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**Proceedings From the
Fifth North Carolina**

**Marine
Recreational
Fishing
Forum**

**Revamping Fisheries Management:
A Discussion of Preliminary Recommendations
by the Moratorium Steering Committee**

February 24, 1996

Proceedings from the
Fifth Annual North Carolina Marine Recreational Fishing Forum

Planning Committee

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Dick Brame, Coastal Conservation Association of North Carolina
Mac Currin, Outer Banks Sport Fishing Schools
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N.C. Fisheries Moratorium Steering Committee
Outer Banks Sport Fishing Schools
Piedmont Offshore Sportfishing Club
Raleigh Salt Water Sportfishing Club
U.S. Fish and Wildlife Service

This forum was convened Feb. 24, 1996, to provide the latest information on fisheries management issues and research that affects the recreational fishing industry.

Moderated by Jim Murray, director of Marine Advisory Service for the N.C. Sea Grant College Program
Edited by Mac Currin and Jeannie Faris

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Jim Murray is director of the Marine Advisory Service for North Carolina Sea Grant and a conference organizer.

By your presence here today, I think you have all recognized that we will be discussing one of the most important components of fisheries management and one of the most important actions in this state over the last generation. That is the Fisheries Moratorium Steering Committee process.

Five years ago, when we put together the first forum, the planning committee wanted to provide an update on the latest fisheries management issues and research for the folks interested in the future management of recreational fisheries in North Carolina. The groups targeted were the leaders in sportfishing clubs, agency folks, the General Assembly and so on. It's important that they understand what is going on so they can communicate with their club members. And the idea was that we would have this forum on an annual basis to bring to the recreational fishing community the latest in fisheries management issues.

Secondly, we wanted the forum to provide an opportunity for the recreational fishing community to speak with the fishery managers and scientists about their views on what needed to be done. Based on evaluations from previous forums, you have been critical that we haven't had enough time for audience questions and comment. So today, in the truest sense of a forum, we are having a full hour and 40 minutes for just that purpose. The subcommittee chairs of the Moratorium Steering Committee will be around the entire time, so jot down questions as you listen to the formal presentations. There will be plenty of time to ask questions and to make comments.

I want to recognize the planning committee: Dick Brame, Coastal Conservation Association of North Carolina; Mac Currin, Outer Banks Sport Fishing Schools; Jim Easley, Cooperative Extension Service; Wilson Laney, U.S. Fish and Wildlife Service; Frank Long, Davis Island Fishing Foundation; John Merriner, National Marine Fisheries Service — Beaufort Laboratory; Tom Monaco, Core Banks Surf Fishing Club; Bo Nowell, Raleigh Salt Water Sportfishing Club; and Dale Ward, N.C. Division of Marine Fisheries.

When the planning committee first met, there was unanimous agreement that the most important issue in fisheries management this year was the Moratorium Steering Committee process. We are fortunate that in January the Moratorium Steering Committee developed and put on paper its preliminary recommendations. There is plenty of time and opportunity for comment and change, and that of course is one of the reasons we are holding this forum today.

In my view, the Moratorium Steering Committee process is an important opportunity to make changes in the way we manage fisheries. About a year and a half ago, the General Assembly passed the moratorium legislation, and at that time I think everyone believed that the fisheries management system was badly in need of repair. The legislation that set up the Moratorium Steering Committee put all aspects of fisheries management on the table — licensing and its impacts, development of management policies and plans, enforcement and "any other issue relating to the fishery."

The Moratorium Steering Committee has 18 members

and five subcommittees. We are going to hear from each of those subcommittee chairs, who will be presenting their preliminary recommendations. You might not like all of what you hear today. The steering committee cannot make everyone happy. But let me say this — the 18 members of the steering committee are all volunteers who have worked extremely hard over the past year and a half to get to where we are today. I urge you and the recreational fishing community to get involved over the next several months. There is ample opportunity to influence the recommendations. And that's what the steering committee is looking for in events like this.

Every year, we start the forum with the director of the Division of Marine Fisheries, who talks about what's going on in fisheries management and the division.

Status of the Fishery

Bruce Freeman is director of the Division of Marine Fisheries (DMF) and a member of the Fisheries Moratorium Steering Committee. He also serves on the Atlantic States Marine Fisheries Commission.

Jim Murray has mentioned some controversial issues, and I am sure the saltwater fishing license will be one of them. This is something that the Moratorium Steering Committee is discussing, and you will hear more about it today.

I have prepared a series of graphs depicting some of the issues that I think are important to you as fishermen and certainly to us as managers. Originally, I wanted to simply go over the status of the stock. That is really the title of this talk I am giving, but I am going to digress some. I want to talk about what we know about the status of the fishery.

This chart (Figure 1, Page 2) shows the stock status of about 29 important finfish species based on the period from 1990 to 1994. We know that about 33 percent are stressed. We are finding signs that they are becoming less abundant, the size frequency is falling or the catch per unit effort is going down. But we are actually seeing improvements in some of these, such as the summer flounder fishery, and because of recent regulations we are starting to see an increase. It is not fully recovered at this point, but we are starting to see very positive signs that the stocks are increasing.

Close to 20 percent of these 29 species are depressed, and we find serious declines in stock abundance and size distribution, which greatly concerns us. We are working on various plans to restore them.

About 25 percent are what we call viable. The information we have indicates the abundance of the stock is very good. We have a good size distribution and the catch/effort ratio is very good.

Then there is another 25 percent that we don't know about. The signs are mixed. We may find an increase in abundance of a particular species, but the size distribution is very skewed. This could be represented by a dominant year-class, but the information we have is not definite. We cannot make a determination of stock status. But, if we add these stressed and depressed stocks together, we have concern about the status of 50 percent of our fishing stocks.

(Continued on Page 4)

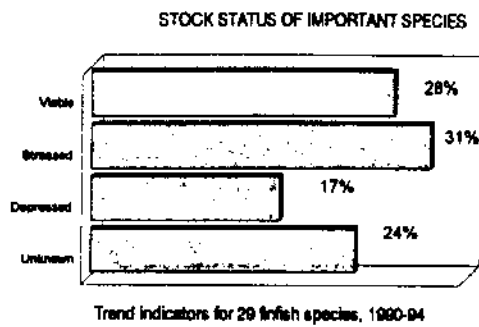


Figure 1.

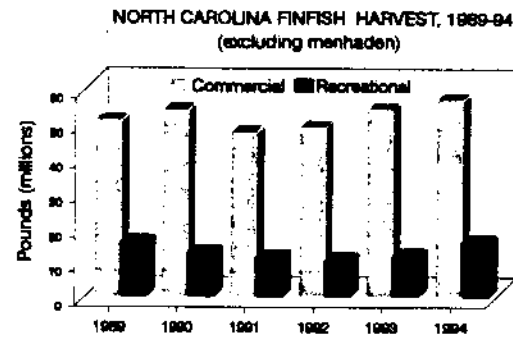


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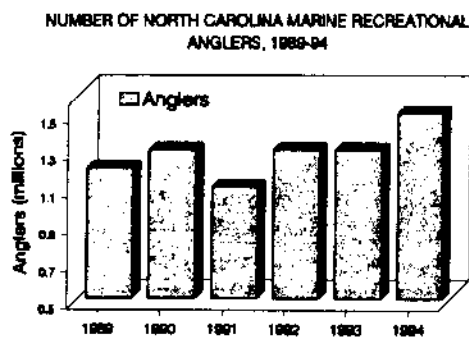


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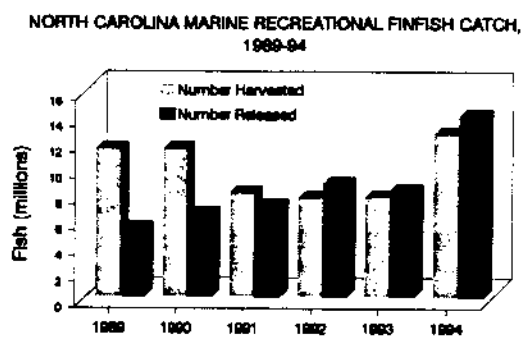


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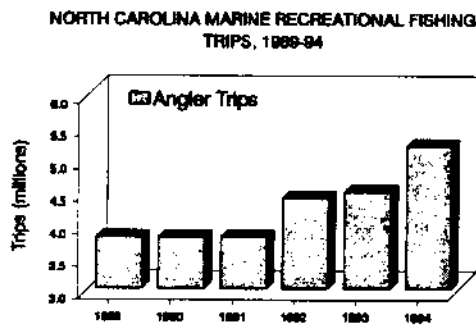
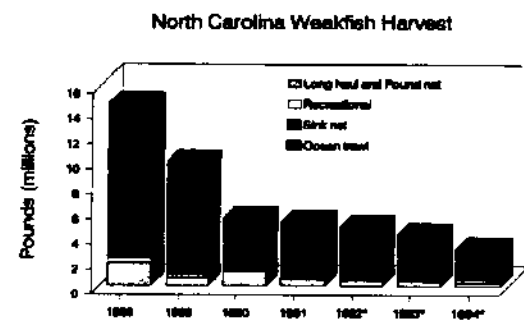
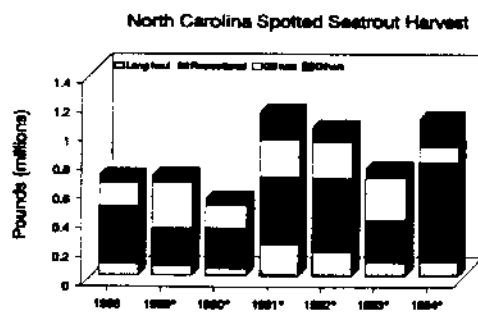


Figure 5.



* size limits implemented Figure 6.



* size limits implemented

Figure 7.

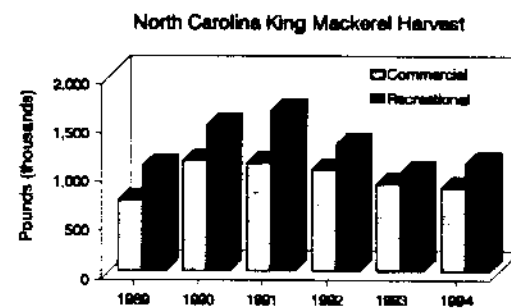


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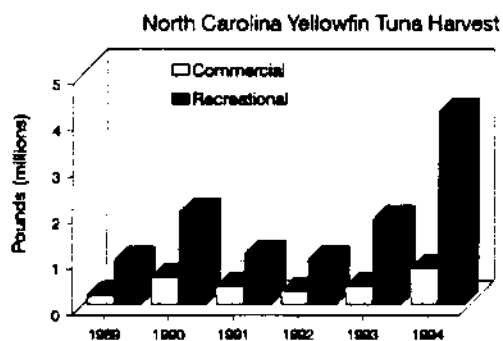


Figure 9.

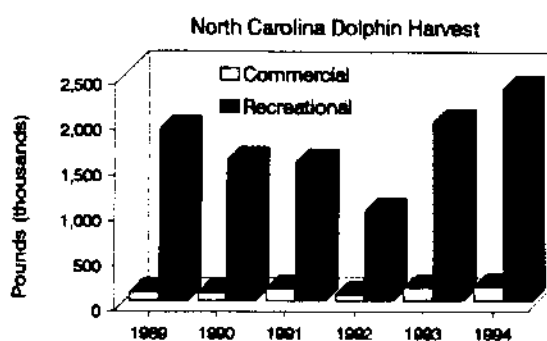


Figure 10.

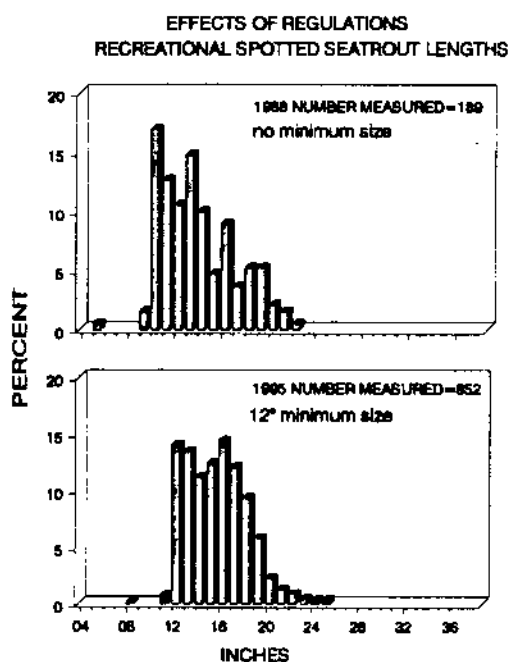


Figure 11.

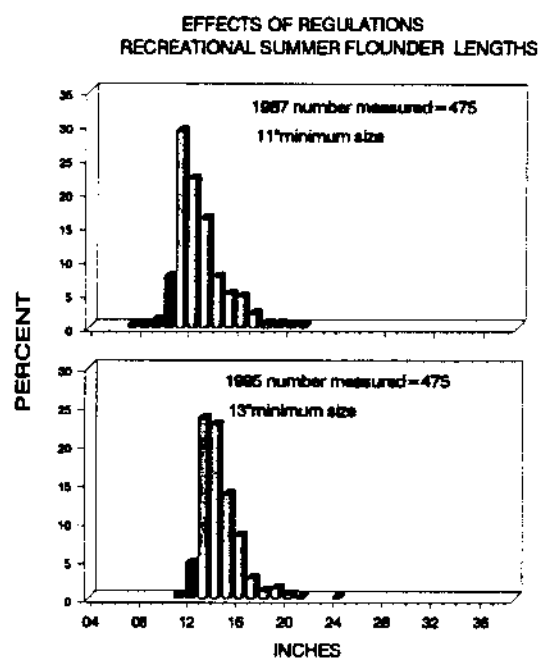


Figure 12.

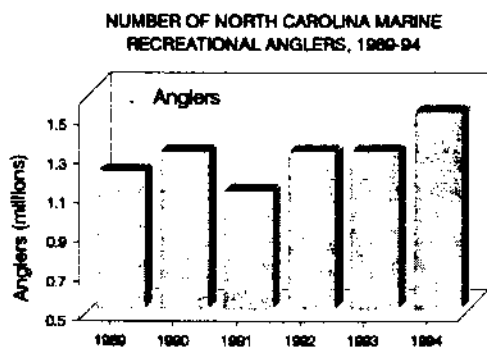


Figure 13.

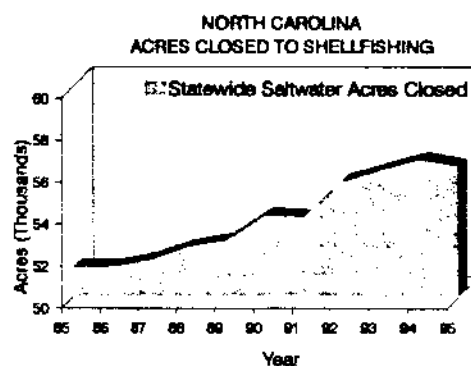


Figure 14.

I would like to talk about why some of these problems are occurring, to give you a little perspective of how recreational stacks up to commercial and show you some of the implications on the recreational side.

One of the concerns we have is so-called fishing pressure. The amount of fish removed can have an impact on the stocks. Comparing the recreational catch to commercial (Figure 2, Page 2), we see that currently and historically, commercial fishing has been much more important. But the recreational catch is still an important component, representing about one-quarter of the total catch.

About 20 million pounds are accounted for by the recreational fishery compared to something like 70 million pounds by the commercial fishery in recent years. You can see there have been changes over time. The recreational catch has varied. In 1989, it was about 20 million pounds. It dropped in '90, '91 and '92, but it climbed in '93 and '94. I think 1995 will also show an increase.

Well, with all of this fishing pressure and the depression of some stocks, why are we seeing increased catches in the recreational fishery? There are several reasons. One is that we're seeing an increase in the number of anglers (Figure 3, Page 2). Even though the catches may not be as great as they were back in the '70s and '80s, we are still seeing an increase in the number of fishermen. There are now between 1.6 million and 1.7 million anglers.

About half of them are nonresidents. North Carolina is a very popular place to vacation, and many people come from out of state to fish. Also, the quality of fishing — particularly in offshore waters, on the Outer Banks and in our sounds — attracts people from all over the country.

The recreational harvest (fish that are kept) is 20 million pounds, but over time we are seeing more and more fish being released by the fishermen (Figure 4, Page 2). In fact, starting in '92, '93 and '94, more fish have been caught and released than actually kept. This is a change in philosophy among fishermen looking for a quality experience. It is not necessary to fill the freezer or the cooler on a trip — they release many of the fish that they catch. So overall, though 20 percent of the total harvest may be by recreational fishermen, the catch is substantially larger if we include released fish.

The other important aspect — in addition to the number of anglers — is the actual angler trips or the effort (Figure 5, Page 2). In the early '90s, we were taking about 4 million trips. In '94, we were up to almost 5 million — an increase of about 50,000 trips per year. So the number of anglers is increasing, and the number of trips per angler is increasing. This really is the key. It is not necessarily the number of people that matters but the effort they expend.

Depending on the species of fish, we see that the catches are dominated sometimes by the commercial industry and other times by recreational anglers. So I'll talk about some of North Carolina's important fisheries.

Menhaden is almost entirely taken by commercial interests. This species is usually rendered to oil and meal. To date, menhaden has not been of interest to anglers except as bait.

Weakfish, however, is something different (Figure 6, Page

2). It is a common species throughout the coast. The graphs show the various types of gear that take them. If we look at the composition of the total catch in 1988, long haul and pound nets are taking a considerable amount. The recreational catch is relatively minor. Sink nets (gill nets) during this period were taking the majority, and then otter trawls were taking a considerable amount. Over time, the otter trawl catches and the gill net catches have been reduced.

We implemented regulations in 1992 within the recreational and commercial communities. As a result, the catches decreased until 1994. Long haul and pound nets are taking a much lower proportion than they have historically. Recreational catch is holding about the same. Gill net and otter trawl catches have been substantially reduced by regulations.

We are under a coastwide plan to restore the stock of weakfish, so you have seen some of these depressions caused by our management efforts. We anticipate that this resource should recover fairly quickly and return to levels where we can take a substantially greater catch than we do now.

Another species related to the weakfish — the spotted sea trout or speckled trout — raises a somewhat different issue (Figure 7, Page 2). The long haul fishery, which historically has been the fishery, takes a fairly modest amount. The recreational catch is considerably higher, and it has been historically. The recreational catch dominates gill nets, long haul seines and other types of gear. Only about a third of the total catch is taken commercially. A substantial portion is taken by the recreational angler.

For king mackerel, the commercial catch is about equal to — but somewhat less than — the recreational catch (Figure 8, Page 2). Starting in '89 and concluding in '94, the commercial catch has been somewhat less than the recreational. The recreational catch has always dominated.

In species such as yellowfin tuna, the recreational catch has been greater than the commercial (Figure 9, Page 3). And more recently, particularly '93, '94, and I think we'll see the same in '95, the recreational catch has been substantially larger. So this fishery is dominated by the recreational harvest.

In the case of dolphin, the catch by recreational anglers is dominant (Figure 10, Page 3). The commercial harvest is a very small portion.

Because of our concern about status of the stock among a number of species, we must limit your catch. And we do that through size and bag limits. So on 35 species or species groups, we now have rules and regulations. But trying to keep track of the minimum sizes and the bag limits is a major problem for you. The Division of Marine Fisheries has problems getting the information to anglers and I will illustrate why.

When we had no minimum size on speckled trout, some fish as small as 8 inches were taken (Figure 11, Page 3). Most, however, were 10 and 11 inches, up to 24 inches. When we put the 12-inch size limit in place, we greatly restricted the numbers of small fish being taken, although people still take undersize fish.

It is not much of a problem with spotted sea trout because most people who fish for them are very knowledgeable about what they're doing. They are very much aware of the regula-

tions. And you need skill to catch these fish; it's not a matter of going out, throwing your hook in any old place and catching fish.

We find a somewhat different case with summer flounder (Figure 12, Page 3). We put an 11-inch size limit in place and eventually went to 13 inches. But we still find people

taking fish as small as 8 inches. Most of these people are simply unaware of the size regulations. Flounder is a species often taken in the summer by anglers in the sounds. Many people are from out of state, and they are not aware of regulations. If someone from Iowa or Nebraska catches a 10-inch fish, it's a keeper. But here, it's an undersize fish. When we went to 13 inches, we greatly reduced the number of 11- and 12-inch fish taken, but we still find people who are keeping fish less than the minimum size. We have a major problem getting timely information to the public on regulations.

Undersize weakfish are even more common than summer flounder. When we had the 10-inch minimum, we still had a few undersize fish being taken. But when we went to the 14-inch minimum, a substantial number of people were taking 13-, 12- and 11-inch fish.

This is not to criticize our enforcement people because they are out on the water every day in the summer. They are trying to educate the public and they are giving out violations. But this is a common phenomenon in all states. If you look at the catches in Virginia, New Jersey or New York, you see the same thing. It usually takes the fishing community a year or two to catch up to new size limits. Until then, you get these undersize catches.

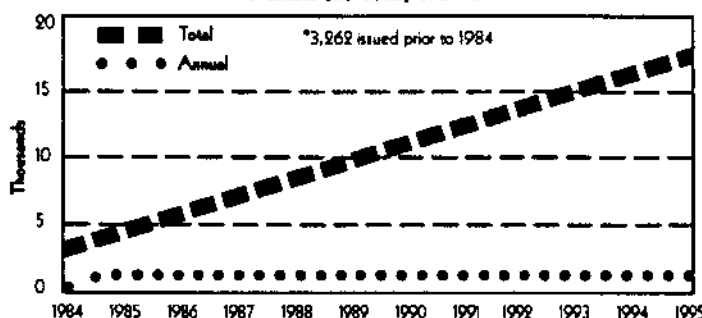
That's a common problem throughout the coastal states. We need to find a better way of getting information to the angling public. Many of you belong to organized fishing clubs whose members are usually well informed. But a great majority of our 1.3 million to 1.4 million anglers (Figure 13, Page 3) have no idea about size and bag limits.

If we look at population in our coastal counties from 1960 to '94, we see an increase in growth, and this equates to more anglers. We also have to be concerned about habitat degradation. This is a very serious concern in North Carolina and in other coastal states.

Our highest quality water classification is for shellfishing — greater even than swimming as far as the Food and Drug Administration is concerned. North Carolina has about 57,000 acres of shellfish-growing waters that are closed to harvest because of bacteria contamination (Figure 14, Page 3). This is a problem associated with increased population and increased development along the coast.

If you look at CAMA (Coastal Area Management Act) permits — permits that are required for developments — you

Figure 15: CAMA Permits Issued
Annual and Total, 1984-94*



see a fairly constant number over time (Figure 15), but these are additive. Every time a development is built, fish habitat is destroyed. So although these permits are fairly stable under our stringent regulations, the overall impact is that we are losing fish habitat. If the fish do not have living space, they will not occur.

The moratorium is one way to solve these prob-

lems. It is going to set the stage for North Carolina's fisheries for the next 20 years, perhaps even longer. So as many people will tell you today, you have to get involved in this process because it is going to affect what you and other people do.

A second aspect is state fishery management plans. We are committed to putting together plans right now. Plans are put together by interstate agencies and federal agencies, but a number of fish species in state waters need a management plan. We need a strategy for how to increase the abundance of these species and how to manage them relative to other species. We are now making a firm commitment to put at least three or four of these plans in place by next year.

Bycatch reduction is another aspect that we need to deal with. This is something that we are working on with weakfish. In cooperation with commercial fishermen, we have developed techniques to reduce bycatch in the shrimp fishery by 65 percent. That is among the highest reductions we have ever recorded. We want to strive for even greater reductions, and there are ways to achieve that by working with fishermen. But we are at a point where we cannot allow a large amount of mortality from nondirected fishing. The fish are now so valuable to us — both recreationally and commercially — that we have to find ways to fish smarter than we have in the past.

Colon Byrd: Why don't you have a creel limit on speckled trout?

Bruce Freeman: Previous to the rule change, the Marine Fisheries Commission went through a process of putting into rule many proclamations that were in place. In the process of doing that, the bag limit for speckled trout was omitted. It was just an oversight. We went through five public hearings. It was never discovered by any of those public hearings. The commission reviewed the rules. No one picked it up. We went through this lengthy process and it was omitted as an oversight. We will start the process of putting that back in. It was a clerical mistake. And I can tell you how it occurred, but quite frankly, we need to find out how to correct it. We will start that process as quickly as we can.

Colon Byrd: Is there a possibility of doing it this year?

Bruce Freeman: Until recently, it could be done quite

quickly. But we do have a legislative act that requires oversight. The process is such that it would probably take a year to get a rule in place, and that is a process that everyone in state government has to go through. We are looking at ways to do it more quickly. If we find one, we will try to do it.

Editor's Note: Following is a discussion of the subcommittee recommendations as they were being considered on Feb. 24, 1996. Based on public input from meetings such as the Recreational Fishing Forum, many of the final draft recommendations have since changed. Improvements will continue through Nov. 1, 1996, when the final report of the Moratorium Steering Committee will be presented to the Joint Legislative Study Commission on Seafood and Aquaculture. To get a copy of current recommendations, write the N.C. Division of Marine Fisheries (DMF) at P.O. Box 769, Morehead City, NC 28557, or call 1-800/682-2632 or 919/726-7021. You can also attend one of 20 public hearings that will be held around the state in the summer of 1996. Schedules are available from DMF.

An Overview of the Fisheries Moratorium Steering Committee Process: Background, Membership, Priorities, Studies and Structure

Bob Lucas is chairman of the Moratorium Steering Committee and the Marine Fisheries Commission. He also serves on the license subcommittee.

I am glad to be here. I hope that your goal today is to understand the process as well as the working recommendations of this moratorium. The recommendations are preliminary, so nothing is carved in stone. I say that so people can participate in the process.

In fact, I am going to tell you a story to illustrate my point. It is a true story. My law partner is Bob Denning, a criminal lawyer, and we practice in Johnston County. If there is one thing that Johnston County is famous for, it's bootlegging. We are proud of that. In fact, I live just a little ways from Percy Flowers, one of Bob's clients who was charged with bootlegging. He pled guilty and was sentenced to probation. As he came down the courthouse steps, the news media were there to interview him. They said, "Isn't this a thing of the past in Johnston County? Aren't you the last of a dying breed?" And all he really said was, "Well, yeah, I reckon so." They asked him a couple more questions and then someone asked, "Well, now that you have been found guilty and put on probation, I guess this is the end of your bootlegging days, too. Isn't that right?" And there was a real uncomfortable pause, and he said, "Well, I reckon so, but I ain't signed no contract." So what I am telling you is nobody has signed a contract on this stuff. It is all preliminary. But I will tell you something — we all have to get involved.

Three years ago, as chairman of the Marine Fisheries Commission (MFC), I started focusing on the regulations. You want regulations for only one thing — to protect the resource. But I quickly realized that the regulations wouldn't do it. If regulations would bring back the resource so that we have a strong recreational fishery and a good commercial fishery, it would have already happened. But it hasn't, and the fisheries

have continued to go down. So we had to go about it a different way. In fact, it came through the crab industry, which wanted to put a moratorium on itself. I went to Mike Orbach and I said, "I think that we need to expand it for the entire fishery." His words were, "Nobody has ever tried it." Nobody has tried what we are doing here in North Carolina. It is a mammoth project. One thing that we learn in law is this — for every wrong, there is a remedy. So what is the remedy here?

Different states have gone about it different ways. Everybody knows what happened in Florida. The remedy was simple — the state eliminated nets and basically eliminated commercial fishing. In New England, there was a different remedy. The fishermen kept saying there was no problem with the groundfish. I can still see Ted Kennedy on the 6:30 news, proud of the fact that he had gotten government assistance for fishermen, handing out welfare checks. That was another remedy.

