headings?

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1 A. Yes, sir.
 2 Q. So when you used this data, you used sprinkler
 3 100 percent and compared it to nonirrigated;
 4 didn't you?
 5 A. Yes. That's correct.
 6 Q. All right. And you didn't analyze the economic
 7 impact of requiring irrigation at a level equal
 8 to sprinkler 66 percent for peanuts; did you?
 9 A. No. Because I was attempting to identify a means
 10 that I thought were feasible of carrying out
 11 Dr. Sunding's deficit irrigation method. And
 12 that led me to the thinking that it would need to
 13 be withdrawing acres from your irrigation.
 14 Q. Now, let's talk about deficit irrigation since
 15 you mentioned it for just a moment. We have used
 16 a couple words in the course of this case for
 17 limiting the amount of irrigation applied. One
 18 has been deficit irrigation, and another has been
 19 limited irrigation. Do you understand both those
 20 terms?
 21 A. Well, deficit irrigation, at this point in time,
 22 I associate with Dr. Sunding's proposal.
 23 Q. And by deficit irrigation, he meant two things;
 24 didn't he?
 25 He meant eliminating excessive water use, but

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1 he also meant reducing the amount of water that
 2 is applied to a crop where irrigation occurs.
 3 Right?
 4 A. Well, my definition -- I mean, when I hear
 5 deficit irrigation, what I think he meant was
 6 reducing irrigation amounts on different plots of
 7 land in a way that is perfectly cost effective
 8 taking into account all of the different
 9 variables that affect that.
 10 Q. Okay. But you would agree with me, won't you,
 11 that it might be most effective and most
 12 economical to reduce irrigation by one-third
 13 rather than cutting irrigation entirely. Right?
 14 A. Yes. As a hypothetical, if it were feasible to
 15 do that.
 16 Q. All right. Well --
 17 A. I'm --
 18 Q. -- let's look and see how feasible it actually
 19 was. So can you turn with me to tab 9, please,
 20 which is FX-929.
 21 A. Yes.
 22 Q. And here we have just taken the data -- I think
 23 you may remember this from your deposition. We
 24 just have taken the data for cotton at 66 percent
 25 and cotton for 33 percent sprinkler, and we have

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1 done the same thing for peanuts 66 percent and
 2 peanuts 33 percent. We have a row for dry years
 3 and a row for all years.
 4 And this is all drawn from the same data you
 5 used from the Shellman study. Right?
 6 **A. That's correct.**
 7 **Q.** Okay. And you would agree -- and I think you did
 8 in your deposition -- that these are fair
 9 representations of what the results were at these
 10 levels of irrigation. Right?
 11 **A. Again, I'm willing to -- we don't want to take**
 12 **time to go back to the original data. I'm**
 13 **willing to stipulate that this represents the**
 14 **original data.**
 15 **Q.** So you see 87 percent for cotton at 66 percent
 16 sprinkler; and, likewise, for peanuts at 66
 17 percent sprinkler, 95 percent yield in dry years?
 18 **A. Yes, I see that.**
 19 **Q.** Okay. And there's, you know, plenty of data
 20 to be reviewed there; but the point I want to
 21 make, if I can ask you to turn back to tab 8,
 22 please --
 23 **A. Yes.**
 24 **Q.** -- is that when you did your analysis, you didn't
 25 look at sprinkler 66 percent; you didn't look

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1 at sprinkler 33 percent. You just compared
 2 sprinkler 100 percent to no irrigation at
 3 all?
 4 **A. The reason that I did that is that I wanted**
 5 **to focus on what were the costs of achieving**
 6 **Dr. Sunding's proposed remedy. He was assessing**
 7 **the cost. And it seemed to me that the method**
 8 **he used, which was perfectly cost-effective**
 9 **allocation across four or five variables,**
 10 **something like 2,000 different combinations of**
 11 **them, I couldn't see that being achieved. And,**
 12 **therefore, I sought to identify a means in which**
 13 **one could strive to achieve those reductions in**
 14 **applications of irrigation water. And that**
 15 **included -- rather than the 10 percent increments**
 16 **that he used, it was essentially equivalent to an**
 17 **irrigation buy-back, which --**
 18 **Q.** Okay. So you just assumed that people wouldn't
 19 irrigate at all?
 20 **A. I assumed that those would be the requirements**
 21 **that this -- that an entity such as the State or**
 22 **whoever could or would put in place.**
 23 **Q.** But you understand, don't you, that Dr. Sunding
 24 was attempting to limit irrigation to a perfectly
 25 rational economic and environmental level that

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1 met a number of needs?
 2 He wasn't trying to eliminate in his deficit
 3 irrigation approach all irrigation; was he?
 4 **A. So I think what you said is right. I would**
 5 **change the words a little bit, and that is what**
 6 **he was attempting to do was to identify a**
 7 **perfectly perfect cost-effective allocation of**
 8 **irrigation reductions to get the most you could**
 9 **get with the least possible cost.**
 10 **And I just didn't consider the instrument --**
 11 **the policy instrument that would be feasible to**
 12 **accomplish that, which is why I --**
 13 **Q.** I think you did and would agree with me that it's
 14 possible to run an auction; you just thought that
 15 the way he was doing it was a little too complex.
 16 Is that right?
 17 **A. My opinion is that an auction, because of the**
 18 **issue of connectivity, would not accomplish that**
 19 **cost-effective allocation.**
 20 **Remember, the cost effectiveness is in terms**
 21 **of cfs, not in terms of water not applied.**
 22 **Q.** You remember our deposition; don't you?
 23 And I asked you if it was possible to conduct
 24 an auction in the Flint River Basin. Right?
 25 **A. And I probably said it is possible.**

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1 **Q.** Okay.
 2 **A. No, I'm saying but it wouldn't achieve his**
 3 **cost-effective allocation because it wouldn't**
 4 **take account of connectivity because the farmers**
 5 **aren't going to be economically sensitive to**
 6 **that.**
 7 **Q.** But you -- just to be clear, I think we're
 8 probably on the same page, sir; but I just
 9 want to be incredibly clear. You didn't look
 10 to see what would happen if those farmers were
 11 required to irrigate less than they currently
 12 do. Right?
 13 **A. So as I sit here now, I don't recall that I**
 14 **looked at that alternative, what the economics**
 15 **would be.**
 16 **Q.** All right, sir. There are several other measures
 17 that we have talked about in this trial that
 18 Georgia could undertake. And to organize our
 19 discussion of those measures, I would like you to
 20 turn to tab 10 where you will find JX-154.
 21 **A. Yes.**
 22 **Q.** And, sir, I don't recall if you have seen this
 23 document before; but just for a minute, if you
 24 could to yourself -- and I won't burden you with
 25 much more reading, but just the last paragraph

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1 on the -- on page 1 and the first paragraph of

2 page 2, and then the bullets in the middle of

3 page 2.

4 **A. So it starts, Director Turner?**

5 **Q.** It starts, Director Turner. Exactly right.

6 **A. You want me to read that paragraph?**

7 **Q.** Yes.

8 **A. Yes.**

9 **Q.** Two paragraphs, plus I'm going to invite your

10 attention to the middle of the second page where

11 there are a number of bullets there. Do you see

12 those, sir?

13 **A. Yes. Should I read those now?**

14 **Q.** Yes. We'll walk through them, so you don't have

15 to read them all at once.

16 But I'll start with the fourth of the five,

17 if I could, sir, acquiring easements for

18 permanent removal from irrigation. You did

19 analyze that; didn't you?

20 **A. Yes. Well, in the sense of -- in two ways.**

21 **One was in terms of the deficit irrigation**

22 **modifications, I certainly did. And then also,**

23 **when I looked at Dr. Sunding's hedonic analysis.**

24 **I'm assuming that easements are the same as**

25 **buy-backs.**

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1 **comment on that.**

2 **Q.** Okay. We'll get back to that because I think

3 it's an important question when you figure how

4 much would it really cost the State.

5 And we're talking about the State paying

6 here; we're not talking about farmers incurring

7 costs. Right?

8 The State would pay them not to apply

9 irrigation water; isn't that right?

10 **A. That's right. I would say as an economist, the**

11 **way I look at this -- and I think any economist**

12 **would -- mainstream economics is that a cost is**

13 **still a cost. If I'm doing a benefit-cost**

14 **analysis, I'm looking at the costs in aggregate,**

15 **whether they're paid by farmers, they're paid by**

16 **the state government, or they're paid by the**

17 **federal government.**

18 **Q.** Well, that's fair; but you also have part of your

19 analysis that looks at distributional impacts;

20 don't you?

21 **A. That's correct.**

22 **Q.** And so if the State -- the entire State is paying

23 farmers for a right to prevent them from

24 irrigating, that's not necessarily the same as if

25 farmers are just prohibited from irrigating in

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1 **Q.** Hedonic analysis is kind of an arcane word. That

2 just means the amount of money that you would pay

3 in order to grant or to obtain an easement. Is

4 that basically how it would apply in this

5 context?

6 **A. It was his attempt to estimate what would be the**

7 **cost to the State to --**

8 **Q.** So we're talking about the State acquiring rights

9 to remove people from their permitted amount of

10 irrigation. Is that right?

11 **A. That's correct.**

12 **Q.** Okay. So somebody who is permitted and had a

13 grandfathered permit that wasn't restricted in

14 any way might be bought out of the right to

15 irrigate. They could still use the land for

16 farming; they just wouldn't irrigate. Is that

17 fair?

18 **A. Yes. Under the proposal here, they would be able**

19 **to have dry-land agriculture.**

20 **Q.** Okay. Have you looked to see at all if the State

21 of Georgia has the right to suspend irrigation on

22 a grandfathered permit?

23 **A. You mean legally has the right?**

24 **Q.** Legally has the right.

25 **A. So I'm an economist; I'm not a lawyer. I won't**

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1 the Lower Flint. Right?

2 **A. So if the State were paying them, it would not be**

3 **the same. But the state revenues to pay them**

4 **have to come from somewhere. It's either tax**

5 **dollars, cutting education programs, cutting**

6 **other programs for farmers. I don't know.**

7 **Q.** Okay. But then you would look at how much money

8 the State would pay and compare that to a

9 different denominator than you would if you were

10 looking at impacts on farmers in the Lower Flint.

11 Is that right?

12 **A. I'm sorry. I didn't understand about the**

13 **denominator.**

14 **Q.** This will just be a short departure from our

15 document, but you have in your analysis a

16 concept, gross regional product; don't you?

17 **A. That's correct, sir.**

18 **Q.** Like the gross national product, but it's

19 regional?

20 **A. Precisely.**

21 **Q.** And for the ACF Basin in the State of Georgia,

22 it's about \$282 billion; isn't it?

