POTENTIAL LISTING OF THE EASTERN OYSTER UNDER THE ENDANGERED SPECIES ACT

OVERSIGHT HEARING

BEFORE THE

COMMITTEE ON RESOURCES
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED NINTH CONGRESS

FIRST SESSION

Tuesday, July 19, 2005

Serial No. 109-24

Printed for the use of the Committee on Resources

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html
or
Committee address: http://resourcescommittee.house.gov

U.S. GOVERNMENT PRINTING OFFICE

22-446 PDF WASHINGTON : 2005

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

COMMITTEE ON RESOURCES

RICHARD W. POMBO, California, *Chairman*
NICK J. RAHALL II, West Virginia, *Ranking Democrat Member*

Don Young, Alaska
Jim Saxton, New Jersey
Elton Gallegly, California
John J. Duncan, Jr., Tennessee
Wayne T. Gilchrest, Maryland
Ken Calvert, California
Barbara Cubin, Wyoming
Vice Chair
George P. Radanovich, California
Walter B. Jones, Jr., North Carolina
Chris Cannon, Utah
John E. Peterson, Pennsylvania
Jim Gibbons, Nevada
Greg Walden, Oregon
Thomas G. Tancredo, Colorado
J.D. Hayworth, Arizona
Jeff Flake, Arizona
Rick Renzi, Arizona
Stevan Pearce, New Mexico
Henry Brown, Jr., South Carolina
Thelma Drake, Virginia
Luis G. Fortuño, Puerto Rico
Cathy McMorris, Washington
Bobby Jindal, Louisiana
Louie Gohmert, Texas
Marilyn N. Musgrave, Colorado
Vacancy

Dale E. Kildee, Michigan
Eni F.H. Faleomavaega, American Samoa
Neil Abercrombie, Hawaii
Solomon P. Ortiz, Texas
Frank Pallone, Jr., New Jersey
Donna M. Christensen, Virgin Islands
Ron Kind, Wisconsin
Grace F. Napolitano, California
Tom Udall, New Mexico
Raúl M. Grijalva, Arizona
Madeleine Z. Bordallo, Guam
Jim Costa, California
Charlie Melancon, Louisiana
Dan Boren, Oklahoma
George Miller, California
Edward J. Markey, Massachusetts
Peter A. DeFazio, Oregon
Jay Inslee, Washington
Mark Udall, Colorado
Dennis Cardoza, California
Stephanie Herseth, South Dakota

Steven J. Ding, *Chief of Staff*
Lisa Pittman, *Chief Counsel*
James H. Zoia, *Democrat Staff Director*
Jeffrey P. Petrich, *Democrat Chief Counsel*

C O N T E N T S

	Page
Hearing held on Tuesday, July 19, 2005	1
Statement of Members:	
Gilchrest, Hon. Wayne T., a Representative in Congress from the State of Maryland	3
Inslee, Hon. Jay, a Representative in Congress from the State of Washington	3
Melancon, Hon. Charlie, a Representative in Congress from the State of Louisiana	4
Pallone, Hon. Frank, Jr., a Representative in Congress from the State of New Jersey, Statement and article submitted for the record	11
Pombo, Hon. Richard W., a Representative in Congress from the State of California	1
Statement of Witnesses:	
Bean, Michael J., Attorney, Environmental Defense	38
Prepared statement of	39
Cowart, S. Lake, Jr., Vice President, Cowart Seafood Corporation	20
Prepared statement of	21
Gaffney, Patrick, Professor, University of Delaware, College of Marine Studies	60
Prepared statement of	62
Gergela, Joseph M., III, Executive Director, Long Island Farm Bureau	31
Prepared statement of	34
Hare, Dr. Matthew P., Assistant Professor, Department of Biology, University of Maryland	66
Prepared statement of	68
Judy, Christopher, Shellfish Program Director, Maryland Department of Natural Resources	95
Prepared statement of	97
Kraeuter, Dr. John N., Associate Director, Haskin Shellfish Research Laboratory, Institute of Marine and Coastal Sciences, Rutgers University	50
Prepared statement of	52
Perret, William S., Marine Fisheries Director, Mississippi Department of Marine Resources	86
Prepared statement of	88
Ray, Dr. Sammy M., Professor Emeritus, Marine Biology Department, Texas A&M University	58
Prepared statement of	59
Rheault, Dr. Robert B., President, East Coast Shellfish Growers Association	23
Prepared statement of	25
Voisin, Michael C., Chairman, Louisiana Oyster Task Force	28
Prepared statement of	30
Wesson, Dr. James A., The Virginia Marine Resources Commission, Division of Fisheries Management, Department of Conservation and Replenishment	80
Prepared statement of	82
Additional materials supplied:	
Aldred, John, Director, Town of East Hampton, New York, Letter submitted for the record	5
Bishop, Hon. Timothy H., a Representative in Congress from the State of New York, Statement submitted for the record	19

Page

Additional materials supplied—Continued
Boyd, Hon. Allen, a Representative in Congress from the State of Florida, Statement submitted for the record 6
Davis, Hon. JoAnn, a Representative in Congress from the State of Virginia, Statement submitted for the record 6
Maslyn, Mark, Executive Director, Public Policy, American Farm Bureau Federation, Letter submitted for the record 7
Sheehan, Denise M., Acting Commissioner, New York State Department of Environmental Conservation, Statement submitted for the record 13
Sieling, Bill, Executive Director, Chesapeake Bay Seafood Industries Association, Letter submitted for the record 15
White, Jack, New Point Oyster Company, LLC, Letter and comments submitted for the record 17

OVERSIGHT HEARING ON "POTENTIAL LISTING OF THE EASTERN OYSTER UNDER THE ENDANGERED SPECIES ACT"

Tuesday, July 19, 2005
U.S. House of Representatives
Committee on Resources
Washington, D.C.

The Committee met, pursuant to notice, at 2:10 p.m., in Room 1324, Longworth House Office Building, Hon. Richard W. Pombo [Chairman of the Committee] presiding.

Present: Representatives Pombo, Gilchrest, Drake, Jindal, Inslee, Costa, and Melancon.

STATEMENT OF HON. RICHARD W. POMBO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

The CHAIRMAN. The Committee will come to order.

Today, we have a number of highly qualified individuals that will give us testimony regarding a petition to list the eastern oyster as threatened or endangered under the Endangered Species Act. While I believe the petitioner has outlined a number of problems previously documented specific to the Chesapeake Bay, he has not given the National Marine Fisheries Service reason to list the eastern oyster.

Simply, we have before us a case where the petitioner has submitted incomplete work as admitted to by NMFS. However, when grading the submission, his former colleagues have been all too willing to establish a curve that unfairly benefits him, and they do this primarily by filling in the blanks he failed to fill in.

In fact, I believe this petition is a case we see all too often in other places of the country. The parties grow frustrated with efforts intended to accomplish a certain goal which have stalled——in this case, clean-up efforts in the Chesapeake Bay——and go "statute shopping," looking for a new way to force action. In doing this, individuals look for a Federal statute with a big hammer that they can use to stop activities affecting their specific issue. In this case, the issue is water quality in the Chesapeake Bay, and the hammer is the Endangered Species Act as a means to stop the introduction of the Asian oyster.

This committee, through Congressman Wayne Gilchrest's Fisheries and Oceans Subcommittee, has held a number of hearings in the past 5 years on both the status of the native oysters and the

health of the Chesapeake Bay. While I don't want to put words in Chairman Gilchrest's mouth—which he probably appreciates—I expect he will agree with the petitioner that there are water quality problems in the Chesapeake Bay, and some of those are very serious problems.

But attempts to list the eastern oyster under the Endangered Species Act as a means to use a big Federal hammer to clean up the bay is not appropriate. If the current restoration activities to clean up the bay are not working, let us look at that rather than waste the Federal Government's time and unnecessarily scare legitimate businessmen by convening a status review committee and studying a nuisance petition to list the eastern oyster.

It is clear that the petitioner does not provide information on the status of the eastern oyster throughout its range, something that NMFS pointed out in the March Federal Register notice. This should have been enough to find the petition not warranted. However, NMFS decided that they knew what the petitioner really meant and took it upon themselves to decide that the petitioner wanted to declare a separate sub-species for the Atlantic coast.

I am surprised that any agency would allow scarce taxpayer dollars to be spent to pursue a half-baked analysis such as this one before us today. In addition, the basis for the petitioner's claim of low population levels is harvest data. This is clearly not an indication of the status of the oyster, but rather an indication of the management practices in the various States. Low harvest levels could indicate smaller population levels, but they could equally indicate a number of other factors that have nothing to do with population levels. NMFS should know this.

In fact, that the agency is even looking into this any further has caused a large amount of concern for those areas of the country that have healthy eastern oyster populations or that ship their eastern oysters into this part of the country. A listing under the ESA, even for a sub-species of the eastern oyster, could have devastating results for this industry.

In any case, the ESA requires that the agency must find that an invertebrate species to be in danger of extinction throughout its range in order to list under the Endangered Species Act, and I do not believe they can do that. The fact that the petitioner is attempting to manipulate the ESA to get at problems or to stop activities in the State waters of the Chesapeake Bay is yet another reason why I believe the ESA needs to be updated and improved.

Would the listing of the oyster do anything to recover it in any way? Given the Fish and Wildlife Service data on the species recovery, I am very doubtful. According to the service data, less than 1 percent of listed species have recovered. Only 6 percent are improving. Three percent are believed to be extinct. Twenty-one percent are declining, and 40 percent are just simply categorized as unknown. Seventy-seven percent of all listed species have achieved 0-25 percent of their recovery objectives.

The National Marine Fisheries Service will now spend a huge amount of time and effort to review a claim that should not have met the standard for further action. This action alone caused a ripple effect in the oyster industry from Maine to the Gulf of Mexico at a time when funding for endangered species is scarce and critics

argue that species that are legitimately endangered are getting no closer to recovery.

Maybe it is time for NMFS to get out of the ESA business and refocus its staff agenda on managing other protected resources. Obviously, as evidenced by the reaction to this petition, they are not acting in the best interest of the species, but rather creating work as a means of self preservation.

The CHAIRMAN. I would like to recognize Mr. Inslee for any opening statement he may have.

STATEMENT OF HON. JAY INSLEE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. INSLEE. Thank you. Just a couple of points.

First, I want to express my appreciation of the shellfish industry as a whole and its environmental stewardship. I come from the Puget Sound area, and in my neck of the woods, the shellfish industry has been a tremendous advocate for measures to keep our waters pure, for economic reasons, for their own self interest. But it is inured to the great benefit of our whole community of being real standard bearers for environmental protection.

I know very little about this particular issue. I just want to make one comment, and that is that I hope that, ultimately, our committee figures out a way to enhance our ability to prevent species from ending up in the degraded status they are. In which case, they end up having to be listed, and that we perhaps spend less time arguing about the specifics of particular listings and more about how we prevent the sixth or seventh great period of mass extinction on Earth, which right now we may be in. And to date, our committee has been wholly ineffective in really devising a way to be effective in that regard.

Thank you.

The CHAIRMAN. Mr. Gilchrest?

STATEMENT OF HON. WAYNE T. GILCHREST, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MARYLAND

Mr. GILCHREST. Thank you, Mr. Chairman.

And I want to thank the Chairman for holding this hearing, but I will probably not put words in Mr. Pombo's mouth as well.

I understand the enormous controversy about listing virginica, or this particular species of oyster, and the ripple effect that that has on the eastern half of the country, from the Atlantic to the Gulf of Mexico. But I think I can assure those who are listening that this committee will look at this issue with objectivity.

And I was interviewed on a radio talk show over the weekend and asked if the native oyster—we call it the native oyster. I guess you call it the native oyster in the Gulf of Mexico, if anybody is here from the Gulf of Mexico—should be listed. And some might say that it is heresy. I said I didn't think so. I didn't think it should be listed.

But getting past the fact of whether or not this should be listed, and I don't think it will be listed, there is enormous problems with water quality. There is enormous problems with disease. There has been over the last century problems with overharvesting, and we are beginning to get over that now.

But how do we clear up the 35 percent dead zone in the Chesapeake Bay of a year ago? How do we clear up the dead zone in the Gulf of Mexico, where nothing lives there along that shoreline about the size of Massachusetts in a seasonal way?

So in the process of reviewing the information that we will get from everyone in this hearing today, I think we really need to take an integrated approach to clearing up the severe problems that have caused the degradation of this oyster to begin with. And today's focus, at least from my perspective, will be the Chesapeake Bay because of the problems of disease.