But what we're trying to do in this state, and hopefully we can be successful, is to go somewhere in the middle. We want to have a viable commercial industry and a strong recreational industry. We went through the Legislature. A lot of people think the moratorium is designed to stop the issuance of commercial licenses. That is true. But the real part is to stop things so that we could get a handle on it. And we're going to have to get a handle on it because we'll have to lift the moratorium. Every audience asks the same question: Why can't we just leave it in place permanently?

We can't because we have a full faith and credit clause in the Constitution. We have to honor other states — you can't seal your borders. We have to have interstate commerce. And North Carolina is an attractive state. *Time* magazine reported a few months ago that more people moved to North Carolina last year than any other state in the country. And people will move to the coast 2-to-1 over any other area of the state. The pressure is there, and it is going to be there for the next five, 10 or 15 years. So what are we going to do about it?

If you read the statute describing the commission's job, it says the job is to protect, preserve and enhance the resource. The job is not to look after commercial fishermen and it is not to look after recreational fishermen. If we can just protect that resource, all of us will be able to catch fish.

I want to let you know how we got where we are and what is going on in the moratorium. The specifics I'll leave to the subcommittee chairmen, who will speak after me. We have really worked hard. A lot of people have done a tremendous amount of work on this committee. The Division of Marine Fisheries (DMF) has done an outstanding job working with us. It is not as easy as you might think.

In the past, the Marine Fisheries Commission has focused all of its efforts on what needs to happen in North River or some other place. We have tried piecemeal regulations for fisheries for years. Piecemeal regulations won't work. They will not accomplish what we need to do. So we have tried to go about it with a total package. With the moratorium, we are trying to set up a structure so that when other people sit in these seats, they can make decisions and manage the resource. We need decisions based upon fact, not perception.

We tried to focus on five categories, and we broke down the Moratorium Steering Committee to five subcommittees. The number-one focus was licenses. They have to be changed. We issued 22,000 commercial fishing licenses the year before the moratorium went into place. If we opened it up today, I have no doubt that there'd be a whole lot more than that. A lot of out-of-state people want to come to North Carolina to fish commercially because of the restrictions in other places. We also have what is called a license to sell, which only 6,000 people bought. So 16,000 people call themselves commercial fishermen in North Carolina, but actually, they're not. We need to manage commercial fishermen differently than people who say they're commercial fishermen but in fact are not.

We have divided the groups into three categories. One is for full-time commercial fishermen, professional fishermen. A lot of people don't agree with that. They say we don't need a commercial industry. Why should we protect a small group of people and allow them to take the resource? Whether it is right or wrong, we made the decision to have a viable commercial fishery. However, we have decided that it will be a professional fishery. A lot of people don't like that. A schoolteacher from Carteret County called me and said she was part of an organization for schoolteachers that I'd hear from at the next public hearing.

Category two is going to be a "messer license" for people who will be able to use a little bit of commercial gear. Melba Edwards will address that in more detail.

Category three is the recreational fishing license. I hope that we can get the recreational fishing license. There will be a tremendous amount of opposition to it. It is perceived by some politicians as a tax, and taxes aren't in right now. If the money was going toward the general fund, perhaps an argument could be made that it's a tax. But it's going to improve the resource in a dedicated fund. Anyway, we have to change the license structure in North Carolina.

The number-two focus is water quality and loss of habitat. That is not as sexy, and a lot of people are not as educated or interested in it. But there is more interest in it now than ever. The worst day that I've had as a member of the Marine Fisheries Commission was shutting down the Neuse River. A man made a fool of me when he stood up and said, "Let me get this straight — your job is to look after the fish. Is that right?" I said, "Well, that is pretty much on target." He said, "Well, 10 million of them is out here dead. Is that right?" I said, "Give or take a million, I think that is right." He said, "I want to know one thing. What are you going to do about it?" I tried to explain to him how the jurisdiction of the commission is limited to regulations and overfishing. And he said, "So what you are really telling me is this — your job is to look after the fish and make regulations, but you don't have anything to do with the water they swim in. Is that right?" And I said, "That is about right." He didn't say anything else to me. He turned around to the crowd and said, "Folks, what kind of government do we have?" Then he sat down.

And I ask the same question. What kind of government do we have that would charge somebody with the job of protecting the resource without doing anything about the water?

It doesn't make any sense. We have to give the Marine Fisheries Commission in North Carolina some real teeth to deal with water quality and habitat. If we don't, everything else said here today is a waste of time. We have to get realistic about it. When are we going to demand it? Melvin Shepard has done an outstanding job on the Moratorium Steering Committee, and he will talk about that later.

The number-three area of focus is law enforcement. We must have some changes in law enforcement. There must be a deterrent like points on a driver's license. Like driving, fishing is a privilege. People who violate the law — commercial and recreational fishermen — need to have their privilege to fish taken away. I am not talking about the fines. Yes, we need to have some of that. But fines very often are a cost of doing business.

If you take away a man's livelihood, you are going to get his attention. The same is true with a recreational guy. If you don't let him fish, you are going to get his attention. We are going to develop a point system. Damon Tatem will talk about that. You get so many points, you don't fish.

We need more law enforcement. We don't have enough men. Selma has 14 policemen, but only 52 field officers cover the state of North Carolina for all the jurisdiction that they have. We have gotten some help from the Legislature. Last year, lawmakers gave us seven officers. But everybody knows what the environment is like at the Legislature. You can't go for more officers. You might pick up one or two, but that is not a remedy. We have to go a different way. How are we going to get enough people out there to help?

What Florida, New Jersey, South Carolina and Pennsylvania have done is come up with a volunteer program. It is an excellent program for people who pay for their own training and uniforms. These people are trained officers, and as volunteers, they will allow law enforcement to do a better job. We need to put the program under law enforcement so that it can be developed the way it needs to be. Doug Freeman has been to New Jersey, and he's seen that program. We need law enforcement for two reasons in North Carolina — as a deterrent and for education. These people can help educate the public about regulations, for instance.

The fourth area of focus is gear. We have to take a realistic look at gear. I think everyone would agree that there are too many crab pots in state waters. The crab fishermen themselves will tell you. There are too many pound nets. Mike Orbach was approached by Carteret County pound netters who said just that. If the commercial fishermen are saying, "Hey, there is too much gear," what does that tell you? We must have the resolve to look at gear. And if it is destructive, we have to put the necessary regulations on it.

But we can't do that in an arbitrary fashion. We have to base it on information. In the past, we just eliminated gear based on perception. This happened in Florida. It is not a good way to do it. We need to base it on facts. And we can get that information from the other areas — the license that I've already talked about. We have to take a realistic look at it.

The fifth area of focus is the Marine Fisheries Commission. We have to change the way the commission is structured.

Chuck Manooch will talk about that. North Carolina has the largest Marine Fisheries Commission in the United States. Julie Wheatley says it is the biggest in the world. It is too big. Seventeen people manage the resource — but you can hardly get 17 people to agree on what day it is. We have to get a smaller group to manage this resource.

These are the five categories, and they interrelate. We don't need one without the other. If we can get these five things in place, we can manage the resource. I am here to tell you that it can be done. We have to come up with a good product. And I am convinced, by the way, that we will do it. But it is going to take your help. I am telling you this — I need your help. Let me tell you how this committee needs your help. There are going to be people who want to torpedo this. We've worked hard for two years, met two and three times a month. We cannot put it together, take it to the Legislature and let it fail. One thing I have learned about politics is that politicians will respond to people. They will respond to their constituents if they are pushed, and we have got to push. We have to demand. It is reasonable for us to expect our legislators to look after the resource.

I was brought up to believe a person can make a difference. I know I am going to leave this world one of these days, and I hope that my son, when he has a son, has an opportunity to fish. And I am absolutely convinced that if we don't do something, he is not going to have that opportunity.

I need your help. First, you must understand this stuff. You can't just say, "I support the moratorium." I have gone to public hearings where recreational fishermen stood up and said, "I support all the regulations." Now, what does that mean? You have to understand these regulations. Please take time and listen. Some of it is boring, some of it you might not understand, but if you will keep on with it, you will understand. And knowledge is power.

Second is the timetable. We will get through these recommendations, and they will be introduced in January 1997. And they will pass if recreational and commercial fishermen are in those committee rooms and both sides want it passed. But if Bob Lucas, Melvin Shepard and a couple of other folks they see all the time are the only ones in the room, it won't pass and we'll just have to move on. So I urge you to talk to your legislators and become involved in this process. This is *the* opportunity in North Carolina. Regulations won't do it.

Moratorium Steering Committee Subcommittee Reports and Working Recommendations

Marine Fisheries Commission Subcommittee

Charles Manooch is an academic representative on the Moratorium Steering Committee. He works for National Marine Fisheries Service in the Beaufort Laboratory and chairs the subcommittee on the Marine Fisheries Commission.

I appreciate the opportunity to come here. It has been a real pleasure serving on the Moratorium Steering Committee under Bob Lucas. I think he has done an excellent job as chairman, and I think all the members have really worked

hard. The attendance has been good, and dedication has been very good. I think we are going to come out with some excellent recommendations. But, like Bob said, we are going to need your support.

I want to recognize the other people on my subcommittee. They are B.J. Copeland, director of North Carolina Sea Grant; Steve Ross, an ecologist with the University of North Carolina at Wilmington; Pete West, a recreational fisherman from Greenville; and Susan West, from a commercial fishing family in Buxton.

I am a deer hunter. And before I go into the field, I take my rifle to the range and make sure that it's zeroed in. That is like this draft revision process. Before we take it to the General Assembly, we want to make sure it's zeroed in and hits the target when we get there. To do that, we have to make adjustments. We make adjustments in our committee meetings, in our subcommittee meetings and after hearing from you, the public. As you bring recommendations to us, we take them back and consider them, so we are always making adjustments to this January draft.

Our recommendations are to ensure that the regulation and management process for fishery resources in North Carolina is conducted in an efficient and effective manner.

The Moratorium Steering Committee, with Sea Grant-administered funds, has hired two consultants to look at the Marine Fisheries Commission and the Division of Marine Fisheries. Our subcommittee has looked strictly at the commission, and the two consultants will be looking at both. So we will incorporate some of their recommendations into ours.

We are looking at the size, composition, attendance, ethical standards and jurisdiction of the commission. One part is fairly easy — the size. But the hard part is determining what it does, how it operates and what its jurisdiction is.

We have found that it is much too large. We have found that its jurisdiction is too restricted. As Bob mentioned, the division and the commission don't have any jurisdiction over habitat, yet we are concerned about the whole fish and what it does all of its life. Our concern goes beyond the adult fish to how it lives in the water, how it reproduces and other issues that impact its well-being. So we have to extend the commission's jurisdiction to include fisheries habitat.

Let's get into the actual recommendations. We have gotten some good comments about the Marine Fisheries Commission. It is a very important part of the process because it involves decision-making and politics. So we want to make sure that we design what is best for the resource.

We have several subheadings in our draft. Under size and composition, we've suggested that the commission have nine members. It now has 17, and that's way too many. We had suggested no less than seven and no more than 11, but we are saying flat-out that we want nine members. They all should be residents of North Carolina, of course. That is not in the General Statute now. They should all be appointed by the governor, as they are now. We agree with that. Now, they can serve for six years, and we believe that is too long. We want to reduce this term to three years. A lot of people come to the commission full of vim and vigor and say, "Gosh. I am going to

serve six years and do a good job." But they've got too many things to do, and yet they don't have the courtesy, if you will, to go the governor and say, "I am busy. I can't serve. Take me off this thing." So they stay on for six years. We think three years is enough for people to show that interest and continue it. Then, if they're not doing a good job, they can be replaced after three years. If they are doing a good job, they could be reappointed. The governor should appoint the chair, which he does now. And that chair calls a meeting to appoint the vice-chair. That is basically the way it works now, and we believe it's a good process.

The question has come up many times about vote by proxy. We think there should be no allowance for vote by proxy. A member can't send anybody else. A quorum — a simple majority — is necessary. So five members of a nine-member commission can conduct business. If they don't have that many, they can't.

Now, we get into the nitty-gritty — the designation or the assignment of the nine seats. A variety of combinations are possible, and we have worked for a year trying to think of the best way to do it. Some wanted all at-large seats, just like a jury. Others wanted all to be designated. We've come up with what we think is good, and we've gotten some good support for it. But we've also had some concerns and comments, so we want to hear from you as we go along.

The Marine Fisheries Commission shall never have a membership where a majority of its members have a financial interest in the regulated resources. Financial interest shall be defined as 10 percent or more of earned annual income from fishing activities. That 10 percent guideline is already on the record books with the Environmental Management Commission. We don't want most of the membership to have a financial interest. That provision would not include people in academia — such as a Jim Rice at N.C. State University or a Steve Ross at UNC-Wilmington — who are elected to an at-large seat. Those people's salaries should not count against them. If they are involved in a recreational or commercial fishing industry, or they receive more than 10 percent of their income fishing, then they could not serve on one of the seats. That would give a majority to one financial interest group.

Let's look at the way our recommendation is set up now. There are three commercial, three recreational and three at-large seats. Two commercial seats are held for those who earn 50 percent or more of their annual income catching fish, selling fish or that type of thing. Among the five of us on the subcommittee, four feel very strongly that spouses should be represented as they are now. We see no problem with that if they know the business and they are actively involved in that business, if it is a family business and joint income.

We also have one appointment designated for seafood processing or distribution — a dealer type with 50 percent or more of earned income from that business. So essentially, we have three with a commercial fishing interest.

The next two would be active sportfishermen. Another would be a sportfishing type who is involved in the industry. So we have a representative of the recreational industry — charter boat, pier or other.

And then there are three at-large seats for people with knowledge of and experience related to fisheries. These seats could be three academics, three attorneys, three whatever, bearing in mind that the financial interest statement would preclude financial interests from being dominant.

In appointing members to the commission, the governor should consider the geography of the state, which he does now. We would also recommend that at least two come from three geographical areas. So six of the nine members would be divided so that two or more are from the northeast, two or more are from the central part of the state and two or more are from the south. In effect, there could be six members from the coast and three from any other place.

There was also concern about compensating commissioners for attending the meetings. We recommend daily compensation commensurate with the director of the Division of Marine Fisheries or the secretary of the Department of Environment, Health and Natural Resources (DEHNR). It has been brought to our attention that a General Statute already identifies \$100 per day as appropriate compensation. It is General Statute 93B-5(a).

We have talked about the Division of Marine Fisheries staff who serve the Marine Fisheries Commission. We realize now that the division is often taxed when its people are pulled away to serve at the pleasure of the commission or the chairman. It is taking away from their normal duties with the division, and we don't think that's right. So new positions should be created or salaries or money should be provided to the division to replace that time. We are recommending that the Legislature provide money to support two types of staff members for the commission. One would be a clerk-typist to arrange the meetings, set up the microphones, make sure that things are copied and provide the agenda set out by the chairman. Another would be a fisheries liaison person — typically a biologist who would work with the division and provide fisheries expertise as called upon by the commission.

Currently, that person spends 60 or 70 percent of his time doing commission work. Neither he nor the division is being reimbursed for that work, which keeps him from spending time on what he's supposed to do.

We think it's very important to strengthen some things if the commission goes from 17 to nine members. The governor has to appoint good folks to serve on the commission. We are recommending stronger attendance requirements, qualifications and ethical standards, particularly when it comes to conflicts of interest. Right now, commissioners are only asked to make an attempt to come — not exactly in those words. But the requirements need to be stronger than that, and we have made a recommendation along those lines.

We also believe that every person who is considered for appointment by the governor be required to file a disclosure statement with the governor, the secretary of DEHNR or an appropriate authority. Currently, it's the state Board of Ethics. And these disclosure forms should be readily available to the public.

Now, we realize there are two types of conflict. There is conflict of interest dealing with money, and that is a bad one.

The second one, however, is just as important. And that is a bias by an individual. Bias is often specified as having a zealotlike stance on an issue. It usually pertains to a conservationist, but it can apply to anybody. When biased individuals come on a commission, board or panel, they may be completely closed to one side and they vote one way no matter what. We want to look very carefully at the financial conflict of interest associated with an industry as well as the zealotlike positions. We want to make sure that such people are not necessarily precluded from serving but are recused from voting. They should recuse themselves from certain actions.

So we are concerned about those two issues. And we want them to file financial disclosure statements, licenses issued by the division or commission, uses made of the regulated resources, and membership listings in organizations, academic committees, advocacy groups and boards. Those are the key things. We want all of that to be disclosed so it is perfectly up-front.

Each commissioner, before assuming the duties of office, shall take an oath. I understand that the oath of office now is very general. We have proposed a new oath and we are going to move that forward.

The enforcement vehicle of all this should be the governor. If somebody refuses to excuse himself or herself from a vote, and the commission feels that person should have done so, the commission should vote on that and the governor should have the opportunity to dismiss that person.

On attendance, we are recommending stronger requirements. We suggest that members can be dismissed if they miss more than one business meeting without just cause. And the chairman would determine just cause. We also recommend that they shouldn't be able to vote on an issue if they didn't come to public meetings and listen to what was said.

We are very high on advisory committees. We are recommending that the General Statute create technical and lay-type advisory committees on water quality and habitat issues, fishery issues and population dynamics. We also want some ad hoc regional committees to be responsible for different geographical areas.

Expanded jurisdiction is something I will touch on. We don't have any control over the habitat. And those of us who work professionally in fisheries realize this is a tremendous problem. We are dealing not only with fishing mortality but natural mortality. We have recommended some alternatives that will help us in key areas, such as submerged aquatic vegetation areas or primary nursery areas. The Marine Fisheries Commission needs veto power over other state agencies regarding impacts in such critical areas. It can now only look at gear and how gear impacts habitat — that is it.

The commission should work closely with the Wildlife Resources Commission on anadromous species. We think that is key. The Marine Fisheries Commission shall represent the state regarding the Exclusive Economic Zone (EEZ) when it comes to fisheries concerns. That is not currently in the General Statute, which says the governor and the state can ask for input. We want the Division of Marine Fisheries and the Marine Fisheries Commission to represent the state. The gover-

nor should have litigation authority as allowed by federal law in the EEZ.

That is basically where we are as a subcommittee, and we feel good now about where we are going.

Gear Subcommittee

Pete West co-chairs the gear subcommittee with Murray Fulcher, a fish dealer from Ocracoke. West is a recreational fishing representative on the Moratorium Steering Committee.

I am one of the recreational representatives on the Moratorium Steering Committee. Murray Fulcher, my co-chair, probably knows more about gear than anybody I've ever met. Murray couldn't be here today — he is fighting a heart condition, so he is lying down right now. At least he is in Ocracoke. But Murray has provided a lot of good information. The other members of my committee are Jim Murray of North Carolina Sea Grant and Steve Ross, who is an ecologist. And I have had quite an education at the hands of Murray and Ross and the people who've attended our meetings.

The most important job of our steering committee is to establish a system that will allow for better management in the future. Ross wrote a guideline for us entitled, "The Future Management of North Carolina Fishery Resources." And what we are trying to do is produce some ideas to better manage our fisheries for the benefit of all the citizens and users in North Carolina. This is going to require accurate data. Hopefully some of this can be attained through the gear license. Part of our recommendations, for example, suggest that we cap present amounts of gear, which is patently impossible because we don't know what gear is out there.

The goal of our gear subcommittee is to reduce gear in the water. We hope this can be achieved initially by restricting who can use commercial gear in commercial quantities by establishing a full-time professional fishery. We also hope to prevent that gear from proliferating. Right now, we are guessing that 75 percent of the webbing in the water does not belong to full-time commercial fishermen. So simply by finding the full-time commercial fishermen and limiting commercial gear in commercial quantities to these people, we can get about 75 percent of the webbing out of the water.

We want to minimize gear conflicts between crab potters and trawls, pots and long hauls, recreational fishermen and beach seiners. We would like to encourage the use of species-selective gears — for example, gill nets rather than trawls.

We would like to establish the gear license system in a manner conducive to determining effort, to collect accurate catch and effort data by gear type and to categorize users. This would establish an information system that provides a mechanism to manage by effort adjustments, to establish user fees that are equitable based on resources used and/or habitat damage. If you use more gear, you pay more. The man with the bigger boat is going to pay more. And I don't think anybody has a problem with that.

The recommendations that the gear subcommittee is making are based on five assumptions. 1) There will be a professional fishery to which commercial fishermen qualify

based on their income. 2) All gears we have discussed are strictly commercial gears with the exception of hook and line. No gear can be used unless licensed and allowed by law. This is a big change for North Carolina. Right now, anything is legal unless it is declared illegal. What we are talking about now is the gear that has to be licensed. This is something that Bruce Freeman has pushed for. 3) There will be a coastal recreational fishing license. We think that everybody who takes from the resource needs to contribute to it by paying a fee that can be used to enhance that resource. 4) The state will develop a fishery management plan on all important recreational and commercial species. We want to structure the license fees according to the impact on the resource and/or habitat. We believe this is equitable. 5) There will be a "messer license" to limit the recreational use of commercial gear per license as follows. One 20-foot shrimp trawl used only in areas open to trawling; 100 yards of gill net tended as required; three crab pots; one cast net; one seine operated without a mechanical aid not exceeding 25 yards with mesh less than 1 1/4 inches; and, most importantly, a no-sale provision on seafood taken by recreational users. And there's one other thing — all commercial gear used under the restricted user license will be differentiated with color-coded tags. So if there's a net in your favorite creek, you'll be able to tell whether a recreational or commercial man left it there.

One thing the joint meeting of the gear and license subcommittees discussed was that these people should be subject to the same bag and creel limits as recreational anglers.

On the licensing structure of fishing gear types, shrimp trawls shall be licensed on a per-linear-foot basis and impact basis. Trawlers should be limited as follows. Limit the total length of trawl head rope to X-feet per fishing vessel in Pamlico Sound and Y-feet in all other inland waters. X and Y are to be determined because there is no data to tell us what it should be. We don't even know what is out there. That is why a gear license and some of the things we are putting forth are so important.

We propose that no sale of landed bycatch be allowed from Dec. 1 to April 30. The idea is to prevent a directed finfish fishery during the winter months. If you are fishing for shrimp, that is all you can sell. There are objections to throwing back dead fish that have market value — this is a contentious issue.

Nontrawling areas should be expanded to protect habitat, reduce bycatch and reduce user conflict. No new entry should be allowed to trawl inside. Only vessels participating prior to 1996 should be allowed to use gear. The number of estuarine shrimp trawl vessels shall not exceed the number existing as of Jan. 1, 1996. We are putting forth a limited entry system on inside fishing. I want everybody to understand this is very contentious.

On crab trawling, we came up with two options. One was to eliminate crab trawling entirely. The second option was to prohibit landing of bycatch in the crab fishery from Dec. 1 to April 30 and to limit vessels to the present number. A third option for a 4-inch tailbag was put forth at our last meeting in Wilmington. Crab trawling used to be almost a directed fish-

ery for flounder. It was done primarily at night. Night fishing for crabs has been outlawed, and I think we are down to only five vessels. Some people think we should allow crab trawling and others think we shouldn't.

On trawls outside 3 miles, one option is banning flynets and midwater trawls in favor of gill nets, a much more selective gear for finfish. This is very contentious. Another option calls for no action due to the existing closure within state waters and the potential changes in Exclusive Economic Zone (EEZ) regulations.

Gill nets should be licensed per linear foot, and an option for establishing a maximum footage of net in the water for a single operation at one time is being considered. Recreational users of gill nets will be limited to 100 yards, which must be tended as required. Commercial users of gill nets will have gear capped at present levels — once again, this is not even possible because we don't know how much gear they have.

The yardage of gill net available to any one fishing operation over a period of time should be reduced from the current level to a maximum established by data. Michael Orbach is working on gear with commercial fishermen. There may be some recommendations from the commercial industry on how much gear fishermen need to participate in certain fisheries.

Pound nets should have an initial application fee of \$250 per new net set with a \$50 per net renewal fee each year. The number of pounds and length per fishing operation should be limited as follows. Cap at present levels. Every pound net is licensed and its location is known by loran coordinates. The number of pounds available to any one fishing operation over a period of time should be reduced (the amount of reduction has yet to be determined).

If necessary, reduce the number of flounder pound nets per fishing operation over time from the current level to a maximum to be established by data. Southern flounder are showing the same signs that summer flounder showed prior to their collapse, so there is some concern that effort will have to be limited. One way to do that is by reducing the number of flounder pounds. We may also have to reduce gill net effort on southern flounder.

Sciaenid pounds, for weakfish and croakers, are at an all-time low. Effort and further proliferation of gear should be monitored. A culling panel to reduce bycatch should be developed. Murray Fulcher has been doing this on his own and has had good results.

On bait pounds and herring pounds, the effort and further proliferation of gear should be monitored. All pound nets should be subject to verification by inspection; licenses on pounds not in place should be canceled. A lot of people license a pound net set to protect their other areas. There are a lot of these nets that never get put in place. We are suggesting that if you license a pound net, it has to be in use during the peak of the fishery or you will lose your license. Hopefully, we will have fewer nets out there trying to protect other nets.

Seines should be licensed for a specific fishery, impact to habitat and on a per-linear-foot basis. Seines are not compatible with other gears and user groups and should be restricted in use.

Long haul seines are at an all-time low. They should be licensed according to length and depth and prohibited from primary nursery areas and submerged aquatic vegetation. The total length of long haul nets per fishing operation shall not exceed existing gear in length as of Jan. 1, 1996. There can be no new entries into that system. Purse lines, draw lines or other means of pursuing a bunt shall not be used. Encourage reduction of bycatch — the Division of Marine Fisheries is working on putting culling rings into long hauls.

Beach seines and stop nets should be licensed per linear foot and limited to fishing operations with a history in beach seining. Beach seining operations are a source of user conflict between recreational and commercial fishermen, and we believe this should be a limited access fishery. We should also reduce conflicts by further developing beach zoning for specific user groups.

All pots should be licensed individually with a price per pot and a limitation on the number of pots per operation. Limits on the number of pots should depend on the species sought. Incidentally, we have this moratorium because crab fishermen raised concerns about overfishing and too many people in their industry. Crab pots should be reduced over a period of time from the current level to a maximum to be established by data. We have made no recommendations on the maximum number of pots pending the outcome of Michael Orbach's study. A large number of crab fishermen in this state have participated, and they are all recommending a limit on the number of pots. We would like further input from crab fishermen on gear reduction.

Dredges are habitat-destructive gears that should be licensed based on size of dredge and impact to the habitat. Dredges should only be used to harvest shellfish in limited areas in order to reduce habitat destruction.

Crab dredging with toothed bar dredges should be eliminated in all North Carolina waters. Smooth bar dredges or scrapes should be permissible in peeler crab and scallop fisheries. Hydraulic escalator and clam kicking are highly destructive gears and should be closely monitored. Current management regulations are deemed sufficient.

Multiple hooked baited lines should be licensed on a per-linear-foot basis and based on impact to species targeted. Long lines should be licensed according to length and species sought. The only types of long lines that are used within North Carolina waters are either trot lines for catfish or long lines for sharks. For hook and line, the licensed vessel should meet requirements for trolled lines, bottom fishing, etc. for commercial fishing. If no commercial fishing license is held, a coastal recreational fishing license should be required.

I might add that on some things, the gear and license subcommittees are in conflict. I think the license subcommittee is saying that a commercial fisherman should have to license every rod and reel; it did not include the trawl in its recommendations.

Tongs and rakes should be licensed. Patent tongs should be prohibited from use due to habitat destruction.

Purse seines are only legal for use in the menhaden fishery. They should be licensed according to size. Menhaden

vessels are now licensed per ton of vessel and will probably continue to be so.

On other gears, the Division of Marine Fisheries gave us a 10- or 12-page list of gears and their impacts on habitat. Most of them were so minor that we haven't addressed them.

On recreational gears, we recommend managing recreational fishing through seasons, creel limits, minimum sizes and quota. The state should conduct studies and assess available data on catch-and-release mortality for the purpose of evaluating future restrictions. A lot of people are going to be moving to North Carolina — people who will want to rod-and-reel fish. And there is really no way to control their effort other than by a fishing license, what they can catch and what sizes they can keep. Other gears mentioned as potential recreational gears are a small clam rake and a gig.