23 **A. Yes. That's my recollection, something like**

24 **that.**

25 **Q.** And for all of the production of row crops in the

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1 ACF Basin in Georgia, it's about \$1.3 billion per
 2 year roughly; is that right?
 3 **A. That's about -- that's correct.**
 4 **Q.** Okay.
 5 **A. Approximately.**
 6 **Q.** And if you were looking at an ACF Basin-wide
 7 comparison, not thinking about how much you're
 8 actually impacting farming activity, but just
 9 looking at those two totals, you're talking about
 10 1.3 billion versus 282 billion. So less than
 11 half a percent. Right?
 12 **A. No, that's correct. That comparison is a half**
 13 **a percent. But, you know, what strikes me, if**
 14 **we are talking about distributional matters,**
 15 **the way you characterized it, then I think about**
 16 **the fact that the agricultural row crops in**
 17 **terms of the direct value within the area of**
 18 **the Lower Flint, we're going to be looking at**
 19 **something like 5 percent of the overall output**
 20 **of the area. So --**
 21 **Q.** Okay. Sir, if you were restricting farmers and
 22 just cutting them off with no compensation at
 23 all, that's what you're talking about when you
 24 say 5 percent of the local area impact. Right?
 25 **A. No. I meant that the cost, again, whether or not**

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1 **it's the cost to the farmers or it's the cost to**
 2 **the government that's distributed to others.**
 3 **You were talking about denominators. And I**
 4 **was saying if, instead, I used the denominator of**
 5 **looking at the Lower Flint Basin, then I'm**
 6 **talking about 5 percent.**
 7 **Q.** I'm just talking about easements for a moment
 8 paid for by the State. So let's focus on that,
 9 if I could.
 10 You know that USDA throughout the United
 11 States looks at the value of irrigated farmland
 12 and compares it every year with the value of
 13 unirrigated farmland; don't you?
 14 **A. Compares the values.**
 15 **Q.** Compares the values, right.
 16 So that would mean that you gather a lot of
 17 data -- the USDA does -- and then they would look
 18 at what an appropriate purchase price for
 19 irrigated farmland with irrigation equipment
 20 versus unirrigated farmland with no irrigation
 21 equipment. Right?
 22 **A. To look at what the appropriate purchase price**
 23 **would be, what would come out of an auction if**
 24 **you carried one out?**
 25 **Q.** Right. And you have seen that USDA data; haven't

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1 you?
 2 **A. I'm not sure if I have seen the USDA data, but I**
 3 **would say that's what I was estimating and what**
 4 **Dr. Sunding was trying to estimate when we were**
 5 **looking at the foregone profits if you didn't**
 6 **have irrigated acreage.**
 7 **Q.** Okay. Let's just look at these two purchase
 8 prices I talked about for a minute. And let's go
 9 to tab 11, FX-927; could we, please.
 10 **A. Yes.**
 11 **Q.** And here we have a USDA National Agricultural
 12 Statistic Service publication. I have -- we have
 13 got several in the binder here. We'll skip many
 14 of them.
 15 **A. Okay.**
 16 **Q.** But this one is a summary publication where the
 17 first graph or table -- I should say table looks
 18 at farmland average values per acre. Do you see
 19 that, sir?
 20 **A. I see that, yes.**
 21 **Q.** And this is, of course, for the Southeast; so
 22 they have Georgia and Florida and Alabama and
 23 South Carolina. Do you see those, sir?
 24 **A. Yes, I do.**
 25 **Q.** So I'm looking at the first table. And I would

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1 invite you to follow me along across from Georgia
 2 as you get to irrigated crop land average value
 3 for 2016. Do you see that, sir?
 4 **A. Yes.**
 5 **Q.** \$4,000 per ache; isn't that right?
 6 **A. I'm sorry. I'm not seeing the 4,000. I'm seeing**
 7 **3410.**
 8 **All crop land, you said, or irrigated?**
 9 **Q.** Irrigated.
 10 **A. Irrigated 2016, yes.**
 11 **Q.** Okay. And you make a fair point. All crop land
 12 is 3410. Irrigated is 4,000. And nonirrigated
 13 is 3200.
 14 **A. I see that.**
 15 **Q.** And let me just pause here. That's an \$800
 16 difference; isn't it?
 17 **A. Yes.**
 18 **Now, keep in mind, again, I would have to**
 19 **review this part of the census of agriculture to**
 20 **know because census -- USDA census of agriculture**
 21 **treats farms as -- I believe they're defined as**
 22 **having annual revenues greater than a thousand**
 23 **dollars. So we have very, very small,**
 24 **essentially nonprofessional operations, hobby**
 25 **farms, farms where people are supplementing their**

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1 **income in other ways. But --**
 2 **Q.** Well, luckily, sir, Dr. Sunding looked at a whole
 3 range of farms --
 4 **A. Yes.**
 5 **Q.** -- you know, at actual prices. He gathered data
 6 from all the sources you would need to, and his
 7 number for the cost of an easement matches very
 8 closely what you got here in the delta between
 9 irrigated and nonirrigated farms on the USDA
 10 statistics.
 11 So this shows a difference of \$800 where
 12 Dr. Sunding has \$864. Is that right?
 13 **A. Something else you might wish to look at would be**
 14 **when actual auctions were carried out, since they**
 15 **weren't carried out. And if you do the**
 16 **arithmetic with those, then you're going to find**
 17 **not a difference of \$800; but you will find that**
 18 **the buy-back for those two years, 20 --**
 19 **Q.** 2001?
 20 **A. 2001, 2002.**
 21 **Q.** That's a one-year buy-back. Right?
 22 Each of those is a one-year buy-back?
 23 **A. Yes, but I'm going to convert. I'm going to do**
 24 **the mathematics.**
 25 **Q.** Okay.

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1 **Q.** Yes.
 2 **A. Well, again, I think these include many, many,**
 3 **many extremely small farms that were probably not**
 4 **even participating in the auctions. I don't**
 5 **know.**
 6 **Q.** Sir, there's actually a couple studies we can
 7 look at in Georgia where -- where this was
 8 evaluated, just like Dr. Sunding did. So if you
 9 could turn, please, to tab 14, FX-928.
 10 **A. Yes.**
 11 **Q.** And I think you probably have seen these studies
 12 before. Here is the first one. It's called
 13 Estimating the Value of Irrigation Water in
 14 Georgia. And, you know, this one does two
 15 things. One, it polls real estate agents to
 16 understand the difference in the value of an
 17 irrigated versus an unirrigated acre. And this
 18 is a little bit old, but it's just about \$800,
 19 800 to a thousand; isn't it?
 20 I'm just trying to save a little time. Have
 21 you seen this before?
 22 **A. I don't know if I have seen this one.**
 23 **I flipped ahead; and I have seen the next**
 24 **one, if you would like to --**
 25 **Q.** Okay. And then \$913 per acre is their value of

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1 **A. I'm going to convert it to an ongoing buy-back.**
 2 **Instead of 854, we're going to get about 2,000 to**
 3 **\$2,500.**
 4 **Q.** You know, don't you, that USDA also looks at the
 5 one-year rental value, right, when it reconciles
 6 all these things?
 7 **A. Uh-huh.**
 8 **Q.** And it looks at both the one-year data type of
 9 thing you just referred to and to the purchase
 10 price per acre. You know it does that; right?
 11 **A. Yes. All that I'm saying, counselor, is that if**
 12 **you look at the actual empirical experience of**
 13 **when in the -- in that part of Georgia auctions**
 14 **were carried out, what the prices were at the**
 15 **auctions, and then you do the -- essentially the**
 16 **reverse of the discounting in order to get a**
 17 **present value to find out what the ease -- what**
 18 **that implies the permanent easement would have**
 19 **been, then you find a -- my recollection is about**
 20 **\$2,500 instead of 854.**
 21 **Q.** You wouldn't take the position ever, would you,
 22 that the cost of obtaining this legal right, an
 23 easement, is greater than the actual cost of the
 24 acre itself. Right?

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1 irrigation water?
 2 **A. Are you referring to Petrie and Taylor?**
 3 **Q.** I'm referring right now to Spurgeon,
 4 S P U R G E O N, and Mullin, M U L L I N.
 5 So I'll turn the page with you; and we'll go
 6 to tab 15, FX-925, Real Estate Analysis and --
 7 analysis. And you would agree with me in this
 8 article, which you have seen before -- the
 9 article is titled Estimating the Value of Water
 10 Use Permits -- the information they got from real
 11 estate agents is that the difference between an
 12 irrigated acre and a nonirrigated acre is about
 13 five to \$700. Right?
 14 **A. So I did review this because Dr. Sunding referred**
 15 **to it, and I referred to it as well. This has**
 16 **in common something quite important with**
 17 **Dr. Sunding's hedonic analysis is that given the**
 18 **method he uses, he's not estimating the value of**
 19 **irrigation. He and Petrie and Taylor are**
 20 **valuing -- are looking at the value of the option**
 21 **to irrigate. And they're quite different.**
 22 **Q.** Well, you know -- I'm sorry, sir. I don't mean
 23 to interrupt you; but you know, don't you, that
 24 USDA, when it calculates the value of an acre of
 25 irrigated land, it includes the irrigation

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1 equipment plus the -- whatever right you have to
 2 irrigate. Right?
 3 **A. So I'm not referring -- I understand what you're**
 4 **referring to; and I'm referring to the fact that**
 5 **the option value is going to be substantially**
 6 **less than what the value of the irrigation is**
 7 **itself.**
 8 **Q.** Well, let's look at what you have and what all
 9 these other sources show. So if you could turn
 10 to tab 17 with me, please.
 11 **A. Yes.**
 12 **Q.** And this is our demonstrative comparing how you
 13 calculated the cost of acquiring an acre with how
 14 USDA data evaluates it and how Dr. Sunding. And
 15 you will see here that your numbers are 9 to 10
 16 times as high; aren't they?
 17 **A. So when you refer to Stavins's first estimate,**
 18 **you're -- you calculated this number, which I**
 19 **don't -- I don't recognize. You calculated this**
 20 **from my February report or from --**
 21 **Q.** From your prefiled direct, demonstrative 17.
 22 **A. Prefiled direct.**
 23 **So what I would tell you is that the approach**
 24 **that's used here, as you probably know, is to**
 25 **look at the lost agricultural productivity. If**

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1 **you use Dr. Sunding's analysis, you will get a**
 2 **number which is smaller than this, but quite**
 3 **close to it.**
 4 **I'm talking about his February report, the**
 5 **one I'm most familiar with.**
 6 **Q.** His February report in appendix B says \$864;
 7 doesn't it?
 8 **A. No. He didn't -- what I'm talking about is if**
 9 **you use the method that I used here, which is**
 10 **looking at lost agricultural productivity, and**
 11 **you look at where he does that as well, which**
 12 **is his deficit irrigation calculation, and then**
 13 **you do the division, you will get the result**
 14 **that is not that far from mine. I carried that**
 15 **out.**
 16 **Q.** Sir, your numbers here to acquire an easement on
 17 land are more than twice the cost of the actual
 18 land; isn't that right?
 19 **A. So I would have to look further to be able to**
 20 **make that -- you know that judgment.**
 21 **Q.** Okay. Let's go back to tab 10, which is Joint
 22 Exhibit 154, again. And we're going to pick back
 23 up with the bullet points, if we could.
 24 And I would like to go now to the first of
 25 those bullets, which is transferring water users

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1 to deeper aquifers. Do you see that, sir?
 2 **A. Yes, I do.**
 3 **Q.** All right. Could you turn with me to tab 20,
 4 please.
 5 **A. Yes.**
 6 **Q.** All right. Have you seen at tab 20 FX-56 before?
 7 **A. I don't recognize it, but it's possible at some**
 8 **point.**
 9 **Q.** Well, Dr. Cowie and I believe Director Turner
 10 both testified about this. And I'm certain
 11 Dr. Cowie did. She prepared this for Director
 12 Turner.
 13 And if I could ask you to turn with me,
 14 please, to page 10 of this document.
 15 **A. Yes.**
 16 **Q.** And do you see where it says option 2B?
 17 **A. Yes.**
 18 **Q.** Actions to support flows for endangered species
 19 and basin contributions to state line flows?
 20 **A. Yes.**
 21 **Q.** You know, don't you, that Dr. Cowie and Director
 22 Turner were both affiliated with Georgia's
 23 Environmental Protection Division. Right?
 24 **A. Yes.**
 25 **Q.** Okay. So do you remember now seeing this

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1 document before?
 2 **A. I apologize. I don't. But, you know, I have**
 3 **looked at hundreds, if not more, documents.**
 4 **Q.** And there are quite a number of documents in this
 5 case.
 6 If you could turn to page 12, you will find a
 7 Georgia EPD estimate of the cost of moving
 8 farmers from the Upper Floridan Aquifer in the
 9 Lower Flint Basin to lower aquifers. Do you see
 10 that?
 11 **A. Which of the -- there are three parts to the**
 12 **table.**
 13 **Q.** There's three options. The one I was referring
 14 to is the last option on page 12.
 15 **A. Groundwater and surface water withdrawals?**
 16 **Q.** Yes.
 17 **A. In 4-mile corridor?**
 18 **Q.** Yes. You're aware, aren't you, that
 19 Dr. Sunding's estimates for transfer of
 20 farmers in the Lower Flint to lower aquifers
 21 are consistent with these numbers on this Georgia
 22 EPD document; aren't you?
 23 **A. Well, I can't -- I can't validate that.**
 24 **The reason why I didn't explore this**
 25 **particular measure of the many measures that were**