And I would like to talk to the scientists when they get up here about the differences between an oyster reef and an oyster bar. How many sanctuaries do we have? Is there enough money for research to develop a virginica oyster that has resistance to these diseases? Because I think that is the future of the Chesapeake Bay.

So we are not here to cause consternation. We are not here to be divisive with anyone, certainly not up here on the dais between Republicans and Democrats, between the processors, the harvesters, the restaurant owners, any of that. Let us all put our minds to the single most important fact—how do we restore the ecological integrity of America's estuaries and oceans, and how do we help ensure the economic equitable distribution of those resources? I think we could start doing that.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Mr. Melancon? Am I close on the pronunciation?

Mr. MELANCON. You are getting there.

The CHAIRMAN. Getting better.

STATEMENT OF HON. CHARLIE MELANCON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. MELANCON. We will have a short course. I appreciate the opportunity just to make a short comment.

As a Member of Congress in coastal Louisiana, and I don't know this to be a fact, I probably have the most oyster, the largest oyster beds and growth of oysters in this country. It is a very important industry, and it has been one that the people in south Louisiana have nurtured.

And just like farmers on the land, in the sea, they have done an excellent job. And I think there is room for everybody. I think it is just a matter of maybe, as our farmers have, learning best management practices and learning to farm oysters rather than to try and collect wild oysters and hope that they will repropagate.

But I am here to listen, and I am open to suggestions. But it scares me to death if we are going to start putting oysters on the endangered species list.

The CHAIRMAN. Thank you.

I ask unanimous consent that the following statements be included in the record at the appropriate point: a statement by The Honorable JoAnn Davis, Virginia's 1st District; the testimony of Denise M. Sheehan, the Acting Commissioner for the New York State Department of Environmental Conservation; a statement by the American Farm Bureau Federation; a statement from the Town

of East Hampton, New York, Shellfish Hatchery; and a statement from the New Point Oyster Company, New Point, Virginia.

Hearing no objection, so ordered.

[The information submitted for the record follows:]

[A letter submitted for the record by John Aldred, Director, Town of East Hampton, New York, follows:]

TOWN OF EAST HAMPTON
159 Pantigo Road
East Hampton, New York 11937

(631) 668-4601
Phone and Fax
ehshellfish@peconic.net

Shellfish Hatchery
John Aldred, Director

July 17, 2005
Re: Petition to List Eastern Oyster as Threatened or Endangered Species
Docket Number 050509124-5124-01
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Dear Sir or Madam,

I am writing to express my concern over the petition, now under review, proposing to list the eastern oyster as threatened or endangered. The native oyster population in eastern Long Island is stable and has been for many decades. Here, oysters traditionally thrive in certain brackish coastal ponds and creeks. The commercial harvest of these wild populations is highly regulated by New York State and local municipalities and has been held to sustaining levels.

For well over one hundred years, enhanced commercial oyster harvests in Long Island and the region generally have been realized as a result of a variety of aquaculture practices, originally through the simple movement of seed, lately through more state of the art hatchery culture. These practices continue, as of late gaining popularity with small-scale producers. It is interesting to note that NMFS itself pioneered shellfish culture techniques and recently sponsored several initiatives aimed at introducing offshore fishermen to oyster culture practices in an attempt to diversify their talents in the face of diminished ground fish stocks.

Building on the commercial model, within the past twenty to thirty years, local municipalities on Long Island, controlling a large proportion of the lands on which shellfish are harvested in the state, have embarked on public aquaculture-based shellfish enhancement programs aimed at maintaining a consistency of harvest through natural population cycles. Currently, I chair the *Long Island Shellfish Managers Group*, which consists of shellfish managers from towns in Nassau and Suffolk counties. Every Long Island township with certified harvesting waters practices some form of shellfish enhancement, many of them include the oyster in their programs. In East Hampton, we have created a viable and sustainable commercial and recreational oyster industry through aquaculture-based enhancement, which, to a degree has taken harvest pressure off the modest traditional wild populations in the town.

Support for shellfish enhancement programs presumes a public benefit through harvest results. I fear that should the oyster be classified as threatened or endangered and its harvest prohibited, it will eliminate this basis of support, putting an end to public oyster enhancement efforts while doing nothing to benefit the wild population, which I reiterate, has been stable in this region for many years.

Sincerely,

John Aldred
Director

cc: Hillary Clinton, U.S. Senator, NY
Chuck Shumer, U.S. Senator, NY
Tim Bishop, U.S. Representative, 1st District, NY
Nancy Locke, Resources Committee, U.S. House of Representatives
Dave Whaley, Resources Committee, U.S. House of Representatives
Denise Sheehan, Acting Commissioner, NYSDEC
Gordon Colvin, Director, Bureau of Marine Resources, NYSDEC
Steve Levy, Suffolk County Executive
Jay Schneiderman, Legislator, 2nd District, Suffolk County
East Hampton Town Board
East Hampton Town Trustees
East Hampton Town Baymen's Association

[A statement submitted for the record by The Honorable Allen Boyd, a Representative in Congress from the State of Florida, follows:]

Statement submitted for the record by Allen Boyd, a Representative in Congress from the State of Florida

Mr. Chairman, I want to thank you for the opportunity to submit this statement for the record today. I appreciate your leadership in holding this hearing today on the subject of adding the Eastern Oyster to the Endangered Species list. I believe that it is important to hold this hearing, in order for all to know that the Eastern Oyster is not endangered, and if it was to be added to the Endangered Species list, it would be devastating not only to my district in Florida, but to the entire economy in our great nation.

The Eastern Oyster is an invertebrate that its species habitat ranges from the Gulf of St. Lawrence down the Eastern Seaboard into the Gulf of Mexico. That encompasses eighteen states. In my district, many of my costal counties rely on harvesting, processing, and shipping oysters, not to mention the restaurants that make their business selling oysters. The oyster industry provides hundreds of jobs in my district and it adds hundreds of millions of dollars annually to the economy.

Florida and the Gulf States have worked together for many years and have spent millions of dollars on conservation programs and artificial reef construction to keep the oyster population stable. Also there are harvesting restrictions designed to protect a healthy population, such as closing the season in certain areas when we are faced with hurricane-related damages to the oyster population.

The reason why we are here today is because oysters in the Chesapeake Bay are facing some biological and chemical concerns. Due to the deteriorating water quality from pollution and the emergence of diseases, oysters in the Chesapeake Bay are not growing to the same size as they would in other areas of the country. I believe that we should work to address these concerns for the Chesapeake Bay Oyster on the local level rather than placing the entire species on the endangered species list.

The Endangered Species Act allows for vertebrates to be grouped in regions, meaning that a group in one area can be listed as endangered or threatened while another group of the same species in a different area can be considered stable. Invertebrates such as the oyster however cannot. If you list a species as endangered in one area of the country, it makes it endangered throughout the country.

Each year millions of oysters from Apalachicola Bay in my district are harvested and sent around the country for the enjoyment of all. The Apalachicola Oyster produces approximately 2 million pounds of oyster meat annually, and it is vital to the economy in my district.

I believe it may be time that we look at the current Endangered Species Act to ensure that a problem in the Chesapeake Bay does not affect the entire country and the economy of the oyster industry.

Mr. Chairman, I am very concerned that if the Eastern Oyster is listed as an endangered species it will jeopardize a very stable industry in Florida. I appreciate the opportunity that you have given me today to submit my statement for the record.

[A statement submitted for the record by The Honorable JoAnn Davis, a Representative in Congress from the State of Virginia, follows:]

Statement submitted for the record by The Honorable JoAnn Davis, a Representative in Congress from the State of Virginia

I want to see the Chesapeake Bay and the Eastern oyster restored. We as a nation have a special responsibility to act as responsible stewards of our natural resources and environment. I am pleased to have secured $5 million in funding for restoration of oyster populations in the Chesapeake Bay, one of America's most important bodies of water and one of my district's greatest treasures. However, I am concerned that listing the eastern oyster as an endangered species would not accomplish the desired goals of protecting or restoring this natural resource.

The Endangered Species Act (ESA) is not the appropriate vehicle to clean up the Bay or prohibit the introduction of Asian oysters. Everyone here knows that only 16 species have been recovered from over a thousand listed, not an impressive track record. I appreciate Chairman Pombo's desire to address ESA failures and I look

forward to full House consideration of ESA legislation that effectively protects natural resources.

I do not believe this petition offers significant new information to warrant listing the eastern oyster as endangered. This petition to list the native oyster as an endangered species relies heavily on historical data and unknown consequences behind the introduction of an exotic species. Relying extensively on imprecise harvest data, the petitioner draws overly pessimistic conclusions. Additionally, the report fails to acknowledge significant action taken by state, local and federal government to clean up the Bay and protect the native oyster populations. Decisions to list species must be made with careful deliberation and sound science.

Federal regulations should not impair commercial or private efforts which have a significant positive impact on native oyster populations and the health of the Chesapeake Bay. Right now, in my district commercial waterman, private companies and individuals are cultivating millions of oysters each year. Oyster aquaculture businesses add oysters that clean and filter bay waters, an important component to improving water quality.

I encourage the Committee and the National Marine Fisheries Service (NMFS) to explore conservation and management options that capture the entrepreneurial character of America. Bureaucratic, top-down regulation is not always the best resource management approach. The watermen, oystermen and fishermen of Eastern Virginia have a long tradition and heritage tied to the water. They also have a critical stake in the future health of the Bay. Let's empower individuals and create incentives for productive resource management instead of regulating, legislating and adjudicating impractical and ineffective solutions.

The Chesapeake Bay and the native oyster are important to my constituents, and I am committed to restoring both. However, listing the native oyster as an endangered species is not the appropriate step.

[A letter submitted for the record by Mark Maslyn, Executive Director, Public Policy, American Farm Bureau Federation, follows:]

JULY 18, 2005

Assistant Regional Administrator for Protected Resources
NMFS Northeast Regional Office
One Blackburn Drive
Gloucester, MA 01930

RE: Comments on 90 Day Finding for the Eastern Oyster—(Docket Number 050509124-5124-01)

To Whom It May Concern:

The American Farm Bureau Federation (AFBF) represents the interests of farmers and ranchers across the United States. Our membership includes oyster producers and harvesters in all of the states where the eastern oyster is produced. We are pleased to offer our comments on the status review for the eastern oyster to determine whether the species should be listed pursuant to the Endangered Species Act (ESA).

We have thoroughly reviewed the petition to list. Based on the evidence contained in the petition and the available information on the species, we do not believe there is sufficient evidence to warrant listing the species.

In fact, we do not think the petition itself presented enough evidence to even warrant a positive 90-day finding. The acknowledged range of the eastern oyster is the entire Atlantic coast and the Gulf of Mexico. The petition, however, focuses only on the status of the oyster in the Chesapeake Bay area of Maryland and Virginia. The petition presents little or no information about the status of the species outside the Chesapeake Bay area. It presents no information about the status of the species in the Gulf region, where most of the eastern oyster production now occurs.

This lack of information is important, because the protections of ESA are not available for only the Chesapeake Bay population of the species. Because the eastern oyster is an invertebrate species, the service cannot designate a "distinct population" of eastern oyster as endangered or threatened. Thus, as the notice of the 90-day finding correctly points out, NOAA Fisheries must consider the status of the eastern oyster throughout its entire range. If the Chesapeake Bay area is considered to be a "significant portion of range" of the eastern oyster, then consideration of the entire species might warrant further consideration. The only other available option

is to consider whether the Chesapeake Bay population of eastern oyster is a separate subspecies of the eastern oyster and could be listed separately.

The petition to list, however, contains no evidence to support either of these two options. In fact, the petition fails even to allege either the possible existence of a separate subspecies or that the Chesapeake Bay constitutes a "significant portion of the range" of the species. The petition seems to be more concerned about the possible introduction of the Asian oyster into the Bay than anything else.

ESA requires that determinations be made on the basis of the "best scientific and commercial data available." We fail to see how NOAA Fisheries can make a finding that further review is warranted on grounds that were not even mentioned in the petition to list. The information contained in the petition to list clearly does not match the information to be considered for further review. In fact, the petition sets forth little or no information useful to the agency for its review. The agency should exercise reasonable judgment in reviewing the petition instead of accepting the unsupported allegations of the petitioner at full value.

Instead of reviewing the petition on its merits, the agency in its 90-day finding presumes to guess at the petitioner's intent. The finding states that "he apparently seeks one of two alternatives," neither of which is even mentioned in the petition. The agency should have denied the petition for failure to contain sufficient information rather than acting on a presumption that is open to question.