Vessels should be licensed as gear on the basis of size and the fisheries they participate in. Vessel licenses should be capped at present levels. We are saying if a vessel is licensed for commercial fishing in this state — there are currently 22,000 licensed vessels — there should never be any more than that. Whether we are going to be able to do this is anybody's guess.

License Subcommittee

Melba Edwards served on the Moratorium Steering Committee as the representative of Rep. David Redwine, who was co-chair of the Joint Legislative Study Commission on Seafood and Aquaculture. She chaired the license subcommittee. More recently, however, Charlie Albertson has assumed that position.

I'm not sure that I know more about this than everybody else, but we have all worked long and hard, and we have many miles to go. Hopefully, you all will help us travel those miles. Damon Tatem, Murray Fulcher, Bob Lucas and Jule Wheatley are on the license subcommittee with me, and they have put in long, hard hours.

Our main objective is to protect the resource, because if there aren't enough fish out there, it doesn't make any difference if you are a commercial or recreational fisherman or a nonfisherman. The objective of licensing is to document the numbers of people who are fishing commercially and recreationally. And we need a basis for determining the value of the fisheries in our state. This will provide a basis for managing our fisheries. We want to manage them to the maximum so there will be plenty of fish for everybody.

We are going to encourage a professional commercial industry. Only those who fish for their living will be allowed to sell their catch. Some people have asked why we need a commercial fishery. There are several reasons. One, the commercial industry is very important to the state in economic terms. It's the only source of income rolling through a lot of communities. It's not just the fish they catch — the fishermen buy gas, groceries, insurance, make house payments and so forth. There is certainly a heritage factor dating from colonial times. We all fished and farmed when we first came here. That's what we did before we got to be insurance salesmen and whatever else we do now.

Fishing is important to the state in our balance of international trade. We have a \$1.3 billion seafood trade deficit each year, and without commercial fishing, that would increase. We would have to import more seafood. It's also important to tourism, because when tourists come, they want fresh seafood. The first thing they ask the waitress when they sit down to the table is, "Is this fresh?" And of course, it always is fresh local seafood. So the industry is important in a lot of ways. It goes all through the economics of the state.

In developing the license, we threw everything out and started over. In the past, a problem would come up and we would try to cure it by patching a piece on. Something else would come up and we would try to amend something and patch something else on. And it is just an unworkable mess at this point. So we threw it all out.

And what we have come up with is a three-tiered system. We want to license commercial and recreational fishermen, and then we have a third category that we are calling a "messer license." This third license is the one that a lot of people don't understand. It covers the people who have fished commercial gear for the fun of it. They may set a gill net a couple of times a year. A lot of them show their children how to use the net like granddaddy did or great-granddaddy did — it is an important part of their heritage.

Some people use it for subsistence. If they couldn't set a gill net and get a few fish for their freezer or table, it would be a hardship. They use the water to supplement their income. They have a very low impact on the resource. And we think it is important to protect these people. We are talking about a very limited amount of commercial gear — 100 yards of gill net, possibly a very small trawl, a few crab pots, a dip net and a rake, a cast net and a seine not exceeding 25 yards in length with a mesh size of 1 inch. It would be very restrictive.

For the commercial licenses, we will initially grandfather everybody now in the system — the people who hold a license to sell (endorsement to sell). They will have to buy a gear license, which will probably be all-inclusive. But somebody who only shrimp trawls will buy a shrimp trawling license, and if he never crab pots, he wouldn't have to buy the crab pot license. Of course, some people target everything, and they go from fishery to fishery to make a living. The commercial fisherman would be licensed, and we would probably license his crew. The fees would probably be the same as those for a recreational person. And then we have a special license for mariculture, fishing piers, dealers and so forth.

I am going to ask Damon Tatem to explain the recreational fishing license because he has worked on it a lot more than I have.

Damon Tatem: I am sure you all remember the 1994 exercise on the recreational fishing license with a committee of 16 or 17 members. We produced a document that was submitted to the Joint Legislative Study Commission on Seafood and Aquaculture, and it was approved. Then we had an election and we went to a moratorium situation, and the document went to the Moratorium Steering Committee's license subcommittee.

Our approach could be considered more resource-oriented. We were concerned with getting numbers out of this license, and we were concerned with getting money out of this license as opposed to taking care of various groups.

We have proposed a resident and nonresident fee of \$15 for an annual license. We accommodated the lifetime license with the Wildlife Resources Commission (WRC) by recommending a one-time \$10 fee for holders of WRC lifetime sportsman and fishing licenses. The special licenses underwent some alterations. Licenses for the elderly, disabled and disabled veteran are proposed as a one-time \$5 fee, but they must be renewed annually to provide accurate data on the users. A license will be issued at no charge to people on state or county assistance.

The committee has chosen to eliminate blanket licenses for charter boats and piers. License sales agents would be allowed to retain a \$1 fee.

The legislation for the Coastal Recreational Fishing License Trust Fund, which everybody seemed to support, is in an optional area. Expenditures from the trust fund will be authorized by the secretary of the Department of Environment, Health and Natural Resources with the advice and consent of a Coastal Recreational Fishing License Trust Fund Board, which is composed of people with interest and expertise in recreational fishing. The secretary would issue an annual report. Funds would go into a trust fund to enhance coastal recreational fisheries and conservation. As proposed, no less than 25 percent could be spent on resource enhancement; no less than 20 percent but no more than 25 percent could be spent on enforcement; no less than 25 percent could be spent on research; no more than 10 percent could be spent on coastal fishing program grants, projects or scholarships; no more than 10 percent could be spent on administering the program; and no less than 5 percent but no more than 10 percent could be spent on public education. These percentages should be reviewed periodically by the board.

There was an option to pool the license monies from commercial and recreational fishermen, putting them into a single dedicated fund for managing coastal fisheries. There has not been any real deep discussion about this. The Marine Fisheries Commission or a specified board of trustees would advise on the use of the funds with allocation guidelines provided in statute. This is something that you need to think about and let us know how you feel.

Melba Edwards: At one time, the commercial fishing boat was the basis for licensing commercial fishermen. Now we are going to license the individual, which is a whole lot simpler. Everyone 16 years and older would need a license. Children could fish under their parent's license, either commercially or recreationally.

We are talking about renewing the license by mail on the date of birth so that we don't have this madhouse of trying to process them all within one month of the year. This way, it will be easier and cheaper to process. The recreational license would be available just about anywhere. We have talked to the people who operate the automatic teller machines about being

able to buy a recreational license through their machines. It will be very easy to get. So someone who comes to the coast can get a license on a weekend or a holiday. It shouldn't stop anybody from fishing. And of course, the funds need to go back to enhance the resource.

Law Enforcement Subcommittee

Damon Tatem represents recreational fisheries on the Moratorium Steering Committee and he chairs the law enforcement subcommittee. He has a bait and tackle shop on the Outer Banks.

I serve on the law enforcement subcommittee with Arden Moore, a commercial fisherman, retired law enforcement officer from Shallotte and president of the Carolina Commercial Fishermen's Association; Barbara Garrity-Blake, a sociologist specializing in fishery policy; and Sherrill Styron, a commercial seafood dealer from Oriental.

A lot of the supervisory members of the Division of Marine Fisheries' (DMF) Marine Patrol attended our meetings. They supplied insight to their problems and suggested ways to improve their ability to enforce fisheries regulations. The committee was also assisted tremendously by Mike Street of DMF. The division staff supplied organizational support and held meetings with fisheries groups to hear their views on some of our proposals.

The intent of the law enforcement subcommittee has been to suggest ways of improving the quality and effectiveness of the Marine Patrol. We have proposed stronger penalties for violations, which we believe will substantially deter the habitual disobedience of fisheries regulations. I want to emphasize that this is a draft document. It has been revised many times. It is predicated upon the existence of a recreational fishing license and some form of gear and crew licenses.

Committee members believe that the existing seizure statutes and policies are not strong enough to deter violations. South Carolina's shrimping statute is considered a model and is well respected and feared by North Carolina fishermen who shrimp there. We recommend that the North Carolina seizure statute include the entire process of seizure, notice, public auction of seized vessels and gear, and the ability to buy back seized items prior to auction. We were told by a number of fishermen that people go to South Carolina with \$5,000 in their pocket in case they get in trouble. It makes believers of them, and they don't make a mistake twice.

We recommend that mandatory seizure apply to the following violations: trawling in a primary nursery area; trawling in a permanent secondary nursery area; taking shellfish from a polluted, prohibited area at night; taking shellfish from a permanently closed area; taking fish by poisons, drugs, explosives or electricity; willfully harming federally protected species such as turtles and marine mammals; resisting, assaulting, obstructing or delaying a law enforcement officer; and robbing or willfully injuring fishing equipment. It is recommended that the Marine Fisheries Commission have the authority to modify the list of violations for which seizure is mandatory.

The committee proposed a violation point system. There

were a lot of requests to put administrative penalties in, which we did, but we had trouble determining exactly what is an administrative penalty.

The system assesses full point values against the person violating a given statute or rule; it assesses half the number of points against the vessel license and the crew members participating in the operation. There is a General Statute (G.S. 113-187) that considers certain offenses a class one misdemeanor and passes them on.

For recreational fishing violations that involve a vessel bearing a Wildlife Resources Commission (WRC) registration number, half the full violation points should be assessed against a record of the WRC number in the files of the Division of Marine Fisheries. This will be a responsibility of the division and should be no burden on wildlife resources. Upon reaching the suspension threshold, the division would prohibit the use of that vessel for sportfishing in coastal waters for the period of the suspension. This would be done in much the same way that a commercially licensed vessel would be barred from commercial fishing during a suspension period. There will be no restriction on the use of a Wildlife Resources Commission registered vessel in inland waters or for nonsportfishing activities in coastal waters during the suspension period.

Upon conviction, points would be assessed retroactive to the date of the violation. A full point total would be assessed against a violator's license — half the points against a vessel license and half against a crew member's license at the discretion of the law enforcement officer. Suspension periods will be 30 days for 18 points, six months for 19 to 35 points. The license would be revoked one year for 36 or more points. At the end of that time, an individual can petition for a new license if the point totals fall below the suspension level.

For each year with no violations, accumulated points would be cut in half. Two points or less would be dropped entirely. Points against a vessel license stay with the vessel if it is sold or transferred. An appeals process similar to the one for the license moratorium will have to be instituted. There are requests for almost a continuous appeals process on this issue because there are a lot of violations. Suspensions would be implemented as soon as possible after the conviction.

The specifics of the point system are outlined in the proposed document. We were asked to set up an administrative violation schedule. We applied 18 points to the violations we thought were really bad. We tried to look at this point system independent of civil penalties. In other words, we looked at each violation and affixed points to it not knowing the end result — that 18 points would be the point where the license is suspended.

The resource violations run higher — they are violations by people who are abusing the state's public trust resources. Gear violations were high also because of the same situation. And officer safety violations were high because we felt it was necessary to support the Marine Patrol to the Nth degree.

We have a bunch of other recommendations. Some of them have to do with the point system. We recommended that the Marine Fisheries Commission (MFC) have the authority to

adjust the point system values by rule. That gives the commission some flexibility. It is recommended that a point value be included in new MFC rules that restrict gear or affect resources, licenses, enforcement or officer safety.

It is recommended that the Division of Marine Fisheries employ a staff attorney to help prosecute violations and develop rules. We invited the chief marine law enforcement officer from South Carolina, which has a similar system. That has proven to be very effective and has provided a liaison between the prosecuting attorneys. Conviction rates in South Carolina are a lot higher than in this state.

If the Marine Fisheries Commission receives full rule-making authority relating to habitat and/or water quality, it is recommended that an environmental crimes unit be established within the Marine Patrol. It is also recommended that the commission and the division establish procedures to consider enforcement in the rule-making process.

Problems have occurred within the existing commercial license system. If you have tried to get a commercial license, you realize there is a tremendous amount of confusion. A lot of these problems relate to the moratorium and the way the legislation was created. Some are probably due to administrative changes within the Division of Marine Fisheries. It is recommended that the organizational location of the license unit be examined by Chuck Manooch and the Marine Fisheries Commission subcommittee.

It is also recommended that the Marine Fisheries Commission and the Division of Marine Fisheries work with the Wildlife Resources Commission in the following areas: to evaluate and adjust the inland-coastal boundaries, to evaluate and adjust rules relating to size and creel limits and harvest seasons for migratory fish. There's been confusion about where the line is, whose rules apply and who has jurisdiction.

It is recommended that the Structured Sentencing Act be amended to reinstate minimum penalties for coastal fisheries violations. This is something that really needs to be tended to. It is not working as it is.

It is recommended that the General Statutes be amended to allow Division of Marine Fisheries patrol officers to be deputized as federal officers and to allow the division to enter into cooperative agreements with federal law enforcement agencies. This is something that the Marine Patrol has supported.

It is recommended that General Statute 113-136(d)(1) be amended to provide Marine Patrol officers with authority equivalent to Wildlife Resources Commission enforcement officers. It is recommended that the Marine Fisheries Commission receive authority to assess civil penalties for conserving coastal fisheries resources, especially if the commission receives specific authority to manage coastal fisheries habitat and water quality.

It is also recommended that the General Statutes be amended to allow Division of Marine Fisheries patrol officers to use regular or fictitious license tags on Department of Administration vehicles during undercover operations. They have to either use their own car or a state tag car, which doesn't work very well if you are trying to slip up on somebody.

The Marine Patrol has been notoriously underfunded. Recently, it received 13 new field officer positions. That is over the last two fiscal years. It is anticipated that the changes we are proposing — increased types and numbers of licenses, greater cooperation with federal enforcement agencies and responsibility for some aspects of habitat and water quality protection — will place an increasingly heavy burden on the Marine Patrol. We are recommending that the DMF prepare an expansion budget to augment the existing Marine Patrol. In other words, we are asking the division to ask the state for more money, which it may not get.

Last but not least is a volunteer program to assist our Marine Patrol officers in their duties. Several other states — New Jersey, South Carolina and Florida — have volunteer officers who have provided consistently good support for the full-time enforcement officers, increasing their efficiency and safety. Several months ago, Doug Freeman from our Marine Patrol visited New Jersey to see how its volunteer program worked and how successful it had been. He came back with a glowing report of a long-standing program. I think the program has been in existence almost 100 years, and it has been an unqualified success. So now, I'd like to ask Freeman to tell you what he found out from New Jersey. He is the acting chief, so he has his work cut out for him.

Doug Freeman: The Marine Patrol is a relatively small enforcement agency. Many of you who've been out on the water at the start of shrimp season can understand that our officers feel similar to how General Custer must have felt at Little Big Horn when he asked, "Where did all the Indians come from?" But we deal with those issues on a daily basis.

I was asked a number of months ago to look into the use of volunteers and volunteer programs. As most of you know, programs on the Eastern Seaboard are coast-watch programs that employ call-ins. They involve mini-training sessions where people are made aware of violations and are issued numbers for calling them in to a central location. Officers respond to work those violations.

One program I focused on was in New Jersey. That program went about as far as it could go using volunteers without making them full-time law enforcement officers. It has four main segments — recruitment, selection, appointment and training. The New Jersey program starts with a recruitment process. Its officers are involved from the initial stages of the program. In fact, the officers actually go out and find people in the communities who are willing to commit the time and effort to become deputized conservation officers.

People who want to join the program are asked to write a letter stating why they want to be involved and what their goals would be. Then the state of New Jersey responds. Individuals go through an application process. The state runs its training session once every two years. The average number of applicants per year is 500. So the state is dealing with 1,000 applicants when it puts on one training session.

When I was there, the state was almost at the conclusion of a training cycle. Out of the initial 1,000 applicants, only 32 qualified. They will tell you that a lot of people want to gain

access to the program for all of the wrong reasons. New Jersey has expanded its use of the volunteer program, opening it up to other avenues within the division.

Once an individual has been selected as a deputy candidate, he or she is required to attend an initial 140-hour training cycle. This cycle runs two nights a week and some Saturdays and Sundays throughout the course of a year. The individual pays for all training costs, including travel time and time in the classroom. New Jersey, however, does provide the books and the documents for classwork.

Once they have completed the training cycle, the volunteers are deputized as conservation officers in the state of New Jersey. Then, their powers lie in the fact that they are working with a full-time law enforcement officer. That is the only time they have any power and authority.

Most officers in New Jersey have from two to five deputy conservation officers assigned to work with them. It gives them some extra assistance. Some of the newer officers will tell you that it's real helpful when they go into a newly assigned area to have talented people who can show them the trouble spots. They can learn where the problems are and settle into the areas they are working.

The full-time officers work very closely with the deputy officers. I had a chance to meet with a number of both who were involved in the programs. They were very candid about the fact that without the volunteer program, they would accomplish 35 to 50 percent less. Without volunteers, they'd have to draw full-time personnel from other areas, leaving those areas exposed, to assist.

Probably the best thing I can say about the New Jersey program is that it's celebrating its 100th birthday. There have been problems over the years, but they've been worked out. I had an opportunity to meet with the chairman of the state's Fish, Game and Wildlife Commission. He has been a volunteer deputy conservation officer in New Jersey for 30 years. And that speaks very well of the program, I think.

I would encourage everyone in North Carolina to become actively involved. I have lived here since a child. I know that historically, North Carolinians have always been willing to volunteer their time and effort. And I would echo Bob Lucas' earlier statement: We need your help. The enforcement effort in North Carolina is only as good as you allow it to be. We are few in number, but we are many in spirit. And the more we involve the general public in enforcement, the more assistance we can get and the better we can serve the entire state.

Habitat Subcommittee

Melvin Shepard chairs the habitat subcommittee. He is president of the N.C. Coastal Federation and the Southeastern Waterman's Association. He runs his business, New River Nets, in Sneads Ferry.

I happen to be on a committee with two great people. One is Bud Cross from the National Marine Fisheries Service (NMFS) Beaufort Lab; the other is Tommy Browner, a recreational fisherman and developer from Southport. Our committee is probably ready to send some water quality recommendations to the short session in May.

In dealing with water quality, I remember one bass fisherman at the Neuse River closure being emphatically dissatisfied with water quality. In working recently with the Senate Select Committee on River Water Quality and Fish Kills, Sen. Beverly Perdue got after me about some issues and I ended up with some cards faxed to me. One says "waterfront development," and it talks about the water in Craven County. "I use as much food and fiber as anyone. Therefore, I create as much waste as anyone. We must all work together, share responsibility for nonpoint source (pollution). Everybody in the state, I believe, is beginning to get tuned in to the fact that we have to do something. We have a severe problem. The Neuse was just an indicator."

Some of my comments will probably reflect negatively on what Henry Lancaster's operation (Natural Resources, Department of Environment, Health and Natural Resources) has been doing. But we have to remember that our state has funded environmental efforts at something like 43rd or 47th in the nation.

As our subcommittee began to get into what's wrong, we met with a lot of people around this state and state agencies. We found that although the state sets up water quality systems, no one assures that the water quality remains the same as it was years ago. We have shellfish closures of SA waters because the fecal coliform count is over 14 per 100 milliliters, and nobody tries to find out why.

The best way I can bring home to you the problem is to say this — we rate waters SA, SB and SC. SB waters would not qualify for shellfish standards, but they can be used for recreation. The fecal coliform count in 80 percent of the area may be 200 per milliliter and as high as 500 per milliliter in the remaining 20 percent. When we go to SC waters, we add another element — there can be floating solids in the water. If any of you can tell me where on the coast you see a sign telling you which of these waters you are in, I will eat this podium. When the classification goes beyond SC waters, in the areas I call X, then I don't know what you would find. I know that we have some areas where the fecal coliform count exceeds 600, 800, 1,000 and 1,200 per 100 milliliters all the time. One of them is near a package treatment plant under indictment by the state Attorney General's Office.

We are going to have to take a better look at what we are doing. The state cannot continue treating fishery habitat like it has. In talking to members of different organizations, we find that the people who are looking at water quality — the people who keep permitting this or permitting that — are looking at the water from an engineering standpoint. They are not looking at it from a fisheries standpoint. And folks, I am telling you, the fish are about to die. They are not being treated as they should be.

The hatchery folks in Watha have very specific guidelines to raise fish — proper temperature, pH factor and everything. These people tell me if the pH factor changes rapidly, then the eggs won't hatch.

A lot of things are going wrong that we can't put our finger on. In the past, when something was observed by the Division of Marine Fisheries, the N.C. Coastal Federation, the

Wildlife Federation or others interested in conserving fisheries, we commented on it. Those comments were taken, read and they might or might not be acted on. That has to change. When the division, charged with protecting fishery habitat, made comments, it might or might not have been listened to. Something has to be done.

We are recommending a staff at the Division of Marine Fisheries that is dedicated to water quality and habitat standards. The comments that they make must be addressed. If there isn't agreement, then they have to be elevated to a higher authority before a permit can be issued in violation of water quality standards for fish. That is getting pretty strong, and I think probably this kind of thing can be addressed in the short session. There seems to be an effort that way.

One of the things we've been working on is a citizens voluntary water quality monitoring program, and a lot of people want to volunteer. This will be one of our recommendations.

Another recommendation is for a hotline to report water quality violations. We are going to recommend that it be set up within the present system at the Division of Marine Fisheries. We are also recommending that its officers look for and investigate water quality violations.

We are going to recommend buffers along all streams. We may get into a takings kind of proposition, so we are going to recommend that people do this on a voluntary basis. This is already recommended by the Senate Select Committee on River Water Quality and Fish Kills. There seems to be a wide acceptance of that.

We also looked at gear in the water now and what effect it has on habitat. And we are making strong recommendations that certain gear be used in certain places and not others. This is going to place some responsibility on the state to clearly designate areas such as submerged aquatic vegetation and oyster bottom. It is going to be the Division of Marine Fisheries' responsibility to mark or delineate closed areas. And it will need funds for this.

One of the great things that we must do is manage fish by fishery management plans. We also must manage submerged aquatic vegetation, oyster grounds, primary nursery areas and secondary nursery areas by a specific plan and stop throwing darts at the dartboard. There must be specific recommendations for what you can and cannot do in certain areas.

Nutrients, Water Quality and Fish Production: What are the Long-Term Trends?

B.J. Copeland is director of the North Carolina Sea Grant College Program.

Again this year, we'd like to express our pleasure in being able to hold this forum. This is the fifth year we've had the forum on fisheries issues with an emphasis on the recreational resources. I think we've seen significant progress in those five years, and the reports that come from this conference have been used in formulating state policy. This has been a good experiment, which I think is totally attributable to the people who come. Your participation enables us to move for-

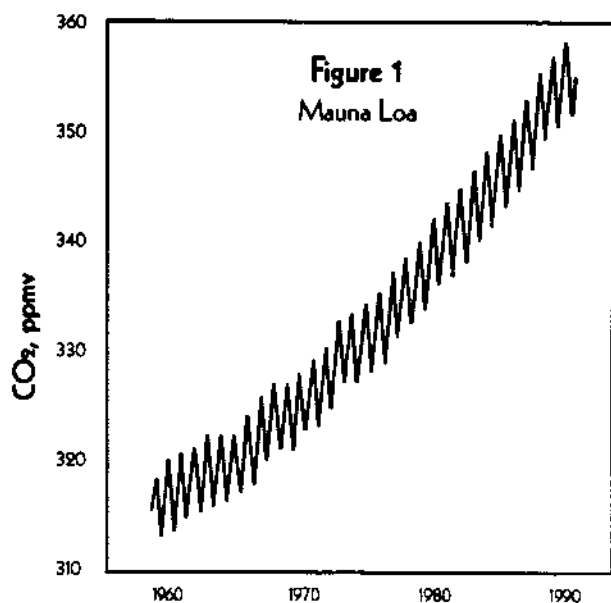
ward. And I think it is very important that we continue to express how we feel about our public trust resources.

Water quality and ecological systems are very important to the well-being of our coastal fisheries. We're fortunate to have a luncheon speaker to give us an overview of the quality and responses of coastal ecological systems. This will enable us to place North Carolina in context with national and international coastal water quality issues.

Scott Nixon is director of the Rhode Island Sea Grant College Program and a world-renowned researcher on coastal ecological systems.

When B.J. Copeland and Jim Murray invited me to speak, they set quite a challenge for me. They said, "We don't need a Rhode Islander to come down and talk about North Carolina water quality and fisheries problems. We want you to talk about global water quality and the nutrient/fisheries situation and give a little historical perspective." It's a tough proposition to take a long-range global view in a very short period of time.

Now, it may seem a little strange, but I want to start by showing a plot (Figure 1) that many of you have probably seen. I think this is probably one of the most important sets of environmental monitoring data ever collected. It shows the rising concentration of carbon dioxide in the atmosphere on top of Mauna Loa in Hawaii. I am sure you all have heard more than you want to hear about global warming and the dangers, threats and reality of that as a major global-change phenomenon. And the major set of information that started our concerns about global warming and precipitated the great policy debates and political debates is the data set that you see in this plot. It shows what appears to be a very dramatic increase in the amount of carbon dioxide in the atmosphere. And remember that carbon dioxide is a very trace gas; it makes up far less than 1 percent of the total atmospheric gases.



Now, that is the way the data are usually shown. I would like to show you the data plotted a little differently (Figure 2), and that is if we make 0 the base of our axis on the left plotting the change in CO_2 over time. And I want to do that not to argue with the atmospheric chemists and others about the importance of the increase in CO_2 , because it is a very important phenomenon, but to give a little perspective for what I'm going to talk about.

When we look at the data this way, there is really about a 15 percent increase over the background when measurements began in the mid-1950s. The atmospheric chemists usually change the axis a bit to emphasize the phenomenon they want to talk about. So keep in the back of your mind the perspective of this fairly small change and the tremendous amount of attention and concern that has been devoted to the global climate change phenomenon and the CO_2 problem. We will look at some other curves as we go along.

Here we have a plot of the amount of nitrogen and phosphorous fertilizers (Figure 3) that have been synthesized over time in the world. You will notice that all these graphs go from 0 up on the left-hand side, so we aren't fiddling with the data here. Those increases are extremely dramatic, and especially since 1965 you can see the huge increase in the amount of nitrogen and phosphorus being used in agriculture worldwide. That increase is relatively recent.

What is the driving force behind that tremendous increase in the movement of these biologically important chemicals, nitrogen and phosphorus? It's the same basic problem that we hear about all the time, but I think we really cannot emphasize this strongly enough. The major driving force is the number of people. Locally, it is the number of people moving into particular areas. Globally, it is the tremendous increase in the human population. And in the time that I have been alive, which isn't really all that long, the world population has about tripled. That is a huge increase in the population, and these people have to be fed.