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1 **proposed was that my understanding is that**
 2 **Georgia is still engaged in examining the**
 3 **feasibility of this because of the rate of**
 4 **replenishment, of recharge of those particular**
 5 **aquifers, and whether or not it would be a**
 6 **sustainable practice.**
 7 **Q.** Well, this document is from 2012. But you know
 8 they have been studying this same issue for many
 9 years before 2012. Right?
 10 **A. It's an important issue.**
 11 **Q.** Okay. Now, could you go with me back to tab 10,
 12 Exhibit JX-154; and we'll quickly cover the other
 13 items here and move along.
 14 The next item is augmenting streamflow from
 15 groundwater. Do you see that, sir?
 16 **A. I do see that.**
 17 **Q.** Now, you didn't look at that; did you?
 18 **A. So this is a proposal to use groundwater aquifers**
 19 **as essentially storage batteries and then to pump**
 20 **it back up.**
 21 **Q.** At tab -- as an underground reservoir more or
 22 less.
 23 At tab 23, do you find FX-53, which is an
 24 analysis -- I'm sorry if I did that -- an
 25 analysis from 2010 of exactly that type of

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1 activity. Do you see that, sir?
 2 **A. Yes, I do see it now.**
 3 **Q.** Have you ever seen this document before?
 4 **A. I don't believe so.**
 5 **Q.** Okay. And you have never analyzed this issue
 6 before; have you?
 7 **A. No, I did not analyze that alternative.**
 8 **Q.** So you don't have a cost listed or, indeed, a
 9 benefit to share with the Court on that; do you?
 10 **A. I do not.**
 11 **Q.** Okay. So can you look at the next item on that
 12 list was aquifer storage and recovery.
 13 **A. I'm sorry. Can you direct me back to which tab**
 14 **it is?**
 15 **Q.** I'm sorry. I'm going fast.
 16 And it's tab 10, JX-154. It might be even
 17 easier if you took it out of your binder so you
 18 can keep it handy.
 19 But aquifer storage and recovery, that's not
 20 something you analyzed either; is it?
 21 **A. That's actually what I thought we were referring**
 22 **to before. So, no, I did not examine that.**
 23 **Q.** Okay. Now, we have already talked about the last
 24 bullet, which was the only remaining one,
 25 temporary removal of land for irrigation.

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1 So if I could, sir, let me focus just a bit
 2 on the Flint River Drought Protection Act.
 3 During your deposition you weren't particularly
 4 familiar with that; were you?
 5 **A. But you piqued my interest, so I have become more**
 6 **familiar, counselor.**
 7 **Q.** Okay. Good. Okay. So you're aware that
 8 multiple documents in this case explain how you
 9 can predict drought effectively; aren't you?
 10 **A. I have seen discussions of that.**
 11 **Q.** Okay. So is it your position that it's
 12 impossible to predict drought?
 13 **A. It's my understanding from the experts in the**
 14 **case who are, you know, hydrologists, so other --**
 15 **either other witnesses, whether they're experts**
 16 **or fact witnesses, that it is difficult to**
 17 **predict droughts in advance. Not --**
 18 **Q.** Okay. Well, sir, let me just see if you have
 19 seen a couple of these documents before.
 20 And you weren't here for the testimony of
 21 Director Reheis; were you?
 22 **A. No, I was not.**
 23 **Q.** Okay. So at tab 26, can you quickly look at
 24 FX-231 from October 2011 from the state's
 25 geologist and tell me if you have seen that

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1 before.
 2 **A. I don't recall seeing this, unless perhaps you**
 3 **showed it to me at deposition.**
 4 **Q.** Okay. At tab 27 can you quickly look at FX-232
 5 and tell me if you have seen it before?
 6 **A. So I have seen materials that were developed for**
 7 **the ACF Stakeholders Group. I don't recall if**
 8 **this is one that I had an opportunity to see.**
 9 **Q.** All right, sir. Let's, if we could, turn to
 10 tab 31 which is Joint Exhibit 47.
 11 **A. Yes.**
 12 **Q.** And can you describe what that is, please.
 13 **A. That is the U.S. Environmental Protection**
 14 **Agency's Guidelines For Preparing Economic**
 15 **Analysis, December 2010, updated May 2014.**
 16 **Q.** Now, sir, you did in your prefiled direct and in
 17 your report perform an analysis of costs and
 18 benefits or benefits and costs, as you say; isn't
 19 that right?
 20 **A. That's correct, sir.**
 21 **Q.** All right. Can you turn in this Guidelines For
 22 Preparing Economic Analysis, JX-47, to page 5-9,
 23 please.
 24 **A. Yes, sir.**
 25 **Q.** And there, do you see section 5.4.1 titled Full

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1 Compliance?

2 **A. Yes, sir.**

3 **Q.** So the next series of questions are going to

4 relate to your analysis of valuating benefits and

5 costs or costs and benefits from reducing

6 irrigation in the Flint River Basin and elsewhere

7 in the ACF.

8 So here, I invite you to read the first

9 paragraph under 5.4.1, full compliance, please.

10 **A. Silently?**

11 **Q.** Silently, please.

12 **A. Yes.**

13 **Q.** Now, do you see where it says, analysts should

14 develop baseline and policy scenarios that assume

15 full compliance with existing and newly-enacted

16 regulations?

17 **A. Yes.**

18 **Q.** When you were doing your cost-benefit analysis,

19 you were essentially performing the same type of

20 regulatory analysis that EPA does when it

21 evaluates new regulations. Right?

22 **A. In basic terms. And I would note, if I might,**

23 **that the sentence begins, as a general rule.**

24 **And the very next section, 5.4.2, is titled**

25 **Under-Compliance and specifies at length the**

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1 **conditions under which one would use an**

2 **under-compliance baseline.**

3 **Q.** Let's just focus on the general rule for now, if

4 we could. Could you turn with me to page --

5 please, tab 32, which is the direct testimony of

6 Director Judson Turner.

7 **A. Yes, sir.**

8 **Q.** And have you seen this before?

9 **A. I don't believe that I have, no.**

10 **Q.** Now, sir, I would invite your attention to

11 pages 37 and 38.

12 **A. Yes.**

13 **Q.** If, sir, you're not familiar with this topic, I

14 would invite you to read paragraphs 125 and 127

15 on page 37, please.

16 **A. Not -- just 125 and 127?**

17 **Q.** You can read it all, if you like; but I'm trying

18 to save you a little time.

19 **A. Yes.**

20 **Q.** All right, sir. Were you aware of this special

21 task force to investigate roughly 90,000

22 illegally-irrigated acres?

23 **A. I had heard about the task force. It was**

24 **recently established; correct.**

25 **Q.** And you agree with me, wouldn't you, that if you

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1 were doing your analysis today, you would have to

2 understand whether or not these were truly in

3 compliance. Right?

4 **A. Well, you know, as an economist, the first thing**

5 **I would say is that I'll recognize that there is**

6 **disagreement between Florida and Georgia**

7 **regarding how much acreage is permitted or not.**

8 **From an economic perspective, the right**

9 **economic analysis is going to take account of the**

10 **cost of reducing the irrigation water whether**

11 **that acreage is permitted or not because either**

12 **way, it's a cost. So it would not actually**

13 **change my economic analysis of the benefits and**

14 **costs of the proposed remedies.**

15 **Q.** Don't you think that the State of Georgia ought

16 to enforce its laws?

17 **A. You know, as a matter of -- I have no expertise**

18 **to say who should do what.**

19 **Q.** Okay. But you have expertise in evaluating costs

20 and benefits. And at least as a general matter,

21 you would want to understand what compliance with

22 Georgia law actually means. Right?

23 **A. Yes. I'm simply saying as a matter of economics,**

24 **for a good benefit-cost analysis, I would not**

25 **be giving due credit to the proposals from**

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1 **Dr. Sunding if I were to ignore this. So I**

2 **take -- I would, nevertheless, take into account**

3 **what are the real costs, whether it's permitted**

4 **or not.**

5 **If you were to press me to say -- in the**

6 **interest of time here, to press me to say -- to**

7 **hypothesize about eliminating the costs, then my**

8 **response would be then what we would need to do**

9 **is to eliminate the cfs impacts as well.**

10 **Q.** Well, if you enforce the law and it reduces the

11 cfs impact, that's a benefit to the State of

12 Florida; isn't it?

13 **A. No. They would both come out, because you're**

14 **putting into it the baseline.**

15 **A fundamental principle, counselor, of**

16 **benefit-cost analysis is we use the same baseline**

17 **on the benefit side and the cost side.**

18 **Otherwise, all sorts of mischief can be done.**

19 **Q.** Well, let's just focus on one sentence, if we

20 could, sir. It says in paragraph 27, the initial

21 stages of the task force's activities will focus

22 on those acres that have the greatest impact on

23 streamflow.

24 Do you see that, sir?

25 **A. I'm sorry. I was pouring myself some water.**

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1 Q. Oh, yes. Please do.
 2 I'm in the third --
 3 A. **Yes.**
 4 Q. -- sentence.
 5 A. **I see the sentence. Thank you.**
 6 Q. And you don't know exactly what the task force is
 7 doing at this point; do you?
 8 A. **I don't know about their activities right now,**
 9 **no.**
 10 Q. You don't even know how the task force is
 11 composed; do you?
 12 A. **I don't believe I do. I don't remember.**
 13 Q. Do you think the task force is likely composed of
 14 enforcement personnel that have experience
 15 enforcing Georgia law?
 16 A. **I won't speculate. I don't know who would be on**
 17 **the task force. It might be speculators --**
 18 **pardon me. It might be stakeholders.**
 19 Q. I hope not.
 20 A. **I didn't mean speculator. As you would say,**
 21 **strike that.**
 22 Q. I have on occasion said that.
 23 A. **Yes.**
 24 **So it might be stakeholders. I don't know**
 25 **who is on the task force, sir.**

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1 **agricultural engineering are the two that stand**
 2 **out at the moment to me.**
 3 Q. Do you know if any of these individuals have any
 4 experience at all with compliance or enforcement
 5 of Georgia law?
 6 A. **I don't have any way of speculating about that.**
 7 Q. Do you see the name Gerald Long, president of
 8 Georgia Farm Bureau in there?
 9 A. **Yes. I do.**
 10 Q. Do you know that the Georgia Farm Bureau has
 11 filed an amicus brief in this case taking a
 12 position on whether or not Florida should get
 13 more water?
 14 A. **No. I don't know anything about any of the**
 15 **amicus briefs.**
 16 Q. There is a nice dream sequence portrayed in it.
 17 Have you seen that amicus brief?
 18 A. **No.**
 19 Q. You haven't seen that?
 20 A. **No.**
 21 Q. Okay. You have looked at regulations and have
 22 assessed baselines with compliance and
 23 noncompliance in law in the past; haven't you?
 24 A. **I mean, in different -- I want to answer**
 25 **accurately. In different analyses that I have**

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1 Q. Well, let's see who is on the task force; and
 2 then we can evaluate whether it's likely they
 3 will actually enforce the law.
 4 A. **Yes.**
 5 Q. So let's turn to tab 35, FX-921.
 6 A. **Yes, sir.**
 7 Q. And I would invite you to just read through this
 8 document, if you could. It begins with, whereas,
 9 the agricultural permitting task force was
 10 established.
 11 A. **Uh-huh.**
 12 Q. Do you see that?
 13 A. **Yes.**
 14 Q. And just go ahead and read it. It's called a
 15 compliance task force.
 16 A. **Yes.**
 17 Q. All right, sir. Do you notice that there are
 18 quite a number of farming interests on this list
 19 of members of the task force -- on the compliance
 20 task force?
 21 A. **Yes. It seems to be a mix of farmers or farm**
 22 **representatives, government agencies, and**
 23 **academics, several professors.**
 24 Q. Several professors of agriculture?
 25 A. **Of water resource management and policy and of**