Even upon further review of the status of the eastern oyster, there is no evidence to indicate that the species should be listed.

1. There is No Evidence to Support a Finding That the Eastern Oyster Is Either Endangered or Threatened.

An "endangered species" for purposes of ESA is one "that is in danger of extinction throughout all or a significant portion of its range." (16 U.S.C. 1533(6)). A "threatened" species is defined as one "likely to become an endangered species within the foreseeable future in all or a significant portion of its range." (16 U.S.C. 1533(20)). Any agency determination must find that the species is in danger of extinction or endangered in order to propose a listing.

One of the factors cited by NOAA Fisheries in making its positive 90-day finding for the eastern oyster was information in the petition that the "annual Atlantic coastal landings of eastern oyster have decreased to less than two percent of their recorded historic value, and harvest from the Chesapeake Bay has decreased to 0.2 percent of its recorded historic value." Even this statement must be taken with a grain of salt, since the notice also finds that resource agencies "did nothing other than increase harvest restrictions." There is no correlation between the decline in harvest and how much of that decline might be attributable to the increase in harvest restrictions.

In addition, the production numbers do not take into consideration any recreational harvest of eastern oysters. That value "though not available, is considered to be substantial." (Attachment 1)

Indeed, decline in historical numbers is one of the factors that must be considered in the overall determination whether to list a species. But loss or decline in numbers or habitat alone is not sufficient to base a decision to list. It is only one factor to be considered by the agency in whether a species has reached the point at which it is likely to become extinct or likely to become endangered in the near future to the extent that it might warrant listing.

This distinction becomes especially relevant in the case of such a wide ranging species as the eastern oyster. The species ranges from the Gulf of St. Lawrence, along the Atlantic coast to the Gulf of Mexico—a range of thousands of miles. Neither the petition nor the finding indicate that the range of the oyster is any less than it was in the 19th century, when comparisons were drawn.

The petition makes allegations that the habitat for the oyster in the Chesapeake Bay is degraded and could possibly be a cause for species decline. The petition does not, however, make any allegations regarding the status of any other areas of the vast habitat for the oyster. In fact, information regarding the Gulf populations of the eastern oyster, which forms the bulk of the oyster landings in the United States, indicates that the Gulf populations are stable.

There is also evidence that numbers in the Northeast are stable. "In 1997, MSX caused mortalities of around 30% in some Connecticut beds, but production should be sustained because large supplies of live oysters easily exceed the quantity the markets will take." (Attachment 1)

Nor can the allegedly declining numbers of eastern oyster on their face justify a conclusion that the species is endangered or threatened. While there is evidence that landings for eastern oysters in the Atlantic Coast area may be declining, that is only one factor to consider in the agency's determination whether the species

meets either the definition of "endangered" or "threatened" under ESA. As indicated before, it is not known whether and to what extent decreased landings might be the result of harvest restrictions rather than decreased populations. There is also no evidence that population numbers are declining in the Gulf of Mexico or any other areas. In fact, evidence indicates that the Gulf production is stable.

The key factor to consider for purposes of the listing process is not whether the numbers might have declined in some areas, but that the annual catch of eastern oysters is still over 30 millions pounds per year. That number in and of itself is an indication that the species is not going extinct.

The determination that the agency must make is whether the eastern oyster is in danger of becoming extinct ("endangered") or "likely to become endangered any time soon in all or a significant portion of its range" ("threatened"). A species that produces 30 million pounds of meat per year hardly fits either of those descriptions.

The petition confuses the seeming decline in harvest from peak historic levels with a "near extinction level" for the Chesapeake Bay area. However, the petition also cites the fact that the Bay still produces over two million pounds of oysters per year.

We trust that the agency will not make the same mistake. It is difficult to think of a species that produces millions of pounds of meat per year as going extinct or likely to become endangered any time soon. Clearly, the evidence does not warrant listing of the eastern oyster under the ESA.

The burden of persuasion is on the petitioner to prove that listing the species is warranted. We do not believe that they have met this burden.

2. "The Best Scientific Data Available" Does Not Support the Existence of a Separate Subspecies of Eastern Oyster for the Chesapeake Bay.

The agency finding presumes that the petitioner must be seeking "a determination that the Atlantic coast populations constitute a separate subspecies" of eastern oyster. This presumption is made despite the fact that there is nothing in the petition that even hints at such a request. On that basis alone, we believe that the petition should have been denied as not presenting any evidence to support this presumption.

In making determinations whether a species should be listed, the Act requires that the agency use "the best scientific and commercial data available." In this case, there is no indication anywhere in the material that we have reviewed that there is any subspecies of eastern oyster. The description of the eastern oyster contained in "Seafood Watch" Final Report, Final Report, 04/21/04 is typical: "The eastern oyster, Crassostrea virginica, is an important commercial species ranging from the Gulf of St. Lawrence to the Gulf of Mexico, and along the coasts of Argentina and Brazil." The same publication states that the life history of the eastern oyster is well know since the species "has been studied extensively." For such an extensively studied and commercially important species as the eastern oyster, if there were any hint of the existence of a separate subspecies that fact would appear in the literature.

The fact sheet on the eastern oyster that appears on the NOAA web site describes only Crassostrea virginica when referring to the eastern oyster. It also describes the eastern oyster as occurring "along the east coast of North America from the Gulf of St. Lawrence to Florida and south through the Caribbean to the Yucatan Peninsula of Mexico and Venezuela." There is no discussion of any possible subspecies.

Even the information contained in the finding regarding this issue is very speculative, at best. The finding states: "There is some limited information in our files to indicate that it is possible to differentiate between eastern oysters from the Gulf and Atlantic Coasts using mtDNA analysis." (Emphasis added) This very qualified statement is hardly enough to justify the conclusion that there even might be a separate subspecies of eastern oysters.

There being no scientific information available to support the conclusion that there is an Atlantic eastern oyster and a Gulf eastern oyster, NOAA Fisheries necessarily cannot do so. Findings and determinations are required to be made on the basis of the best scientific and commercial data "available." ESA sets strict time limits to find and evaluate the scientific data that is available to justify a determination. Given those time limits, it is not the intention of ESA to have an agency go down a scientific path that heretofore does not exist.

That might be different were there disagreement among scientists on the existence of a separate subspecies. We believe that it could be a proper role for the agency to resolve that disagreement before acting. We do not think it appropriate, however, for the agency to try to create new science where there is no indication that it is warranted.

Nor should an absence of scientific evidence of a separate subspecies be misused to buttress an unjustified claim. Such a posture would essentially be asking for

proof of a negative. All the evidence points to the existence of a single species, and the burden should be on those claiming there is a separate subspecies to prove that the "best science available" supports that conclusion.

In any event, any different conclusion that the agency might contrive would still have to be peer-reviewed and scientifically accepted before it could be the basis of a listing decision. In the process, it would have to overcome decades of established science.

The "best scientific and commercial data available" clearly and unequivocally supports the notion that the eastern oyster is one species from the Gulf of St. Lawrence to the Yucatan Peninsula.

3. The Chesapeake Bay Should Not be Considered a "Significant Portion of the Range" of the Eastern Oyster.

Should the status review conclude that there is no separate subspecies for the Chesapeake Bay population of the eastern oyster, the species could still be subject to listing upon "a determination that the eastern oyster is in danger of extinction throughout a significant portion of its range (e.g., along the Atlantic coast or in the Chesapeake Bay) or likely to become so in the foreseeable future."

There is no evidence in the petition to support any portion of that finding. The petitioner does not even allege that the Chesapeake Bay area or the Atlantic coast area represents a "significant portion of the range" for the eastern oyster.

The only reference petitioner makes to possible extinction is a statement that the Chesapeake Bay production of 0.2 percent of historical highs represents, in his opinion, "a near extinction level." This unsupported conclusion contains no information regarding what a "near extinction level" might be for the eastern oyster, much less whether such a level has been reached.

As indicated above, there is evidence that oyster populations in Long Island Sound are now stable. Commercial landings for oysters in South Carolina are stable (Attachment 2). In Florida, oyster production from the Atlantic side has shown declines, "although there has been a slight upturn in recent years." (Florida Fish & Wildlife Conservation Commission, FMRI (2003). The declines since 1985 in those areas "can be attributed to hurricane Elena's destruction of productive beds and the prolonged drought during 1987-1989." (Id)

It is difficult to argue, on its face, that the Chesapeake Bay constitutes a significant portion of the eastern oyster's range. It certainly cannot be justified from a geographic perspective. The Bay constitutes a very small part of the thousands of miles of coastline along the Atlantic and around the Gulf of Mexico. Nor can it be justified from a commercial standpoint. According to NOAA-Fisheries own figures, the Middle Atlantic region only produced three percent of the oyster landings in 2003.

There is no evidence that the eastern oyster is declining throughout the Atlantic coast region. Even if the Chesapeake Bay population is declining, it cannot be considered to occupy a "significant portion of the range" of eastern oysters in order to justify a listing of the entire species under the ESA.

4. Listing the Eastern Oyster Would be More Harmful to the Species than Current Efforts to Promote and Enhance the Species.

There is another factor to consider.

Even if the eastern oyster met all of the criteria for listing, listing it under the Endangered Species Act might well have a critical adverse impact. That conclusion reflects the nature of the industry itself.

The oyster industry is a state-regulated industry that is a combination of natural oysters and aquaculture. Natural oysters grow and reproduce without human intervention. Managed oysters are supervised by harvesters. Cultivated oysters are transported to man-made oyster beds where they mature. No figures are available to describe how many oysters are naturally produced and how many oysters are farmed. Both factors are important.

As a commercial enterprise, oyster production is important to both state and private interests. Both have an interest in seeing the oyster industry thrive because it is to the economic benefit of both. As such, both the state and private interests will do whatever is possible to ensure the viability of oyster populations wherever they occur.

Eastern oysters are not found in federal waters and are not subject to federal jurisdiction. There is no federal management plan for eastern oysters. Oysters along the Atlantic Coast are managed by the states. In the Gulf of Mexico, there is the Gulf States Marine Fisheries Commission to oversee oyster production.

Because the eastern oyster is important from a commercial standpoint, there is more of an interest and an incentive from the state and private interests to care for the species. Its biological welfare is directly tied to its commercial value.

State and private regulation of eastern oysters will serve the species much better than federal "management" under the Endangered Species Act. State and private interests spend millions of dollars preparing and caring for oyster beds. Private aquaculture raises millions of pounds of oysters and provides a significant part of oyster beds. Harvests are regulated according to conditions.

By contrast, listing under ESA would dry up the private production of oysters and lead to the eventual destruction of natural oyster beds. NOAA Fisheries has neither the funding nor the manpower to prepare and care for the oyster beds that are needed to "recover" the species. Oysters would lose their commercial value, and therefore the incentive for anyone to cultivate and "recover" them. Regular harvesting is necessary to maintain the beds and the populations.

Furthermore, state and private interests can respond more quickly and more effectively to natural factors that might affect the status of the oyster. For example, State and private interests have invested large sums of money to develop an oyster that is resistant to MSX and dermo, two diseases that devastated oyster populations in the Atlantic. In many places, the effects of these crippling diseases have been stemmed, and oyster levels are either stable or approaching stability. Had the species been listed under ESA, these responses could not have occurred, and the species could very well have been wiped out.

Thank you for the opportunity to provide comments on the status review.

SINCERELY,

MARK MASLYN

EXECUTIVE DIRECTOR, PUBLIC POLICY

[NOTE: Attachments to Mr. Maslyn's letter have been retained in the Committee's official files.]

[A statement and article submitted for the record by The Honorable Frank Pallone, Jr., a Representative in Congress from the State of New Jersey, follows:]

Statement of The Honorable Frank Pallone, Jr., a Representative in Congress from the State of New Jersey

Thank you, Mr. Chairman. Fresh oysters represent the rich taste of the sea as well as healthy coastal waters. New Jersey has been enjoying oysters and their positive impacts on our shorelines and coastal communities for centuries. Although not as abundant as they once were, New Jersey fishermen continue to harvest Eastern oysters in Delaware Bay, and the states of Delaware and New Jersey are committed to restoring Eastern oysters in Delaware Bay.

I am glad we have this opportunity to discuss listing of the Eastern oyster under the Endangered Species Act. These oysters are of great value to the commercial fishery and thus local, coastal economies. They are a favorite summertime treat for many on hot summer days like these. But at the same time, Eastern oysters are a key member of the marine ecosystems that line the Atlantic and Gulf Coasts. I hope this hearing expands our understanding of the impacts that listing the Eastern oyster would have on the environment and various stakeholders.