The nitrogen and phosphorus mobilization on the surface of the planet is driven by feeding the population. We could not sustain the given world population today without the intensive use of synthetic fertilizers. It has nothing to do with lifestyles or rich countries versus poor countries or anything else, be-

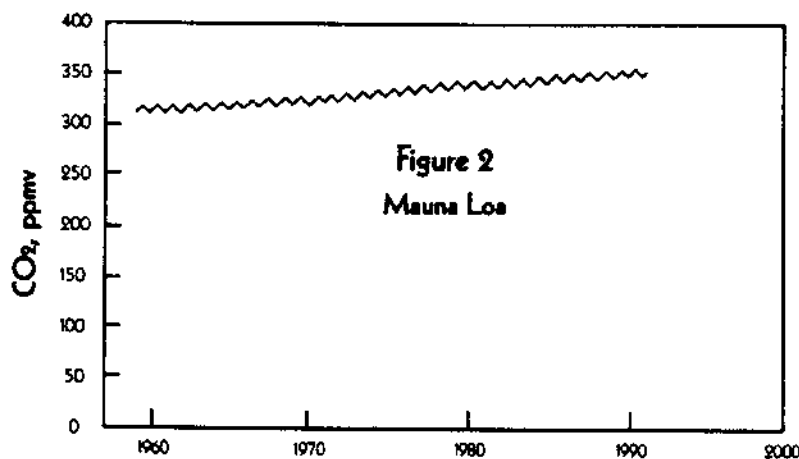
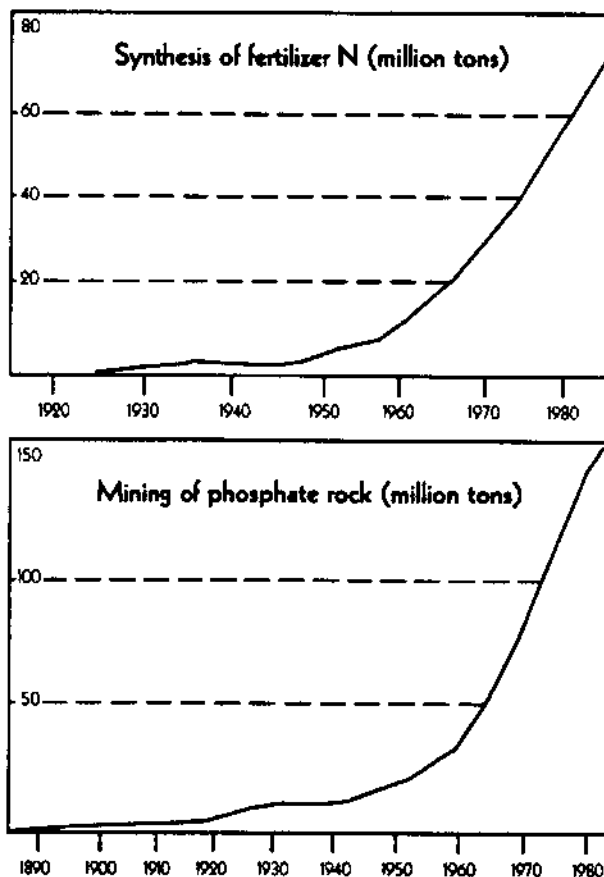


Figure 3



cause much of the food is redistributed around the planet. But this is an inescapable need of human nutrition on the Earth. As a result of that tremendous fixation of nitrogen from the atmosphere to make fertilizer, we have now managed as a human population to play as big a role in the global nitrogen cycle as all of the natural processes that take place on the planet.

I have to pause for a minute for some of you who may not get concerned as much about nitrogen as I do. Nitrogen, of course, is an extremely abundant element on Earth. Eighty

percent of the atmosphere is nitrogen gas, which is essentially inert. It doesn't participate in biological reactions. But that nitrogen gas, that inert gas, becomes fixed, which means it gets converted into ammonia and then into nitrate, which are the two forms of nitrogen that are very effective biologically. When you buy fertilizer, much of it is in those two forms. When we produce human waste as feces and urine, it contains or is quickly converted into those very reactive forms of nitrogen instead of the inert stuff that is in the atmosphere.

There are natural processes by which that inert gas is made biologically active. A very small amount is fixed by lightning, and

a good bit is fixed by specialized biological organisms, bacteria and some blue green algae, on land. And that is what the world was driven by. The productivity of the Earth was sustained by those natural processes prior to about the last 100 years or so.

Now, human activities fix a very large amount of nitrogen by fossil fuel combustion. The nitrogen doesn't come out of the gasoline, the coal or the oil. It comes out of the atmosphere, because when you burn fuel, the very high temperature converts the unreactive nitrogen gas into very reactive forms of nitrogen, just as it does with lightning. And that nitrogen contributes to the acid rain problem. Nitric

acid is a very important component of acid rain along with sulfate and other things. So by generating electrical power, running automobiles and burning things at high temperatures, we inject reactive forms of nitrogen into the atmosphere. They are transported various distances and come down in rain, snowfall and dryfall onto the surface of the Earth.

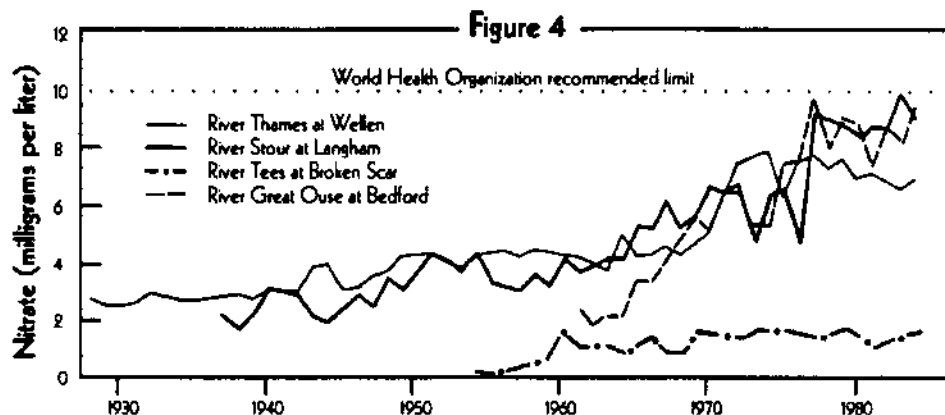
Another major way we convert unreactive nitrogen from the atmosphere into reactive forms is by planting certain crops, which fix nitrogen. We are increasing the biological drawdown of nitrogen from the atmosphere and making it available in very reactive forms by planting crops like rice. Fertilizer production — the biggest anthropogenic impact on the global nitrogen cycle — is another major contributor. We make fertilizer mainly by burning natural gas as the energy source by which we take nitrogen out of the atmosphere and make it into highly reactive forms for use in agriculture.

Right now we have made a huge perturbation in the global cycle of this chemical, which is extremely important in influencing biological responses and the production and formation of organic matter by plants. The prediction for the future is that in the next 25 years, we will double the rate at which we are making nitrogen available on the surface of the Earth. This is a huge change in a very important biologically active chemical. I think people have not paid as much attention to this and generally don't appreciate the potential seriousness of it.

One consequence is that as we begin to make all of this reactive nitrogen available, it runs off the land. If it just stayed on the land, that would be fine. We wouldn't care if we fertilize our bushes and grass and corn crops. It wouldn't cause any problem for us. But nitrogen and phosphorus run off various kinds of land uses at different rates into streams and rivers. As you compare the forest with runoff from pastures and especially croplands, you can see tremendous enrichment in the streams and rivers because of that human activity.

As a result, concentrations of nitrogen, in various forms,

and phosphorus are rising in rivers all over the globe. This figure (Figure 4) shows historical concentrations of nitrogen in rivers in England, but you can find similar plots in the United States and many other places in the world. It's not everywhere, but it is increasingly widespread. You will notice that



we are not talking about increases of 10 or 15 percent. We are talking about doublings, triplings, quadruplings and five times and more the amount of these chemicals running off the landscape into estuaries. The watershed of an estuary is much larger than the estuary. It acts like a giant funnel. So we are concentrating these chemicals from a broad piece of the landscape, running them down in the rivers and streams, concentrating them into one relatively small piece of coastal water.

I mentioned earlier that the injection of nitrogen into the atmosphere was an important part of this story. And just to give you a feel for the kind of changes that have been taking place, these are the oldest measurements (Figure 5) of the Earth's atmospheric deposition of nitrogen. They happen to have been made in Rothamsted, England, in the late 1800s. And you can see the amount of nitrate on the left and the amount of ammonia on the right in the historical data compared to measurements made during the 1980s. There is a very large change in the amount of nitrogen coming down from the atmosphere onto the landscape.

Figure 5
Atmospheric Deposition at Rothamsted, England
Nitrogen in precipitation, $\text{kg ha}^{-1} \text{y}^{-1}$

	NO_3	NH_3
early 1980s	5-10	5-10
1888-1916	1.5	3

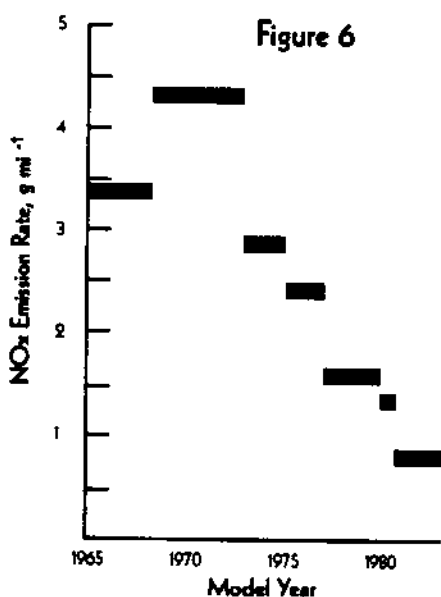
Summarized by Goulding et al (1986)

That has impacts on the kinds of forests and plants that grow. It means that the amount of nitrogen coming off that land is increased from the atmosphere as well as by fertilizer applications. So when we start measuring nitrogen running off

land — agricultural land — most of it comes from the fertilizer, but not all of it. In some forests, there is so much nitrogen coming from the atmosphere that they become saturated and can't retain any more. Nitrogen is beginning to show up in the streams and rivers by this atmospheric pathway. In Narragansett Bay, for example, the amount of nitrogen coming down in rain is about 10 times what it was prior to 1900.

We can make an impact on that in some cases. This figure (Figure 6) shows you the emission of nitrogen gases, oxides, from automobiles in the United States as a function of the model year of a car. Since about 1970, we have made a major improvement in making those engines more efficient and reducing their input of nitrogen to the atmosphere.

We have also applied this kind of technology, which is expensive technology, to power plants and reduced their nitro-



gen emissions. As a result, in places like the north-eastern United States, we have been able to turn the tide a little bit at great cost and reduce the amount of nitrogen in the rainfall. But that is

in a very industrialized, wealthy country like the United States, and it is only part of the story. Worldwide, we are being overtaken by tremendous increases in the number of vehicles and in the amount of electricity generated.

There is a relationship between the carbon dioxide problem that we looked at first and the nitrogen problem, because when you burn fossil fuels, you insert CO₂ into the atmosphere. You also convert unreactive nitrogen in the atmosphere into reactive forms.

There are projections for huge increases in automobiles and the electric power to be generated in the developing world. That means we will be putting more and more nitrogen into the atmosphere.

There's another consideration in the future prospects for nitrogen in the coastal environment. The tremendous population growth will not be evenly distributed over the planet or within countries. Almost all of that growth will take place in developing nations, most of them tropical; and most of that development is going to be urban development in coastal cities in the Third World.

This (Figure 7) is a really startling statistic to look at. It is a tremendous number of people — 81 million people a year — being put into large urban agglomerations in coastal areas around the world. Why is it important that they are in urban areas? One reason is that in the developing world, where people live outside of urban areas, their waste disposal involves what we politely call dry technology. That means they use the ground, latrines or they go into the bush, and there is very little movement of human waste. We did the same thing in this country, of course. Until relatively late in the 1800s, people in cities across the United States and Europe were all using privies. I expect most people here have some nodding acquaintance with what a privy or an outhouse is. There is no running water involved, so the human waste stays in the ground or it is collected and recycled in agricultural uses.

When people come together in big cities, the waste begins to impact the water supply. You have to provide urban infrastructure. You have to give them running water. And once you have provided water, they all have toilets and you have to get that wastewater away from the city. So you build a sewer

Figure 7

In the 1990s, over 83 percent of the world's population increase is expected to take place in towns and cities — 81 million people every year, equivalent to around 10 new cities the size of Moscow, Delhi, Paris or Lagos.

The Future is Urban
U.N. Population Fund 1992

system to collect all of that water and you either treat it at great expense or, more often in developing nations, you discharge it into the nearest river or ocean without treating it at all. In order to improve human health, we have a major impact on environmental health downstream. By providing running water and sewage collection, we assure that the nitrogen and phosphorus contained in human waste quickly get into the coastal environment instead of staying on land.

This figure (Figure 8, Page 21) shows the amount of nitrogen coming into Narragansett Bay and Pamlico Sound over time. Don Stanley reconstructed the history for Pamlico Sound. The scale for the plot for Pamlico Sound is one-tenth that for Narragansett Bay because Pamlico Sound is a much bigger estuary with a bigger watershed, so the absolute amount of nitrogen in that watershed is 10 times what it is in Narragansett Bay. The important point is the different time of the increases in these two estuaries. Narragansett Bay is not agricultural. It is a very urban, industrial estuary. It was developed with a lot of urban structure and it was well developed by the early 1800s. Providence was one of the first American cities to install an urban water system and an urban sewer system.

The infrastructure was largely installed between 1870 and 1900. In a matter of 20 or 30 years, all the human waste from the people living around that estuary was collected with what

they called the water carriage system, meaning water was carrying the human waste. It was brought to the sewage treatment plants and dumped into the estuary. So the city became leaky instead of very tight. We began to release all these nutrients. That increase took place around the turn of the century, and that is the pattern you see throughout most of Europe and the northeastern United States.

But the major increase took place in 1960 in areas like North Carolina and parts of the West and Gulf coasts, where the major source of the nitrogen wasn't human sewage but nonpoint source runoff from agriculture and atmospheric deposition into the watershed. Beginning around 1965, there was a really dramatic increase in nutrients coming into the coastal waters.

So the difference between point and nonpoint sources can produce an offset in time by 50 years or more. And in a lot of the Third World countries, we are seeing both of these things come together. They are using more fertilizer more intensively. They are releasing more nitrogen into the atmosphere from fossil fuel burning. And they are constructing the urban infrastructure that will more efficiently move nitrogen from the landscape to the water.

Removing nitrogen is expensive. It is much more expensive than lowering the organic matter in sewage or the solids or the objectionable floatables in sewage. There are only one

farming the ocean and the grass of the sea being phytoplankton and so forth.

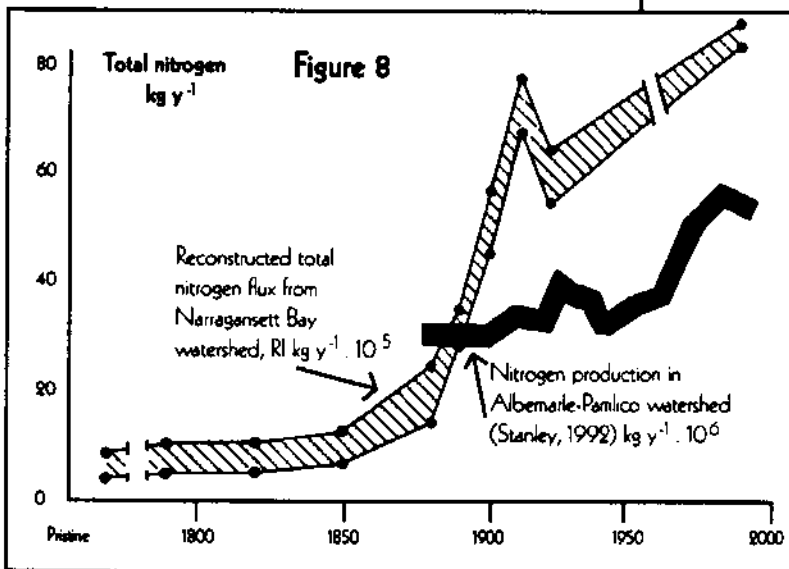
This figure (Figure 9) is from the most marine ecology popular textbook at the turn of the century, by James Johnstone. The view was that the ocean operated pretty much like a farm. You had plants in the form of diatoms and they fed cockles or oysters or little zooplankton animals, and those were eaten by one kind of fish or another and the food chain went up to man. So if you fertilize those plants, that would be

Figure 9

So we can easily construct series of animals each of which is the food of the one higher in the series. Thus:

diatoms \Rightarrow cockles \Rightarrow flounders \Rightarrow man;
 diatoms \Rightarrow oysters \Rightarrow man;
 peridians \Rightarrow copepods \Rightarrow sprats \Rightarrow whiting \Rightarrow cod \Rightarrow man;
 and so on.

Thus the nitrogen compounds which are produced on the land from putrefactive decomposition of the dead bodies of animals and plants or the excretions of the animals, are washed down into the sea; and a fraction of the total mass of nitrogen so transported may again return to the land in the form of the bodies of useful marine animals which have fed, indirectly, upon this nitrogenous drainage substance.



or two cities in the United States that really remove nitrogen to any extent. The idea of doing that in the developing world is fairly remote. And nonpoint source nitrogen is even more difficult to control, as many of you know. So I think the future is definitely going to be nitrogen-rich. There is no question. We've already had a huge impact on the global nitrogen cycle, and that impact is going to increase.

We are left asking why we should be worried about this and what the impact on the estuary will be. After all, one of the great prevailing metaphors in marine ecology is to look at the sea as a farm. Many of you have heard people talk about

look all around the world at a large number of different estuaries, bays and coastal waters, we also see that there is a good relationship between the amount of plant growth in that system, the primary production, the amount of carbon fixed per square meter per year, and the yield of fisheries from those systems. So it's suggested that the systems that are greener and more productive will yield more fish. The transfer is not very efficient. Less than 1 percent of the energy grown in plants shows up in the yield of fish. But nonetheless, the trend is there. We could make the argument that one impact of fertilizing the coastal ocean is that we are going to increase the

good. You would make more animals, just like you do on a farm. And the literature was full of people talking about trying to fertilize the ocean to make more fish come out of it.

If we look at data from the field and from experiments in certain kinds of coastal marine environments — even in the open ocean — we discover that if we add nitrogen to those waters, we increase the primary production. Primary production is the rate at which the plants grow in that system. That sounds like a good deal. We can make the ocean greener if we add nitrogen and phosphorus. If we

productivity of fisheries. And that may in fact be true in certain areas.

The ocean is not a farm, however. If you compare a recent textbook to the nice, simple food chains in James Johnstone's textbook, you can see the way we look at the ocean today is anything but simple. The ocean is far more complicated than agriculture. And it is not clear at all that if you dump fertilizer into such a system you will produce more fish at the other end. We know, for example, that there are major changes in the species that we can have in the system if it's fertilized. Seaweeds can come in and choke out the eelgrass beds in a coastal environment. There are complicated interactions where we can lose entire habitats as a result of fertilizing the water. And of course, oxygen is another huge difference between the farm and the ocean. In the air, oxygen is about 20 percent of the total atmosphere. And the atmosphere mixes rapidly — air is easy to move around. Water is much more viscous. It doesn't mix very efficiently, and very little oxygen is dissolved in water compared to air.

Life in the sea is always on the verge of strangulation. If there is very little oxygen to start with and you mix in a lot of organic matter that decomposes in the water, that decomposition uses up the oxygen and produces things like mats of white sulfur bacteria. There is no oxygen in that water. It's obviously not a desirable habitat and can, of course, produce fish kills.

A host of suggestions have been made about how the marine environment responds to fertilization. We talk about the greening of the planet as a result of fertilizing on land and the green revolution in agriculture. But we don't necessarily green the ocean when we fertilize it; we color it because we get blooms of phytoplankton of various species and different colors. We get red tides and brown tides and white tides as well as green blooms. We have been involved in a big coloring of the coastal ocean, and we don't know what the impact will be on the diversity or on the food chains. We are producing more blooms of exotic species of algae. We don't know whether that is due to fertilization or global warming or other causes. There is also some evidence that those blooms are increasing.

In this chart (Figure 10), I have summarized what I think is our level of certainty about some of the changes caused by nutrient input into coastal waters. There are various effects on plants and marine animals. And I think it makes a big difference whether the water is stratified or unstratified. Being fishermen, you probably know what I mean by that. But in some systems like the Pamlico estuary and the Neuse, the combination of fresh, warmer water on the top and cooler, saltier water on the bottom effectively isolates those water masses. And since you don't have strong tides in those estuaries, it takes a very strong wind to mix the water. Bodies of water like the Pamlico and the Neuse are much more prone to these problems than a place like Narragansett Bay, where the tide and wind are strong and there isn't much fresh water coming in.

Our certainty about many of the potential impacts of nutrient enrichment is very low. I can imagine people probably lose patience with us sometimes and wonder, "Why don't

Figure 10

Effects of Eutrophication on Marine Plants

Response	Level of Certainty
Blooms of phytoplankton	H
Increased primary production	H
Shift from diatoms to flagellates	M*
Increased toxic phytoplankton	L
Increased seaweed growth	M-L
Loss of sea grasses	H-M

*more certain in stratified waters

Effects of Eutrophication on Marine Animals

Response	Level of Certainty	
	unstratified waters	stratified waters
Increased growth rates	H	L
Shift to very small zooplankton	L	M
Shift from clams to worms	L	L
Increased pathology	L	L
Fish kills and other mortality	L	H

you folks who have been studying the ocean know more about this?" Part of the reason is that this isn't a simple system to understand or to learn to manage. Another reason is that work on this issue is relatively recent. Until about the 1970s, general wisdom held that the coastal marine environment wasn't susceptible to the impact of nutrient enrichment like lakes were. We thought that we didn't have to worry much about this problem because our estuaries and bays were sufficiently well flushed.

Boy, were we wrong. It is happening worldwide, and now there is a tremendous growth in attention to this problem. But we are playing catch-up, and we are far behind in trying to figure out what is going on. We have a complicated system and we are really just getting started.

As a last point, it is certainly true that marine and coastal pollution problems have gotten more attention. But unfortunately, that attention is short-lived and it focuses on crisis events. The attention has been generated by such things as syringes and other medical wastes washing up on the beaches in New York City, which resulted in a huge concern with coastal water quality and environmental issues. That concern didn't last terribly long, and it wasn't a very serious problem.

The more chronic issues — such as habitat changes and loss and the coloring of the coastal ocean from this insidious ubiquitous fertilization — have not generally been perceived by the press or the public as important in terms of human impact on the globe. I think that is going to change. We are going to see more and more awareness of it.

Charles Clark: I have read that fish will assimilate nitrogen in the production of protein, which is part of their body. If a 4-ounce fish is thrown overboard dead, it creates nitrogen. Is that correct?

Scott Nixon: Yes.

Charles Clark: And if that same fish was left alive and grew to a pound, would it not assimilate a lot more nitrogen than the process of dying?

Scott Nixon: The answer to both of your questions is yes. But let me give a little perspective. When we look at the amount of nitrogen removed from the marine environment in fisheries landings, it is a very small part of the amount that goes in. Most of the nitrogen that goes into a place like Pamlico Sound produces a large growth of plants that take up a lot of that nitrogen.

Most of the plants get eaten by some small animal. That small animal assimilates a little bit of the nitrogen that was in the plants. Most of the nitrogen excretes back out into the water again in its waste products. Then a fish eats that animal, assimilates a little bit of nitrogen and grows, but most of what that fish eats it excretes into the water again. So animals don't represent a large storage of nitrogen, phosphorus, carbon or any of these other elements, but a large amount does pass through them.

William Lambeth: Is the amount of nitrogen used to fertilize fields in excess of what needs to be put down to make them productive?

Scott Nixon: I am probably not very well qualified to answer that. An agronomist would do far better. But I am told by my agronomist friends that we overfertilize in most of western Europe and the United States. Countries such as Denmark and the Netherlands put tremendous amounts of fertilizer on the land relative to most other parts of the world.

Michael Orbach: Do you know of any places where the nitrogen issue has been dealt with successfully or has been reversed because of some climatic condition? I am particularly interested in the public policy response that may have actually changed any of it.

Scott Nixon: The most successful place I know of is Tampa Bay, Fla., where they went to tertiary treatment. They also instituted a nitrogen-control program with fertilizer industries and farmers in the area. And in fact, they have seen improvements in water quality, declines in turbidity and increases in the spread of seagrass beds in Tampa Bay. And I have been told anecdotally that some of the fisheries populations traditionally in the bay are recovering. Other countries like Denmark, for example, are struggling with the nutrient issue and debating things like a nitrogen tax. I don't know whether that would be a good policy or not.

Question: Are you familiar with the removal of phosphates from detergents and the change in some of these water quality parameters in Lake Erie?

Scott Nixon: Yes. The freshwater folks are lucky in a way

because the major nutrient that limits the growth of algae in lakes and fresh waters is usually phosphorus. In the marine environment, it is nitrogen. The reason they're lucky is that phosphorus is relatively cheap to remove; it is easy to precipitate out of sewage effluence. It is also easy to remove from detergents — a major source. In agriculture, phosphorus tends not to move so actively across the landscape. It binds to the soils much more effectively than nitrogen does. And the atmosphere is not a very important pathway for phosphorus to get around the landscape.

The marine environment gets a quadruple whammy because there is no product that can be controlled to remove significant amounts of nitrogen unless we stop eating protein. We could lower our protein consumption — all of us eat more protein than we need. But we have a much tougher problem than the lake people have.

B.J. Copeland: I think the bottom line is that, like the Tampa Bay situation, we will begin to make changes when we discover that it's worth more to us to improve those resources than to do other things. Until we discover what that value is, it isn't going to happen very fast.

Open Forum on the Working Recommendations of the Steering Committee

Moderator B.J. Copeland is director of the North Carolina Sea Grant College Program.

The subcommittee chairs have given their reports on issues that the Fisheries Moratorium Steering Committee is dealing with. In addition to those subcommittees and their deliberations, we were also commissioned in the Moratorium Act to conduct research to fill in the gaps where we don't have information. So we've asked a panel to be here today: Melvin Shepard chairs the habitat and environment subcommittee; Pete West chairs the gear subcommittee; Bob Lucas chairs the Fisheries Moratorium Steering Committee and the Marine Fisheries Commission; Damon Tatem chairs the subcommittee on enforcement; Melba Edwards co-chairs the subcommittee on licenses; Charles Manooch chairs the subcommittee on reorganizing the Marine Fisheries Commission and dealing with the Division of Marine Fisheries; and David Eggleston of N.C. State University, Michael Orbach of Duke University and David Griffin of East Carolina University conduct research.

Michael Orbach is a professor at Duke University.

Ours is a joint project between East Carolina and Duke universities. It has two objectives. One is to get some data and information about who is out there fishing. Bob Lucas mentioned that out of 22,000 commercial vessel licenses, only about 6,500 had the endorsement to sell. So who are the people that are endorsed? How do they fish and what is their percentage dependence on commercial fishing? Of the nonendorsed group, what are the fishing patterns? Presumably none of them are selling, but what amounts of gear do they use and how do they fish?

The first part of our study involved several hundred fairly in-depth personal interviews — it was a random stratified sample by area. We'll be giving back some of the results to the moratorium committee to help in its deliberations.

If you look in more detail at the breakdown Lucas mentioned this morning, there is an item in the Moratorium Steering Committee's draft package that has to do with defining who can obtain this endorsement to sell. Although everyone with a commercial license or endorsement to sell may be grandfathered in at the beginning, who should be able to qualify for these commercial licenses over time? If you look at the 6,500 people with an endorsement to sell in 1994-95, about 1,000 of them never sold anything at all; about 3,000 sold less than \$1,000 worth; about 4,000 sold less than \$5,000 worth; and only 1,700 sold more than \$10,000 worth. Now, this does not address how many people are employed in the industry; it's just a breakdown of the number of licenses in each category.

It also varies from region to region. For example, people in the Albemarle and Pamlico area said a fairly high percentage of their income comes from commercial fishing. Of our sample, 87 percent in the Albemarle area and 77 percent in the Pamlico area said that more than half their income was from fishing. On the other hand, in Carteret County and south of Swansboro, where the fishing population is presumably more part-time leisure and tourism-oriented, only 59 and 62 percent respectively said they made more than half their income from commercial fishing. We had an inland sample, where several hundred people have endorsements but live in noncoastal counties. And only 25 percent of those people said that they made more than half their income from commercial fishing.

So clearly, these things differ around the state. This is the kind of data we need to show the committee what impacts its recommendation will have and what groups of people it will affect. These are not the kinds of decisions you should make without knowing whom you're going to affect.

The second part of the study was to look specifically at limited entry or limited access systems. These are management systems used around the world and in several other states. Generally, they restrict either the number of licenses or the amount of gear that can be used in the fisheries. We had almost 30 workshops with groups around the state, talking about what these limited access systems could address.

We focused on three fisheries where we can show from scientific data that there is more effort than you'd need to take the available fish and where industry people have come to us and said they think there is a problem. Those were our two criteria for picking focus fisheries. We have looked at crab pots; pound nets, particularly in the Ocracoke-Core Sound area; and the ocean summer flounder fishery.