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1 **done, I have sometimes assumed compliance and**
 2 **sometimes assumed noncompliance, particularly**
 3 **because some regulatory proposals or policy**
 4 **proposals are specifically intended to target a**
 5 **situation in which there's previously been**
 6 **noncompliance. So you don't want to assume full**
 7 **compliance for that.**
 8 Q. All right. Let's talk a little bit further about
 9 compliance, but let's move to tab 36 to do that.
 10 And it's Joint Exhibit 21. Do you see that, sir?
 11 A. **Yes, sir.**
 12 Q. And I'm not going to spend a huge amount of time
 13 on this document because we have spent a lot of
 14 time in this case on this document. So I'm only
 15 going to look at a couple very specific things.
 16 And I invite your attention to page 38, if I
 17 might, first.
 18 A. **Yes, sir.**
 19 Q. Now, do you see there where it says -- there's a
 20 reference to the Groundwater Use Act about midway
 21 down the page?
 22 A. **Yes.**
 23 Q. And then it says, the Regional Water Development
 24 and Conservation Plan. Do you see that?
 25 A. **In bold.**

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1 Q. Yes. And then it says, such plan shall include
 2 water development conservation and sustainable
 3 use. Do you see that, sir?
 4 A. **Yes, I do.**
 5 Q. And then after that in the next sentence, upon
 6 adoption of a regional plan, all permits issued
 7 by the Division shall be consistent with that
 8 plan. Do you see that, sir?
 9 A. **Yes, I do.**
 10 Q. Do you remember during your deposition we focused
 11 on the sustainable use criteria in the Upper
 12 Flint and the Lower Flint Basin. Right?
 13 A. **The two tables we looked at?**
 14 Q. The two tables. Right.
 15 A. **I do recall that.**
 16 Q. But when you did your economic analysis, you
 17 didn't assume compliance with those sustainable
 18 use criteria; did you?
 19 You assumed noncompliance?
 20 A. **So my understanding is that those were a modeling**
 21 **exercise and are not specifically requirements.**
 22 **So for those and other reasons, I didn't look at**
 23 **them.**
 24 Q. All right. Well, we looked at the Groundwater
 25 Use Act. Let's shift now to page 12 in your
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1 prefiled direct, if we might.
 2 A. **Yes.**
 3 Q. And there I would like to look at what is called
 4 Stavins demo 5. Do you see that, sir?
 5 A. **Yes, I do.**
 6 Q. And this seems peculiar to me, at least. Maybe
 7 to others. But do you see under peanuts there,
 8 the return per acre is almost always negative?
 9 A. **Yes, I do.**
 10 Q. And that's because this graph here, Stavins
 11 demo 5, doesn't take into account federal
 12 subsidies or price support for peanuts; does it?
 13 A. **That's correct. I state that in my footnote.**
 14 Q. Well, it's more than just peanuts; isn't it?
 15 You didn't take into account price or other
 16 financial aid from the federal government to
 17 farmers for any crop; do you?
 18 A. **That's correct.**
 19 Q. All right. And, in fact, you don't take into
 20 account crop insurance of any kind; do you?
 21 A. **Right. Neither the -- I don't believe I take**
 22 **into account the cost, and certainly not the**
 23 **payments.**
 24 Q. All right, sir. You realize that farmers can
 25 get, with a federal subsidy to their premium
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1 payments, crop insurance for yield loss and crop
 2 insurance for crop loss. Right?
 3 A. **So this is very similar to something we were**
 4 **discussing a few moments ago. If it is**
 5 **subsidized, the money is coming from somewhere.**
 6 **It is still a cost. In this case, it might be a**
 7 **cost to the federal government. And if it --**
 8 Q. It might be a cost to me and you; right?
 9 A. **Exactly. It comes out of tax revenues.**
 10 Q. Right.
 11 A. **So it's still a cost.**
 12 Q. Have you taken the time to go back and look and
 13 see how much the federal government subsidizes
 14 farming in the State of Georgia?
 15 A. **Do you mean empirically to look historically at**
 16 **what the actual payments have been?**
 17 Q. Well, how about the payments for last year?
 18 A. **For the last year, no; I haven't done that.**
 19 Q. Would it surprise you to learn that more than a
 20 quarter billion dollars has been provided to
 21 farmers of crops in Georgia by the federal
 22 government --
 23 A. **Well --**
 24 Q. -- last year?
 25 A. **-- it would neither surprise me or not surprise**
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1 **me because I don't have a basis for comparing it.**
 2 Q. Isn't it relevant when you're talking about the
 3 loss that might be incurred by farmers from
 4 reducing irrigation to think about the impacts of
 5 all these federal payments?
 6 A. **Let me distinguish. This is an important point.**
 7 **If we're looking at -- comparing the benefits**
 8 **to the costs, which is the overall thrust of my**
 9 **work, then that subsidy ought to be included**
 10 **because it -- it's coming from somewhere. And**
 11 **it's a wash. It's going to be a cost to you, and**
 12 **then maybe it's a benefit to the farmers.**
 13 **If we were looking at it in distributional**
 14 **terms, then it could matter; but I would still**
 15 **have to trace through where that money from the**
 16 **federal government is -- you know, is coming**
 17 **from.**
 18 Q. Well, sure. And I would invite you to do that.
 19 The last day of trial it would be kind of hard
 20 now.
 21 A. **Yes.**
 22 Q. But can you turn with me to page 56 of your
 23 prefiled direct testimony, and in particular
 24 Stavins demo 19.
 25 A. **Yes, sir.**
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1 Q. And there you will find a chart titled Comparison
 2 of Conservation Scenarios Costs and Streamflows.
 3 Do you see that, sir?
 4 A. That's -- yes.
 5 Q. Now, where did you get your information about
 6 streamflow?
 7 A. So the -- it depends on which ones you're looking
 8 at. The streamflow for Sunding's are from
 9 Sunding's testimony from his February, his May,
 10 and his prefiled direct, I believe. The ones
 11 from my own are from the analysis that I have
 12 carried out.
 13 So, for example, the one that you may well
 14 remember, just to trigger, you know, the memory,
 15 if you look at the second of mine where it
 16 says, full deficit irrigation, row crops only,
 17 the 678 was -- that was the point at which in my
 18 analysis -- do you recall the table -- actually
 19 ran out of available land.
 20 Q. I remember your tables. So --
 21 A. That's where that comes from, sir.
 22 Q. But you're not the hydrologist that did this
 23 analysis? You're not a groundwater hydrologist?
 24 A. No. I drew -- I drew on the experts in hydrology
 25 for the input to that, yes.

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1 Q. So which expert did you get your cfs modeling
 2 information from?
 3 A. So the cfs, the impacts were -- were drawing on
 4 Sunding's work and then modifying the acreage
 5 that would apply. That was, I believe, from
 6 Dr. Panday.
 7 Q. And did you use Dr. Panday's and Dr. Bedient's
 8 numbers about surface and groundwater?
 9 A. For connectivity?
 10 Q. Yes.
 11 A. For the connectivity I believe I was using maybe
 12 the same as Sunding's. The difference ways in
 13 terms of the seasonal impact factor, I believe.
 14 Q. Well, let me ask you this. There is an analysis
 15 that I'm sure you had to employ about how much
 16 water would flow down the Apalachicola.
 17 And these are your numbers. Right?
 18 A. Yes.
 19 Q. 616, 678 --
 20 THE REPORTER: Okay. Wait a minute.
 21 BY MR. PERRY:
 22 Q. -- 682, and 855.
 23 I'm looking at the clock. I'm almost done.
 24 Sir, did you rely on Dr. Bedient's analysis
 25 in his running of ResSim to get these very

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1 specific numbers?
 2 A. Actually, I can explain it. These numbers come
 3 out of the simulations that I was doing having
 4 made what I thought were appropriate adjustments
 5 to Dr. Sunding's analysis.
 6 Q. Okay. And those simulations didn't include all
 7 of the information that, and we talked about
 8 earlier, that you didn't analyze. Right?
 9 A. In terms of other measures, this particular one
 10 is only looking at full deficit irrigation.
 11 Correct.
 12 Q. Okay. Thank you, sir.
 13 There is one issue -- one very short issue
 14 that I just want to approach; and it has to do
 15 with outdoor water use --
 16 A. Correct.
 17 Q. -- in metro Atlanta. And I believe you estimated
 18 that there would be a huge cost associated with
 19 cutting outdoor water use by, say, greater than
 20 50 percent or 75 percent in a severe drought; is
 21 that right?
 22 A. So it turns -- that cost turns up tremendously
 23 between 50 percent and 75 percent; and you see
 24 the result in this table.
 25 Q. Here is my question. You know, putting the

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1 difficult parts of your calculations aside for a
 2 moment, how much do you really think a homeowner
 3 would pay per month to irrigate a lawn during a
 4 drought?
 5 A. So, you know, I'm not going to speculate on that.
 6 This is not only about, you know, irrigating
 7 lawns. This is all outdoor water use.
 8 Q. Right. But the vast majority of what Sunding --
 9 Dr. Sunding focused on was irrigating lawns.
 10 A. Yes.
 11 Q. So do you think that -- and I'm thinking about
 12 your number. Do you think that there are many of
 13 your neighbors that would pay two or \$3,000 a
 14 month to keep their lawn green during the summer?
 15 A. I don't want to speculate.
 16 Q. Okay. Thank you, sir.
 17 REDIRECT EXAMINATION
 18 BY MR. PRIMIS:
 19 Q. Good afternoon, Dr. Stavins.
 20 A. Good afternoon.
 21 Q. I would like to take one large step back, and can
 22 you just introduce yourself to the Special Master
 23 and explain your educational background and what
 24 you do for a living.
 25 A. Sure. So I'm Robert Stavins. I'm the Albert

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1 **Pratt Professor of Business and Government at the**
 2 **John F. Kennedy School of Government at Harvard**
 3 **University. I direct the Harvard environmental**
 4 **economics program. All of my research is on**
 5 **environmental and natural resource economics,**
 6 **agricultural economics, and water resource**
 7 **economics being a subset of that.**
 8 **Q.** And, Dr. Stavins, in connection with your work in
 9 natural resource economics, have you worked with
 10 government entities?
 11 **A. I have worked with government entities in a**
 12 **variety of capacities. One of them was that I**
 13 **was appointed by Carol Browner, the administrator**
 14 **of the Environmental Protection Agency in the**
 15 **Clinton administration and reappointed by**
 16 **Christine Todd Whitman, the administrator of EPA**
 17 **in the George W. Bush administration to be**
 18 **chairman of the Environmental Economics Advisory**
 19 **Committee at the Environmental Protection Agency.**
 20 **Q.** How long did you hold that position for?
 21 **A. I believe -- I was on the committee for probably**
 22 **15 years and held the position for perhaps seven**
 23 **or eight until I hit a statutory limit.**
 24 **Q.** Dr. Stavins, can you describe what you do as a
 25 natural resource economist. What is the field?