On a related issue in neighboring Chesapeake Bay, where native oysters have been hit hard by diseases, the States of Maryland and Virginia are considering the introduction of a non-native Asian oyster species. In a joint statement, New Jersey and Delaware have taken the position that such an introduction in the Chesapeake Bay would be premature and that more research is necessary.

Last Monday, three scientists working for state and federal resource agencies published a letter to the journal Science entitled "When the World is Not Your Oyster". I'd like to submit this letter for the record. In short, the authors—members of the National Academy of Science's panel on Non-native Oysters—express their concerns the potential spread of Asian oysters to the Delaware Bay and the lack of meaningful participation for adjacent states in process.

While today's hearing focuses on the petition to list the Eastern oysters under the Endangered Species Act, I am hopeful that today's discussions will lead to further dialogue on how states like New Jersey and Delaware can better incorporate their concerns in any proposal to use Asian Oysters as a recovery tool for Eastern oysters in the Chesapeake.

In conclusion, I want to stress that this hearing and the deliberations over this oyster's status should not be used as an excuse for dismantling the Endangered

Species Act. The status of the Eastern oyster is a specific issue that we should discuss separately from any larger discussion of the Act.

Attachment

LETTERS

When the World Is Not Your Oyster

THE DECLINE OF THE EASTERN OYSTER *Crassostrea virginica* in Chesapeake Bay from overfishing, disease, and habitat degradation is well documented (*1–3*). Oysters provided important ecological and economic benefits to the Chesapeake Bay states of Maryland and Virginia, which have poured millions of dollars into their restoration (*4*). Recently, these states have effectively conceded that restoration has been ineffective (*5*), and they are developing an Environmental Impact Statement (EIS) to evaluate alternatives for increasing oyster populations (*6*). Under the EIS, the preferred (proposed) action is to introduce diploid populations of an Asian oyster, *Crassostrea ariakensis*, into the Bay. Such an introduction could occur in 2006 (*7*).

Eastern oysters (*Crassostrea virginica*) are in decline in the Cheseapeake Bay.

Adjacent states currently have no recourse to prevent (or alter) such an introduction despite the likelihood of being affected by it. A recent National Academy of Sciences (NAS) study that examined the proposed introduction concluded: "The existing regulatory and institutional framework is not adequate for monitoring or overseeing the interjurisdictional aspects of open-water aquaculture or direct introduction of *C. ariakensis*. There is no federal legislation that gives specific criteria for regulating the introduction of a nonnative marine species... there is no statutory mechanism for resolving differences among the interests of affected states" [(*4*), p. 7].

Delaware Bay, the estuary just north of Chesapeake Bay, has experienced a similar decline in its once lucrative oyster fishery (*8*). Delaware and New Jersey, which border Delaware Bay, have not given up on native oyster restoration. They object to the Chesapeake introduction of nonnative species because reproductively viable populations in Chesapeake Bay would make the spread of *C. ariakensis* outside of the Bay, by unintended or deliberate means, "highly likely" (*4*). Currently, New Jersey and Delaware have no regulatory role in an introduction in the Chesapeake. In a joint statement, they have taken the position that the introduction is premature and that they would like Maryland and Virginia to fund further research on the little-known basic life history of the oyster before any introduction (*9*).

Federal legislation could provide a mechanism to address this loophole by establishing a process for the governors of any states potentially affected by an intentional introduction to appeal to either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. If the federal agency was not satisfied with the biosecurity measures accompanying the proposed introduction, that agency could block the introduction, with judicial review for dissatisfied parties in the federal courts. The pending reauthorization of the federal Invasive Species Act could provide a forum for discussion of these or similar changes in federal law, to provide a better-coordinated and better-focused approach to intentional introductions.

J. JED BROWN,[1] RICHARD HILDRETH,[2*] SUSAN E. FORD[3*]

[1]Delaware River Fisheries Coordinator's Office, United States Fish and Wildlife Service, 2610 Whitehall Neck Road, Smyrna, DE 19977, USA. E-mail: Jed_Brown@fws.gov. [2]University of Oregon Ocean and Coastal Law Center, 1515 Agate Street, Eugene, OR 97403–1221, USA. E-mail: rghildre@law.uoregon.edu. [3]Haskin Shellfish Research Laboratory, Rutgers University, 6959 Miller Avenue, Port Norris, NJ 08349, USA. E-mail: susan@hsrl.rutgers.edu

*Members of the National Academy of Sciences panel on Nonnative Oysters in the Chesapeake Bay

References and Notes

1. J. B. C. Jackson *et al.*, *Science* 293, 629 (2001).
2. C. L. MacKenzie, in *The History, Present Condition, and Future of the Molluscan Fisheries of North and Central America and Europe, vol. 1, Atlantic and Gulf Coasts*, C. L. MacKenzie Jr., V. G. Burrell Jr., A. Rosenfield, W. L. Hobart, Eds. (NOAA Tech. Rep. 127, U.S. Department of Commerce, Washington, DC, 1997), pp. 141–169.
3. B. J. Rothschild, J. S. Ault, P. Goulletquer, M. Heral, *Mar. Ecol. Prog. Ser.* 111, 29 (1994).
4. Committee on Nonnative Oysters in the Chesapeake Bay, National Research Council, *Nonnative Oysters in the Chesapeake Bay* (National Academies Press, Washington, DC, 2004).
5. See www.dnr.state.md.us/dnrnews/infocus/infocus/oysters.asp
6. U.S. Army Corps of Engineers, Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Introduction of the Oyster Species, Crassostrea ariakensis, Fed. Reg. 69 (no. 2), 330 (5 Jan. 2004) (available at http://a257.g.akamaitech.net/7/257/2422/05jan20040800/edocket.access.gpo.gov/2004/04-73.htm).
7. See www.dnr.state.md.us/dnrnews/infocus/eisschedule.html.
8. S. E. Ford, in *The History, Present Condition, and Future of the Molluscan Fisheries of North and Central America and Europe, vol. 1, Atlantic and Gulf Coasts*, C. L. MacKenzie Jr., V. G. Burrell Jr., A. Rosenfield, W. L. Hobart, Eds. (NOAA Tech. Rep. 127, U.S. Department of Commerce, Washington, DC, 1997), pp. 119–140.
9. See www.dnrec.state.de.us/DNREC2000/Admin/Press/Story1.asp?PRID=1507.

Regulating Mercury: What's At Stake?

THE U.S. ENVIRONMENTAL PROTECTION Agency (EPA) has issued a new rule regulating mercury emissions from power plants. But is the rule sensible?

The best way to answer this question is to tote up the benefits and costs of the rule and compare them. The EPA did not do such an exercise when it issued its proposed rule, so we did our own analysis.

We started with the two alternatives that EPA had on the table. One called for a 30% reduction in mercury emissions by 2008 through the use of command-and-control regulation—where all utilities must meet the same standard. A second was a cap-and-trade program that would reduce emissions 70% by 2018; this was the proposal that the Bush administration adopted in its final rule. It puts a cap on mercury emissions but lets firms sort out the least costly way to achieve those emission reductions. That option appears to cost about $15 billion less than the command-and-control approach while achieving roughly the same environmental outcome.

Is the cap-and-trade program really worth it? We estimate that the costs will be somewhere in the neighborhood of $4 billion on the basis of existing models. There is a lot of uncertainty in these estimates because some of the technologies needed to reduce mercury emissions are not commercially proven.

The main benefit from reducing mercury emissions from power plants is an increase in IQ. But the chain of reasoning that takes us from power plant reductions to IQ increases is uncertain. The basic idea is that reduced mercury emissions will reduce mercury in waterways, which will reduce mercury in fish, which will reduce mercury in pregnant mothers who eat fish, which will make newborns smarter.

We tried to quantify this information, recognizing there are major potential weaknesses in most links in the chain. We find some points worth noting. First, shutting down all

CREDIT: GILBERT S. GRANT/PHOTO RESEARCHERS INC

[A statement submitted for the record by Denise M. Sheehan, Acting Commissioner, New York State Department of Environmental Conservation, follows:]

Statement of Denise M. Sheehan, Acting Commissioner, New York State Department of Environmental Conservation

Thank you for inviting the New York State Department of Environmental Conservation (Department) to testify on the status of the Eastern Oyster and the petition to nominate it as an endangered species. I would like to share with you the position of the Department on the Eastern Oyster petition, and on the Endangered Species Act in general.

New York State's coastline is lengthy, and includes the Atlantic shoreline along New York City and Long Island, along with the State's Great Lakes coastal region. The Atlantic region of New York's coast supports a diverse array of commercially and recreationally important fish, wildlife, and plant species in its productive tidal wetlands, estuaries, mudflats, and reefs. The habitat of the Eastern Oyster is located in this area, generally within Long Island Sound. The Department's Long Island Regional Director, Peter A. Scully, described the Long Island area in his June 27, 2005 testimony before the House Subcommittee on Fisheries on H.R. 307, the Long Island Sound Stewardship Act.

The Long Island Sound area is heavily populated, making it a challenge to effectively balance the needs of the people who live and work there with the natural resources which make Long Island such a unique and vibrant place. Recognizing this concern, Governor George E. Pataki has directed the Department to make the reduction of pollution and the restoration of aquatic habitats along the Sound one of our highest priorities. Since Governor Pataki took office in 1995, New York State has invested nearly $345 million in projects to achieve this priority B along with the funds spent by local governments and private organizations which are also committed to Long Island's environmental quality. The Governor's strong commitment to the wise and effective conservation of New York's natural resources is evident through the policies which he has championed for the Long Island region.

One of our most important partners in our activities to protect Long Island Sound has been the United States Congress. Through the Long Island Sound Restoration Act of 2000 (LISRA), Congress authorized appropriations of up to $40 million annually for five years, to be shared equally between New York and Connecticut, for projects to restore the Sound's water quality and environmental resources. This authorization, totaling $200 million, was designed to ensure that the federal government matched the significant financial contributions which New York and Connecticut already have made to projects for the improvement of the Sound's environment.

Approximately three million people live on Long Island. Within 50 miles of the Sound the population balloons to a staggering 20 million people. Thus, pollution loading to the Sound can be considerable unless both the States of New York and Connecticut and the federal government make a concerted effort to protect the Sound's natural resources and water quality. Because Congressional appropriations under LISRA have been approximately one-tenth of the authorized amount, the reauthorization of LISRA and the continued infusion of federal funds into projects to implement environmental projects are still needed.

The Department greatly appreciates the efforts of Congressmen Pete King and Jim Walsh for the much-needed LISRA appropriations. However, the reauthorization of LISRA and increased annual appropriations are needed to help New York and Connecticut reach our goal of restoring the Sound's water quality. For that reason, Governor Pataki has made the reauthorization of LISRA, and continued appropriations, a high environmental priority for 2005. New York State strongly supports the language of H.R. 307, sponsored by Congressman Simmons, which would reauthorize this statute.

The questions regarding populations of the Eastern Oyster in the waters of New York and other states are intrinsically linked to the larger issue of the adequacy of funds, from all sources, to address the ecological problems which human populations can cause to fish and wildlife. The Eastern Oyster, like many other species, is a barometer of our success—or lack thereof—as stewards of our natural resources. The Department urges Congress to continue its support to the states on activities which protect our natural resources, consistent with sound ecological practices, while providing people with the opportunities to enjoy the natural benefits with which areas such as Long Island Sound abound.

New York State is taking steps on its own to protect the Eastern Oyster. At the request of the Department, the New York State Legislature recently approved, and Governor Pataki signed, State legislation to authorize the Department to adopt regulations concerning oyster management. Presently, there are no size limits, catch or possession limits, seasons or other restrictions on the taking of oysters from New York State waters. Most of the towns on Long Island have established their own limits and seasons, leading to a lack of continuity between the State and local communities, and confusion for the baymen who harvest these oysters. Poaching has been an inevitable result of this patchwork of local laws. The new State law (Chapter 155 of the Laws of New York State for 2005) will help us to ensure the long-term viability of oyster resources in State waters.

In conjunction with this new State effort, the Department looks forward to working with the United States Congress, the National Marine Fisheries Service (NMFS), the commercial and recreational fishers of Long Island, and other interested parties, to resolve the ecological challenges faced by the Eastern Oyster along the Atlantic coast. The Department notes that the petition to designate the Eastern Oyster as an endangered species expresses serious reservations about the actions which Atlantic coast states have taken in response to reductions in Eastern Oyster populations. The Department believes that this petition is best addressed through the status review which NMFS intends to undertake, and we will be happy to share with NMFS and other interested parties our data on Eastern Oyster populations in New York State waters.