I won't go into details about those discussions, but at the April meeting we will present the committee with results of those studies. I will say that various people have commented about whether one group or another thinks there is a problem in the fisheries and how some of the crab fishermen have initiated a lot of this. In our survey, we asked endorsed and nonendorsed people a series of questions about limited entry

and access and their thoughts about it. One question we asked was, "Do you think that some form of limited access is appropriate in some North Carolina fisheries?" Seventy-seven percent — both commercial and recreational — said yes.

So the point is there's a fairly broad perception that there's a problem and some sort of access limitation may be appropriate. What everyone emphasized, however, is they want all the constituencies — commercial and recreational — to be involved in the process of deciding what to do. They don't want someone else to make that decision and then thrust it on them. And that is what we are trying to do — get everybody into the process.

Question-and-Answer Session

B.J. Copeland: Now we'll open the floor to questions so that the audience can interact directly with the people who are doing the analyses and making the recommendations. Your input is very important. Nothing is going to happen unless we all do it together. This is a sermon that Bob Lucas has been preaching for I don't know how long. And I think the handwriting is on the wall that something has to change. We just don't know what and how much and where.

Tom Quay: The Division of Marine Fisheries has 52 law enforcement officers. If you could spring full-scale into optimum operation with volunteers, how many of these high-class New Jersey volunteers would you like to have right away?

Damon Tatem: We never discussed exact numbers. The officers had one or two or three assigned, if my memory serves me correctly. And, as Doug Freeman mentioned, we are looking at this pool not only for enforcement assistance but also for biological assistance, assistance for the Division of Environmental Management and that type of thing. So it is wide open, numerically speaking.

Tom Quay: Well, out of 1,000 volunteers, New Jersey got 32. How many do they have all together? Do they add some every two years?

Damon Tatem: I think that's what the schedule was — every two years. But we are talking about law enforcement volunteers in that case.

Tom Quay: I am talking about the regular New Jersey type that was described. There must be some figure you would like to have. Fifty-two is how much too little, Bob?

Bob Lucas: Let me refer back to Doug Freeman. To answer the question, how many does New Jersey have in its volunteer program?

Doug Freeman: Currently, New Jersey has 100 active conservation officers. Its law enforcement, I think, was 54 at the time I was there.

Bob Lucas: To answer the question, we want to make sure the program works. I think we would certainly like to have two for one. That would be the goal. If we have 50 officers, then we'd like 100 volunteers. And it will take us a while to get there. The answer is we would like as many as we can get.

Gil Radonski: I live in Swansboro, but you can tell from my accent that I'm not a native. I live there by choice. I spent most of my career working on sportfishery issues at the national level. I am now retired, but I still have a great deal of interest in the activity.

My words to the organized sportfishing community are to support the type of activity that's going on with the Moratorium Steering Committee. It is probably the most progressive, far-reaching overhaul of a system that I have seen in my entire career. These people are asking you to be a part of it, and you can't pass up that invitation.

And though I say let's get behind it and endorse it, there are several questions we need to raise as the process goes on. I have been an advocate of a saltwater fishing license for a long, long time. When I first got into the issue, only a handful of states had such a license. They were Alaska, Washington, Oregon, California and Texas. There was no saltwater license on the East Coast. Since then, we have seen saltwater licenses come into Louisiana and Mississippi. Alabama licenses its nonresident saltwater anglers. Of course, Florida has one. I believe Georgia and South Carolina have one. Maryland and Virginia license their inside saltwater fishery in the bay. So we see this growing.

I was president of the Sportfishing Institute, which was very active in helping those states do some of the legwork involved. As I look at what they are doing with the saltwater license here, I think it is very progressive. Among the shortcomings that I see, and you may have discussed it, is the issue of equitability. You are going to have all commercial fishermen licensed at \$35 a head or \$25 a head and recreational fishermen licensed at \$15 a head. There is a great question of equitability here. You can go out and land tons of fish versus pounds of fish. It is an issue that we will have to look at.

I am also concerned about the statement that was made about mixing commercial and recreational funds. If you want to jeopardize all your funds from the sport, the Federal Aid and Sportfish Restoration Act (Wallop-Breaux or Dingle-Johnson), that is what you are going to do if you mix them.

Also, if I was a member of the Coastal Conservation Association, I would hesitate to support a saltwater license unless we had a discrete function unit within the Division of Marine Fisheries, an office of sportfisheries, to attend to the needs of sportfishermen.

These are some of the issues that we have seen arise in other states. They all took different approaches and came up with different answers. Some put together advisory boards that had a veto over the expenditure of the funds. That is a good thing. You need some sort of citizen participation. Also, I didn't see a license come about in any state that didn't project the income from that license and how the money was going to be spent. And if we don't do that in North Carolina

and give some assurances to the people who are going to be paying this user fee, it's going to be very difficult to get wholesale support for the program.

Bob Lucas: I think the first question is whether it's unfair to charge \$25 for commercial fishermen. I made the same argument when we were talking about it yesterday — that would be the perception if we didn't make some changes. And we did yesterday in our draft recommendations. There will be a \$100 minimum. But as a practical matter, that's only if a commercial fisherman uses one type of gear. If he uses different types of gear, it will be a maximum of \$500, which is probably what most licenses will be. We are going to basically charge the commercial fishermen based on use of gear.

Gil Radonski: The important thing is not so much the exact dollars and cents but the equitability of what you do.

Bob Lucas: Absolutely. And that argument was made very clearly yesterday. So we hear you and agree with you. Secondly, to your question about having a sportfishing department within the Division of Marine Fisheries, we do. We have Dale Ward, and that's it. He has done an outstanding job. I will say that he certainly is the most popular employee in the division. But we need a lot of help.

The recreational fishing industry does not get enough credit for the dollars that it generates for this state. I am guilty of focusing on the commercial side of things. I get preoccupied with that. I can't help it. The truth of the matter is I don't have a lot of choice. But we have to focus on the dollars and cents of the recreational industry because it is tremendous. You can look at tackle, gas, boats — the list goes on.

The last thing is your question about the fee. I really should let Mike Orbach answer this question about breaking out the saltwater fishing license and how the money would be used in the different categories.

Michael Orbach: That is a good question. Before I resigned from the Marine Fisheries Commission to head this project, I chaired the coastal recreational fishing license committee. And it was clear through that entire exercise that nobody was interested in doing this unless all the money went back to fisheries and it was clear what it would be used for. So in fact, there are some thoughts about specifically where these monies should go and in what amounts, including resource enhancement, enforcement, research and public education.

But it's going to be difficult to accomplish. It's most important for you folks to get involved with the Legislature and argue that a dedicated fund is appropriate. Legislatures don't like dedicated funds because they don't like their flexibility reduced. An ex-legislator is sitting right here nodding his head. So if you want a source of money to be dedicated to a fund, you need to tell them that. Now, we need your comments on whether you think the proposal is correct in specifying where it would be spent.

Bob Lucas: One thing that we are going to have to deal

with is equity. I don't want to get a debate going here, but is it fair to charge \$15 for the person with one rod and reel who fishes from a bridge and then charge the same amount for the guy with a 50-foot boat who fishes offshore? You have all these equity issues out there.

B.J. Copeland: At our first meeting of the Fisheries Moratorium Steering Committee, we established some goals for ourselves. One was to achieve some level of perceived equitability. And I think we always need to keep our eyes pointed toward that. I just don't believe that this will go forward without some degree of equitability.

Joel Arington: I am with *The News & Observer*, and I would like to address this question to Chuck Manooch. By what logic or justification did the subcommittee recommend that three of the commercial representatives on the Marine Fisheries Commission may have a financial interest and only one of the three recreational commissioners may have a financial interest?

Charles Manooch: Well, those three slots are pretty much taken the way they are right now. Where we had most of our discussion was with the at-large slots. Are you talking about the two commercial representatives (or their spouse) with 50 percent or more and the one recreational representative?

Joel Arington: Well, there are two commercial and one processor.

Charles Manooch: That gives you three; that is right.

Joel Arington: That gives you three. All three of them must have 50 percent or more income from commercial fishing.

Charles Manooch: We thought we would provide opportunities for those in the recreational fishing industry without having to depend on the at-large slots. In other words, people who are pier operators or tackle shop owners are sometimes overlooked, but they're involved in that industry and are quite active. They would have the opportunity then to serve and to actually represent the industry.

Joel Arington: Well, it looks like the committee is willing to have a conflict of interest on the Marine Fisheries Commission to some extent, provided it is in favor of one side and not the other.

B.J. Copeland: I am a member of that subcommittee, so let me give my version. The idea was to have one slot for a commercial processing sector representative and one slot equitably distributed for the recreational industry — that is, someone who is in the business.

And then you go back to the commercial and recreational interests. Two slots would be for commercial fishermen. Whatever way we come to define a commercial fisherman,

that is who would occupy those two slots. And whatever way we define a recreational fisherman, that is who would occupy the other two slots. So there would be two and two, one and one on the commission. I think the value of one's income is a red herring in that discussion. It is not relevant because you want the interest there.

Now, for the three at-large seats, we need someone with some understanding of what the fishery is about. So it's going to be difficult to get all those interests in with three people. But the idea was to have two recreational, two commercial, one processor and one businessperson related to fisheries.

Bob Lucas: I'd like to add to that. I would be interested in what any of you think about this. That's the purpose of this meeting.

B.J. Copeland: We also need to be sure that folks understand what is on that piece of paper.

Charles Clark: I am from Belhaven. I have been active in this fishery, trying to get something done, since 1968. I am impressed with what the Moratorium Steering Committee is trying to do. I see a lot of things that I think need to be done in a different way, but change sometimes comes with difficulty. How can we improve weakfish stocks if all commercial fishermen are permitted to keep weakfish 10 inches or longer but recreational fishermen are held to four fish 12 inches long?

Bob Lucas: I think the answer is that we made a mistake. And the best thing to do when you make one is to admit it. We've learned that it isn't wise to have different restrictions for commercial and recreational fishermen. And in fairness to the commercial guys, they feel the same way. They don't like it because it reflects on them. It just doesn't make a lick of sense. We want to change it, and we will change it.

B.J. Copeland: As a biologist, I want to comment that if a 12-inch minimum is required to maintain the reproductive capacity of a species, then a 12-inch fish is just as important for one group as it is for another. And that could be true for a 10-inch fish.

Bob Lucas: It is. But at least let me say that the weakfish plan from the Atlantic States Marine Fisheries Commission allowed different scenarios that could be adopted. The recreational sector could adopt this and/or this, and so we elected to do that with some input from the recreational side. But we made a mistake. We were complying with the plan, but we caused more confusion than solutions. We won't make the same mistake again.

Colon Byrd: I am from Morehead City and the Light Tackle Fishing Club. First, on that 12- and 10-inch weakfish issue, we've known about this for a long time and we've talked about it at four meetings that I've been to. We have still got to do it.

And you heard my question about the creel on speckled

trout. We are upset about that because we have a tagging program in Carteret County, and we think it's a pretty good one. This doesn't help one bit, and I hope you can do something about it.

Bob Lucas: The Marine Fisheries Commission has voted on the weakfish issue and has given the director of the Division of Marine Fisheries the authority to go to the 12-inch fish. But it is a little more complicated than that. We are in the midst of having to comply with the Atlantic States plan and Amendment 3, which comes out in the spring. So we have given him the authority to do our plan, and the 12-inch fish may very well be part of that. There will be some changes on weakfish this spring. We don't have exclusive jurisdiction in the state. We have to comply on an interstate basis.

Colon Byrd: Along that line, where do we stand on the New York ban on gray trout — the length of fish that its markets will accept versus what we are catching down here?

Bob Lucas: I think it is 16 inches on weakfish.

Bruce Freeman: At our request, New York is allowing fish into its market when it's below-season. New York requires a 16-inch fish, and the fish need to be tagged or identified. We are working on a system right now to do that. Most of the fish we have right now are large. They're caught mostly in gill nets, and the majority of them are 20, 24 and 26 inches. Because we closed fishing south of Hatteras to flynets, we virtually shut down the weakfish fishery. That's where almost all weakfish or gray sea trout are. It has had a major impact on the resource. But we are working on getting these larger fish — caught legally in North Carolina — allowed into the New York market.

Colon Byrd: I have attended quite a few meetings, and I always hear the expression, "We need help." One of our club's objectives is to get along with the commercial boys. We invite membership from recreational and commercial fishermen, so we don't advocate any problems. We want to live and work together. However, the sportfishing group is not organized and I don't know exactly what vehicle we can use to help this group. As individuals, we can't do but so much. But if we were organized, we could appear before legislators and appear with lobbyists to remind people running for office that we represent votes. If you have a suggestion, I'd like to hear it.

Bob Lucas: Well, I am going to have to stay away from that one. I wear a lot of hats, but I can't do that. I try to say the same thing to the commercial groups as I do to the recreational guys. By the way, I have had more commercial people ask me what they can do to get this thing through. If I leave one message, it's not that this is commercial versus recreational. Some of the interests on this thing are very much the same. It will pass if both groups get behind it. Organizations will help, but I think you'd be shocked at how much difference an individual can make. Touch base with your legislator.

For example, Jean Preston co-chairs the Joint Legislative Study Commission on Seafood and Aquaculture, and she lives in Emerald Isle. She told me that she understands how important recreational fishing is, but she's never had a recreational fisherman call her. I asked if any commercial guys had called her, and she said probably over 100.

Colon Byrd: She is being invited to speak to our club. We intend to show her the utmost courtesy, obviously, but we also intend to let her know that we represent votes. I don't mean that in an ugly way at all. On the other side of your license program, how do the roadside shrimp, fish and oyster salesmen fall into your categories?

Mike Street: I am with the Division of Marine Fisheries. Right now, if a roadside salesman buys his seafood from a licensed dealer, he needs no license from the division. Or, if he buys from a licensed commercial fisherman and has a dealer's license, he is in full compliance.

If a commercial fisherman is selling his own catch, he needs a dealer's license — and the vast majority of them do. The enforcement folks check them to make sure that they are licensed. The commercial statistics people check them and make sure that trip tickets are filled out, if that is necessary. The vast majority of these operations are in compliance.

B.J. Copeland: I'd like to add to this. The communication of ideas, inputs and feelings is fundamentally important to this whole process. The Moratorium Steering Committee is going nowhere without that. We meet the second Thursday of each month in a coastal location to make it easier for people to come. We were in Wilmington for our February meeting, and I would estimate that the crowd was easily 250. Bob Lucas is a remarkable fellow. I think he allowed everyone there who wanted to speak a chance to speak. It took a little while, and sometimes we had to slow them down and say, "Okay, what is the question?" But they were allowed to speak. And I believe those inputs were well-received by the steering committee.

There are news media — radio, television and newspapers — that are doing a really good job. Talk to your local reporters. Talk to your local radio stations.

But unless we have that coming, equitability won't happen and we will have failed. So even though you are one person, show up. We want to hear what you have to say, and I think we will act on that in as positive a way as possible.

Charles Manooch: Let me go back to Joel Arrington because I am not satisfied with the way I answered him. We have a subcommittee meeting on the 13th at the North Carolina Aquarium in Manteo. We are going to get into qualifications and advisory committees, which I didn't spend enough time with this morning. Anybody here is welcome to come and share your feelings about the setup for the commission.

Joel Arrington: I appreciate that, but I won't make any specific recommendations. It's just that what is sauce for the goose ought to be sauce for the gander. There ought to be

some symmetry to the design and the representation on the committee.

Charles Manooch: Well, I have taken a note to that effect and we will definitely be taking that up. I appreciate your comment.

Dick Brame: I am the executive director of the Coastal Conservation Association, and I have a suggestion to make about the coastal saltwater fishing license. Mike Orbach, Damon Tatem and I met for about eight months on the coastal license committee, and we hammered out what I thought was a very good package. We had all of the saltwater fishing clubs meet and give their recommendations. They came from Charlotte and Morehead City. It was a very good package. But now, the licensing subcommittee of the Moratorium Steering Committee seems to ignore that. Not totally — I am not criticizing. But I would recommend that the blue ribbon committee be recalled and allowed to meet with the licensing subcommittee to talk about why we came up with what we did. A lot of time and effort was put into that. And I feel sure almost everyone would come because they were very committed to it. Larry Stephenson from Winston-Salem attended almost every meeting. I think they could lend some expertise.

B.J. Copeland: I might also add that this subject (saltwater fishing license) was aired two years ago at this forum. It was published in the proceedings and is available to you. It contains a lot of good information. I would recommend it.

Bob Lucas: Dick, we have already acted on that, and a meeting is being set up. It's a good idea.

William Lambeth: I am from Raleigh, and I am a recreational fisherman. I have a couple of questions about the license. Does the jurisdiction of the license cover offshore fishing beyond 3 miles? And would it be possible for someone to buy, say, a five-day license for a guest so that he wouldn't be scurrying around to get a license at 5 in the morning while getting ready to go?

Damon Tatem: As far as the license for offshore fishing, we were talking about the place of landing. You would need a license even if you fished in the Exclusive Economic Zone (EEZ) because you landed the fish within the state.

Availability wasn't discussed much by this committee. We just accepted that the other committee had dealt with this problem. The issue at that time was availability everywhere. We had talked with some ATM people who were interested in a buck as opposed to their normal commission fees.

We plan to get funding from the Legislature with a payback setup within the legislation to make availability excellent along the coast. You could get licenses in advance anyplace, anytime. You could get them by mail, by telephone, the whole works. Availability was built into the system when we discussed it originally because the license has to be available to work.

William Lambeth: My next question really is about environmental concerns. There has been a lot of discussion about hog farming and its effect on the environment. I would like someone to comment on what effect this might have on the marine environment.

Melvin Shepard: When you are asking what effect "this" would have on the marine environment, are you talking about the swine industry?

William Lambeth: That is correct.

Melvin Shepard: This issue has been hit heavily by the Senate Select Committee on River Water Quality and Fish Kills, and there will be a summit in New Bern next weekend. Under the Senate Select Committee, some people at N.C. State University are being contracted to help. They have the isotopic ability to identify nutrients and their sources (human beings, turkeys or pigs). There is a lot of concern about the effects of the swine industry. One effect, as Scott Nixon said earlier, is that ammonia returns in the form of acid rain as part of the nitrogen process. The other is that waste from problem lagoons ends up in the estuarine streams, and that has to stop.

That problem is being addressed very, very heavily right now. The swine industry, for example, has put \$100,000 toward the \$300,000 needed to study the sources of nitrogen in the Neuse River. Someone else came up with another \$100,000. We now have \$200,000 to get that study off the ground. We are talking about buffers on farms. We are talking about conservation easements. We are talking about tax credits for buffers. We are talking about inspecting these places for their renewals, performance and their spray field performance. We are talking about requiring people to have certain training to operate a waste facility. There is also talk of doing away with ammonia evaporation.

B.J. Copeland: There are several issues related to animal waste. First, there are about 3,500 lagoons for hog waste in the state in addition to those for poultry waste. And there is a system for permitting. Since 1992 or 1993, lagoons have had to meet certain requirements. But one problem is that some of these lagoons were built before then and may not meet the criteria.

The issue is one of having more nitrogen produced or concentrated than you can dispose of. The main means of getting rid of material from the lagoons is to spray it on land. Three counties, maybe four, produce more nitrogen in animal waste than they could accommodate if they were entirely under cultivation. So you can see right away that we have to do some trading. There is a distribution problem.

The second problem is that nitrogen goes off into the atmosphere. There is some research in this state right now to estimate what that rate is and where it goes. That work is being done by people in the Department of Marine, Earth and Atmospheric Sciences and the Soil Science Department at N.C. State University.

We don't know all the answers. We do know enough

answers to realize that we are up to our earlobes in some of this stuff, and we have to do something about it. Recently, we learned that 56 percent of those 3,500 lagoons are in compliance. They are not a problem. But we've got to work on the other 44 percent, and the state is taking some action there. But as Melvin Shepard says, there is plenty of legislative action on the table right now and the session begins May 13.

Melvin Shepard: There is also information from other countries about a dry rather than wet process. Just about anything that can be found anywhere is being studied. Now, there is a problem, and you have a reason to be concerned about it. But as a real person who attends every one of those Senate water quality meetings, I have to believe that we are really addressing the problem.

B.J. Copeland: I think we are making progress. But progress comes slowly.

Al Allison: I am from the Charlotte Offshore Fishing Club. I want to commend Bob Lucas for his leadership and direction and to commend everyone who serves on the Moratorium Steering Committee. I am very supportive of this plan, but I am concerned about its implementation. As someone from the central part of the state, I am not sure that everybody is aware this is going on. I have a number of employees who like to go fishing at the pier once a year, and that is their experience at the coast. I have mentioned a saltwater license to them, and they don't know if they like it or not. Are you doing anything to poll the community? Could we vote here about where we'd stand if it was implemented today? I don't have any objection, but I know there are some people who would object to it. Is that in order?

Michael Orbach: Let me comment on that. I am coming at this as a professional social scientist. You have to be sure that people understand what the problem is, what is being proposed and what the impacts of doing it different ways would be. And it is not entirely clear right now that everybody even in this room — much less in North Carolina and inland — really understands what is being proposed. I think at some point it may very well be appropriate.

In our survey, we asked people their opinions once we were comfortable that they understood. And I think we may want to do some more of that in a couple of months when more information is out. But right now, not everybody is entirely clear about what's being proposed. I'd be interested in hearing more about what you think about this three-tiered license proposal. Does everybody understand what is being proposed? And with respect to your question, I think there needs to be more discussion before people are comfortable doing what you asked them to do.

Ron McPherson: I am from Winston-Salem, and I am a recreational fisherman. One question that hasn't been spoken to is the cost of implementing all of these committee recommendations. Has that been examined? And if so, have you

looked at what the saltwater fishing license would generate? Would there be a shortfall or a surplus?

Michael Orbach: The recreational subcommittee has worked with the Marine Fisheries Division and representatives of the Wildlife Resources Commission to estimate implementation costs, including greater enforcement needs. We determined that the cost would be met under the 10 percent administrative limit on the funds there. Now, that is just for the recreational coastal license under the configuration that came out of the committee a year ago. But as far as I know, those kinds of estimates have not been done for the rest of the package.

Bob Lucas: I think it's too early to assess what the cost would be because we haven't come up with a plan yet. The purpose of this meeting and others is to get input. But, for the most part, the cost of what we're talking about is not high.

This is all about the resolve to make decisions. We are not talking about huge amounts of money. If we were, the likelihood of getting it passed would probably be very small with the exception of the saltwater fishing license, which will generate a lot of money. But the cost of implementing a lot of this is just having the resolve to make decisions.

Ron McPherson: For example, I heard someone mention identifying areas where you could or could not trawl. How many millions of acres do we have out there? It seems like it'd be very expensive to sign those things and maintain the sign system. I'm concerned that when you go to the legislators with a program and they ask if it will take care of itself, you'll be in trouble if you don't know. My point is that somebody needs to look at this.

Bob Lucas: I agree, and we will do that. But before we get there, we need to come up with the plan itself.

Frank Turn: I am also from Winston-Salem, and I am with the Davis Island Fishing Foundation. I have a question about equity in licensing and then some observations about reorganizing the Marine Fisheries Commission. About the license, what was the justification for proposing the same charge for in-state and out-of-state recreational fishermen? I think I know the answer to that.

Michael Orbach: What is reflected in the current document basically came out of the previous committee, so let me comment on that. The wildlife license charges \$30 out-of-state and \$15 in-state because visitors don't pay state taxes. When we examined other states, we saw that most had an out-of-state differential, which could be quite high. Some had none. It varied in the other coastal states. There is a fear in the coastal communities that this license will have an impact on leisure and tourism. So the previous committee reached a consensus that we aren't out just to make money with this license. We are trying to take into account everybody's interest, including the leisure and tourism economies. We looked

to other states for an impact on leisure and tourism. And though we couldn't find any, we also couldn't find anybody who had specifically studied it. Our coastal communities depend on that income and we wanted to take that into account.

Frank Tursi: But I think that many recreational fishermen who generally support the process may not like the idea of paying the same amount as a fellow from South Carolina, Virginia or Idaho. In the process, you might lose some of the support you would otherwise have among in-state fishermen.

Also, I noticed that when you listed the eligibility requirements for prospective members of the Marine Fisheries Commission, you failed to mention what the minimum contribution would have to be for the governor's election campaign. Forgive me for being cynical, but I am a newspaper reporter in another life and I have watched the Coastal Resources Commission at work, which is not a good example of how these things operate. The fact that the governor will appoint all nine members will not fly in the Legislature. That six of the nine members will represent specific points of view tends to narrow the commission — commissioners lose their broad focus. They don't vote on what benefits the state; they vote on what benefits the small niche that they represent.

I also think that most recreational fishermen do not live in coastal counties. I question the requirement that you have to be from a coastal area. You may have to rethink that.

Bob Lucas: What do you think it should be?

Frank Tursi: I personally don't like the idea of members representing a specific point of view because I don't think it works if the Coastal Resources Commission is any indication. And I think the membership has to be broader than coastal counties.

Bob Lucas: So you think the membership should be all at-large?

Frank Tursi: Yes, I think so.

Charles Manooch: It should be all at-large with no geographical boundaries at all? Like a jury?

Frank Tursi: I would think so, yes.

Bob Lucas: Do you think that if we made it all at-large with no residential requirements that we'd get a higher quality person? Let's assume that the governor makes the appointments, because that's the way it is right now. Do you think it will be any better?

Frank Tursi: Probably not.

Bob Lucas: Then what is the basis for your opinion?

Frank Tursi: Basically, I think the Coastal Resources Commission system does not work. I think what you're trying to

set up is very similar to that commission. And I think that model does not work. We need something different.

BJ. Copeland: One suggestion that we debated for an entire meeting had to do with letting interest and government groups, such as a Senate committee, make three nominations for each seat that could be handed over to the governor for appointment. Is that a step in the right direction or a step in the wrong direction?

Frank Tursi: I don't think the Legislature will pass a bill that allows the governor to appoint all its members. That is not going to happen. So I think you are going to have to change that just to get it through the General Assembly. I don't know what the answer is, but I do know that the Coastal Resources Commission model is not working.

Larry Stephenson: First, I'd like to ask a couple of questions about the fishing license because it's still near and dear to my heart. I notice that the lifetime license was removed. Was there a particular reason for that? It looks to me like you're going to force everybody to buy the freshwater license so they can piggyback them all together, and you're going to lose revenue there.

Damon Tatem: We debated that, and we were looking for simplicity. That was the main thing. But we are going to be meeting with this committee again. It was discussed three weeks ago and it will be discussed again.

Mike Street: I work for the Division of Marine Fisheries. The fishing license was removed because — unlike the Wildlife Resources Commission, which dedicates funds from the lifetime sportsmen's licenses, hunting licenses, fishing licenses and lifetime magazine subscriptions to a special dedicated fund — there was no intent for coastal fisheries to have a limited, dedicated fund within the program. And without need for that kind of fund, there's no need for a specific type of money dedicated to such a fund. So the lifetime license was deleted.

Larry Stephenson: But are you going to grandfather all of the freshwater lifetime licenses into the program?

Mike Street: No. So far, the way it's proposed is that people holding Wildlife Resources Commission lifetime licenses as of the day the fishing license is enacted would have six months to pay \$10 and get in.

Larry Stephenson: I was thinking you'll sell a lot of these licenses to the wildlife people.

Mike Street: That may be.

Larry Stephenson: Sen. Marc Basnight was wanting to put this money into a trust fund. This was deleted as best I could tell. Good. I hated that idea.

And one other thing — a lot of us who live west of I-95 don't get down to the coast until fairly late on Fridays. And we bring people with us once or twice a year, so it's critical that there's a way to facilitate that. Maybe we could buy a book of one-day passes for \$20 or something and just resell them. I have 10 or 12 people who come with me once a year, and that is about it.