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1 **A. So the field of -- I'll say broader,**
 2 **environmental and natural resource economics is**
 3 **to carry out economic analysis of environmental**
 4 **and natural resource phenomenon, in particular**
 5 **proposed public policies and regulations with**
 6 **particular attention whether or not those**
 7 **proposed policies or regulations or remedies will**
 8 **be efficient, meaning a comparison of the**
 9 **benefits and the costs.**
 10 **Q.** And Mr. Perry asked you some very specific,
 11 narrowly-focused questions. What was your task
 12 in this case?
 13 Getting kind of out of the weeds, what was
 14 the task?
 15 **A. So my broad task was to examine economic issues**
 16 **that bear upon the fundamentals of the case,**
 17 **i.e., the equitable apportionment of water**
 18 **between the two states and to give particular**
 19 **attention to Dr. Sunding's analysis and**
 20 **Dr. Daniel Phaneuf's analysis.**
 21 **Q.** You mentioned Dr. Phaneuf. We haven't really
 22 heard that name, I think, other than maybe in my
 23 opening. Who is that?
 24 **A. So he had submitted an expert report in February,**
 25 **but I believe he has not been called to testify.**

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1 **Q.** Now, in connection with your work in this case,
 2 did you study the economic activity in the ACF
 3 Georgia portion of the basin?
 4 **A. Yes, I did.**
 5 **Q.** And we can --
 6 MR. PRIMIS: We have prepared some
 7 demonstratives, your Honor, that -- if you
 8 want to flip through these, it will move it
 9 along.
 10 BY MR. PRIMIS:
 11 **Q.** Can you turn to demonstrative tab 1 in your book,
 12 Mr. Stavins.
 13 Did Mr. Reigstad --
 14 **A. I did not get a book.**
 15 **Thank you.**
 16 MR. PRIMIS: I was supposed to hand out
 17 the books out. I'm sorry.
 18 The record should be clear that was not
 19 Mr. Reigstad's fault.
 20 BY MR. PRIMIS:
 21 **Q.** So now turning to the substance, on demonstrative
 22 tab 1 could you tell us, sir, what you depict
 23 there.
 24 **A. So I'm looking at industries in the upper**
 25 **Chattahoochee region, so the region of**

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1 **metropolitan Atlanta essentially, that are**
 2 **particularly dependent upon access to water. So**
 3 **I looked at the top 10 manufacturing industries,**
 4 **where I'm characterizing the top 10 as the most**
 5 **water intensive; but I'm simply defining as**
 6 **spending the most on water. And you can see that**
 7 **for them, their total output per year is**
 8 **approximately 29 or \$30 billion, total employees**
 9 **over 35,000.**
 10 **There are also what we call green industries.**
 11 **These are industries that may not be water**
 12 **intensive themselves; they're not using water,**
 13 **but their business is associated with people who**
 14 **use water. Prime example, of course, would be**
 15 **landscaping services. And if we look at that, we**
 16 **find an additional \$964 million of output per**
 17 **year, 14,000 employees.**
 18 **So the total of these two categories in the**
 19 **upper Chattahoochee is about \$31 billion of**
 20 **annual output and close to 50,000 employees.**
 21 **Q.** Did you study the extent of agricultural economic
 22 activity in the -- just to be clear, this is
 23 M & I water use --
 24 **A. That's correct.**
 25 **Q.** -- in the metro Atlanta area?

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1 **A. Yes. This is exclusively M & I water use in the**
 2 **Atlanta metropolitan area.**
 3 **Q.** So let's turn to tab 2 and look at economic
 4 output and activity in the agricultural sector
 5 that uses water. Can you tell the Court what you
 6 found when you looked there?
 7 **A. So when we looked at the commercial value of**
 8 **agriculture within the ACF region of Georgia,**
 9 **if we first look at row and forage crops, we**
 10 **see \$1.3 billion in commercial value per year.**
 11 **And then if we extend that to look at all**
 12 **agricultural commodities -- so I repeat the**
 13 **1.3 billion in the second set, so we can add**
 14 **them up -- see that grand total comes to close**
 15 **to \$5 billion annually of commercial value.**
 16 **Q.** Dr. Stavins, the term benefit-cost analysis came
 17 up several times on your cross-examination. Do
 18 you recall that?
 19 **A. Yes, I do.**
 20 MR. PRIMIS: And Mr. Perry, like me,
 21 knows that when you talk to Dr. Stavins, you
 22 call it a benefit-cost analysis, not a
 23 cost-benefit analysis.
 24 BY MR. PRIMIS:
 25 **Q.** Is that correct?

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1 **greatest experience is, it's core to activities**
 2 **in the following sense. So all regulations that**
 3 **are above a threshold cost of \$100 million per**
 4 **year are required to carry out what is called a**
 5 **regulatory impact analysis and submit it to the**
 6 **U.S. Office of Management and Budget, Office of**
 7 **Information and Regulatory Affairs for approval.**
 8 **To guide that effort OMB has developed Circular**
 9 **A-4 which provides the framework to be used.**
 10 **The other highlight I would mention would be**
 11 **at the U.S. Environmental Protection Agency.**
 12 **There, we also already saw -- and counselor**
 13 **referred to them -- the economic analysis**
 14 **guidelines. Those are in my opinion the best**
 15 **guidelines that exist now in the federal**
 16 **government in any of the departments and agencies**
 17 **of how to do a regulatory impact or benefit-cost**
 18 **analysis.**
 19 **Q.** Dr. Stavins, one thing we discussed with
 20 Dr. Sunding is whether it's appropriate to value
 21 alleged ecological benefits. How do you approach
 22 that situation?
 23 **A. Well, so it is not always easy; but it is fully**
 24 **appropriate. Indeed, there is a very large**
 25 **literature in academia, and I would estimate**

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1 **A. That's correct, yes.**
 2 **Q.** So I'll stick with your term.
 3 **A. Thank you.**
 4 **Q.** Can you explain what you mean by a benefit-cost
 5 analysis?
 6 **A. So a benefit-cost analysis, which is absolutely**
 7 **central to economics broadly, and as well to**
 8 **environmental and natural resource and**
 9 **agricultural economics, is an assessment of the**
 10 **economic value of the benefits of a proposed**
 11 **policy compared with the cost of the proposed**
 12 **policy. In order to look at the benefits and the**
 13 **costs, we have to look at a change in both cases.**
 14 **Typically, a change from the status quo or**
 15 **business as usual to what the world will be like**
 16 **if the policy goes into effect, both on the**
 17 **benefit side and the cost side.**
 18 **Q.** Is this an accepted methodology in your field?
 19 **A. Absolutely. The literature goes back 75 years.**
 20 **It's the core central of economics.**
 21 **Q.** How about government literature? Anything from
 22 the government supporting this idea of a
 23 benefit-cost analysis when looking at changed
 24 environmental policies or proposals?
 25 **A. So certainly in the federal government where my**

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1 **thousands of articles, maybe tens of thousands of**
 2 **articles of developing methodologies and applying**
 3 **methodologies for estimating the benefits**
 4 **associated with ecological impacts.**
 5 **Q.** Did -- have you -- you have reviewed the Florida
 6 expert work on economics in the case. Right?
 7 **A. Yes, I have.**
 8 **Q.** Have any of Florida's experts, whether they
 9 submitted testimony or were not put forward to
 10 submit testimony -- did any of them conduct a
 11 benefit-cost analysis of Dr. Sunding's proposed
 12 conservation measures?
 13 **A. No. I don't believe that I have seen a**
 14 **benefit-cost analysis in any case.**
 15 **Q.** Is that significant to you in this case?
 16 **A. Well, I was very surprised by it, to be, you**
 17 **know, honest. The first thing I thought I would**
 18 **see from Florida would be a comparison of**
 19 **benefits and costs.**
 20 **Q.** Did you perform a benefit-cost analysis in the
 21 case?
 22 **A. Yes, I did.**
 23 **Q.** Can you turn to demonstrative 3.
 24 **A. Yes.**
 25 **Q.** Does this reflect your benefit-cost analysis?

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1 **A. Yes. It does.**

2 **Q.** Can you describe what's depicted here on

3 demonstrative 3?

4 **A. So what I'm illustrating here are the costs in**

5 **the red bar, and then I'll take you to the**

6 **benefits in a moment.**

7 **At the very first part of the bar, these**

8 **are three of the remedies, the measures that**

9 **Dr. Sunding had proposed. I estimated that the**

10 **row crop irrigation reduction, which he tends to**

11 **refer to as deficit irrigation, would cost**

12 **annually \$335 million. That's in terms of lost**

13 **profitability to agriculture.**

14 **And for outdoor water use reduction, I**

15 **estimated that the cost of a 50 percent**

16 **reduction, which is one of the remedies of three**

17 **different ones that I believe Dr. Sunding has**

18 **looked at, it would be a \$445 million cost. That**

19 **is not a simple financial cost. That is**

20 **something which is just as meaningful, which is a**

21 **welfare cost, a welfare impact. Again,**

22 **mainstream economics.**

23 **And then the last, the \$34 million, is the**

24 **cost of leak abatement. And this is more in**

25 **terms of the technologies that are required in**

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1 **the practices.**

2 **Q.** And what does that total up to about?

3 **A. So that comes out to a bit more than \$800 million**

4 **per year.**

5 **Q.** And, Dr. Stavins, you have a line for benefits to

6 Florida. But you said that no one on the Florida

7 side calculated that. Right?

8 **A. So they didn't do the calculation and certainly**

9 **didn't compare benefits to costs; but some of the**

10 **Florida experts on -- in the biophysical side of**

11 **things as well as Georgia experts did make**

12 **estimates. And although the Florida experts did**

13 **not provide estimates of most things, one that I**

14 **could work with, and so did, was Dr. Jenkins's**

15 **estimates of what would be the impact, not of one**

16 **of the proposed Sunding remedies but, rather, of**

17 **eliminating all use of water whatsoever by the**

18 **State of Georgia. And he then predicted from**

19 **that what would be the increase in the biomass of**

20 **oysters and blue crab?**

21 **I then, through a series of what I think are**

22 **quite conservative assumptions, priced that out.**

23 **What did that translate into in terms of**

24 **increased profitability to the people who are**

25 **gathering the oysters and the crab?**

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1 **And when you look at that on an annualized**

2 **basis, it comes out to \$40,000 per year, having**

3 **adjusted it for one of the Sunding remedies.**

4 **Q.** Now, Dr. Stavins, Florida alleges harm to a

5 number of species other than oysters and blue

6 crabs. And I think you said that you assumed or

7 believed that the value of that other alleged

8 harm is de minimis. Correct?

9 **A. So the reason why I do not include those**

10 **benefits here is that no estimates that I could**

11 **translate were provided by Florida. And in my**

12 **communications and my reliance upon other**

13 **experts, it -- they demonstrated that the impacts**

14 **in biophysical terms were trivial or in the**

15 **language, de minimis. And, therefore, I**

16 **interpret that quite directly as the economic**

17 **benefits would be de minimus.**

18 **Q.** Dr. Stavins, what, if any, conclusions did you

19 reach based on the benefit-cost analysis you have

20 laid out here in demonstrative No. 3?

21 **A. Well, the conclusion I reached, the inescapable**

22 **conclusion, is a more dramatic one than one**

23 **normally sees in a benefit-cost analysis; that**

24 **is, that it's not even close, that the annual**

25 **cost of the proposed remedy of this particular**

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1 **scenario -- but we have seen it from other**

2 **scenarios -- are over \$800 million a year and**

3 **benefits that, I think it's fair to say, are de**

4 **minimis.**

5 **That means that the net benefits, the**

6 **benefits minus the cost, would be on the order of**

7 **negative \$800 million a year. In other words,**

8 **the proposed remedy would be making society worse**

9 **off.**

10 **Q.** Dr. Stavins, I want to come back to this point

11 about the ability to value environmental

12 resources. I'm going to read from Dr. Sunding's

13 testimony. It's paragraph 95.

14 And you have read that. Right?

15 **A. I probably have.**

16 **Q.** He says, it is beyond the bounds of mainstream

17 economic science to estimate the monetary value

18 of the purple bankclimber mussel or salinity

19 gradients in Apalachicola Bay or disrupting of --

20 or disruption of longstanding cultural and social

21 relationships in oystering communities, let alone

22 to monetize the value of changes in these

23 resources, as Dr. Stavins would have us do.

24 Do you recall him saying that?

25 **A. Yes.**

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1 **Q.** And what's your view on that?