Through this process, the Atlantic coast states, the United States Congress, and the people whose livelihood is dependent upon thriving populations of species such as the Eastern Oyster can assess the effectiveness of the Endangered Species Act on a regional basis. Working with agencies such as the United States Fish and Wildlife Service and NMFS, the Act assists the Department in the protection and restoration of declining populations of specific species. In New York State, these efforts have been very successful, ensuring the restoration of populations of our Nation's symbol, the Bald Eagle, peregrine falcons, the Karner Blue butterfly and the bog turtle, among other species. Through our efforts, we have successfully provided people who live or work near sensitive habitats with opportunities to continue their on-going activities in an environmentally-sustainable fashion. Activities to preserving endangered species in New York State are based on sound scientific principles, and have an excellent track record. We believe that the Endangered Species Act has been effectively implemented in New York State, and that our experience in working with our federal counterparts to implement this statute will be beneficial throughout the review of the status of Eastern Oyster populations.

I appreciate the opportunity which the Committee has afforded to the Department to discuss our views on the Endangered Species Act through the current petition to protect the Eastern Oyster. We look forward to working with NMFS and others during the status review.

Whether or not the Eastern Oyster is determined to be threatened or endangered, the declining populations of this species along the Atlantic Coast points to the necessity for all levels of government—state, federal, and local—to work together cooperatively and effectively to wisely foster natural environments. I believe that the United States Congress can be most effective in assisting the states to improve our coastal resources through actions such as the reauthorization of LISRA, and through the appropriation of funds to ensure its effective implementation.

Thank you for providing me with this opportunity to share the perspective of the Department on these important issues.

[A letter submitted for the record by Bill Sieling, Executive Director, Chesapeake Bay Seafood Industries Association, follows:]

CBSIA Chesapeake Bay Seafood Industries Association
110 Severn Ave. • Annapolis, MD 21403 • 410-507-3249 • Fax: 410-990-0721 • CBSIA@aol.com

July 15, 2005

Nancy Locke
Chief Clerk
Committee on Recourses
U.S House of Representatives
1328 Longworth House Office Building
Washington, D.C. 20515

Dear Ms. Locke:

The Chesapeake Bay Seafood Industries association is a trade association representing the majority of oyster processors here in Maryland. We want to formally go on record as being very opposed to having the Eastern Oyster, Crassostrea virginica placed on the Endangered Species List.

I have been associated with the oyster industry in Maryland my entire life as a private grower on leased ground, as a harvester on public oyster grounds, as a natural resource manager with the Maryland Department of Natural Resources, as chief of Maryland's seafood marketing program, as a member of the Maryland Oyster Recovery Partnership, as a member of the Maryland Oyster Steering Committee and finally as Executive Director of the Chesapeake Bay Seafood Industries Association,(CBSIA).

In all my fifty plus years of working within various phases of Maryland's oyster industry I have never encountered a more foolish and nonsensical proposition than the one before your committee, namely to declare the Eastern Oyster an endangered species.

This petition is a politically motivated move designed to prevent the states of Maryland and Virginia from going forward with plans to study the feasibility of introducing the Asian oyster into the Chesapeake Bay. Maryland and Virginia want to see if the Asian oyster will survive sufficiently on many barren oyster bars to allow the restocking of large areas of the Bay's oyster bars with oyster resistant to the diseases presently killing the majority of native oysters before they can grow to maturity.

President, Bill Woodfield; *Vice President,* J. C. Tolley; *Secretary/Treasurer,* Bill Brooks; *Executive Director,* Bill Sieling
Board Members: Jim Dodson, Robin Hall, Jerry Harris, Jay Newcomb, Casey Todd, Roy Tod, Roger Van Dyke

In addition to stopping needed research and experimentation on the Asian oyster, such a declaration of endangerment for our native oyster will prevent us from moving forward with our ongoing research within the Oyster Recovery Partnership to find ways to keep our local oyster industry viable while at the same time learning new techniques of commercial harvesting which actually increase native oyster populations in certain areas.

One very promising technique being tried now is the managed power dredging of old silted over oyster bars that have become unproductive because oyster larvae can no linger find the clean oyster shells they need to set on when they spawn. Studies have shown a big improvement of new spat set on old oyster bars once they have been power dredged. A continued trial of this type activity is essential if we are to fine ways to manage around the diseases presently killing the oysters on many of our most potentially productive oyster bars..

Another very damaging consequence of a cessation of all harvesting in Maryland would be the halting of all fossil shell dredging in the bay. These shells are used in great quantities to spread clutch on existing and new oyster bars to provide clutch for the young oyster spat to attach too. Once stopped this expensive and complicated program will probably never be able to be restarted. This would mean that there would never be enough clutch available in future for reshelling native oyster bars to once again sustain a large scale native oyster population in the Chesapeake Bay.

In addition a whole way of life and tradition centered around one of the oldest and most historic seafood industries in Maryland and Virginia would disappear. Once the infrastructure and skills required for this industry disappear they will never return, no matter how many native oysters eventually return to our oyster bars.

I could go on with more examples of the many negative impacts this proposal would have on the oyster situation in our region but hope that the information I have given you will be sufficient to show the folly of taking such a draconian step as declaring our native oyster an endangered species.

Sincerely yours,

Bill Sieling
Executive Director

CC: members of the CBSIA

[A letter and comments submitted for the record by Jack White, New Point Oyster Company, LLC, follows:]

NEW POINT OYSTER COMPANY, LLC
POST OFFICE BOX 35
NEW POINT, VA 23125
804/725-9894
703/408-2035

Dear Friend of Oysters,

My name is Jack White and I own and operate the New Point Oyster Company. We supply cultivated oysters to Washington raw bars and have been voted the Number One oyster in the City at Old Ebbitt Grill's "Oyster Riot", an annual wine and oyster competition. I am a former House staffer and lobbyist who gave up a lucrative and fulfilling legal career to dedicate my energies to restoring oysters in the Chesapeake Bay. I not only formed an oyster company, but also one that manufactures and markets home aquaculture systems to facilitate people growing oysters from their docks. We attend large public functions to educate the public about the importance of the oyster and the need for everyone to do their part in restoring this important resource. We have lobbied EPA, NOAA and numerous other resource agencies to implement proven market-based initiatives to show how to put significant numbers of oysters in U.S. waters with little or no cost to the taxpayer. I am writing to request your help in saving my business and industry. More importantly, I am writing to seek your help in saving the eastern oyster from listing on the ESA which will most assuredly lead to its destruction.

I am appending a copy of my comments to NMFS/NOAA which give a quick rundown on where this process is headed and why it should not be implemented. Having worked on the Hill, I understand the constraints on your time and resources and have avoided detail and minutiae in the hope that you will find time to read my submission. I intend to visit the House Resources Committee on Monday, July 18, 2005 and will be happy to give you all the time necessary to satisfy your informational needs. There is also contact information above for your use. Please read my submission and give this pressing issue the time and effort that is required.

VERY TRULY YOURS,

JACK WHITE

COMMENTS TO NMFS/NOAA ON PETITION TO LIST EASTERN OYSTER AS THREATENED OR ENDANGERED UNDER THE ESA: WRONG MOVE; WRONG REASONS

NMFS has solicited comments on whether the eastern oyster is endangered or threatened pursuant to conducting a status review as required by the ESA (Endangered Species Act) and in response to a petition filed by a private citizen seeking to restore water quality in the Chesapeake Bay to historic levels. While Petitioner's submission is quite articulate, compelling and laudable, it is not wholly accurate and its timing ignores significant improvements that suggest that the trend may be getting better. Most importantly, it calls for action that would lead to results that are the opposite of those intended. Any action that curtails or restricts the commercial aquaculture of the eastern oyster will eliminate the most significant contributor to stabilizing and improving oyster populations, the lynchpin of environmental health of aquatic ecosystems. Listing on the ESA will substantially set back oyster recovery and the innovations supporting it while rewarding and empowering the very parties (LMRAs) that Petitioner has cited as responsible for the problem.

There is no new information or changes in conditions listed by Petitioner that would justify listing the eastern oyster on the ESA except for the threat of Maryland introducing Crassostrea ariakensis, an exotic species, that may or may not impact the eastern oyster. This appears to be the real reason that is moving this process. While I do not support its introduction, neither I, nor anyone else can say with specificity what its impact will be. Petitioner cites competition, hybridization and polydora (a native worm that also exists in eastern oysters), however, others counter by citing its disease resistance; added filtering capacity and reduced stresses on local populations. All are valid points, but there are many others, both known and unknown. The important fact is, it cannot be proven at this time that such introduction is a "man-made factor affecting its (the eastern oyster) continued existence" and therefore is not an appropriate criteria for triggering listing on the ESA. There is no other item in Petitioner's submission that is not historic and that has remained

more or less static for the last decade and which would provide justification for such a draconian measure.

Petitioner omits or overlooks important and substantial efforts that are adding millions of active, growing and reproducing oysters to the natural population and which suggest improvement that may not occur in statistics. Private commercial oyster aquaculture activities contribute substantially to water quality and are unrivaled in effort, innovation, number and success in putting oysters in the waters that constitute the eastern oyster's range. This effort is adding significantly to breeding populations; reducing pressure on wild stocks while increasing their numbers and gene pool; and providing many collateral environmental benefits. Listing the eastern oyster as threatened or endangered will curtail or eliminate these activities. It will also negatively impact supply and consumption of oysters at a time that public awareness, trust and demand for oysters is improving to a point that it will support wide-scale, sustainable, environmentally beneficial, aquatic activities. This is the wrong move, for the wrong reasons! Value-added products such as half-shell oysters that support sustainable aquaculture are the very activities that need to be encouraged and expanded. Placing restoration primarily or solely in the public sector has provided negligible, if not failed results and has been alluded to by petitioner as "the expected positive impact...that...has not been very significant" in his reasons why listing on the ESA is necessary.

Hundreds of commercial oyster aquaculture operations in the eastern oyster range are actively growing oysters to market size and replacing those harvested with new crops, improvements in genetics and disease resistance continue and equipment innovations and techniques are routinely made. They work closely with resource agencies, academic institutions and researchers and often provide many of the resources that are necessary to move public efforts forward.

These operations are almost exclusively funded with private monies and stand alone as a success story for introduction/manipulation of diminished natural stocks of oysters. These activities need to be encouraged rather than restricted, restrained or prohibited. If the eastern oyster is listed on the ESA, trading in a threatened or endangered species will be prohibited and most of this activity will cease and many of these operations will have to go out of business.

Time, space and format rules preclude a lengthy discussion of the history and nature of oyster production, hence I will assume that the reader will understand and those in the industry will forgive the analogy of the "hunter/gatherer" which describes the historic harvesting of oysters as well as that of many other extractive resources. This analogy does not apply to today's industry which is based on environmentally beneficial, sustainable efforts where seed is produced, placed in containers and grown to market size and sold on a rotating basis. Most oysters now in commerce are the product of man's industry from beginning to end and in no way infringe on natural populations. They provide a significant collateral benefit by filtering water, forming important structure (habitat) and by reproducing, broadcast billions of spat into the estuary. Programs such as nutrient credit trading and oyster-based mitigation would provide a more sensible approach and avoid the negative impacts and damage of listing the oyster on the ESA.

In closing, I can state unequivocally, that there are more oysters in the Chesapeake Bay now, than were there ten years ago! The problems cited are historic and the solutions sought are prohibitively expensive if not impossible. The eastern oyster should not be listed as threatened or endangered and under all circumstances private oyster aquaculture activities should be protected.

The CHAIRMAN. I would like to call our first panel of witnesses up today. Mr. S. Lake Cowart, Jr., Dr. Robert B. Rheault. Mr. Michael C. Voisin? Voisin. I am learning here. Come on. Mr. Joseph Gergela. And Mr. Michael Bean.

Mr. MELANCON. Mr. Chairman, before they start, if I could? Congressman Bishop has a statement he would like included in the record.

The CHAIRMAN. Without objection, so ordered.

[The prepared statement of Mr. Bishop follows:]

Statement of The Honorable Timothy H. Bishop, a Representative in Congress from the State of New York

Mr. Chairman, Ranking Member Rahall, and distinguished members of this Committee, I applaud you for calling this important hearing and thank you for giving me this opportunity to discuss how listing the Eastern Oyster as a threatened or endangered species would affect the fishing industry and related businesses in my district.