Also, I think the three at-large Marine Fisheries Commission seats are potentially critical in the decision-making process. If you have three recreational people and three commercial people, they tend to align themselves together. So three other people, in most cases, are going to have a major impact on the decisions. I think they should be designated scientific or conservation or something other than just at-large. And with so many anglers living west of I-95, there doesn't seem to be much equity in having six of the nine seats held by people from the east.

I also think it would be beneficial for the commercial and recreational fishing interests to have some input into the people who fill those seats. Maybe the recreational anglers could submit a list of names that the governor could choose from. That would remove some of the politics.

Larry Coble: I sense that this process is evolving almost daily. When will the proposed regulations be fixed so that I can decide whether I support them or not? And will you ask for public comment?

Bob Lucas: The recommendations in a final draft form will probably be available around the first of June. At that time, we'll go to a public hearing process. And my goal is to go inland as much as to the coast, and we will try to do that in as many different places as we can and to give as much notice as we can. After that, the final recommendations will be submitted to the Joint Legislative Study Commission on Seafood and Aquaculture. Hopefully, they'll be put in a bill form that can be introduced in the General Assembly in January 1997.

Larry Coble: I want to echo the previous two speakers' comments about the makeup of the commission and the way that it doesn't seem to add. Like Larry Stephenson said, the majority of fishermen live west of I-95. There should be some way for people in the western part of the state to be equally represented. I also want to see you go back to boat and pier licenses for the charter boat captains and the pier owners.

Bob Lucas: We will take that back. And when you're deciding whether or not you support it, you're going to find something in it that you don't support. That's because this is so far-reaching. If you think we have the wisdom to come up with a plan that's perfect, we don't. If you decide not to go for it, then let this be the reason — that in all honesty you do not believe it would be a step forward in protecting the resource. If you think that it's not perfect but it's a step in the right direction, then I'd ask for your support.

Larry Coble: I would like to invite the Moratorium Steer-

ing Committee to come west and meet a couple of times.

Damon Tatem: I wanted to say something to Larry Stephenson. The option of a Coastal Recreational Fishing License Trust Fund is exactly the same as it was in the original document. The change is in option 4.2, which puts the money from all licenses into one pot for distribution. It doesn't specifically say that there is a trust fund. It says "single fund." But that is what you need to think about.

B.K. Baringer: I'm from Mooresville, Lake Norman. I am also a member of David Island Fishing Foundation. And of course, I would like to echo the comments of the gentlemen from the western and Piedmont portions of our state. I want to compliment the Moratorium Steering Committee on its technical solutions to emotional problems, but the final solution will be political, I am sorry to say. There are legislators here, and I am sure we all realize that's our system.

We have a political sleeping giant in our western and Piedmont legislators. But that word is not getting to the western lawmakers, who are a majority of the Legislature. So I think it's important that we get that word to our Piedmont and western people. We have our lobbyists, Coastal Conservation Association, Jerry Schill and his group, and we hear and read correspondence from each of these groups. Do you all sense any consensus?

Bob Lucas: Well, I am the wrong person to ask because I am an eternal optimist. I know that we are going to prevail. I know it can be done. I think you may very well see a consensus of the recreational and commercial industries. There may be different motivations. I think that the commercial fishing industry very much wants this process. There are people who disagree with different items, just as we have seen right here.

But I think that some hard choices will have to be made. And the battleline will be drawn in the middle category, the messer license. As you have seen, 16,000 licenses are issued. There are many people in that category who won't accept the recommendations. There will be a tremendous push from that sector, I believe. And we are just going to have to hope that compromise can be reached.

B.J. Copeland: We should also point out that the Moratorium Steering Committee has 18 members named by the legislation, which purports to bring to the table representatives from all fisheries interests. That's only 18, and there are a lot more interests than that. It's hard to identify whom your representative might be.

The steering committee is going to have a difficult time agreeing on what recommendations to carry forward. The subcommittees are only the first step. Now, we're ready to take additional steps, but there's a long way to go before getting down to something for a piece of legislation. We can do it, but only if we work together and compromise. We aren't going to solve all the problems.

Barry Ottmann: I am a recreational fisherman from this

area. The objective here is to make the fishery better. My concern is that a lot of this seems to be based on money. The resource is owned by everybody in the state. And as we move forward and begin divvying up the pie, we allocate property rights. This is what will happen when we professionalize the industry, and the fishery gets better — there is going to be an initial windfall. As you are designing this license, I want to see that windfall rebated to the state so that we can fund the volunteers for enforcement and things like that.

In my opinion, there shouldn't be a dibblers (messenger) license. We should have professional fishermen who do that for a living and the rest of us. That should generate a pretty good windfall as this fishery improves. I'd like to see that system designed with a rebate to the state.

Michael Orbach: That is an excellent point, and it's getting a lot of discussion nationally as to what to do with fisheries. Our federal law prohibits any extraction of "economic rent" from fisheries, and that is a big issue with the reauthorization of the federal law (Magnuson Act) right now.

There will be new legislation to do the more complicated parts of this, and we can design that legislation to have the features we want. I worked with some fishermen in Florida on a similar issue down there. We constructed the legislation so that when the licenses were first created and transferred, they were subject to a 25 percent windfall recovery tariff that went back to the state. There was also a provision for continuing economic rent extraction because of the exclusive nature of the access. That can be designed into the legislation, and it is a matter of what people are going to want. But clearly, we have the opportunity to do that.

Dallas Ormond: I am a commercial fisherman from Bath. I feel out of place here with all these sportfishermen, but my reason for being here is the same as theirs. My concern to this committee, and to the people trying to address the problems with our fishery, is that we are wasting millions of dollars on our fishery every year. I know some of it is being wasted by pollution, but the majority of our waste is coming from commercial gear. And that amounts to millions of dollars of waste. But take that waste and turn it into jobs for the commercial and recreational industries, and I think that North Carolina and all users will benefit in the long run.

Joel Arrington: How can you turn waste into jobs?

Dallas Ormond: We are destroying millions of pounds of food fish and shellfish. Therefore, we will have to stop the waste of our fishery and water quality. We can do a lot for North Carolina and the people who want to use our precious public trust resource.

Colon Byrd: I'm sure you've addressed the fact that we have three things involved on the coast. We have salt water, brackish water and fresh water. But we have a problem identifying whether someone is in brackish water, salt water or fresh water. Somebody has to identify brackish water.

Melvin Shepard: I heard somebody mention the sleeping giant, and I've heard some comments about what we ought to do. This short session of the General Assembly will probably produce some of the most far-reaching environmental proposals that this state has seen in a long time. And there will be a big push to fund those efforts. This sleeping giant can make a whopping difference by saying to legislators, "I want to see you support environmental improvement in North Carolina in our waters." And you can begin to say that right now. You don't need a written agenda. You can have one hell of an impact if you do it, but you need to get busy and do it just as soon as the legislators meet.

Catch-and-Release Mortality of Saltwater Sport Fish

Jon Lucy is a marine recreation specialist with the Virginia Institute of Marine Science, part of the College of William and Mary in Virginia. He works with the Sea Grant Marine Advisory Program.

I have been conducting research on hook-release mortality in summer flounder. In conjunction with our research effort, we organized a May 1995 national conference in Virginia Beach entitled "Release Mortality in Marine Recreational Fisheries: Current Research and Fishery Management Implications." Let me provide you with some background on the status of hook-release mortality research, some results from the conference and an update on research with flounder, gray trout (weakfish) and speckled trout.

Why should fishery researchers and managers be concerned about catch-and-release mortality, particularly given the concerns over fishery resource losses attributed to bycatch in the commercial fisheries? While hook-release mortalities are not comparable in magnitude to commercial fishery bycatch problems, such losses associated with recreational fishing activities are somewhat like bycatch. The act of capturing a desired fish results in some mortality of catch that is released because it is undersize, over the bag limit or otherwise unwanted. What needs to be understood and factored into fishery management regulations is the level of hook-release mortality in specific recreational fisheries, the fishing situations-gear types-hooking scenarios accounting for release mortality on a species-by-species basis, and the significance of release mortality as a component of overall fishing mortality attributed to specific marine recreational fisheries.

There wasn't much concern about hook-release mortality in saltwater fisheries until the 1970s, or even the early 1980s, because it was generally considered that there weren't enough people fishing to make much of an impact on fishery populations. In fact, millions of people were saltwater fishing in each state in the late '70s and '80s. When you add them together, that's an awful lot of lines and rod hours relative to the fish. No doubt the fish realized a lot of us were out there fishing.

In the same time frame, tagging programs became more popular with fishing clubs and they were being expanded into regional and national efforts. Programs such as the Cooperative Game Fish Tagging Program and the Cooperative Shark Tagging Program of the National Marine Fisheries Service experienced significant growth. Of course, fishing tourna-

ments, particularly for tuna and billfish, really took off in the '70s and '80s. Tournaments have dramatically increased for coastal species, such as king mackerel, bluefish, striped bass (rockfish) and even the lowly oyster toad.

The increase in tagging programs and tournament activity likely helped make people think more about tag-and-release mortality — that maybe it's more important than once thought. As a result, fishery biologists are increasing research efforts to help fishery managers get a better handle on what, in some fisheries, may prove to be a significant component of overall fishing mortality. Research is also being stimulated by the fact that ever-changing fishery management plans for pelagic, coastal and inshore species have begun to factor hook-release mortality into estimates of total recreational catch (or kill). Release mortality may be considered by some as a penalty that recreational fishermen are having to pay; it's added to estimates of recreational catch for a total estimated fishing mortality on the recreational side. It has certainly begun to get the attention of the recreational fishermen and fishery managers.

So what is going on with the research? Most of the work has been done in fresh water, beginning right after World War II. As a result, much has been learned and certainly some of it translates to the saltwater side. In the '50s on up into the '70s, research focused on salmon, freshwater trout, black bass (largemouth and smallmouth) and walleye.

Some of the first saltwater research on hook-release mortality was done on Pacific salmon in the West Coast troll fishery and billfish in the Gulf of Mexico. More recently, the pace has picked up on red drum, speckled trout, reef fish and sharks (work in North Carolina, Georgia, Florida and the Gulf Coast). In the '90s, the pace certainly quickened with work on striped bass (Massachusetts, North Carolina, Maryland and, to a limited extent, Virginia and Rhode Island); on bluefish, scup and black sea bass (New York); on scup (New Jersey, New York and Rhode Island); on tuna (the West Coast and Hawaii); on gray trout or weakfish, summer flounder and the entire reef-fish group of snapper and grouper (East Coast states).

Let me review some of the research results that were discussed at the release mortality conference in Virginia Beach last May. Most hook-release mortality work on saltwater fish is done by actually catching the fish on hook and line and holding them in cages or pens for observation. In the majority of studies on estuarine and coastal fish species, hook-release mortality often occurs within 24 hours of the fish's release. This phenomenon helps researchers reduce holding times on fish and reduces the complications in interpreting results because of stress-related problems with fish held in enclosures. Often by the end of the first day, one sees the bulk of any release mortality that is going to occur. However, most studies hold and observe released fish for a minimum of 72 hours, and sometimes for up to two or three weeks. Evidence is beginning to accumulate that some delayed hook-release mortality may occur in specific situations, such as when the leader is cut in a "swallowed" hook situation, leaving the hook embedded in the fish's throat tissue. Such mortality could take a week, a month or longer to mani-

fest itself. Research is continuing, particularly in striped bass.

What are some of the most critical factors impacting hook-release mortality? What are the major causative agents? Foremost seems to be anatomical location of hook penetration and the type of injury it produces. Second is water temperature. Warmer water holds lower amounts of dissolved oxygen than cooler water, thereby contributing to significant stress in released fish. Warmer water also causes higher metabolic rates (faster respiration rates, higher oxygen demands) in released fish. Also, bleeding rates from hook injuries may be faster in fish released in warmer water. Third is the depth of water where the fish is caught (generally water deeper than 40 feet). Fish size is a lesser, but still significant, issue. For most species, larger fish seem to demonstrate a higher mortality rate than small fish, but this is not always the case.

What are some of the secondary factors that may significantly affect hook-release mortality? Playing time does not seem to have as much impact as most of us would assume, but sometimes it proves important. The technique used to remove a hook from a deeply hooked fish can have an impact, but not consistently. Handling of the fish while bringing it into a boat, onto the beach or onto a pier can affect mortality. Again, results are inconsistent compared to the factors of anatomical hook location, water temperature, capture depth and fish size.

Therefore, hook-release mortality may be significant for many species, but it is highly variable among saltwater species studied to date. Differences in the release-mortality rate occur from species to species, depending on water temperature, water quality (oxygen level) and salinity. Some fish demonstrate very low levels of release mortality while others show relatively high rates — up to 60 or 70 percent in some studies.

Recent literature reviews on saltwater and freshwater fish release mortality demonstrate that fish range from no release mortality under certain circumstances to occasionally exceeding 30 percent in some studies. Release mortality rates exceeding 70 percent have been documented in field studies on speckled trout, bluegills, crappies, striped bass and coho salmon. Some of the lowest release-mortality rates have been observed in late trout, pike and tautog, the latter only in the mid-Atlantic at water temperatures below 60 F.

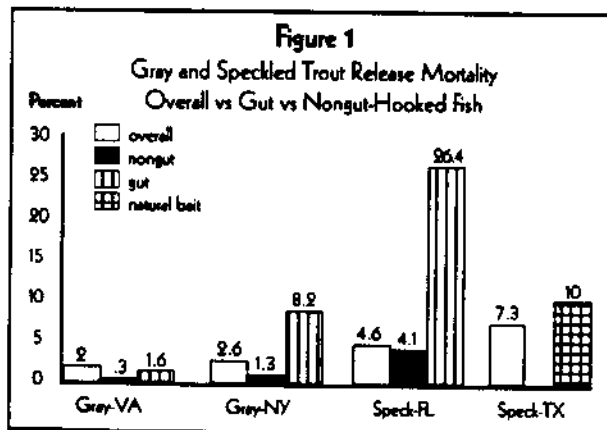
A brief overview of some of the conference findings follow. Deeper-water reef fishes have been examined in North Carolina at the National Marine Fisheries Service's Beaufort Lab and in South Carolina at the Marine Resources Institute. Fish taken from more shallow water generally exhibited lower release mortality rates than those taken from very deep water. Fish taken from about 69 feet showed 12 percent mortality while those taken at 119 feet showed 19 percent mortality. Fish taken from 150 to 178 feet exhibited 38 percent hook-release mortality. Therefore, a capture depth of 119 feet versus 150 feet resulted in a doubling of the hook-release mortality rate. Black sea bass, however, did not follow this scenario. Work on scup and bluefish in New York and Rhode Island showed roughly a 5 to 12 percent rate of release mortality; work on Spanish mackerel in Florida showed a 12 to 17 percent release mortality; billfish showed 0 to 4 or 5 percent hook-release mortality.

Striped bass are getting considerable research attention in Chesapeake Bay, where relatively high release mortalities have been documented in freshwater areas. Field studies have demonstrated as much as 70 percent of the fish were dying when released in fresh to low-salinity water during the summertime. Low salinities and temperatures greater than 70 F produced the highest release mortality rates. Mortality rates were higher in fish over 21 inches in length. In the mid-bay area, where salinities were 18 to 25 parts per thousand and water temperatures were under 70 F, stripers demonstrated an 8 to 10 percent hook-release mortality rate.

Work with red drum has shown a wide range of mortality rates, but typically it seems to be in the 4 or 5 percent range. Under stressful conditions, especially warm water temperatures, release mortality rates ranged much higher.

There has been some work on the Pacific West Coast with coho and cutthroat salmon. Fishery regulations assumed 26 percent hook-release mortality in that fishery, and there was concern about closing down the hook-and-line fishery because of the high release mortality rates. Two research projects demonstrated that the hook-release mortality rate was more on the order of 6 to 7 percent. As a result, the regulations are being re-examined.

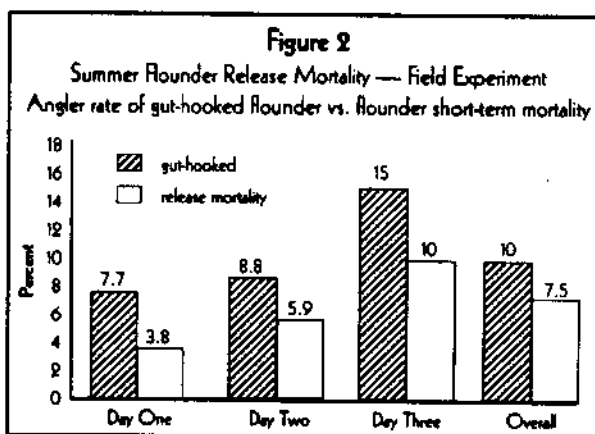
Let me talk quickly about gray trout and summer flounder to give you a feel for something closer to home. Overall, hook-release mortality is proving to fall in the 2 to 3 percent range based on 1995 research done in Virginia and New York. Gut-hooking in gray trout appears to be the major factor linked to release mortality (Figure 1).



Speckled trout work in Florida shows an overall release mortality rate of about 4 percent in nongut-hooked trout. In trout that swallowed the hook, the rate was about 26 percent. A Texas study on speckled trout showed somewhat similar results to the Florida research, documenting a hook-release mortality rate of about 7 percent. Natural bait or fresh bait used on lures and single hooks produced about 10 percent mortality rate. Natural or live bait fishing increases the tendency of the fish to take the hook deep in the throat region, or possibly the gills, often resulting in higher release mortality.

In Virginia, summer flounder research on release mortality using tanks has shown that only gut-hooked fish exhibit

significant hook-release mortality. In one experiment done in water 73 F, 91 percent of the gut-hooked fish died. Another experiment, done at 61 F, showed a much lower release mortality rate, again only in gut-hooked fish. To compare the tank results with real-world fishing situations, we conducted controlled fishing experiment with volunteer anglers. We dictated the type of hook and bait used and recorded detailed data on how each flounder was hooked and what hook-release damage, if any, occurred. We held the fish in live-wells and then put them in floating cages to monitor them. We were pleased to see that the gut-hooking rate was relatively low. Release mortality observed was almost always in gut-hooked fish. The overall release mortality rates were frequently a little less than the actual percent of gut-hooked fish in each experiment, i.e., not all the gut-hooked fish died (Figure 2).



To sum up, a fish is only dead for sure if it is in the box. If you release it, there is a good chance that it may survive, even if some bleeding is observed. Of course, released fish do not always survive. We need to understand what contributes to hook-release mortality and what levels of release mortality occur in natural fishing situations. Then we need to factor hook-release mortality, based on carefully conducted research, into fishery management to help ensure that management decisions are soundly based and accomplishing their intended objectives.

William Lambeth: Material from The Billfish Foundation includes a very low number of tagged fish that are recaptured. Can you comment on that?

Jon Lucy: It's the same thing in tuna, but to a lesser degree. We've studied tagging programs (13 along the East Coast) that typically showed only a 1 to 2 percent rate of tag returns. The only fishery that shows a significantly higher tag return rate is bluefin tuna, and I am not sure why. Billfish returns are frequently about 1 percent. I think it has a lot to do with the fact that those fish are distributed over such a large ocean area and the chance of catching them is relatively low. But I think that because they are big fish and they are frequently brought to the boat in somewhat of a tenuous or hard-to-control situation, many tags are not seen or recovered. I

also think that tags are sometimes found in fish that are intentionally not returned because people don't think the tagging program is helping their interest group, or they think it may be hurting them by getting data to the wrong group of people. I have seen tags on boats and in tackle boxes that never got back to the tagging program.

Joel Arrington: How was the billfish mortality release study in Hawaii done?

Jon Lucy: It used sonic tags — the same thing Randy Edwards has done in Florida. I think that's the best way to follow these big fish for two, three or four days. The archival sonic tags, going \$700 to \$1,000 each, can provide months or even up to a year of data depending on how frequently you query them to retrieve data.

Sonic tags or electronic tags are certainly the way to better understand what goes on short-term. Phil Bettoli in Tennessee presented some work from a reservoir, where they tagged 86 fish with sonic tags. The tags were implanted with sutures that dissolved in water after three days. So if they didn't find the fish, the tag popped to the surface. They found that warm water produced higher mortalities than cool water. But, more importantly, they found that the observations of biologists and some experienced fishermen regarding the condition of the released fish did not correlate well with the anticipated release mortality results. That really threw the biologists. Such work tells us that hook-release mortality is more complicated than we realize. But the good news is that in typical fishing situations, with reasonable care and reasonable water temperatures, release mortality rates in saltwater fish are in all likelihood low, ranging somewhere around 1 to 3 percent up to 10 or 15 percent. In unusual circumstances, they might be in the 25 to 70 percent range. We need to learn more and possibly do things a little differently when we catch and release certain fish to reduce some of the impacts of hook-release mortality on saltwater fish populations. That way, it cannot be said that the recreational fishery is not doing its part to help solve fishery management problems; likewise, the fishery is contributing to conserving fishery resources.

Light Tackle Fishing Opportunities in Western Pamlico Sound

Captain George Beckwith works with the Down East Guide Service.

I am going to talk about light tackle fishing opportunities in the western Pamlico Sound. And let me tell you, that is a pretty broad thing to talk about in 30 minutes. I'd like to describe a calendar year of Down East Guide Service and some of the things I think are important to the growth and success of this fishery.

We've heard all day about the importance of the recommendations from the Moratorium Steering Committee, and I want to echo that. Being on the water every day, I have seen firsthand that we have a lot of problems in a lot of different areas. And even though we may not agree with certain aspects or rules, we can resolve those things over time. But we are not

going to be able to resolve them without the process to do it. And I think that is the benefit of the steering committee suggestions.

Let me tell you a little about myself. I graduated from UNC-Wilmington a couple of years ago with a degree in marine biology. I fished the Bassmaster pro circuit and started Down East Guide Service to enable me to do that. As it turned out, that's where 100 percent of my energy now goes.

I feel like I am a pioneer in developing an inshore light tackle fishery, in particular on the western Pamlico Sound, the Neuse River and the Pamlico River. From what I understand, there are no other guides in that area. I have been doing it two years. This year, there will be six new guides in Pamlico County alone, either part-time or full-time.

Now, the economic benefit to Pamlico County is pretty substantial. If these seven guides establish themselves over the next couple of years and the fishery grows and water quality improves, then I believe we would have a fishery that can sustain seven guides. On average, people spend \$500 a day on travel, motels and restaurants when they come to the coast to fish. Suppose the seven guides work every other day. That is roughly 180 days a year. And that amounts to almost \$700,000 pumped into an economy that is in need of growth. As an economic boost, it's a low impact on the fishery.

Another thing I want to make clear is that I don't think banning all nets is the way to go. Now, I am frustrated by a lot of what I see out there in the water every day. But that is not the answer. I do believe there is room for a healthy recreational fishery, or a commercial sportfishery as I call it, and a commercial fishing industry.

What frightens me most is the amount of gear and who is using the gear. I've seen the gear being used more effectively by full-time commercial fishermen. Many part-timers don't know what they're doing to a large degree, and when they're trawling, they have a lot more bycatch than commercial fishermen. The same is true with gill netting.

The third thing to consider is water quality. If we eliminated all the nets and brought back the fisheries without improving water quality, then it really wouldn't make a difference because the fish couldn't live there anyway. Over the last five years, I have noticed a dramatic degradation of water quality. And that was especially vivid this past fall with the fish kills.

Over the last five years, in some parts of the sound, especially the Neuse River and the Trent River around New Bern, we have seen an explosion of submerged aquatic vegetation, and that has improved the fishery. There were a lot more fish up until this fall because of that submerged aquatic vegetation. And that vegetation, I believe, is a result of deteriorating water quality. What good is the aquatic vegetation, which is a nursery area for the fish to grow in, if they can't live in the water? With degrading water quality and increased vegetation, we are also getting increased algae blooms, which choke oxygen and kill the fish that the grass has produced. You also get other things flourishing in the same water, such as *pleistheria*. And this past year, that totally destroyed what I had worked so hard for two years to promote.

I want to go through a calendar year and tell you what I do from month to month. I have the greatest job in the world. I get up in the morning, watch the sun rise, meet some new, fantastic people and spend a good day on the water — and I get paid for it.

The year starts in December with duck season. I do a lot of duck hunting, shooting divers, primarily bluebills, canvas-back. I don't do a lot of fishing then. A couple of years ago we had a pretty good striped bass fishery in the wintertime.

Springtime striper fishing is what I do next. And it is something that I have really enjoyed seeing come back. When I was growing up on the Trent River, I would log 24 hours of fishing time for each striped bass that I caught. And now — up until this last year, and I hope it's going to come back — we could catch 24 striped bass in one hour. I have seen the fish get bigger and bigger over the last couple of years, and I have seen different year size classes. So it is working.

One problem I've seen is the need to examine the effects of some nets in the areas where the striped bass are. I have been concerned about striped bass bycatch in the gill nets during the closed seasons for commercial fishing. It seems like we have worked so hard to build back the striped bass fishery, and now that we've got it back, we may really be starting to step backward.

Also I am encouraged to see the increase in enforcement officers in that area, and I think it's critical that we all play a part in the enforcement process. When we see violations — recreational or commercial — we need to get involved and make a phone call. We need to go ahead and implement our own volunteer enforcement policies that the Moratorium Steering Committee is asking for. Make a phone call. Same with the Wildlife Resources Commission. We have to get involved.

In the springtime, I fish for stripers that are making their runs up the Neuse and Trent rivers to spawn. There is also a fabulous fishery on the Roanoke River, but I concentrate mostly around New Bern. Two or three years ago, during my spring break in March, we caught over 300 striped bass in a week. We released 99 percent of those fish, which averaged 20 to 24 inches. They were 3- to 5-pound fish with the occasional 10- to 20-pound female.

The striped bass in North Carolina are different than the striped bass they've been busting off the Outer Banks. Off the Outer Banks, they're Chesapeake Bay fish that migrate down for the winter. Those fish are morphologically different. They're roughly twice the size because of where they spawn. They spawn up in the bay, where there's a lot more current, and the eggs need to be bigger to form more oil in order to float there. And in order to have a bigger egg and the same numbers of eggs, they have to be bigger fish to carry those eggs. As a result, it takes Chesapeake Bay stripers twice as long to reach sexual maturity. So they are bigger fish, and that's why their limits are a little bit tighter than ours. We are lucky to be able to keep three striped bass that are 18 inches.

Late in the springtime when it starts to warm up, we move the operation down to Oriental. There, we experience some fabulous speckled trout, flounder and puppy drum fish-

ing in the sound and the rivers — the Pamlico, the Bay and the Neuse. Most of them are keeper-size, and we like to use real light line to catch them. I am using stuff that you think about using in the mountains for rainbow trout, but it catches 2- to 4-pound speckled trout and 10-pound puppy drum with 6-pound test.

We fish for those until mid-June, when the big boys show up — the tarpon. The tarpon fishery in North Carolina is the best that it gets in the world. Anywhere that you can catch six 100-pound tarpon in a day is pretty good. And people are starting to realize it. The local community has made a big push to ensure that people who come down to fish for tarpon are educated on the right tackle to use and how to release the fish. They want to ensure that the fishery can continue for a long time.

During that time, I see something that disturbs me — I see a tremendous number of part-time shrimp boats. I will ask these shrimp boats to borrow bycatch, and my clients will ask to buy some shrimp to take home. And a lot of times these shrimp boats will give us 50 or 100 pounds of bycatch, but they don't have enough shrimp to sell. They don't have but 2 or 3 pounds of shrimp to sell. That is disturbing. But let's be sure to note that many of those are not the full-time commercial fishermen. The ratio among full-time commercial fishermen is a lot lower, but there are a significant number of part-timers, and that's why the Moratorium Steering Committee suggestions are so important.