2 **A. Well, I was very, very surprised to read that.**

3 **There are entire literatures in environmental**

4 **economics, again, going back 50 years or more**

5 **looking at methods that can be used and have been**

6 **used repeatedly in published, refereed journal**

7 **articles and documented in dozens of books for**

8 **valuing in economic terms the benefits that would**

9 **be forthcoming from ecological services in**

10 **general ecologies. So I found it very, very**

11 **surprising.**

12 **Q.** Dr. Sunding also testified at the trial that

13 Florida has spent something like almost half a

14 billion dollars to preserve the Apalachicola

15 River and Bay, and that that's an indicator of

16 the value of the resources there. Do you recall

17 that testimony?

18 **A. I do recall that.**

19 **Q.** Do you agree that these expenditures that Florida

20 has made to purchase land in the Apalachicola Bay

21 region are an indicator of value for the

22 Apalachicola River and Bay?

23 **A. No. I strongly disagree with that.**

24 **Indeed, in the environmental economics course**

25 **that I have been teaching at Harvard for about 25**

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1 **A. My recollection is that it's 50 years.**

2 **Q.** And did Dr. Phaneuf actually annualize that

3 value?

4 **A. Yes. Dr. Phaneuf took a similar approach, which**

5 **I critiqued previously. And he estimated that**

6 **the annual amount was \$25 million.**

7 **Q.** And how does that \$25 million per year figure

8 compare to the cost that you have estimated that

9 would accrue to Georgia from Dr. Sunding's remedy

10 scenarios?

11 **A. Well, whether or not we call it de minimis, we**

12 **would certainly call it vastly smaller than the**

13 **\$800 million.**

14 **Q.** Now, Dr. Stavins, Dr. Sunding presented a chart.

15 And I don't know if Mr. Smith can call it up.

16 It's table 4 of his direct at 44.

17 I don't want to take the time to pass it

18 around, but we have got it on the screen.

19 **A. Yes.**

20 **Q.** And do you see that for a number of proposed

21 conservation measures, he has an incremental

22 fiscal cost per year of zero?

23 **A. Yes, I see that.**

24 **Q.** And this is from his 2,000 cfs scenario.

25 Correct?

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1 **years now, actually there is a segment in one of**

2 **my lectures which is dedicated to explaining why**

3 **looking at such costs are not an adequate measure**

4 **of the benefits. Indeed, they are an example of**

5 **what I think it's fair to say is committing the**

6 **most egregious error in a benefit-cost analysis;**

7 **it's confusing the costs and the benefits.**

8 **Those are the costs of preserving the land.**

9 **They are not the benefits of preserving the land.**

10 **Q.** Does -- even taking Dr. Sunding at his word that

11 it's half a billion dollars in value, did he

12 estimate the change in value based on any conduct

13 by Georgia?

14 **A. So even if that were a correct measure of**

15 **benefits, which it categorically is not, one has**

16 **to look at what is the change in the value of**

17 **that land as a result of one of the remedies,**

18 **because it's not as if the land is going to**

19 **totally disappear and then is preserved as a**

20 **result of the remedy. So you have to look at the**

21 **impact.**

22 **Q.** Did anybody do that?

23 **A. No.**

24 **Q.** And what's the time frame for Dr. Sunding's

25 estimate of almost half a billion dollars?

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1 **A. Correct.**

2 **Q.** Do you believe that undertaking these scenarios

3 would have zero cost to Georgia?

4 **A. No. I don't believe that. And for some of them,**

5 **in his previous materials submitted as part of**

6 **his case, he actually did have positive costs, as**

7 **I recall.**

8 **Q.** Were they significant positive costs that

9 Dr. Sunding previously estimated?

10 **A. Yes.**

11 **Q.** And Dr. Sunding testified that it was appropriate

12 to assign zero cost to these because such costs

13 are associated with implementation of Georgia's

14 own existing policies.

15 I think Mr. Perry asked you about this, but

16 I'm not sure you had a chance to fully explain

17 your view on that.

18 **A. So I think it's an important point that we**

19 **previously discussed that whether or not there is**

20 **a policy to do something, there is still a cost**

21 **associated with it. If one wishes to remove it**

22 **from the baseline on the cost side, then we have**

23 **to take out the cfs numbers that are there as**

24 **well.**

25 **I would think the best thing to do is to keep**

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1 **it in place for both. To have the cfs numbers,**
 2 **which would be on the potential benefits if they**
 3 **were properly monetized, and also to have the**
 4 **proper cost numbers.**
 5 Q. Okay. Let's shift gears now, and I want to
 6 discuss irrigation in Georgia and ask you did you
 7 analyze the yield impact on crop yields if you
 8 eliminate irrigation on various crops in the ACF
 9 Basin?
 10 A. Yes, sir.
 11 Q. Can you turn to demonstrative No. 4.
 12 A. Yes.
 13 Q. What does demonstrative 4 show?
 14 A. So this is looking at the impact of irrigation
 15 within ACF Georgia on the yields of three -- the
 16 three principal crops, cotton, peanuts, and corn.
 17 And you can see that in the case of cotton, for
 18 example, with irrigation in a dry year, the
 19 anticipated yield from experimental farm data --
 20 this is empirical data, not modeling -- is 1500
 21 bushels -- pardon me, pounds approximately. It
 22 drops to 329 pounds, again, from empirical
 23 experimental data, if there is lack of
 24 irrigation.
 25 **And then similarly for peanuts, 5,050 drops**
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1 **to 2,471. And in the case of corn, it's even**
 2 **more dramatic going from 183 bushels now down to**
 3 **13 bushels.**
 4 **So the percentage differences for cotton,**
 5 **peanuts, and corn are respectively 78 percent**
 6 **drop, 51 percent drop, and 93 percent drop.**
 7 Q. In this chart, which comes from your direct
 8 testimony at page 11, you're comparing irrigation
 9 versus dry-land farming. Correct?
 10 A. That's correct.
 11 Q. So that's no irrigation?
 12 A. That's correct.
 13 Q. Just looking -- leaving it to rain?
 14 A. That's correct.
 15 Q. And Mr. Perry asked you about 66 percent and
 16 33 percent and whether you had looked at those.
 17 Do you recall that?
 18 A. Yes, I do.
 19 Q. And I think you were trying to make a point about
 20 whether that's feasible or not. And he told you
 21 you could wait for me to come up.
 22 So I'm here. What were you trying to say
 23 about the feasibility?
 24 A. So what I wanted to explain was that
 25 **Dr. Sunding's approach under his deficit**
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1 **irrigation specified an ideal, a remarkable**
 2 **ideal, which would be a cost-effective allocation**
 3 **across 2,000 different combinations of**
 4 **connectivity, soil type, 10 percent increments of**
 5 **reducing irrigation, and crop type.**
 6 **I don't see that the government could achieve**
 7 **that for reasons we can discuss. And, therefore,**
 8 **I wanted to -- in order to estimate cost, to**
 9 **estimate what are sensible costs of what it**
 10 **would actually -- of what is a remedy that**
 11 **could be used and the one that was closest to**
 12 **Dr. Sunding's, because I wanted to stick close to**
 13 **what he was doing, was one in which it would be**
 14 **what is now being discussed in terms of**
 15 **irrigation buy-back, although we were talking on**
 16 **an annual basis. In other words, land being**
 17 **either irrigated or nonirrigated. And so I**
 18 **looked at that in terms of these differences in**
 19 **yield.**
 20 Q. Now, Dr. Stavins, did you also look at the
 21 percentage of crop production in terms of
 22 irrigated acres in the ACF Basin?
 23 A. Yes, I did.
 24 Q. Because there's been a lot of debate and
 25 discussion about whether irrigation is necessary
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1 or discretionary and its relative value. How did
 2 you try and get at that issue?
 3 A. Well, I'll tell you, counselor, I had never
 4 before in an economic analysis heard this word
 5 discretionary used. Almost every input to
 6 production for most goods and services is
 7 ultimately discretionary. The key issue is if I
 8 don't have that input or I reduce the amount of
 9 that input I use, what does that do to benefits?
 10 What does that do to costs?
 11 So I didn't see in the first place that
 12 pointing out that there were some -- there was
 13 some acreage that didn't use irrigation was
 14 telling me that it's, therefore, discretionary.
 15 Q. Can you turn to demonstrative 5, please.
 16 A. Yes.
 17 Q. And explain what you have shown there.
 18 A. So looking -- even if we think that making these
 19 kinds of comparisons says something about whether
 20 it's discretionary or not, looking at either the
 21 number of farms or the number of acres is
 22 potentially very misleading. What I want to look
 23 at is what percentage of the production of those
 24 crops is coming from an irrigated acre as opposed
 25 to a nonirrigated acre. So that's what I have
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1 done.

2 **And here you see, therefore, that from the**

3 **empirical data from ACF Georgia, that 94 percent**

4 **of the corn was coming from irrigated production,**

5 **77 percent of the cotton, and 63 percent of the**

6 **peanut production.**

7 Q. What does that tell you as an economist?

8 A. **So that tells me that irrigation plays an**

9 **exceptionally important role. We would have a**

10 **very large falloff of production and**

11 **profitability and huge impacts to agriculture**

12 **and, indeed, to consumers because prices would be**

13 **driven up.**

14 Q. Okay. Dr. Stavins, just two more short topics;

15 and I'll be done.

16 I now want to talk about the extent to which

17 Georgia irrigators underwater. Have you seen

18 Dr. Sunding's testimony about -- he's taken the

19 position in this case that there are a number of

20 Georgia farmers whose irrigation practices waste

21 water. Right?

22 A. **Yes.**

23 Q. And do you know how Dr. Sunding reached that

24 conclusion, and have you seen any evidence that

25 many Georgia farmers in fact underwater?

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1 **said -- that's the point of the irrigation that**

2 **brings about the maximum yield; and anything**

3 **above that he called overwatering -- then it**

4 **follows arithmetically from that that for the**

5 **years 2008 to 2013 there was underwatering by ACF**

6 **Georgia farmers that varied from almost 70**

7 **percent to close to 90 percent, as you can see in**

8 **this bar chart.**

9 Q. Okay. Now, the last issue, Dr. Stavins. I want

10 to ask you to explain the comparison you did

11 between the productivity of the water use on the

12 Georgia side and the amount of water that Georgia

13 uses as a percentage of the basin. And did you

14 prepare a demonstrative or two on that?

15 A. **Yes, I did.**

16 Q. Okay. Let's go to demonstrative No. 7 behind

17 tab 7.

18 A. **So even if we put aside for the moment the very**

19 **important comparison of benefits and costs, the**

20 **benefit-cost analysis, we can compare ACF Georgia**

21 **and ACF Florida in a variety of relevant ways.**

22 **The upper left-hand corner, the first comparison,**

23 **is in terms of land area, the square miles. And**

24 **what you can see here is that the land area of**

25 **ACF Georgia is five times the land area of ACF**

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1 A. **And usually, as economists, we don't use the word**

2 **waste. So that was a little surprising to me, I**

3 **suppose.**

4 **The way he reached that conclusion was**

5 **through a rather complex method of looking at**

6 **agricultural metering data and then matching that**

7 **up, matching two different data sources through a**

8 **geographical information systems, matching them**

9 **up to estimate the amount of water that was being**

10 **used in specific areas; and then he contrasted**

11 **that -- and there are errors in that by the way.**

12 **And then he contrasted that with what, from**

13 **yield curves -- synthesized yield curves, he**

14 **considered to be the maximum -- the amount of**

15 **water that would bring about the maximum yield.**

16 Q. Now, when you dug into Dr. Sunding's data, did

17 you actually see evidence that there were many

18 farmers that underwatered?