I represent a constituency that depends on an extremely delicate balance of environmental conservation and sound management of our fisheries to sustain Long Island's economic progress. The First Congressional District of New York is host to the Long Island Sound on our north shore, the Atlantic Ocean to our east and south, and the Great Peconic Bay splitting our twin forks on the island's east-end. These bodies of water are the lifeblood of our economic survival and serve as a constant reminder of our rich heritage as one of the Nation's oldest and most storied fishing communities. As this area's Representative in Congress, I take any move to disrupt this equilibrium very seriously, as do my constituents.

Long Island's oyster harvests have seen better days, but its future is far from having been decided. After experiencing parasitic diseases and brown tide that decimated the oyster harvest in the 1990s, the industry took the initiative to rehabilitate the oyster population by introducing a shellfish that proved more resistant to disease. Coupled with a renewed focus on improving stewardship of the local waterways, the shellfish industry—in partnership with environmental advocates and elected officials—have combined efforts to reverse the decline of the oyster industry on Long Island and steered it back toward the path to recovery. In just five years, using innovation, technology, and patience, we were able to increase oyster harvests fivefold—from 9,020 bushels in 1999 to nearly 50,000 bushels in 2004. Our story, while still a work in progress, is a shining example of how active management and prudent stewardship can stave off an environmental disaster and instead result in rehabilitating the environment and preserving the most vulnerable species, like the Eastern Oyster populations off the shores of Long Island.

Although I sympathize with the crises faced by the shellfish industry in the Chesapeake Bay, the implications of listing the Eastern Oyster would be disastrous for the Long Island oyster industry and related businesses. Just as New York and Connecticut were able to cooperatively rebuild their oyster industries, so too can Maryland recover the Eastern Oyster population in the Chesapeake Bay through a similar effort involving patience, perseverance, and grounded science. However, the Endangered Species Act alone will not facilitate the active management that is necessary to accomplish those efforts. It will take everyone with a stake in the industry to achieve such success. Therefore, Mr. Chairman, I oppose the proposed listing of the Eastern Oyster on the ESA.

The Eastern Oyster crisis in the Chesapeake seems to reflect similar problems that were once unique to the oyster populations along the northeast Atlantic coastline and Long Island Sound during the 1980s and portions of the 1990s. However, after taking proactive measures to combat a diminished harvest and overall oyster population, the region is rebounding and reaping financial and environmental rewards. The Chesapeake Bay region can find a similar turnaround in its oyster population were it to use the same approach.

Accordingly, I believe that we must approach this problem by recognizing that each region has its own set of challenges unique to that location without jeopardizing the jobs and future of hard-working Americans and their families who rely upon the Eastern Oyster for their livelihood.

Mr. Chairman, the shellfish harvested on Long Island, both naturally and through aquaculture farming, has a wholesale value of $37 million per year, as reported by the New York State Department of Environmental Conservation. This value does not include the income from associated businesses, including transportation, packaging, and restaurant revenues. Removing the Eastern Oyster, a carefully managed and safeguarded part of this industry, would cause significant harm to Long Island's shellfish industry.

The Endangered Species Act of 1973 has been an effective and landmark measure to preserve and protect threatened plants and wildlife as well as the habitats that they call home. However, this particular petition that is the focus of today's hearing has been filed without the foundation of sound science and cites a regional problem as a global phenomenon. I would urge the National Oceanic & Atmospheric Administration to take a moment to employ the delicate caution necessary to ensure that a regional issue does not unnecessarily invoke a burden on a larger scale, thereby causing irreparable harm.

Mr. Chairman and distinguished members of this Committee, I look forward to working with you toward that end and thank you again for the opportunity to present my views on this important matter.

The CHAIRMAN. If I could have the panel stand and raise their right hand?

[Witnesses sworn.]

The CHAIRMAN. Thank you very much.

Let the record show they all answered in the affirmative. We welcome you to the Committee. I look forward to hearing your testimony. I know a number of you. This is an extremely important issue.

Mr. Cowart, we are going to begin with you.

STATEMENT OF S. LAKE COWART, JR., VICE PRESIDENT, COWART SEAFOOD CORPORATION

Mr. COWART. Thank you, Mr. Chairman.

I am Lake Cowart with Cowart Seafood Corporation, and I am a fourth-generation oyster processor and grower in the State of Virginia. And we certainly appreciate your comments at the beginning of this hearing.

The Virginia seafood industry opposes the petition to list the eastern oyster for the following reasons. First reason is the petition has misused the Endangered Species Act in an attempt to halt the proposed non-native introduction in the Chesapeake Bay, not to protect the eastern oyster from extinction.

Secondly, the eastern oysters are abundant in several regions of its native range, including the Gulf coast States and the North Atlantic. The Chesapeake Bay does not have the historic harvest that it once had, but it does have harvestable quantities of oysters.

And thirdly, eastern oysters in the Chesapeake Bay cannot be classified as sub-species. Millions of mature oysters from the Gulf coast and Delaware Bay have been planted and have reproduced in the Chesapeake Bay. Scientific breeding programs have used disease-resistant eastern oyster strains from Louisiana and Delaware Bay for years to crossbreed with wild Chesapeake Bay oysters in the hopes of transferring those disease-resistant genes.

So we believe that this petition is a misuse of the Endangered Species Act. The petitioner is misusing the Endangered Species Act to prevent the introduction of a non-native oyster in the Chesapeake Bay. The Federal Register stated, "The petition expresses concerns about the proposed introduction of the exotic Asian oyster, Crassostrea ariakensis, because it could result in the extinction of the eastern oyster through competition and hybridization."

This is totally false. Since Allen and his colleagues proved in 1993 that these oysters do not hybridize, there is no proof that non-native oysters will outcompete the eastern oyster. In fact, in federally permitted oyster trials in Virginia over the last several years, eastern oysters strike or attach—the small oysters do—more readily to the non-native shells than they do to their own species.

In summary, the Endangered Species Act is not the proper forum to attempt to justify an opinion on a proposed non-native oyster introduction in a small geographical region like the Chesapeake Bay. Secondly, the eastern oyster is not in danger of extinction. The

petitioner fails to recognize that healthy populations of eastern oysters exist in the Gulf coast States and the North Atlantic, which makes up the majority of the eastern oyster's native range.

Although the Chesapeake Bay may not support commercial-scale harvest like other regions, there certainly are ecologically important and healthy eastern oyster populations in the Chesapeake Bay. Since 1992, Virginia has been a leader in the creation of oyster reefs and other areas, such as the Lower Rappahannock and Mobjack bays, where oysters are prohibited from being harvested.

When salinities fall due to ample rainfall, oysters are more abundant. And as an example, in 2004, the Lower James River and Newport News produced thousands of bushels of the eastern oysters due to high rainfall in the years 2003 and 2004.

Thirdly, I do not believe that there is a sub-species of eastern oysters. The petitioner is wrong to conclude that the Chesapeake Bay oysters are a sub-species of the eastern oysters for the following reasons.

Mature, reproducing eastern oysters from Delaware Bay and the Gulf coast have been legally planted on private beds in Virginia for years. These oysters are planted in the spring and harvested throughout the summer. Spawning occurs in these oysters several times per year and coincides with the wild Chesapeake Bay oysters. Therefore, the potential exists for mixing between these oysters.

Also the disease-resistant scientific breeding programs in the mid-Atlantic have used Louisiana and Delaware Bay oysters for years. These programs are specifically designed to inbreed with wild Chesapeake Bay eastern oysters to increase future disease resistance. In the last few years, the Federal Government, in conjunction with the State of Virginia, has planted millions of these disease-resistant eastern oysters originally from Delaware Bay in hopes of accomplishing gene transfer.

For these reasons, we feel that this petition should be denied. We thank you for the opportunity to address this committee.

[The prepared statement of Mr. Cowart follows:]

Statement of S. Lake Cowart, Jr., Vice President, Cowart Seafood Corp.

By way of background information, Cowart Seafood Corp. operates one of the largest oyster shucking-packing businesses in Virginia. We have been in the oyster business since the early 1900's and I have been intimately involved in all aspects of the industry for the last three and a half decades. I have witnessed the oyster population in Virginia rise and fall with changing environmental conditions.

Through the mid-1980's, oysters were an ecologically and commercially viable species. However, after 1986 oysters were less plentiful, but not absent from the Chesapeake Bay. Drought conditions, coastal run-off and pollution have all contributed to oscillations within oyster abundance. Certainly commercial harvests have oscillated in response to oyster abundance. For example, one year thousands of bushels of oysters may be harvested but then fewer oysters may be caught in subsequent years. Despite an apparent "false commercial extinction", oysters were still present in the Bay during these less abundant years. One thing is for sure, oystermen still tried to catch oysters but environmental conditions changed the Bay's ecosystem. In the short term oysters are highly sensitive to environmental conditions, yet in the long term resilient to these changes. They have survived in the Bay for millions of years because of their ability to adapt over evolutionary time. Oysters have not gone extinct over these evolutionary time scales enduring massive changes to their environment.

More recently, say within the last half a century, the Bay has changed once again due to coastal and watershed-level development, oyster parasite proliferation and pollution. This shift in the Bay's inputs has caused the oyster population to remain at a low abundance compared with historic levels. However, oysters have not been able to adapt and will not be able to adapt to these changes that have occurred in the last half century because of deforestation, run-off, and reduced repletion of surface groundwater that eventually flows into streams feeding the Bay. Proponents of this petition may blame over-harvesting as the causative agent for this decline, however, commercial-scale oyster harvesting has not occurred in the Bay for the last twenty years. Why hasn't the Bay's population of oysters recovered? The answer is that oysters are not the problem they are the solution. The actual problem that needs to be addressed is poor water quality caused by pollution and run-off. Unfortunately, this petition targets the solution and not the problem.

I strongly oppose this petition to list the eastern oyster, Crassostrea virginica, as an endangered or threatened species. The following is a list of reasons, from an industry perspective, of the negative impacts if the eastern oysters were to be listed:

1. Loss of irreplaceable industry infrastructure, primarily large shucking houses and aquaculture operations. Once these businesses are lost it is too expensive to re-purchase waterfront land and acquire or rebuild oyster houses and sorting operations. The Virginia oyster industry provides $50,000,000 in annual sales and employs 1,000-1,500 workers.
2. Continued degradation of oyster beds. The industry works hard at maintenance of their oyster beds by "turning over" shells to remove sediment build-up thereby allowing oyster larvae suitable substrate to settle.
3. Loss of recovery/replenishment/restoration initiatives fostered by collaborations with industry, governmental agencies (state and federal), scientific institutions, special interest groups and the public. The State of Virginia is committed to oyster restoration through reef building, creation of oyster sanctuaries, and repletion efforts.
4. Loss of private companies planting oyster shell and seed oysters to increase population abundance and encourage oyster larval settlement. For example, in any one-year Bevans Oyster Company and Cowart Seafood in Virginia have planted 100,000's of bushels of shells on existing oyster beds and millions of seed (juvenile) oysters struck on shell in the hopes of restoring oyster populations.
5. Local and state economies would suffer because of the loss of jobs and economic multipliers such as purchasing of packing materials, fuel, ice, and transportation.

I challenge and oppose this petition based on the observations I have made in my own backyard, the Chesapeake Bay. Virginia state regulators and scientific institutions have documented oyster settlement in the Bay for years and juvenile oysters are plentiful during this fall survey post reproduction. However, these oysters die and do not reach market size, so subsequently, the layperson assumes oysters are "going extinct". This assumption is false. Oysters are present in this ecosystem, maybe not as abundant as other regions, but C. virginica certainly exist. The actual reason these juvenile oysters do not survive to market size is because of disease proliferation and pollution induced-mortality.

Due to low salinity market size oysters survived in the James River and Tangier Sound ecosystem just this past year and a limited basis fishery was opened temporarily. Although just a short commercial harvest was realized this is clear evidence that oyster populations survive when localized environmental conditions are favorable. This has been a rare event in the past. Essentially, we have not had commercial-scale harvests (1 million bushels) in the State of Virginia for the last 20 years or more. The petition alludes to the fact that a moratorium of harvesting oysters would solve the problem, however, we have essentially been under a moratorium and oysters have not recovered. For example, in the Rappahannock River oyster beds from the Whitestone Bridge to the mouth of the River has been closed for commercial harvest since 1992 and despite extensive repletion efforts oyster abundance has not recovered. This clearly demonstrates that over-harvesting is not the reason oyster populations have not recovered and implementing a harvest moratorium is going to nothing to increase oysters in the Bay.