In August, the tarpon fishing starts to fade out and the giant red drum migrate in the sound. In the springtime, you catch them on the Outer Banks. In the summer, they are scattered out through the sound. By August, they start to concentrate and get into a spawning mode. And they are real predictable and easy to catch. They average 30 to 50 pounds. We are catching them on as little as 10-pound test and they are a blast. The biggest threat that I see to these fish is the recreational fisherman. Most recreational fishermen don't know that those 30- to 50-pound drum are 20 to 60 years old. They carry as many as 7 million eggs. And a study in South Carolina showed that eight female drum and 22 males in the laboratory produced 60 million fertilized eggs. That is incredible.

I see the locals and visitors getting in on the best giant red drum fishing in the world. Each time they go, they keep their legal bag limit, which is one fish over 27 inches. All these fish are pretty much over 40 inches. So there are a lot of giant drum being kept. If 20 of those are females, with 7 million eggs each, that's potentially 140 million puppy drum. If we can protect that fishery and educate people about how to properly catch those fish, then the opportunity for commercial and recreational harvest is pretty good. There is a lot more we have to learn about it, but it is another way that recreational and commercial fishermen can work together.

The commercial guys aren't hurting the big fish in my area because they don't like them. They mess up the nets. The fishermen try to keep from catching them, and they can't sell them if they do keep them. But anglers have a heck of an impact on them.

I will tell you a little bit about how I catch them. Mostly,

I dead bait them on the bottom using what I call a Carolina rig. It is a bass fishing technique. You want to use at least a 20-pound test on your rod with a barrel swivel and a half-ounce slip weight that slides down to a barrel swivel. From your barrel swivel to the hook is a 3-foot leader of 40- to 50-pound test. And this is the critical part — I am using a tiny 4.0 bronze hook with the barb bent down.

The barb on a hook is not to hold the fish; it's to hold the bait on the hook. And you don't have to use a barb to catch these big fish. You have to keep pretty constant pressure on them, but you are not going to lose fish because the barb isn't on the hook. And you will be able to remove that hook with little to no damage to the fish. When 70 percent of these fish swallow the hook, if you cut the line the chances of getting it back out without ripping or tearing are extremely high. The bronze hook — not a stainless or a cadmium-plated hook — will rust out. So be sure to use the right hook.

I fish for them everywhere. I got a call last night from somebody writing a story on me. He asked where I was catching them. I said from Minnesott Beach on the Neuse River, down to Brant Island shoals, around Goose Creek Island and up the Pamlico River to Indian Island, Swan Quarter Bay, Rose Bay. And he said, "Yeah, but where are you catching them?" I said, "That is where I'm catching them."

I am not kidding you. We caught drum pretty much everywhere we stopped last year. We were most successful fishing for them about dusk as they move onto the shoals. During the day, especially in August, the fish are going to stay in the deeper water, 15 to 20 feet. And as night approaches, they are going to move up onto the shoals, which stretch hundreds of yards offshore, to feed and spawn. In late August to October, these fish will be on the shoals a lot more during the daytime.

I like to get on an irregularity of the shoals. It would be a point, a peninsula. I use a chum line, just a minnow bucket with holes in it, cut up a mullet and hang it over the side. And I will position the boat so that the wind and the current are carrying the chum line parallel into the drop-off. There will be a break line from 4 to 16 feet within 20 yards or so.

I position the boat so the chum gets down the break line. That way, fish at the bottom of the break line in deeper water or fish coming up on the shoal are going to smell the bait first thing. They're going to be hungry, and they are going to chew. You can set your watch by them because they are there at the same time, the same place, every day. You don't need to use a gaff to boat the fish. A big landing net does lovely. And it is amazing how docile these big fish are when you get them to the boat. It's almost like they know you are trying to help them out by removing the hook, and they revive pretty easily.

After removing the hook, hold that tail and work the fish back and forth until you are absolutely sure that it has righted itself. It will let you know because it's going away from there when it's ready. But don't let go too early. I have worked on fish for as long as five to seven minutes, and thought, "Man, this fish just isn't going to make it." And then it's gone and you don't see it again. Last year, I only saw one giant drum floater and it was about a 50-pounder. It had a 7.0 stainless steel hook with a wire leader snipped off in its throat.

At about the time we're fishing tarpon and drum — especially later in August and September — the puppy drum really bunch up. That is some fine, fine fishing. It is light tackle, and chum is real important. I am fishing right on the shoreline. You can anchor on a windy point or bank and put the chum out. The chum will go to the bank and run down the bank. You cast where your chum goes into the bank and you are going to catch it. The last three days that we fished in September, we caught 103 puppy drum from 2 to 12 pounds. We kept six.

Again, the thing that concerned me about the puppy drum was seeing 3 miles of gill net stretched out 10 feet off the bank. When those puppy drum and flounder went up to the bank to feed, they were caught by 3 consecutive miles of gill net. That was frustrating because I couldn't get to the bank and there were very limited areas where I could fish. But again, I want to stress it was not all full-time commercial fishermen. The majority was set by part-timers. And there are more and more part-timers every year.

When I return to New Bern, normally at the end of September, I am live baiting with menhaden. In the springtime in New Bern, menhaden migrate up the river. Following them are the puppy drum, speckled trout and flounder. And coming down the river, just off the spawn, are the striped bass. What happens is an explosion. Hungry fish come from both directions with the poor old menhaden stuck in the middle. It is a lot of fun. We use 6-pound test, a shock leader of 15-pound test and a little slip weight. We just free-line live menhaden using a 2/0 or 3/0 flounder hook with the barb bent down, especially on a flounder hook. Once a flounder hook gets in there, you really have to do some twisting to get it out if it still has the barb in there. We are not losing any fish, but we lose a few menhaden.

Stripers are real structure-oriented. They like to be around bridges and pilings, and downtown New Bern is full of bridges, docks and pilings. But how in the world are you going to catch these stripers on 6-pound test around barnacle-encrusted bridges? We catch largemouth, flounders and stripers right there using these rigs throwing the live menhaden.

One tactic that I have developed is chumming with menhaden. You anchor your boat 20 or 30 yards away, and you toss about 20 of those menhaden in the water. Now, a live menhaden is going to want to get to where it feels secure. So the first place it goes is to the bridge, but guess what is waiting on it? The stripers. They chase the menhaden away from the bridge and start busting them. And you are sitting there with 6-pound test and a hook and live menhaden and asking, "Which striper do I want to catch now? I want that one." The stripers just go crazy after them even when they're not feeding. I have seen people fishing with artificials or some other bait on New Bern bridges for hours, but when someone pulls up and throws some menhaden over, everyone is catching them. It just turns them into a frenzy.

My big concern for the striper fishery is bycatch by gill netters who aren't targeting stripers but are catching them incidentally. So I think we can work together and have a real successful commercial and recreational fishery in the future.

Speckled Trout Fishing in the Surf

Joe Malat is an outdoor writer and former surf fishing guide.

You can call me Joe Mullet if you want. What I want to do is go over a few ways that you might be able to catch more speckled trout.

Let me give you some background on where I am. I live in Nags Head, and I'm a former professional surf-fishing guide. Now I'm the curator of exhibits at the North Carolina Aquarium in Manteo. I am also a part-time outdoor writer and photographer. And, along with Mac Currin, I teach the Outer Banks Sport Fishing Schools. We offer them at several different times during the course of a year.

Let me start the program with three things. I have found that persistence and attention to details are important to successfully catching speckled trout on the beach. It is not real complicated. These are fish of habit. They consistently do the same things at the same times of the year on a regular basis. The best fishermen I know are also very observant people. They pay attention to what's going on around them.

When I talk about fishing for speckled trout, I like to use the three Ts: territory, tackle and technique. I have a video as an introduction to that. This is a clip from a show about surf fishing that I did last fall with my friend Joe Albea. He has a show on PBS called "Carolina Outdoor Journal." We were lucky to be on the beach doing this show during some really hot speckled trout fishing in Kill Devil Hills. The previous three days we didn't catch a fish. So persistence pays off.

Short video is shown.

That was just a real pretty day. It's one of those things where you put in your time. You have mornings when you're blanked and then you have days when you can do no wrong. A lot of folks were catching fish that morning. I made the comment that the speckled trout are the best fish in the ocean. But actually, I believe the best fish in the ocean is the one I happen to be catching at the time. I am not that particular, but I will take all those I can get.

In that little clip, we talked about three different things. One was territory, which is important. All the speckled trout fishing that I do on the beach is basically between Kitty Hawk and Ocracoke. I have to admit that I don't know much about fishing the Bogue Banks area. I think they use different techniques. The fish that we target in the fall usually start to show up about the end of October; the good-size fish appear at the end of October. The 2- to 3-pound fish show up in the middle of the month. This year, the fish were a little bit late. We didn't start to see substantial numbers until the early part of November. But it was an excellent speckled trout fall, and we had a fair number of striped bass mixed in with them.

We look for fish to orient to certain things — the bar formations that are typically found north of the fishing piers. Year after year, they traditionally stay in the same locations, these little sloughs or troughs where they feed up and down the beach. A slough is defined by an outer bar and a pocket of deep water that runs between the outer bar and the beach. Now, these sloughs can be wide or narrow. The best trout sloughs are generally fairly narrow. You don't need to cast a

real long way. The key is the depth of the water.

You can recognize the sloughs by the white water breaking across the outer bar. Ideally, if you can have that bar funnel up to the beach on the south end of the slough, the fish will trace along the outer bar and move into the pockets to feed. The best time to find those locations is at a falling tide down to low water.

I have had my best luck beach-fishing on a falling tide down to dead-low water. Right at dead-low water, the bite will usually stop. I say "usually" because you can never say "always" in fishing. And then with the change of the tide and the water starting to run in, the fish will begin to feed again. Sometimes the fish are on the feed, and they will bite at the same time of day three or four days in a row regardless of the stage of the tide. But I prefer to fish a falling tide for speckled trout in the ocean in the fall.

The time of day is critical, which I have found to be true most of the time. I would like to fish a falling tide early in the morning, but my first choice would be first light. Get on the beach before the sun starts to come up. I have talked to some folks who say, "I went out there fishing early yesterday morning and I didn't catch any speckled trout. I heard they were catching them." I said, "What time did you get out there?" The answer: "About 8:30, after breakfast." Well, by 8:30, the bite is over a lot of times. But I have seen it go on for a whole tide, a whole falling tide sometimes.

Tackle is also critical. These are very funny fish. Contrary to popular belief, I don't think they are incredibly intelligent. They are probably smarter than the average fish, certainly smarter than the average human because they outsmart me most of the time.

Presentation of the lure is important. Most fish on the beach are caught with artificial lures. Some folks will fish live mullets when the finger mullets are running. But I use a couple of different things. A finesse tail is a lead head with a twister tail type rig. It is a soft plastic tail. In general, I use a lead head weighing between a half-ounce and a quarter-ounce. The quarter-ounce heads can be too light if you are throwing into any kind of a wind. I prefer to use a head that weighs three-eighths of an ounce. This is a round head. You talk to five different trout fishermen, you get five different favorite shapes of heads.

The color red is probably good because that's what I use most, but I've caught a number of fish on a plain lead head with no paint. I have seen days when a white head will produce. I also see people using whatever it is that the tackle shops are selling most of at the time.

And it is very interesting about people who trout fish a lot. I fish most of the time with a green twister tail, anywhere from a 2-inch to a 4-inch twister tail. There were days on the beach last year when everybody next to me was using finesse tails and they caught the dickens out of them. That was a good lure, but everybody was using them. So if the trout were there, chances are they were going to bite a finesse tail.

I like to have confidence in the bait I use. I feel comfortable using a twister tail. When I throw it out, I can feel it settle down in the water column. I feel the lead head hit the sand.

And if I am working in a rip or a current, I can feel it pulling against that tail, and I think that is important.

You need to be able to understand exactly what your lure is doing and to be tuned into how your rod is working that lure. I like a fairly light spinning rod, 6 to 7 feet. I don't care for a rod much shorter than that because sometimes you have to throw a pretty good cast to reach the top or far side of the bar because the fish might be on top of the bar.

My preference is 8-pound test line. I don't recommend going any lighter than 6-pound in the fall because we do get some big fish. A 4- or 5-pound speckled trout with any kind of shore break on 6-pound doesn't give you much room for error. Ten-pound test is okay, but the 8-pound seems to get the maximum distance and puts a bit of pressure on the fish.

They do have a soft mouth, but there are times when you have to let them know you're in control and give them a little bit of a turn. When you have them on top of a wave that starts to surge and break, you have to walk them back into the ocean and let that wave pull them back until you can surf them up again.

I don't recommend any particular brand of reels. I like to use top-quality stuff. I do like graphite rods because of their sensitivity. Some people like to use really whippy rods when they're trout fishing. I found that to be more of an advantage boat fishing, but that is just my preference. I like to feel that lead head working. I can do that best with a fairly stiff rod.

I use three rods most frequently — two 6-footers and a 7-footer with a little bit stiffer tip action. Around the Bogue Banks area, when folks are fishing on the upside of the stop nets, they might use a different rod to get some extra length because the beach is more gradual and tapering than ours north of Hatteras. But a 6- to 7-foot rod is my preference.

I will use the lead heads with either the twister tails or the finesse tails rigged singly or two in tandem. A lot of times fish will hit the real small bait. They might be feeding on glass minnows or small silversides, not the bigger finger mullet that are a primary food source for them. You rig up a tandem rig with a heavier weight up front and a little smaller bucktail trailing behind it. You catch most of the fish on the trailer. You use the heavier one just to get your casting distance.

I will very rarely use leader material heavier than about 15-pound line. Sometimes I will tie the line directly to the lead head if the water is exceptionally clear. I like a little piece of a leader — about 18 to 24 inches — and the very smallest (#12) black swivel that I can find. Tie your line directly to the lead head. The knot I use is a uni-knot, which provides a loop at the end of your leader and gives the lure a nice working action. So these are little details, but I think they make a difference over time.

I have some good buddies who don't use any leader; they just tie their line to the lead head, and that works fine. I prefer to have a little bit of insurance because your lead head is rolling around in the surf. And if you fray a piece of 8-pound right there close to the lure, you don't have much room for error. If you put any pressure on that fish, it is going to pop.

You need to pay attention to what is going on — from watching the guy next to you to looking in the ocean for a bird

picking or a fish swirling. Finger mullets, when they are moving up and down the beach, typically jump because that is what they do. But if you see a whole wad of finger mullets jump up out of the water at the same time, something is eating them. A lot of times, it's little bluefish, but sometimes it's trout. If you see some bait shower, you cast where that bait is moving.

You will see rip currents form with the bar formations. That is usually on a falling tide at a break in the sand bar. You will see water being sucked out of a slough through a little break. Well, that is where a lot of big fish will stage, waiting for bait to come to them. If you are fishing in a rip, you don't need to work your lure. With these lead heads, I prefer to jig it. Cast it out, let the bait settle to the bottom, start to crank and just jig it every once in a while. Don't fall into the pattern of doing the same thing all the time. If you are jigging and reeling, jigging and reeling and the guy next to you is catching fish by just reeling, well that's when you just start reeling. You must pay attention to what is going on around you. It is not real complicated, but you need to look at what is going on up and down the beach, all around you and work the lure right up to the drop.

On the beach, you will have an outer bar, the deep water and the slough. At the edge of your feet, you'll often have a drop. I have caught fish 2 feet out, just past the rod tip, just as I got ready to pull that lead head right up off the edge. Work the lure right up to your feet.

I fish mirrolures sporadically only because I can't fish mirrolures very well. I stick with what I do best. I have friends who are deadly with mirrolures. That is pretty much a slow retrieve technique. You tend not to cast them as far as you can the lead heads, especially on an easterly or northeasterly wind, which is good for trout fishing because it helps to clear the water. But it's a pleasure to watch a person who is good with a mirrolure consistently catch fish.

I want to wrap up with a few things. Persistence pays off, and you need to give an area a good effort. If you go out and have a fishy looking place on the beach, work it over. Give it some time, 15 or 20 minutes. Try fanning your casts. Don't cast only directly in front of you. Try varying your retrieve, a little bit of a jig action, maybe just a slow, steady retrieve. Sometimes a steady retrieve will work real well if you are casting into a rip because that water is moving anyway.

William Lambeth: How long does the surf fishery last for trout? You said it starts about the end of October?

Joe Malat: Yes. Typically, it's early October, when the water temperature starts to drop a little at the north end of the beach — Kitty Hawk, Duck, Kill Devil Hills. Further into fall, the fish tend to move farther south.

December before last, I caught trout up until a couple of days before Christmas in Nags Head. It will stay consistently good in Hatteras through December and well into January unless the water temperature starts to take a nosedive and the fish move off the beach. But you have a three-month period when it can be big.

Question: How about the spring? Do you have any luck in the springtime?

Joe Malat: We have a little flurry of fish in May, but not the big fish that we have in the fall and not the consistent numbers. I think they catch a few more fish on the southern end of Hatteras Island than we catch up north. Spring is like fishing anywhere for speckled trout. It is very iffy. It depends on the weather and the water temperature.

We also have a few fish in the summer — a lot of small, barely legal-size fish. If you can get out early in the morning and fish either side of the piers, you can catch some of them, but that is real sporadic.

Question: Do you fish the finesse grubs the same way you do the twister tail?

Joe Malat: Yeah. It probably requires more of a jigging action because it's a straight soft plastic lure. The twister tail — and that is not particularly a brand name, it's just the configuration — has a natural action just sitting in the water. The finesse tail doesn't have as much of that. But you cast it out, let it settle and try a varying kind of a jigging retrieve.

Question: Is the color of the grub or the twister tail or the finesse really important? I know when I have asked the people who catch them, everybody is catching them on pink.

Joe Malat: Well, I will probably subject myself to verbal abuse on this one, but there are some days when the color is very critical. Get a color that is in the realm of what the trout are going to eat. Green is consistently good. Sometimes a smoke-colored tail is good.

Have confidence in what you are using, work it correctly and pay attention to what you are doing. A lot of times, trout will bite a lure and the average angler doesn't even feel it bite. You cast it out and the trout will suck on it as your bait is going down to the bottom and the line just feels a little bit different. That is when paying attention will make all the difference in the world.

I think if you have faith in the lure and you use a color that is in the ballpark, you will do well.

Question: How important is setting the hook when you feel that little tension in the line?

Joe Malat: There are different ways to set the hook. You can snatch up real hard, which I don't do most of the time. Sometimes just bring it tight by turning your reel handle a few times so you feel that resistance. The fish has it in its mouth, and then you set the hook. You don't need to snatch it real hard, just a good, decent hook set. And then you keep steady pressure on the fish the whole way in. That is the most important thing.

Recreational Fishing and the Fisheries Resource Grant Program

Mac Currin is the director of the N.C. State and Outer Banks Sport Fishing Schools.

The Fisheries Resource Grant Program is an interesting program. Sen. Marc Basnight established it in 1994 and '95. He appropriated \$1 million with the intent that it go primarily to the commercial industry for researching specific topics and developing information that could be used to better manage our fisheries. It was left so that the monies are available to recreational interests as well.

In a little bit, I will go through some of the projects that were funded and give you some broad categories. I want to say at the beginning that recreational angling groups and individuals are eligible to apply for this money, but very few of them have. If you have some good ideas that meet the criteria of the grants program, I would encourage you to apply for some of the funds and generate information that can be used to better manage our fisheries. I presume that the grants program will be funded again next year.

One million dollars was appropriated for this program in 1994-95. Another \$1 million has been appropriated for 1995-96. The funds are administered by the Department of Environment, Health and Natural Resources (DEHNR). They are intended to enhance the state's coastal fishery resources through individual grants. To be eligible, a proposal must meet four criteria.

One is to test new equipment or techniques to reduce bycatch and fishing impact on nontargeted species. The second criterion is to assess fishing industry trends and identify new opportunities and strategies to develop and conserve North Carolina's fishery resources. The third criterion involves environmental studies to reduce adverse impacts of fishing techniques, restore habitat and understand environmental controls and shellfish abundance. The last criterion is to study other fishery issues, which leaves it wide open to almost anything. So as you can see, the playing field is pretty open. I think anything that relates in a positive manner to fishery resources, especially improving or enhancing fishery resources, is eligible for some of this money.

Who is eligible? The field can include, but isn't limited to, fishers, commercial or recreational fishing people, groups of fishers and fishing companies. Most grant application forms are pretty intimidating. This one is not. I brought a copy to show you that there's not really all that much to it. It's two pages. Of course, you can add more if you want to fully explain something, and I think people are encouraged to do that.

But this gives you some idea of what is involved — it asks where the project is located, which one of the four basic criteria it fits, how much money is requested, dates for starting and completing the work, and names of others involved. Applicants are asked to describe their project, including the fishery problem or issue it addresses, the objectives and its relationships to these problems and issues. They're asked to describe the cost, the people involved and their responsibilities and qualifications, how the project will be carried out, how its results will be evaluated and how its findings will be made

available to the public. They're also asked how the project will benefit the fishing industry. So it's pretty straightforward. Virtually anybody can do it.

After the proposals are received, they are reviewed. I helped review proposals last year and I will be doing it again in a few weeks. I know you are probably aware of the stink raised last year in the newspaper about the process and the conflict of interest. I think that was overblown. And I feel very comfortable about what we did, the way we did it and the recommendations that we made. I volunteered to do it again this year because I believe it is a good program and I want to provide whatever expertise I can to the decision-making process for those proposals.

Applicants are required to submit five copies of their proposal so that three can be sent for outside review. When they come back, the Division of Marine Fisheries (DMF) looks at the reviews and takes a first cut at them. The DMF makes its recommendations based on rankings from the outside reviews and its own reviews, and then it submits the proposals in a number of categories, usually based on a numerical ranking.

Last year, DMF developed an A-list of the highest-ranking proposals and a B-list of the lower-ranking proposals. Then it cut out the ones that didn't meet certain criteria, didn't have an appropriate proposal or didn't submit the required information. DMF takes the first cut so that the committee doesn't have quite so many to review.

After that, the committee reviews these proposals and makes its recommendations. Then the proposals go to the Marine Fisheries Commission (MFC), which for the most part acted on the committee's recommendations last year. After they are rewarded, the grants are administered by DEHNR under the guidance of DMF.

In many cases, as you can imagine, the commercial fishermen and others who submit proposals don't have the statistical expertise to properly analyze and evaluate the information they're gathering. They have great ideas. They can identify the problem and they know how to go about trying to solve it. But there is a little more to problem-solving than that. You have to be able to say, "Yes, I solved this problem" with some degree of certainty. So statistics, unfortunately, play a role in that, and DMF works very closely with many of the awardees to make sure that their information is appropriate and able to meet those criteria of enhancing North Carolina's fishery resources.

To ensure that some of these criteria are met, DMF holds back 25 percent of the money until the final report is submitted. Awardees do have to submit interim reports — I believe at six months — and they may even be required to give an oral report to the MFC. In case they don't perform, there are penalties and procedures for them to pay back the money. So people can't come in, ask for \$10,000 to study crab shedding or whatever and then say six or eight months later that they didn't do it. There must be a means of getting the money back for noncompliance or nonperformance.

In 1994 and '95, 143 proposals were submitted requesting a total of \$8.6 million. They varied tremendously, as you

can imagine. One proposal was submitted for \$1 million, the whole shooting match. Somebody wanted to develop a computer system to handle all the trip tickets. And they ranged down to very meager requests for \$1,500 or \$1,000. One guy wanted to build a marina in Tyrrell County to stimulate economic activity, provide better access to fuel and bait, and promote fishing. Six were weeded out by DMF as not meeting criteria.

Twenty of the 49 commercial proposals focused on bycatch, an important topic, and there were some very good proposals. There were only 12 recreational proposals, so if you have ideas, I would encourage you to submit them next year.

The processors are the dealers or fish houses — people who process aftermarket products, such as crabmeat, oysters or squid, and make something else out of them. They develop machinery to better handle fishery products.

There were a whole lot of aquaculture proposals. I personally have a problem with those because I don't see how aquaculture fits directly into enhancing North Carolina's fishery resources except in a very indirect way. I guess I was hard on some of the aquaculture proposals, but a number of them were good and they were funded.

Among others, there were a lot of proposals related to software development. I mentioned the one about the trip ticket system. They dealt with history, education and environmental studies (habitat and water quality issues). Some of those were funded as well.

The legislation and regulations stipulated that the money be equally divided among the regions of the coast. Last year, 36 were from Albemarle, some were from the Pamlico area, Morehead City, Wilmington, and some applied statewide.

This year, 109 proposals were submitted for a total of \$4.2 million. So people aren't quite as greedy this time, I guess. They break out this way: 25 are from Albemarle, especially relating to striped bass and herring; 15 are from the Pamlico region; 51 are from Morehead; and 18 are from Wilmington. They aren't quite as evenly distributed as they were last year.

Broken down by focus, there are 25 proposals for new equipment or techniques, eight for bycatch, 10 for fishing industry trends, 24 for environmental studies, 21 for aquaculture, 15 for education and eight for watershed monitoring programs.

DMF does virtually no water-quality monitoring. The Division of Environmental Management is required to do that, and it has citizen programs. Now, under this grant program, other citizens are getting involved in monitoring dissolved oxygen and other water quality parameters that affect our fishery resources.

In a couple of weeks, the committee will start going through these proposals, submitting reviews and recommending to the MFC what should be funded this year. I urge all of you to be aware of this process and to disseminate information about it. I strongly encourage you to mention this grant program to other people who might be interested in submitting proposals.

Question: Does the money have to be equally divided among the four areas of interest?

Mac Currin: No, it doesn't have to be divided equally among those areas. But I think committee members were concerned that they're somewhat equally divided.

Question: If someone lives, let's say, in Hyde County and has an idea or knowledge about something in another area, does he have to live there?

Mac Currin: No, he would not. I don't think that is a requirement.

Question: You don't have to be in those four areas?

Mac Currin: You don't have to be. Applications are accepted from anywhere. I suspect that things like computer development, which might be used to indirectly enhance the resources, could be done virtually anywhere. And certainly those would be considered.

Question: So through this process, applicants give you their programs. Do they give you a budget of how they expect to accomplish this?

Mac Currin: Yes.

Question: And when they receive this money, you monitor the money and expenditures?

Mac Currin: Yes. They can request up to 25 percent of the money up-front to start their projects. So, for instance, if someone wants to investigate a new way of catching mullet that reduces the bycatch of striped bass, he can apply for the money to buy nets with a different mesh size.

Question: What were some of the recreational projects? There were only about 10 or so.

Mac Currin: There were 12 last year, and I haven't seen them this year. Two that I remember were related to tagging. One — a Coastal Conservation Association proposal to tag speckled trout — was funded. I remember another one submitted by a man and his wife who wanted money to buy some rods and reels to travel up and down the coast. They wanted to check out the fishing between the Virginia line and Southport. That one wasn't funded.

It was real interesting to sit on this panel because we got some very interesting proposals.

Jim Murray: Let me encourage anyone who is considering writing a grant to check your idea with someone once you've gotten it in a draft form. Get some help from someone in the academic community or from the Division of Marine Fisheries. I don't know much at all about catching fish. I would starve to death if I had to catch fish for a living. But I like to

think that I know something about writing proposals because that's what I do for a living. It is really an art form.

Last year, a number of folks contacted Sea Grant for help with packaging their ideas, experimental design and writing down objectives. Ultimately, the people who are reviewing these proposals are people like Mac Currin, who know how to write proposals and are looking for certain things. The folks who took that extra step to get help writing proposals are the ones who fared the best. They were funded in a much higher proportion than those who did not.

Question: Are you available to assist people in doing this?

Jim Murray: Yes, Sea Grant will do that. For the first year, we listed about 50 resource people you could call for help. Now, they're not going to write the proposal for you. But about a half-dozen people came to me before the grants went in and asked if I could look over their proposals and suggest changes. I offered changes that I think improved their chances for success.

Mac Currin: As a reviewer, it's frustrating to see a good idea that isn't written in such a way that you believe they could pull it off. It was difficult to understand what some of them were trying to do. You just had the feeling that a good idea was there, but it was very difficult to determine whether the proposal had much chance of success.