19 A. **Well --**

20 Q. Even using his analysis.

21 A. **If we take his analysis as given -- and I think**

22 **that there is -- is there a --**

23 Q. Yes. Let's go to tab 6, demonstrative No. 6.

24 A. **If you take his analysis as given, that there is**

25 **this one, single defined point, which is what he**

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1 **Florida.**

2 **Moving directly to the right, we find that**

3 **the population of ACF Georgia is fully 56 times**

4 **the population of ACF Florida.**

5 **Down at the lower left, employment, there are**

6 **80 times as many jobs on an annual basis in ACF**

7 **Georgia as in ACF Florida.**

8 **And, finally, what's in some sense putting**

9 **this together is looking at gross regional**

10 **product, so economic activity as traditionally**

11 **measured. And we find that the gross regional**

12 **product of ACF Georgia is 129 times that of ACF**

13 **Florida.**

14 Q. Dr. Stavins, with that information as a backdrop,

15 did you then look to see, relatively speaking,

16 how much water is used and how much -- in

17 comparison to how much flows down to Florida in

18 an aggregate basis?

19 A. **Yes, I did.**

20 Q. Can you go to demonstrative No. 8.

21 A. **So what we see here is a comparison of the water**

22 **that is consumptively used by ACF Georgia and the**

23 **amount of water which is available at the border**

24 **flowing into ACF Florida. And I do it for two**

25 **different measures here.**

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1 **The one on the left is the 10-year average**
 2 **over the years 2004 to 2013. And you can see**
 3 **that 4 percent of the water -- in green at the**
 4 **top -- 4 percent of the water was used**
 5 **consumptively by ACF Georgia, and 96 percent of**
 6 **the water was available on average over those 10**
 7 **years to Florida.**
 8 **If we look at a dry year -- indeed, an**
 9 **extremely dry year -- 2011, the numbers are still**
 10 **quite dramatic; and, namely, that in terms of**
 11 **consumptive use, Georgia used 8 percent of the**
 12 **available water, leaving 92 percent of the**
 13 **available water to flow going into Florida in the**
 14 **year 2011.**
 15 **Q.** Dr. Stavins, what conclusions do you reach based
 16 on the last two charts we just looked at about
 17 the current allocation of water in the ACF Basin?
 18 **A. Well, you know, comparing these two bar columns**
 19 **here of the amount of water used by Georgia and**
 20 **the amount of water that's available to Florida**
 21 **and comparing that to the size of the economies,**
 22 **the populations, the employment, the land area,**
 23 **they're completely reversed. And it seems to me,**
 24 **therefore, that to put it in general language,**
 25 **Florida is currently getting a very good deal.**

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1 **Q.** Thank you, Dr. Stavins.
 2 MR. PRIMIS: No further questions.
 3 RE-CROSS-EXAMINATION
 4 BY MR. PERRY:
 5 **Q.** All right, sir. Not much longer. Not much
 6 longer for any of us.
 7 Sir, let me just start with the figure you
 8 were just talking about. And you did an analysis
 9 of what the percentage would be in the summer of
 10 a drought year; didn't you?
 11 **A. And you're saying relative to this very last**
 12 **figure that was --**
 13 **Q.** Yes.
 14 **A. The comparison?**
 15 **Q.** Yes. You have got some very small numbers on
 16 here.
 17 **A. Yes.**
 18 **Q.** But you separately looked at what the summer
 19 would be; didn't you?
 20 **A. So I also looked at -- instead of the dry year of**
 21 **2011, if we look at the three driest months of**
 22 **2011, I believe June, July, and August.**
 23 **Q.** And that wasn't 4 percent or 8 percent; was it?
 24 **A. No. There, the ratio was 24 percent used by**
 25 **Georgia ACF and 76 percent available at the**

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1 **border for Florida.**
 2 **Q.** So what happens in the summer in the Flint Basin
 3 for agriculture? Is there a lot of irrigation in
 4 the summer?
 5 **A. Well, in years in which it's a dry year and**
 6 **there's less precipitation, then there's -- then**
 7 **there's substantial irrigation, yes.**
 8 **Q.** All right. So what we did, sir, was we took both
 9 the summer consumption numbers from Dr. Zeng --
 10 Zeng -- do you know him?
 11 **A. Yes.**
 12 **Q.** All right. And we also took the consumption
 13 numbers for Dr. Lettenmaier and Dr. Hornberger,
 14 the Florida experts. And we plotted them on a
 15 graph against the flow of the Apalachicola River
 16 in the summer of 2012. So I would like to --
 17 MR. PERRY: Your Honor, if I may
 18 approach to hand that out.
 19 **A. Thank you.**
 20 **Q.** Now, sir, on the demonstrative I just supplied
 21 you, the numbers with green bars are the numbers
 22 we got from the prefiled direct testimony of
 23 Dr. Zeng. And those are plotted against the
 24 actual flow at the Apalachicola Gage, which I
 25 think is what you were trying to represent at

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1 tab 8. Right?
 2 The percent of --
 3 **A. Yes.**
 4 **Q.** -- total flow?
 5 So this is a summer chart. And then, as you
 6 know, Florida's experts used a different model, a
 7 rainfall runoff model, which is the type of model
 8 recommended by Georgia Water Resources Institute,
 9 Dr. Georgakakos. And using that model, we got a
 10 higher number than Dr. Zeng got using his ResSim
 11 model and Dr. Bedient's.
 12 And you see these numbers on this chart are
 13 quite a bit higher than 4 or 8 percent; aren't
 14 they?
 15 **A. No. I believe, if I understand what you're**
 16 **saying -- and I won't get into debates among**
 17 **hydrologists. But if I understand what you're**
 18 **saying, this is for 2012, dry year, and the June,**
 19 **July, August was what I said was 24 percent. And**
 20 **that looks to me like that averages out to about**
 21 **24 percent used consumptively by Georgia.**
 22 **Q.** Sir --
 23 **A. Am I missing something perhaps?**
 24 **Q.** Yes. If the rainfall runoff model were to be
 25 a better selection of model than ResSim using

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1 the flood UIF's, then, of course, these numbers
 2 would mark a very, very significant percentage of
 3 the actual flows of the Apalachicola; wouldn't
 4 they?
 5 **A. I'm sorry. I don't actually -- this sounds like**
 6 **a -- forgive me -- a hydrological issue. I'm not**
 7 **following the difference.**
 8 **Q.** No, I understand, sir. I thought your testimony
 9 was that you looked at the percentage of flows
 10 that you thought that Georgia was consuming as a
 11 percentage of all the flows, that as an
 12 economist, you thought that those numbers were
 13 low.
 14 Well, what I'm suggesting here, Dr. Stavins,
 15 is that if you look at it as a hydrologist, it's
 16 quite a bit higher potentially using a particular
 17 type of model?
 18 **A. So I'll leave that to the hydrologist's approach.**
 19 **I mean, my approach to look at this is to think**
 20 **about the amount of water that's being, you know,**
 21 **used by Georgia for M & I and agriculture**
 22 **combined, versus the amount that's available to**
 23 **Florida at the border.**
 24 **Q.** Sir, may I invite your attention to tab 3 of the
 25 binder that Mr. Primis gave you. And I would

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1 like to talk to you about your benefit-cost
 2 analysis, if I could. Now --
 3 **A. Tab 3?**
 4 **Q.** Yes, I think it's tab 3. It's got a red bar on
 5 one side and nothing on the other.
 6 **A. My -- unless I'm wrong, my tab 3 is Nathan Deal.**
 7 **Q.** I'm asking you about the binder that Georgia gave
 8 you.
 9 **A. Oh, I'm sorry.**
 10 MR. PRIMIS: Also to help you out,
 11 Mr. Perry, we put it on the screen.
 12 MR. PERRY: Thank you.
 13 BY MR. PERRY:
 14 **Q.** Now, sir, you talked about a methodology that
 15 economists use to value something, which I think
 16 you would refer to as nonuse value. Right?
 17 **A. So it's both. There are use values and nonuse**
 18 **values. The use values would be things such as**
 19 **the financial impacts on oysters and also**
 20 **recreational being a use value, but also nonuse**
 21 **values, yes.**
 22 **Q.** Now, before I get into the way in which you
 23 did that, let me just ask you; you know that
 24 Dr. Phaneuf, who wasn't called, did not try to
 25 value all the nonuse or use values of the

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1 Apalachicola Basin; did he?
 2 **A. Well, he looked at -- I think -- my understanding**
 3 **is that what he was trying to do was to look at**
 4 **it in an economic -- from an economic perspective**
 5 **what the impacts were on Florida ecology. And he**
 6 **used a variety of methods to do that.**
 7 **Q.** But he -- he explicitly said in the first
 8 paragraph of his report that he was not
 9 attempting to assign value to all of the nonuse
 10 values, the intrinsic values, the natural values
 11 of the basin. Right?
 12 **A. So I'm willing to stipulate that. I don't recall**
 13 **the first sentence of the report.**
 14 **Q.** Okay. And he looked at some things, but he
 15 didn't look at everything. That's what you're
 16 stipulating. Right?
 17 **A. That's correct.**
 18 **Q.** Okay. Now, Dr. Sunding testified at length about
 19 nonuse values and, in particular, the concern of
 20 he and his colleagues at University of
 21 California, Berkeley about the method of
 22 contingent valuation, which is essentially what
 23 you're recommending as a method here. Right?
 24 **A. Well, I'm not recommending. It's far be it for**
 25 **me to recommend to Georgia what kind of analysis**

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1 **they should do. One of the two major methods for**
 2 **valuing nonuse value is contingent valuation; the**
 3 **other being conjoined analysis.**
 4 **Q.** Let's talk about the contingent valuation part.
 5 That is essentially a poll; right?
 6 Taking a poll of people who aren't
 7 particularly knowledgeable about the
 8 circumstances to see, when they're telephoned,
 9 what they think the value of the resource is.
 10 Right.
 11 **A. So I wouldn't refer to it as simply a poll. That**
 12 **makes it sound very, very naive. That's how**
 13 **horrible work would be done. And typically,**
 14 **they're not done by a telephone because of the**
 15 **bias and other problems that would introduce.**
 16 **Q.** There are -- there are a number, including the
 17 faculty at University of California, Berkeley --
 18 but there are a number of other highly reputable
 19 economists that believe that contingent valuation
 20 is hopeless; isn't that right?
 21 **A. So I would -- a number. There are -- there may**
 22 **be -- apparently Dr. Sunding is among them, and**
 23 **maybe other colleagues.**
 24 **What I can tell you, sir, is that although I**
 25 **have not done a survey of all the economics**

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1 **community, is that it is my opinion that the vast**
 2 **majority of environmental and natural resource**
 3 **economics participate in -- you know, in this**
 4 **literature; and they subscribe to the methods.**
 5 **These methods are central to environmental**
 6 **economics. They're not the fringe whatsoever.**
 7 **And they're taught at universities from Maine to**
 8 **California, and as well as at my own institution**
 9 **at Harvard.**
 10 **Q.** Did you take a poll here to do a contingent
 11 valuation?
 12 **A.** **No, I didn't take a poll; but I did look at --**
 13 **and consulted what other universities and faculty**
 14 **members that I hold in high regard are doing.**
 15 **Q.** Now, just to be a little more precise, what
 16 you're espousing is a process where a bank of
 17 telephone callers call individuals and read them
 18 a statement; and they answer from, likely, among
 19 some multiple choice alternatives. And you
 20 prefer that to any type of other analysis that
 21 might take into account what the state does to
 22 value the property, what purchases they have
 23 made, and so forth. Right?
 24 **A.** **So if a true revealed preference approach were**
 25 **available for the environmental amenity we wished**