I would also like to address the issue of subspecies of C. virginica. I understand that NOAA/NMFS will be examining mitochondrial DNA sequences to determine if certain regions constitute subspecies. This seems to be very subjective. It is my understanding that mitochondrial DNA sequences can be "picked apart" to the very last individual gene and marker, however, the fact remains that oysters within the native range (Gulf of St. Lawrence to Gulf of Mexico and south through the Caribbean to the Yucatan Peninsula) are of the same genus and species. I would further

challenge the determination as a subspecies because interstate transplanting had taken place for decades. I personally know of several companies in Virginia that bought thousands of bushels of mature Louisiana and Delaware Bay oysters and planted them in the Chesapeake Bay during reproductive seasons. This planting of mature oysters means that billions of sperm and egg are released into the Bay and most likely competent oyster larvae will result. The Virginia Department of Health now prohibits the planting of Gulf coast oysters but mature Delaware Bay oysters are legally planted in abundance in Virginia each year. Certainly, some hybridization and interbreeding occurred over time. In addition, breeding programs at scientific institutions in the Chesapeake Bay region have worked for years with oyster strains taken directly from Louisiana and Delaware Bay waters. These oysters were selectively bred with native Chesapeake Bay oysters in the hopes of accomplishing transfer of disease resistant genes. Several industry members in Virginia were part of studies involving the field performance of these experimental oysters, in most cases these were planted adjacent to wild stock Bay oysters. A reasonable person would have to assume that over the course of years and years of experiments and hundreds of thousands of test oysters deployed for up to three growing seasons, some degree of hybridization and interbreeding occurred.

The Federal Register stated "the petition expresses concern about the proposed introduction of the exotic Asian oyster, Crassostrea ariakensis because it could result in the extinction of the eastern oyster through competition and hybridization..." which I believe is poor use of the Endangered Species Act as this does not belong in a petition as a reason to list a completely different species. The petitioner is clearly opposed to this non-native introduction however this is not the proper forum to accomplish his objectives. In fact, the petitioner has not been complete in his research as the documented literature clearly states that C. virginica and C. ariakensis (=C. rivularis) only develop to 7-day larvae but do not hybridize (Allen, S.K., Jr, P.M. Gaffney, J. Scarpa, D. Bushek. 1993. Inviable hybrids of Crassostrea virginica (Gmelin) with C. rivularis (Gould) and C. gigas (Thunberg). Aquaculture vol. 113. pp. 269-289).

Finally, I would point out that the petition seems to concentrate on the Chesapeake Bay region, however that is one small geographical area compared to the vast oyster ground available in the Gulf coast states and Atlantic coast states. By all accounts, the Gulf coast population is healthy, reproducing and abundant yet is completely ignored in the petition. The Gulf coast region makes up a significant portion of the eastern oyster industry and native range but ironically, this information is missing in the petition.

The CHAIRMAN. Thank you.

Dr. Rheault?

STATEMENT OF ROBERT B. RHEAULT, Ph.D., PRESIDENT, EAST COAST SHELLFISH GROWERS ASSOCIATION

Dr. RHEAULT. Mr. Chairman, members of the Committee, I would like to thank you for this opportunity to comment on this petition. As President of the East Coast Shellfish Growers Association, I represent about a thousand small farmers from Maine to Florida.

For the past 20 years, I have run my own small oyster farm in Rhode Island. I have a degree in oceanography, and I did my thesis work on the feeding and growth of oysters. In short, my life revolves around oysters. I could talk for hours about why this is a bad idea, but I will try and keep my testimony to 5 minutes and ask that you read my written comments.

I have three points I hope to make today. First, I believe the petitioner makes selective use of the data to paint a picture that appears dire, but conceals the fact that oysters are thriving in many areas. We recently estimated that there are currently somewhere in excess of 10 billion—with a "b"—oysters in U.S. waters.

Secondly, the petitioner attributes much of the decline of the oysters to degraded water quality, excessive silt, and nutrient

loading. In fact, the oyster is well adapted to rich, turbid waters and thrives in many of our most polluted coastal estuaries.

The third point I would like to make is that the listing of the oyster will have serious negative environmental impact because it will eliminate much of the private commercial aquaculture of oysters. Oyster culture has been shown to benefit water quality and provide a sustainable source of free-swimming larvae into the watershed.

The petitioner describes the decline of the oyster on the East Coast. However, he neglects to include the data from the Gulf coast region, which maintains a sizable harvest. Clearly, this is the same species.

Moreover, the data is deceptive because the Chesapeake-Delaware region was historically such a huge percentage of the Atlantic coast production. It appears as if the entire population has suffered when, in fact, the population declines are largely centered in the mid-Atlantic States, while New England and Gulf coast populations are relatively stable.

Mid-Atlantic States have been hit hard with the triple threat of two parasitic diseases, a degraded habitat, and a mismanaged wild harvest. Outside the mid-Atlantic region, other States wrestle with each of these three threats to various degrees, yet oyster populations are relatively healthy, and oyster aquaculture is expanding. The decline of the oyster in the mid-Atlantic is a failure of fisheries management that has gone on for decades.

Dr. William Brooks wrote about the Chesapeake harvests in a book called "The Oyster" in 1891. "Our oyster policy is destructive and sure to result, ultimately, in ruin to the industry. The oyster property of the State is in imminent danger of complete destruction unless radical changes in the methods of managing the beds are made at once."

It is important to note that his predictions pre-dated the oyster diseases that hit in the 1930s and 1950s, as well as the dredging and habitat destruction discussed in the petition. Unfortunately, the work of Dr. Brooks was ignored, and his predictions proved accurate.

In stark contrast, New England has experienced an oyster renaissance through aquaculture. In 1972, Connecticut growers placed a million bushels a shell on setting grounds. Harvest went from 30,000 bushels a year to nearly a million bushels in just 10 years, a $60 million a year oyster industry with 650 jobs was reborn. The Rhode Island oyster aquaculture industry is growing at 28 percent a year for the past 5 years. Massachusetts has some 300 aquaculture leases. New York oyster culture permits have tripled in the past 15 years, while landed harvests go from 1.2 million to 3.4 million.

Even in Virginia, private growers prosper using hatchery-reared seed and intensive culture techniques. This despite the intense disease pressure and degraded water quality alluded to in the petition. The take-home message is that with proper management, we can have a profitable oyster industry despite diseases and pollution. We should not use the Endangered Species Act as an instrument to rectify decades of mismanaged fisheries in the mid-Atlantic.

The second point in the petition I would like to refute is that declining water quality, high silt loading, and nutrient loading are to blame for oysters disappearance. The oyster is uniquely adapted like no other shellfish to thrive in conditions of soupy, turbid water. The feeding apparatus is capable of sorting microscopic particles of silt from those which are nutritious algae. And oysters thrive in some of the most severely degraded estuaries on the eastern seaboard.

The last point I would like to make is that adding the oyster to the endangered species list will damage the shellfish aquaculture industry, which, in turn, will hurt both the wild oyster population and the marine environment. While I understand that the ESA does not permit consideration of economic factors such as jobs or harvest, if the listing does go forward, we can be assured that the market for oysters will collapse, and interstate transport of oysters will become a regulatory paperwork nightmare. Farming will cease to become profitable.

Well, environmental groups now recognize that oyster culture is sustainable and has significant environmental benefits. Oysters farms have been shown to increase the diversity and abundance of fish and crustaceans. My oysters on my tiny, little farm filter over 100 million gallons a day, and my oysters cast trillions of larvae into the tides, where they replenish wild stocks.

And because I invest tens of thousands of dollars each year in new seed, my harvest is sustainable. And when I harvest, I remove nitrogen from the watershed. There are literally thousands of small growers like myself up and down the coast, and I hope you can see there will be negative impacts to the environment and to wild populations if this petition goes forward.

Thank you.

[The prepared statement of Dr. Rheault follows:]

Statement of Robert B. Rheault, Ph.D., President, East Coast Shellfish Growers Association

First of all I want to thank you for the opportunity to comment on this petition. As President of the East Coast Shellfish Growers Association I represent thousands of small farmers from Maine to Florida. For the past 20 years I have run my own small oyster farm in Rhode Island. I have a degree in Oceanography and my thesis was on the feeding and growth of oysters. Most of my life revolves around oysters.

I would like to point out what I believe are certain flaws in the petition to list the oyster as endangered.

First, the petitioner makes selective use of the data to paint a picture that appears dire, but conceals the fact that oysters are in fact thriving in many areas. We recently estimated that there are currently somewhere in excess of five billion oysters in U.S. waters based solely on what goes to market each year.

Second, the petitioner attributes much of the decline in oysters to degraded water quality and excessive silt and nutrient loading. In fact the oyster is well adapted to rich turbid waters and thrives in many of our most polluted coastal estuaries.

The third point I would like to make is that the listing of the oyster will have serious negative environmental impact by virtue of the fact that it will curtail or eliminate much of the private commercial aquaculture of oysters. Oyster culture has been shown to benefit water quality, provide habitat for juvenile fish and provide a sustainable source of free swimming larvae into the watershed.

The petitioner has submitted an eloquent and convincing case describing the decline of the oyster on the East Coast. He neglects to include the data from the Gulf Coast region, which maintains a stable and sizeable harvest of oysters. Clearly this is the same species. Had he included this data the decline would not appear as drastic as his data appear to suggest.

Moreover, the data set is deceptive because the Chesapeake-Delaware region was historically such a huge percentage of the Atlantic coastal production that it appears as if the entire population has suffered when in fact the population declines are largely centered in the mid-Atlantic states, while most New England and Gulf coast populations are (with tremendous year to year variation) relatively stable over the long term.

Furthermore, harvest statistics do not accurately track abundance. Most states have substantial populations of oysters behind pollution closure lines that serve as spawner sanctuaries and yet never reach the market.

The mid-Atlantic states have been hit hard with the triple threat of two parasitic diseases, a degraded habitat and a mismanaged wild harvest. Outside the mid-Atlantic region other states wrestle with each of these three threats to various degrees, but oyster populations are relatively healthy and oyster aquaculture is in many cases expanding.

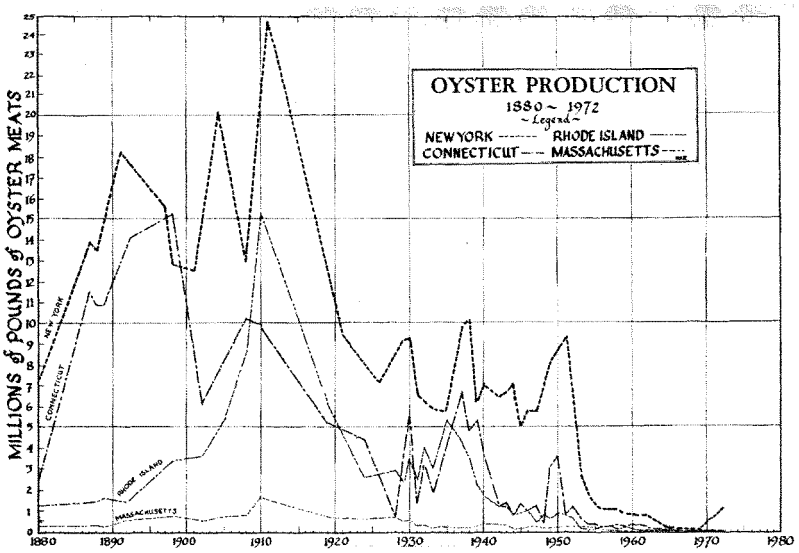
To put the issue in perspective it helps to review a little of the history of oystering.

For the past hundred and fifty years oyster management has been a delicate balance of regulating a wild fishery and augmenting wild populations with certain forms of public aquaculture enhancement. Around 1830 it was discovered that sets could be enhanced by placing clean shell in key setting beds, and then relaying the seed oyster to growing grounds. This simple aquaculture tool coupled with advances in harvesting efficiency brought the Maryland harvest from roughly 2 million bushels to nearly 15 million bushels by 1880. Overzealous harvesters pounded the beds and over the next 20 years those harvests had declined to 3 million bushels.

Dr. William Brooks wrote in The Oyster in 1891 "We have wasted our inheritance by improvidence and mismanagement... "our oyster policy is destructive and sure to result, ultimately in ruin to the industry. "the oyster property of the state is in imminent danger of complete destruction unless radical changes in the methods of managing the beds are made at once."

It is important to note that his predictions predated the discovery of significant oyster disease and the bulk of the dredging and habitat destruction that has occurred in the past 100 years. Unfortunately the work of Dr. Brooks was ignored and his predictions proved accurate.

To the north natural populations were also quickly being depleted by overzealous harvesters. Many states allowed private individuals to lease bottom for commercial aquaculture. In Rhode Island, Connecticut and Long Island turn-of-the century entrepreneurs developed oyster farms that produced several millions of dollars (in today's value) worth of oysters each year. Hundreds of thousands of barrels of oysters were shipped to England and by train to the West Coast.