So that is a very important point. Last year, the Sea Grant advisory agents did a wonderful job helping people write these proposals and reviewing them before they were submitted. The Division of Marine Fisheries did a good job as well. All the districts in the state had biologists review proposals for fishermen or anyone else who asked for help making sure they were on the right track.

Question: What is your time frame? When are the proposals due?

Mac Currin: The legislation stipulates that proposals must be submitted by Jan. 16. So this year, of course, the cycle is out.

Question: When does the money go out?

Mac Currin: Last year, the funding didn't go out as quickly as it should have. I know Dick Brame had a hard time getting his, and I don't think he got it until later. Of course, he feels like that was intentional, but I am not so sure it was. In general, the funding went out in June. There were quite a few delays the first year getting the program going. But I suspect it will run a little smoother this year.

Question: Do you have a list of the projects that were funded?

Mac Currin: I don't have a list, but I can tell you that a number of them from the Albemarle area dealt with striped

bass bycatch in various fisheries — the flounder fishery, gill net fishery, mullet gill net fishery, some of the trap fisheries. Some of the projects funded dealt with release panels in pound nets. One proposal dealt with release panels in long haul seines. There were a number of bycatch reduction devices in the shrimp fishery. There were some proposals to generate more information about the crab trawl fishery and the bycatch of small flounders related to that. A number of product development projects were funded for the processors, such as creating new products out of crabmeat or what has been scrap in the past. I am sure that some aquaculture proposals were funded as well.

Jim Murray: Several were related to the chub system, which is an off-bottom system for growing oysters. A fairly successful one in the Sneads Ferry area has been growing oysters off the bottom.

Mac Currin: There were a couple on clam aquaculture. I don't think there were many, if any, finfish aquaculture projects funded.

Wilson Laney: Quaker Neck Dam.

Mac Currin: Quaker Neck Dam was another good one. The Fish and Wildlife Service and the Coastal Federation submitted a proposal to remove a dam on the Neuse River system, opening up 108 miles of river. That dam has not been blown up yet, but it is scheduled soon.

Wilson Laney: The terms of its removal are still being worked out. In the meantime, another grant was awarded to Joe Hightower at N.C. State University. He is putting transmitters on striped bass and American shad in the Neuse River and monitoring them this year before the dam is taken out. Then, he'll monitor the same fish and additional fish next year to examine their before-and-after instream migration and movement. He got another grant to look at the impact of water quality on herring in the Albemarle and Chowan River.

Mac Currin: Mary Moser got a grant to put transmitters, sonic tags, in white shad moving through the locks on the Cape Fear River system. She's examining when the fish came, how they were impacted and whether an opening regime might allow more fish to pass up to the spawning grounds.

Comment: That is a tremendous need — the locks in the Cape Fear River. I would like to see someone really go for some money to handle that.

Comment: The Fish and Wildlife Service, in cooperation with the U.S. Army Corps of Engineers, is putting in an interim fish passage device. It's called a DeNealski pass and fits to lock and dam number 1. So that is kind of an interim measure while a longer-term study looks at the passage issue relative to the locks and dams.

Question: When is that dam supposed to be blown?

Wilson Laney: The terms of the memorandum of understanding are still being worked out among CP&L, the state of North Carolina and the Fish and Wildlife Service. So I don't know. I don't think they have a fixed date yet because of liability and insurance concerns.

Question: But it will be done?

Wilson Laney: Another biologist and I, who've worked on the project for about five years now, have volunteered to go out and break it up with sledgehammers if nobody else will.

Mac Currin: Originally, it was proposed that the U.S. Marines blow it up for nothing. But the Environmental Protection Agency wouldn't grant a permit because of concern about how many explosives they would use and what else they were going to blow up.

Fishing Giant Bluefin Tuna off Hatteras

Bob Eakes owns and operates the Red Drum Tackle Shop.

For some reason I have the distinction of being a bluefin tuna fisherman. I am mostly a surf fisherman. But I want to show a video about what is going on in Hatteras. It shows the first fish of last year. We had chummed them up. These fish are maybe 15 or 20 feet off the side of the boat, and we are pitching out whole menhaden, whole fatback.

Question: You just threw out one or two whole ones?

Bob Eakes: Yeah, and maybe a little bit more than that.

Videotape is played.

Bob Eakes: Once we have chummed these rascals up, my friend's wife throws a topwater plug that doesn't have hooks on it. Nobody told her it didn't have hooks. She thinks she is trying to hook one.

Videotape is played.

Question: Do some people troll or is everybody doing this?

Bob Eakes: Some troll, but it is predominantly chunk fishing with half or a whole menhaden or herring. The thrill of it is to bring them close to the boat and see this. These are probably 200- to 400-pound fish. And there's nothing to hooking one of these fish right now.

Videotape is played.

Bob Eakes: Watch the girl with the spinning rod. Watch the line. About every 15 seconds, she gets hit.

Videotape is played.

Bob Eakes: The day before yesterday, 95 boats were fishing, and every single one of them had a school chummed up to the boat.

Videotape is played.

Bob Eakes: This is early last year. We have done a lot of work with full circle hooks, and we've gotten away from gut hooking and doing damage to the stomach area. The circle hook only goes in the corner of the mouth.

We spent a lot of time last year working on tag placement. It is fun to watch the first time a man tries to tag one. He always wants to take dead aim, just like you would shoot a deer, hit it dead-center. But you ought to tag it in the mid-side, right on that dark, broad shoulder. Last year we cut the leader off close to the fish. This year we get the hooks out — I'll tell you about that later.

Videotape is played.

Bob Eakes: Most of what we have been seeing are 200- to 300-pound fish.

Question: How long has that fish been on to be that tired?

Bob Eakes: Well, that fish is not that tired, believe me. It was crushing my hand there. We probably spent about 5 to 8 minutes on that fish.

Comment: It looks like it's just lying on its side.

Bob Eakes: A lot of people call that a death spiral. They fight that way, they spiral up like that. Even when it is wired up 2 or 3 feet away, the fish is watching when I am tagging it. It is absolutely not tired.

Comment: It isn't belly up.

Bob Eakes: No. It was hurting me, and I still have a sore left hand, but it was worth it. There were a dozen opportunities to tag the fish anywhere, but I kept bringing her back to put it in the right place.

Here we have taken the hook out. We're holding the hook by the barb, pulling the eye back through the wound and letting the leader pass back through the wound. That is pretty revolutionary in the world of released pelagic fish because most often you cut the leader and it swims off with the hook.

I get a lot of questions about people standing up fighting these fish. This is Dennis Braid, a renowned stand-up artist from California. He wanted to see if he could do it. He caught three in a fairly short time, but by the third fish he had to lie down. So you can do it standing up, I would recommend you get in a boat that has a chair.

Videotape is played.

Question: How many fish do you pull up with tags in them?

Bob Eakes: Last year, I retrieved three fish with tags in them. So far this year, about 10 or 15 fish have been caught with tags. Their tags have been snipped off; they've been retagged and sent on their way. I tagged 335 fish last year, and I have 3 or 4 percent returns right now. That is considered high by the National Marine Fisheries Service. The fish are absolutely surviving this ordeal. It happens fast.

Right here, we are 40 miles south of Hatteras Inlet. Traditionally, these fish dwell on three or four wrecks about 25 miles south of the inlet. A body of colder water has stayed on top of those wrecks this year, and the fish have just hung down another 10 miles below that.

Question: Is this a relatively new phenomenon?

Bob Eakes: Yes, this is a new phenomenon. Nobody has a good idea why they are here. A lot of fish are being caught and released, a lot of fish are being tagged. The biologists are scratching their heads and a layman like me doesn't have a clue. But it is good fishing.

Most of our fishing is done with 180-pound test rods and reels. The reels are loaded with 200-pound Dacron, overlaid with 300-pound monofilament and 60 to 90 pounds of drag. The other day, a guy got in the chair, and we put a big harness around him and tied it to the back of the chair. I asked if he was ready, and he said yes. I pitched the bait out there, he shoved the drag lever up to 60 pounds of drag and he said, "I am not ready." His eyes were huge.

Hatteras is blessed to have this, and you should get out there if you haven't done it. You should absolutely charter a boat and take a look at something that has never been seen.

Joel Arrington: Is the boat anchored all the time?

Bob Eakes: No, it is not anchored at all. I fished one time last year, anchored and probably cut my anchor line off when the Dacron went across it. It cut the ball off.

Joel Arrington: Can you tell us your impression of what has been happening on the headboat where they have been doing some stand-up?

Bob Eakes: I wouldn't want to do that right now. I had a lot of reservations last year with that boat being anchored and not having the ability to drag the fish. But I haven't gone on the boat, and it's not for me to take them to task. He does have the ability now to tow the fish. After you unhook most pelagic fish, you should tow them for a short distance. And that was the neat thing about taking the hooks out. We were taking the hook out, using the leader through the wound, towing them 30 or 40 feet and they were instantly reviving.

A good friend of mine, Brad Chase, works for the Division of Marine Fisheries in Massachusetts as a premier tuna biologist. He's done studies where they wear down the fish

past the point that you'd expect them to survive, put pinger tags in them and track them. They survive. They probably are tougher or more hardy than we want to think.

But we also have a responsibility, and that's one of the things that I preach in this fishery. We are out there not trying to kill the fish but borrowing a little energy and time. And we have to be responsible taggers and releasers. If we can't do it successfully, then we shouldn't be doing it.

Joel Arington: Tell me how you rate the relative ability of fighting from a chair relative to a stand-up. Obviously, you can catch them on stand-up; you said this guy caught three but was tired out.

Bob Eakes: Well, it was real rough that day and I think his supper was working on him too. I set up his reels and we had the drag pressure set the same as the big reels. He withstood it fine. He fought through three of these nice fish.

I would also have to say that I have a lot of reservations about the average person taking a small boat out and standing up with a small 6/0, 9/0 reel. Dennis was in specialized harnesses and gear. It can be done.

Joel Arington: So you wouldn't categorically say that stand-up tackle kills too many fish, right?

Bob Eakes: I don't categorically say anything. My point is to get out there and show them how to do it right. This fishery is so fantastic. It is the best offshore pelagic tuna fishery that has ever been. The most renowned people you can talk to have never seen it anywhere in the world. It can only be protected if the best of us get out there and do it right. I will go through this season and then I will make up my own mind where it goes from here.

But I think there needs to be some instruction and a permit. I think the National Marine Fisheries Service should take some top Sea Grant people and teach guys the right catch-and-release and tag techniques, because I know that they survive. I have seen too many of them swim off.

Jim Murray: What percentage of fish have you caught on stand-up versus sit-down?

Bob Eakes: I have only caught three fish stand-up on my boat, and that was after letting the best show me. Besides that, I value my lower back too much.

Question: Is there a growing number of anglers trying to do it stand-up?

Bob Eakes: I don't think so. I think the small boat fishery wants to be there. Everybody wants to be there. But the weather is very punitive. It is not very forgiving in the winter-time off Hatteras. Last week I was out there in 8- and 10-foot seas breaking all in the cockpit. A reporter along from the Raleigh newspaper didn't think that was too good.

Joel Arington: I don't blame you for wanting to put the best light on this fishery down there. We would all like to continue to have the fishery. But I would like some sense of how many people have an experience like yours.

Bob Eakes: There are an amazing number of big tunas. I think it's wrong for a guy who doesn't know what he's doing to take a 50-pound outfit, hook a fish and fight it for three or four hours. But there are professional captains who don't think that stresses the fish so bad. The point is, if he wears that fish for three or four hours, he's only impacted one fish when the numbers come up at the end of the day. The numbers come from somebody like me, who can catch 50 of them in a day. I have done it, but I do it knowing that it is a low-impact fishery. That's what I've pushed so hard for, to get to the point that we're not hurting these fish.

Jim Murray: Brad Chase from Massachusetts Division of Marine Fisheries spoke at a bluefin tuna conference that Sea Grant held in Nags Head in December. What was striking about his findings was that bluefin tuna are better able to handle stress than any other species of marine fish because of their physical structure. They are able to thermoregulate. He said that of all marine fish that we stress through fighting time, the bluefin tuna is best able to handle it.

Bob Eakes: Brad Chase comes again to Hatteras in another week. One thing we're going to do is take them as fast as I can, put a pinger on them and follow them around. Hopefully, we will come back the next day and see that fish still with us.

The study that he's done — wearing them down, putting a pinger on them and watching them — shows that they swim back to the school and begin feeding. So there is a lot to be answered. What a neat place for the biologists. They are loving this. They have a giant tuna fishery that is not accessible to them anywhere else.

Jon Lucy: I am from Virginia. I think you deserve a lot of credit that you don't get locally for your innovative ideas — not only tagging fish but also pulling that hook and leader through the jaw. I haven't seen anybody else doing that, and it makes so much sense.

Bob Eakes: Well, I appreciate that. I recently wrote a letter to one of the higher-ups at National Marine Fisheries Service. I see a methodology here that now lets a long liner release a fish — a blue marlin, white marlin or sailfish — that traditionally would have been hauled to the boat and the leader clipped. Here is a way to catch the same fish, unhook it and maybe let it go into the system. I like that. It has some long-term potential that is not up to me to develop. It is up to some of you to develop.

Jon Lucy: I was talking to you about going to some small circle hooks. All of sudden, Eagle Claw came out with smaller circle hooks. People up our way are talking about trying a lot of different things to see if they can reduce some of the gut-

hooking. It won't work for everything, but you are putting ideas to use and letting people know that they are working. You tag more bluefin tuna in one year than the whole fishery in New England does in a decade.

Bob Eakes: It is a shame, though, that there are forces against this fishery because it's already become the tuna fishing center of the world. But I can't look far enough into the future to see where it goes. It can go the right way, and I hope it does.

We used a smaller hook — a midsize — on red drum, and it appeared to work as well or better with a three-way swivel instead of a fishfinder. A drum would pick it up and hook itself. It's been a tarpon-fishing hook for a different reason. It's not a mortality thing. It was just that a tarpon is so hard to hook. But this is different. Instead of having a gut-hooked drum, we were now hooking them in the corner of the jaw.

Question: What other modifications have you made to your tackle and technique since you started?

Bob Eakes: Well, I came up with a different way to tag the fish. It's hard to take a straight-in approach on tagging. If you remember the video, it always comes up to the guy who wires it with its belly to him. And that is just the way it is when you hook it in the corner of the mouth. So we took a right-angle tag stick — I call it a chopstick — and use it like a hammer.

The same problem exists for the long liners, for everybody. When you bring a fish up to the side of a boat, you can't always get a good shot with a straight punch. Circle hooks — and now the removal of circle hooks — is the more exciting aspect of it. And that took a whole summer of sitting there and thinking about it. I am proud of that. That is cool.

Joel Arington: Did you start out with heavy tackle or did you end up with the heavy tackle?

Bob Eakes: I am so heavy right now that it's not going to get any heavier because it is getting too dangerous. But I like the big stuff. I like hearing anything that will spin that 130 and make it zing. If you get the opportunity to come to Hatteras, you ought to. Do it right now because there are no guarantees. It sure has been some hot fishing.

Water Quality in the Neuse River

Rick Dove is with the Neuse River Foundation, and he's the Neuse River Keeper.

I probably have the best job in North Carolina. I am actually paid to take care of a river. Can you imagine, somebody paying you to go out and take care of a river? My river is the Neuse River. I am going to let you take a look at it.

Videotape is played. A complete understanding of the presentation is difficult without seeing the video.

The Trent River is a tributary of the Neuse in New Bern. The problems on the Trent are characteristic of others that we're having on most all of the Neuse River tributaries. What

we're seeing is a combination of various types of vegetative growth in these waters. Prior to 1990, none of this growth existed in these tributaries to the degree noted on the video. In some years, we had some growth along the banks of the Trent and the Neuse River tributaries, and we even had some good growth in the Neuse River itself. But beginning in 1990, we began seeing more and more of this vegetation growing in our waters.

Most of the houses that are in this area (Trent) range in price from a couple hundred thousand all the way up to \$2 million. Hood's Creek leads into the Trent near New Bern. In 1990, this creek was completely clear. People could use their boats, their docks. They could swim in this water. Each year it has gotten worse.

What scientists are telling us about the Neuse River is that it is overnutrified, especially with nitrogen.

The Trent River has had some of the most prolific agricultural growth — especially in the animal industry, hogs — of any watershed in our area during this period of time. The problem was so bad last summer that people were unable to use their boats and docks and some could not fully use the channel of the Trent and parts of the Neuse. People were pulling this grass out of the Trent River and carting it to shore in wheelbarrows.

Most people are familiar with the fish kills that occurred last summer. But long before these fish kills became a problem for the Neuse River, people were complaining about the growth of all this algae and the other vegetation in the rivers. It got so bad that it made "Good Morning, America." It made *Sports Illustrated*. It made *U.S. News & World Report*. It made *Health* magazine, and *Natural History* is getting ready to do an article.

A fellow named Joseph Lokes had sores on his hands, arms and body that were very similar to the sores we see on the fish. He is a marine contractor who worked in the water most of the summer. He wasn't the only one to come out of the water with those sores. We also found Department of Transportation divers who had these sores on their bodies from working in the water, and their sores were identical.

JoAnn Burkholder, a botanist from N.C. State University, and the Neuse River Foundation, my sponsor, worked very closely taking water samples during this 100-day fish kill on the Neuse River. And every menhaden that we took from the water — I mean every single menhaden in a 70-square-mile area of the Neuse River — had these sores. We believe that we lost every menhaden in the Neuse River in that period. We actually counted 10 million fish that had died. That is, of course, an estimate. We only counted on 10 of the 100 days that the fish died in the Neuse River last summer.

The problem is not limited to these small menhaden. We saw every kind of fish known to exist in the Neuse River with these sores, but not 100 percent of those fish had sores, and certainly the larger fish did not die in the same numbers as did these smaller menhaden. The menhaden are very susceptible to attacks by *pfisteria*. It is a one-celled animal that puts a neurotoxin in the water, paralyzes the fish and then actually eats its flesh. There were times on the Neuse River where,

from shore to shore, you would see these huge rafts of fish floating along. And again, they weren't just menhaden.

A lot of folks ask what's causing all the growth. One thing is the influence of the animal industry in North Carolina. Most people are concerned with the lagoons breaking, but lagoons aren't the problem for our surface water. (*Showing photos.*) On spray fields, the water puddles up and makes its way over to ditches. In this photo, the ditches go alongside the outer perimeter of the property. Here is Long Branch, which leads down to the Trent River and almost completely circles a farm. So anything running off from the spray area into ditches is making its way down the Trent River.

The theory behind spraying waste on fields is to make things grow. But more is being sprayed than could ever be used for growing. One of the problems with this industry is that waste is sprayed for disposal — not so much to make things grow. Animal operations are supposed to be zero-discharge operations, and that is one of the problems that we need to address.

It took Mother Nature about 2 million years to make the Neuse River. And in that period of time, she set up a pretty good balance in terms of how much nitrogen and phosphorus she could handle. But she didn't figure how many people she could handle, because when you talk about pollution, you really can't talk about animals or wastewater treatment plants. You really need to talk about people. We are the problem.

The river is about 250 miles long. At its mouth, the widest in the country, it's 5 to 7 miles. It covers about 6,000 square miles.

One of the problems with the Neuse River is that the Division of Environmental Management (DEM) only has 25 ambient monitoring stations in that 6,000-square-mile area. They are monitored only 12 days of the year. And even though we've been collecting data for many years, our data base isn't as good as it should be.

The river is dammed in by the Outer Banks. In a way, that's good because it makes up the Albemarle-Pamlico Sound. But it's bad because none of this water exchanges with the ocean very easily. So one of the problems is that we have no flow. We have a flow coming out of Raleigh on the Neuse River until New Bern. At that point, what happens to the water is largely governed by which way the wind is blowing. We only have a half-inch of lunar tide, but we can have as much as a 3- or 4-foot shift in the water levels by the wind alone.

The color of the water can be brown, orange, black or just about any color you can imagine, depending upon the color of the algae that might be growing.

In 1995, the Neuse River was declared one of the most threatened rivers in North America by the American Rivers organization, of which Charles Kuralt is a director. What are the pollution sources? It really comes back to people, pipes and animals.

It is not, in my opinion, just the Neuse that is in trouble in North Carolina. It is probably all the waters in the state. And one reason I think we are having that problem is we don't do much in the way of protecting that resource, the water quality.

North Carolina is the tenth most populated state in the

nation, but it ranks 47th in the amount of money it spends to protect waters. That's only 1 percent of the state's per capita budget on protecting our resources. The Environmental Protection Agency ranks us ninth among 50 states for releasing toxins into the environment.

In 1990, when we began having all the problems in the Neuse River, we asked Carl Wagner, a volunteer with the Neuse River Foundation, to compare the years 1988, '89 and '90 with '91, '92 and '93. We divided those six years into two periods because the lower Neuse estuary was declared nutrient-sensitive in 1988. We also knew that new nitrogen sources had been added in the watershed since 1988. So we wanted to look at what the new loadings might be for the Neuse River at the Craven County line.

Using DEM's data, we found that we'd added about 800,000 pounds of new nitrogen per year in that period. So for three years, we had loaded an additional 2.4 million pounds. DEM says about 8.7 million pounds per year reach New Bern. This is almost a 10 percent increase per year, which is very significant when an estuary is already in trouble.

Where is the nitrogen coming from? What major sources have been loading new nitrogen in the Neuse River watershed since 1989? In 1989, 3 million pounds of nitrogen were being discharged directly into the Neuse River from wastewater treatment plants above the Craven County line. By 1994, that amount had gone up by 500,000 pounds. This is a discharge directly into the water. This isn't an animal operation or a crop farm where some of it is getting in the water. This all gets in the water.

What makes this really significant is that since 1993, DEM has authorized an additional 54 million gallons of sewage per day to be discharged into the Neuse River with no limits on the amount of nitrogen. That doesn't make any sense if you realize that the division has declared the river nutrient-sensitive.

Let's take a look at a wastewater treatment plant in Raleigh. On Jan. 28, 1994, Dempsey Benton went to the end of the pipe, filled a glass of water, drank it and said, "If it is good enough to drink, it is good enough for a river." Ted Atwater went behind him several months later and looked at what came out of the plant in one day: 2,723 pounds of nitrogen and some other stuff I don't think he knew he was drinking.

Question: Does he have cholera now?

Rick Dove: No. The truth is that a lot of operators of wastewater treatment plants will do that. They go to the end of a pipe, drink it and say, "Well, if it is good enough to drink, it can't hurt the river." That really is very misleading because you can remove the germs very easily with chlorine or ozone. So there are ways you can get the germs out and your body can handle a little nitrogen — less than 10 parts per milligram. But I guarantee you that if everyone in Raleigh drank that water every day in their soup, coffee, soda and everything else, they would have a problem. So it's really very misleading for these people to drink the water to show that it's okay to discharge because that is a bad test.

Let's take a look at loading from animals in the Neuse River watershed since 1989. We have gone from about 400,000 or 500,000 in '89 to about 1.2 million to 1.5 million in '94. I don't think anybody knows exactly how many animals are on the Neuse River watershed for several reasons. One, some of the counties where these hogs are located are in more than one watershed. So these are general figures, but they're believed to be as accurate as we could get.

In 1989, about 5.8 million pounds of nitrogen were loaded to the ground on these farms, some of which we know was getting in the water, but nobody knows how much. But by 1994, it had increased. And remember, nitrogen doesn't go away once you put it down. For example, if the corn to feed hogs is being produced in Nebraska and shipped to North Carolina, and the hogs eat the feed, do the poop and that gets applied to the land, well, you have taken the nitrogen in the corn, run it through the animal and left it on the ground. Even if you grow a crop on that farm, where is the nitrogen? It is in the crop. So unless we send all of that nitrogen back to Nebraska, what are we doing? We are taking nitrogen from an area well outside our watershed, importing it, storing it here and recycling it here.

The only way the system really works is if you feed the hog, take the waste and put it on the field. You need to begin recycling within the watershed because, remember, Mother Nature took 2 million years to set up the balance and now people are starting to upset that balance.

There is some denitrification that occurs naturally. Nature can take nitrogen from the nutrient form and send it back to the atmosphere as an inert gas — or not as a nutrient. But I don't believe that the denitrification process is anywhere near the nitrification that we're laying into our watershed. The balance is off.

The Contentnea Creek area that drains into the Neuse has the highest loading of nitrogen per square mile of any area in the watershed. It's had about 351 hogs per square mile since 1990. Now, I can't stand up here and say that the problem with the Neuse River is just hogs or just wastewater treatment plants because it's more than that. It is golf courses and swans and illegal discharges and atmospheric deposition. It is all of those things combined.

But the one thing that we do know about the Neuse River, like most other rivers in North Carolina, is that it's getting too much nitrogen. And unless we find a way to cut that back very soon, we'll start seeing in other North Carolina rivers what we are seeing in the Neuse.

One thing happening is the Neuse is getting a voice these days. When fish die in the river, you will hear about it because a lot of people have volunteered their effort and time to make sure. We know what's going on, and then everybody else gets to know. So the Neuse River really has a voice.

But you don't hear so much about the Tar-Pamlico even though it has fish with sores, huge fish kills last summer and a nutrient problem. That doesn't mean that the river isn't having some of the same problems as the Neuse. And the same is true for other rivers in North Carolina, including the New. What we're seeing on the Neuse isn't happening there alone. It's

happening in waters all over our state.

That is all the bad news I have. There is some good news. The good news is that because of the problems on the Neuse and the terrible embarrassment that North Carolina has suffered this past year, the negative publicity has opened a window of opportunity for state waters.

We have a lot of people concerned, including the governor and the General Assembly. We have the Environmental Review Commission headed by Sen. Fountain Odom and Rep. John Nichols. We have the Senate Select Committee on River Water Quality and Fish Kills, headed by Sen. Beverly Perdue, which is looking into the problems on the Neuse River. We have the Environmental Management Commission, which is taking a hard look at what's going on in the Neuse River. We have all of these people looking at fixes for the Neuse River. And if we can find fixes for the Neuse River, then we can find fixes for other waters. So there really is a good window of opportunity in North Carolina to do some good and take care of our waters.

You all like to fish. That is why you are here today. There was a time when a fisherman could overfish an area and then back away for a while. If the waters were healthy, the fishery would recover. But it doesn't happen like that anymore. If you have bad water and overfishing, the water quality will deny you that quick recovery that you used to have. So these things work together. There are problems with overfishing, problems with commercial and recreational fishing, and problems with water quality. Working together, bad water quality and bad fishing practices will hurt us all.

Fishing is a neat thing to do. It's one of the first things I remember doing with my dad. He is 90 years old and I brought him with me today. It is the thing I like to do best. Yet as we look at the waters we've fished since we were kids, we know they're not as good. And if they are not as good for you, what are they going to be like for your kids? What is going to be left?

We have a lot of work to do in North Carolina. One of the earlier speakers said this is the time for all of you to write a letter to somebody during the short session to make a difference in the water quality in North Carolina. This is going to be important to what you enjoy as fishermen.

Jim Murray: I am sure you have been following the Hog Commission and the Senate Select Committee. What is your gut reaction to this short session of the General Assembly? Do you think the legislators are going to have the will to make some hard choices? And are the choices being considered the ones that you think need to be made?

Rick Dove: Let me take the second part of your question first. The recommendations they're putting on the line are not going to fix the river, and there isn't a scientist in the state who will tell you that they'll fix the river. But they are a good start if we can get them through.

Most people who've talked to me about what needs to be done to the river have talked about a 50 percent reduction in nitrogen. Probably the best that we can hope for through the

General Assembly is a 30 percent reduction, but that is still a start. I believe that the opportunity to fix the Neuse and other rivers in North Carolina is here if we just stay on their backs. We need to beat on their doors, talk to them, call them and write them letters. We need to let them know that the people of North Carolina want the environment handled as a priority matter.

We need to let the legislators know that water isn't just something for fun. It is in fact important. For people down east, it's their economic artery. So whether you are fishing one side of I-95 or the other, good water quality is something that we've got to have or else the fishing isn't going to get better. But we can do it this year.

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