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1 **to investigate, I would probably prefer the**
 2 **revealed preference approach.**
 3 **The approach you just mentioned of looking at**
 4 **how much the State spends is really making that**
 5 **egregious error that is looking at a cost and**
 6 **pretending that that's a benefit.**
 7 **Q.** And your position there is that the
 8 representatives of the state, the people of the
 9 state and the state legislature, when they voice
 10 their views and allot budget to buying land,
 11 which Secretary Steverson testified about --
 12 **A.** **Yes.**
 13 **Q.** -- in his prefiled direct, that's completely
 14 irrelevant to the value of the resource. And,
 15 instead, you ought to take a poll?
 16 **A.** **My position, sir, is that if that \$500 million**
 17 **was coming out of the pockets of the legislators,**
 18 **that would be a revealed preference method and**
 19 **would demonstrate the benefits to them.**
 20 **That's -- but when it's someone else's money**
 21 **that's being spent through a political process,**
 22 **that's turning benefit-cost analysis on its head.**
 23 **That would eliminate the role for WIRA at OMB.**
 24 **Anything the government does has got to be big**
 25 **benefits because they spent a lot of money.**

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1 **Q.** Well, sir, the Obama administration recognized,
 2 did it not, in its amendment to Executive Order
 3 12866 that nonuse, in other words, the natural
 4 value of the resources, can't always be
 5 quantified because it can be priceless and not
 6 subject to analysis through a poll?
 7 **A.** **So I think, you know, look, if you were talking**
 8 **about, you know, my children, I'll agree with**
 9 **priceless. But when we're talking about these**
 10 **natural resources for which there are true**
 11 **opportunity costs, I don't agree with the word**
 12 **priceless.**
 13 **And what I would agree with is that sometimes**
 14 **it's very difficult to measure them; but it is**
 15 **not impossible. And, counselor, it is done every**
 16 **day. It's done by government. It's done in**
 17 **litigation. And it's done in academic studies.**
 18 **That's the reality. That's the simple fact.**
 19 MR. PERRY: Well, may I approach to pass
 20 out one last --
 21 **A.** **Thank you.**
 22 **Q.** All right, sir. Looking now at JX-65 that I just
 23 passed out, who is the author, Jerry Hausman?
 24 **A.** **Yes.**
 25 **Q.** I'm sorry. Who is the author?

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1 **A.** **Jerry Hausman.**
 2 **Q.** And can you describe his background and his
 3 current position?
 4 **A.** **So Professor Houseman is an economist. He may**
 5 **now be Professor Emeritus since this was written,**
 6 **but was for a long time a professor in the**
 7 **economics department at MIT. His expertise is**
 8 **econometrics. He's not an environmental or**
 9 **resource economist.**
 10 **Q.** Now, when you -- on tab 3 of the binder
 11 Mr. Primis gave you -- that's the small binder --
 12 when you said the benefits of restricting
 13 irrigation upstream were zero, that's basically a
 14 determination there's nothing to be gained from
 15 more water flowing downstream. Right?
 16 **A.** **I didn't say there was nothing to be gained.**
 17 **What I said was that I can estimate the impacts**
 18 **on the oysters based upon Dr. Jenkins's work, the**
 19 **Florida witness, and that my understanding from**
 20 **other experts in the case from Georgia was that**
 21 **the biophysical impacts of the remedies were**
 22 **trivial or, as you say, de minimis; so,**
 23 **therefore, I interpret that as being the benefits**
 24 **were de minimis.**
 25 **Q.** Now, Dr. Jenkins didn't testify here; did he?

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1 **A. Pardon me?**
 2 **Q.** Dr. Jenkins didn't testify here?
 3 **A. No. I was using his -- I believe it was his**
 4 **expert report.**
 5 **Q.** And he did not look at the entirety of the ACF
 6 Basin even in the expert report that was not
 7 submitted. Right?
 8 **A. So I looked at -- I based it upon his, and**
 9 **attempted to monetize what he did.**
 10 **Q.** All right. So you took a sliver of what might be
 11 the value of the ACF Basin based on a witness
 12 that hasn't testified; is that right?
 13 **A. I don't want to agree with sliver, because we**
 14 **would have to look at that quantitatively.**
 15 **Q.** All right, sir. Now, you mentioned a couple
 16 other topics. And I'll be very brief since we're
 17 about at 5 o'clock.
 18 **A. I'm sorry. Did you want to do anything with**
 19 **the --**
 20 **Q.** No. I just wanted to identify who he was.
 21 **A. Okay.**
 22 **Q.** Now, you didn't value or attempt to value the
 23 benefits of keeping sloughs open or preserving
 24 the floodplain in the Apalachicola River; did
 25 you?

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1 **it would, therefore, take it to a much lower**
 2 **yield.**
 3 **Q.** And that's because you didn't look at the
 4 possibility you might just reduce rather than
 5 eliminate irrigation?
 6 **A. That's because I looked at what I consider to be**
 7 **a feasible policy approach, yes.**
 8 **Q.** And that means that you don't consider it
 9 feasible for the State of Georgia to just
 10 restrict the amount of irrigation inches that can
 11 be applied?
 12 **A. No. I didn't consider feasible what Dr. Sunding**
 13 **used to estimate costs, which was this perfect**
 14 **cost-effective allocation of cuts in irrigation**
 15 **water across 2,000 combinations of, you know, the**
 16 **four variables that we have been talking about.**
 17 **Q.** Now, sir, about 44 percent of land in the Flint
 18 River Basin is irrigated -- farmland is
 19 irrigated. Right?
 20 **A. I believe that.**
 21 **Q.** All right. And you haven't gone through, using
 22 Georgia's databases, to figure out what the yield
 23 percentages are acre by acre of nonirrigated
 24 versus irrigated land; have you?
 25 **A. No. What I did -- you know, each of us took a**

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1 **A. No.**
 2 **Q.** All right. Now, on tab 2 of the document that
 3 Mr. Primis gave you, you will see there's row and
 4 forage crops?
 5 **A. Yes.**
 6 **Q.** And agricultural commodities?
 7 **A. Yes.**
 8 **Q.** Now, part of the number you testified about there
 9 is poultry and eggs.
 10 **A. Yes.**
 11 **Q.** Are we seeking in this case a relief regarding
 12 poultry and eggs?
 13 **A. No. I simply wanted to put in to put in context,**
 14 **frankly, the row crops, that that was 1.3**
 15 **billion, and to put that in the context of all**
 16 **the other crops there are. So I thought I had to**
 17 **be somewhat, you know, representative to include**
 18 **them. That's all.**
 19 **Q.** And, in fact, the remedies that Dr. Sunding talks
 20 about, including depths of irrigation, reducing
 21 the amount of irrigation, that wouldn't eliminate
 22 yield on the cotton, peanuts, corn, or other row
 23 and forage crops; would it?
 24 **A. It wouldn't eliminate yield. In my estimate,**
 25 **what it would do if you would limit irrigation,**

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1 **different approach, Dr. Sunding and myself. What**
 2 **he did was this matching and in a sense**
 3 **simulating through what I think is complex**
 4 **modeling that has a lot of room for error. And**
 5 **what I did was to go to experimental farm data**
 6 **from United States Department of Agriculture and**
 7 **use that.**
 8 **Q.** And that was for those 1-acre plots that you
 9 talked about earlier. Right?
 10 **A. The -- the experiments are carried out in 1-acre**
 11 **plots within a much larger experimental farm.**
 12 MR. PERRY: Thank you, your Honor.
 13 SPECIAL MASTER LANCASTER: Thank you.
 14 MR. PERRY: Thank you, Dr. Stavins.
 15 THE WITNESS: Thank you.
 16 SPECIAL MASTER LANCASTER: Mr. Primis?
 17 MR. PRIMIS: No further questions.
 18 SPECIAL MASTER LANCASTER: No questions.
 19 THE WITNESS: Oh, I'm disappointed.
 20 SPECIAL MASTER LANCASTER: And if you're
 21 disappointed, that's very dangerous.
 22 Thank you.
 23 THE WITNESS: Okay. Thank you.
 24 SPECIAL MASTER LANCASTER: Are we
 25 finished?

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1 MR. PRIMIS: Your Honor, Georgia has no
 2 further witnesses to call.
 3 MR. PERRY: Your Honor, we will shortly
 4 supply a binder with our proposed rebuttal,
 5 which I'm sure Georgia will have an
 6 opportunity to object to, if they so desire.
 7 SPECIAL MASTER LANCASTER: Thank you.
 8 Anything else?
 9 MR. PERRY: No, your Honor.
 10 SPECIAL MASTER LANCASTER: Well, let me
 11 say that I'm immodest enough to think that
 12 the fact that we're finishing so early is
 13 because you wanted to relieve me of the
 14 burden tomorrow and not because you want to
 15 catch a plane out of here.
 16 Now, if I'm wrong, either way, let me do
 17 a few housekeeping things. First of all,
 18 briefs, two weeks; reply weeks two weeks
 19 after that. I can assure you that we will
 20 then turn promptly to our report. And
 21 although my wife won't be happy to hear me
 22 say this, over Christmas we will get it out
 23 to you just as soon as we possibly can.
 24 Now, a few other housekeeping details;
 25 and then we're done.

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1 Do you remember that I requested a
 2 survey on restaurants asking you to look at
 3 that list and, either anonymously or by
 4 identification, without checking with other
 5 tell me which ones you thought were pretty
 6 good and why. And after you rate them, send
 7 them in to me with copies to the others.
 8 Mr. Chapman, are you here?
 9 MR. CHAPMAN: Yes, sir.
 10 SPECIAL MASTER LANCASTER: You
 11 understand why I declined your request for a
 12 profile?
 13 This case is not about me; it's about
 14 water.
 15 For the record, I would like you to tell
 16 your managing editor that your reporting has
 17 been as good as any I have seen in this case.
 18 Thank you very much for that.
 19 Now, I have to say again, for the
 20 record, that I have been very impressed with
 21 the caliber of the people both representing
 22 Florida and Georgia. And I'm not just
 23 talking about you, Mr. Perry, and you,
 24 Mr. Primis. I'm talking about all the people
 25 involved. Mr. Walton, Mr. Smith, I don't

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1 know how you kept up with these birds and got
 2 things on the screen so quickly; but you did.
 3 I'm sorry if I didn't meet some others
 4 of you, but I really am impressed with the
 5 teams. And I want that to be on the record.
 6 The depth of your representation has been
 7 extraordinary, and I mean that.
 8 There is one national representative of
 9 one of the parties who keeps mentioning the
 10 amount of the cost for lawyers. I would
 11 appreciate it if you would tell him that he's
 12 getting more than his money's worth.
 13 You know who I mean, I think. If you
 14 don't, you can ask me; and I'll tell you.
 15 Frankly, I'm going to miss you all. I'm
 16 not going to miss this case, but I am going
 17 to miss the people. I really think you're
 18 not only multi-talented, but you're very,
 19 very nice.
 20 I hope that you will come back to Maine
 21 sometime in the spring, summer, or fall when
 22 we're not having a deluge and we're not
 23 freezing. If you want to come back, look up
 24 Pierce Atwood. And if there's anything I can
 25 do to help you, just call me and let me know,

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1 because I really would like to be able to do
 2 that.
 3 And, finally -- and you won't be
 4 surprised to know what I'm about to say --
 5 please settle this blasted thing. I can
 6 guarantee you that at least one of you is
 7 going to be unhappy with my recommendation,
 8 and perhaps both of you. You can't both be
 9 winners. You can both be losers. So,
 10 please, please, open negotiations again and
 11 let me know.
 12 With that, I think we're done. And
 13 thank you, again, very much.
 14 MR. PERRY: Thank you so much, your
 15 Honor.
 16 MR. PRIMIS: Thank you, your Honor.
 17 (Time Noted: 5:02 p.m.)
 18 (Proceeding Concluded.)
 19 - - - - -
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CERTIFICATE

I, Claudette G. Mason, a Notary Public
in and for the State of Maine, hereby certify
that the foregoing pages are a correct
transcript of my stenographic notes of the
Proceedings.

I further certify that I am a
disinterested person in the event or outcome
of the above-named cause of action.

IN WITNESS WHEREOF, I subscribe my hand
this 15th day of December, 2016.

/s/ Claudette G. Mason
Claudette G. Mason, RMR, CRR
Court Reporter

My Commission Expires
June 9, 2019.

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