Oyster Production. Drawing by Robert J. Pawlik.

After the turn of the century the New England industry went into decline. By 1950 the private farms had ceased to produce. The forces that conspired to eliminate oyster farming were not biological, but rather they were economic. First the invention of the flush toilet in 1900 (before the development of sewage treatment plants) resulted in several cholera epidemics which subdued the market for oysters. The cheap labor pool went off to fight in world War II and oysters were not affordable for depression era families.

New England's Oyster Farming Revival

Connecticut has fostered a resurgence of the oyster industry. With techniques little changed from a hundred years ago, the industry was revived with a large dose of faith and public and private investment. In 1972 a million dollars worth of shell was dumped on the setting grounds and the industry bounced back. Prior to this the annual harvest was about 30,000 bushels. Within ten years the harvest was back up to nearly a million bushels a year. A $60-million-a-year oyster industry with 650 jobs was reborn.

Connecticut's oyster industry has subsequently suffered setbacks from the same parasitic diseases that have ravaged the mid-Atlantic, and periodically wild larval sets disappoint, but the industry still sustains a harvest that is hundreds of times what an un-enhanced wild fishery would yield on its own.

The take-home message is that with proper management and incentives we can have a profitable oyster industry despite devastating diseases, pollution closures and habitat loss. Production from aquaculture is up sharply in the past twenty years. The profit motive has come back and there is a proliferation of small oyster farms in New England who are using a host of methods to grow oysters successfully.

Innovative oyster farmers in Rhode Island rely on hatchery-reared seed to fill their racks and cages. This is an industry that has grown 28% a year for the past five years.

Massachusetts has some 300 shellfish aquaculture leases—most of which are less than 20 years old.

In New York, oyster culture permits have tripled in the past fifteen years and the landed value of harvests has gone from $1.2 million to $3.4 million.

Even in Virginia where the wild populations are in decline, private growers who have leases have found that they can prosper using hatchery-reared seed and intensive culture techniques. This despite intense disease pressure and degraded water quality alluded to in the petition. The difference lies in the ownership of the crop. Where private leases have been resisted in favor of preserving the artisanal wild-harvest fishery you find that there is little incentive to invest adequately in the rejuvenation of the seed beds.

The differences in these management approaches (public fisheries versus private farms) have been noted by many experts over the years. In The Oyster (1891) Dr William Brooks wrote eloquently of the possibilities of oyster culture in the Chesapeake Bay and the problems of unmitigated free and common fisheries. His comments are as valid today as they were over a century ago. "Our opportunities for rearing oysters are unparalleled in any other part of the world.."

Recently, numerous groups have made a concerted effort to replenish the oyster bars and some of these efforts are starting to bear fruit. However, many fear that these efforts will be doomed to failure unless the destructive harvest practices of the past are curtailed. Unfortunately, funding for these replenishment efforts was cut in the most recent federal budget. This is often the fate of publicly funded fishery restoration efforts because there is a disconnect between those footing the bill and those reaping the benefit.

We should not use the Endangered Species Act as an instrument to rectify decades of mismanaged fisheries in the mid-Atlantic. While the ESA is an important and valuable tool, the ESA is a blunt instrument and was never intended as a fisheries management tool.

The fisheries management practices of the past have failed to protect the resource. We need only look to the north to see how there is a tremendous potential to rejuvenate the oyster resource through private commercial aquaculture. It can succeed even in areas where disease pressure is severe and water quality is degraded.

The second point in the petition I would like to refute is that declining water quality, high silt loading and nutrient loading are to blame for the oysters disappearance. The oyster is uniquely adapted like no other shellfish to thrive in conditions of soupy turbid water. The feeding apparatus is capable of sorting microscopic particles of silt from those which are nutritious alga. Oysters thrive in some of the most severely degraded estuaries on the eastern seaboard.

During my thesis work I experimented with growing oyster seed under docks in marinas. We expected problems from the heavy metals in the bottom paints and the fuel spills, however we experienced nearly 100% survival and growth rates as fast as any reported in the literature. Based on the data I supplied to the FDA showing these animals were safe to consume after a few months in clean waters, the FDA changed its regulations to allow nursery culture of shellfish seed in uncertified waters, a practice in wide use today. I now culture my entire crop of three million animals a year under the docks of a local marina.

The last point I would like to make is that adding the oyster to the endangered species list will have severe negative repercussions to the shellfish aquaculture industry, which will in turn have negative implications for both the wild oyster population and the marine environment. I understand that the ESA does not permit consideration of economic factors such as jobs or harvests, but if the listing goes forward we can be assured markets will be damaged and interstate transport of cultured oysters will become a regulatory and paperwork nightmare. Siting of new aquaculture leases in protected essential oyster habitat will be impossible.

Under this scenario, my small farm, which occupies 2.3 acres and employs five year-round, will cease to be profitable. A graduate student recently documented the abundance of fish and critters that live in and around my oyster cages. He found ten times the abundance of fish and crustaceans as he found in a nearby eelgrass bed. In summer I estimate there are a thousand baby lobsters and tens of thousands of juvenile fish that make our cages their home.

My oysters filter over a hundred million gallons a day removing silt and improving water clarity. Each year my oysters cast trillions of larvae into the tides where they replenish wild stocks.

Because I invest thousands of dollars each year in new seed my harvest is sustainable and when I harvest I remove nitrogen from the watershed (in the form of protein) and ship it off to Manhattan or DC. Only about 40 pounds of nitrogen a year, but then I have only a small farm.

There are literally thousands of small growers like myself up and down the coast. It is easy to see there will be negative impacts to the environment and to wild populations of oysters if this petition goes forward.

The CHAIRMAN. Thank you.

Mr. Voisin?

STATEMENT OF MICHAEL C. VOISIN, CHAIRMAN, LOUISIANA OYSTER TASK FORCE

Mr. VOISIN. Chairman Pombo and members of the Committee, I want to thank you for this opportunity to testify before you on the status of the eastern oyster and the petition to list it under the Endangered Species Act.

I am Mike Voisin, Chairman of the Louisiana Oyster Task Force, a governmental agency within the Louisiana Department of Wildlife and Fisheries composed of Oyster Industry Association and governmental agency appointees. The Louisiana Oyster Task Force was created in 1988.

I am currently President of the Molluscan Shellfish Committee, a part of the National Fisheries Institute, and a board member of the Gulf Oyster Industry Council and the Louisiana Oyster Dealers and Growers Association.

I am a seventh generation oyster farmer and processor. Our farm comprises approximately 14,000 acres of water bottoms in coastal Louisiana, which produces between 15 million to 25 million pounds of in-shell oysters annually. This represents 45 million to 75 million individual oysters that we harvest on an annual basis. Since our oysters take anywhere from 2 to 4 years to grow to harvest size, this means that, at any one time on our farm, we may have anywhere from 135 million to 225 million individual oysters on our water bottoms.

The State of Louisiana produces approximately 250 million in-shell pounds of oysters annually or 750 million individual oysters with a similar growth cycle of 2 to 4 years to market size. This means that, at any one time, there are approximately 2.25 billion oysters in our oyster farms and public producing areas, many of which—in fact, a predominance are in Representative Melancon's area, which we think is the largest oyster-growing area maybe even in the world.

The Gulf States, combined with Louisiana, produce annually approximately 500 million in-shell pounds of oysters, totaling approximately 1.5 billion individual oysters and maintaining approximately 4.5 billion individual oysters in Gulf producing areas at any one time. So one might ask why anyone would consider eastern oysters for a listing on the Endangered Species Act? That is a question that I ask myself.

Even in areas along the eastern United States seaboard, where in some areas oyster diseases have had an impact on harvestable populations, there are hundreds of millions of individual oysters in coastal oyster growing areas. Could the answer to my question be that someone is trying to impact the livelihood of thousands for a personal political agenda by using the Endangered Species Act? If this is the case, which it appears to be, then maybe Congress needs to look at significant changes to this act.

The petition to list the eastern oyster as endangered or threatened under the Endangered Species Act is targeted at concerns in the Chesapeake Bay. For a number of years, Congress has funded oyster research in this area, and some successes have occurred. Thomas Jefferson, our third President, said, "Nothing can stop the man with the right mental attitude from achieving his goal. Nothing on Earth can help the man with the wrong mental attitude."

I believe that Congress has had the right mental attitude in funding this research and development and should continue to do so. I believe that the petitioner may have the wrong mental attitude relating to this concern.

We must continue to press forward on resolving whatever concerns are presented to the oyster community. As Babe Ruth said, "We must never let the fear of striking out get in our way."

Thomas J. Watson, a successful businessman, said, "Would you like me to give you a formula for success? It is quite simple, really. Double your rate of failure. You are thinking of failure as the enemy of success, but it isn't at all. You can be discouraged by failure, or you can learn from it. So go ahead and make mistakes. Make all you can because, remember, that is where you will find success."

I believe that we are getting closer to narrowing in on a significant success in the Chesapeake's oyster challenge. But without a viable ability to market a product, the incentive to invest in oyster reef and crop expansion will be lost. And if we lose a generation of harvesters, farmers, and processors, we may never see a recovery of the oyster or oyster communities in this area.

A few years ago, my oldest son graduated from Brigham Young University and was trying to decide if he was going to become the eighth generation in our family to continue in the oyster community. I told him of the great potential and future that our family

business had and how, with good management and research and development, we could grow and continue to be successful. He is now the eighth generation of our family in the oyster community, where his younger brother, who recently graduated from the University of Utah, will be joining him this September.

We must continue to do the necessary research and development, with its associated failures and successes, with the academic community and the oyster community to once again help it to thrive. Raul Armesto said, "The world isn't interested in the storms you encountered, but whether or not you brought in the ship." This industry, this community is one ship worth bringing in.

Let me once again speak of things that are happening in the Gulf of Mexico. The oyster community has supported at Louisiana State University the development of a small hatchery in Grand Isle, Louisiana. My father, my brother, and my nephew are working on a project with the hatchery that they believe may double our company's oyster production in 3 to 5 years. That means we may harvest an additional 45 to 75 million individual oysters annually.

Henry Ford once said, "You can do anything if you have enthusiasm. Enthusiasm is the yeast that makes your hopes rise to the stars. With it, there is accomplishment. Without it, there are only alibis." We must foster the enthusiasm that exists to resolve the challenges that are before us.

We do not support the petitioner's request to have eastern oysters listed under the Endangered Species Act as either threatened or endangered. We do support the appropriate changes to the Act that will not allow successful and viable resources to be subjected to this type of review and continued funding for research and development in this area.

[The prepared statement of Mr. Voisin follows:]

Statement of Michael C. Voisin, Chairman, Louisiana Oyster Task Force

Chairman Pombo and Members of the Committee, I want to thank you for this opportunity to testify before you on the Status of the Eastern Oyster (Crassostrea virginica) and the Petition to List it under the Endangered Species act.

I am Mike Voisin Chairman of the Louisiana Oyster Task Force a governmental agency within the Louisiana Department of Wildlife and Fisheries composed of Oyster Industry Association and Governmental Agency appointees. The Louisiana Oyster Task Force was created by the 1988 Louisiana Legislature with the directive to strengthen the oyster industry. I am currently President of the Molluscan Shellfish Committee (a part of the National Fisheries Institute (NFI)) and a board member of the Gulf Oyster Industry Council (GOIC) and the Louisiana Oyster Dealers and Growers Association (LODGA).

I am a seventh (7th) generation oyster farmer and processor. Our farm comprises approximately 14,000 acres of water bottoms in Coastal Louisiana which produces between 15 million to 25 million pounds of in-shell oysters annually. This represents 45 million to 75 million individual oysters that we harvest on an annual basis. Since our oysters take anywhere from 2 to 4 years to grow to harvest size, this means that at any one time our farm may have anywhere from 135 million to 225 million individual oysters on it.

The State of Louisiana produces approximately 250 million in shell pounds of oysters annually or 750 million individual oysters with a similar growth cycle of 2 to 4 years to market size, this means that at any one time there are approximately 2.25 billion oysters in our oyster farms and public producing areas. The Gulf States combined with Louisiana produce annually approximately 500 million in shell pounds of oysters, totaling approximately 1.5 billion individual oysters and maintaining approximately 4.5 billion individual oysters in Gulf producing areas at any one time.

So one might ask why anyone would consider Eastern Oysters for a listing on the Endangered Species Act. That is a question that I ask myself.

Even in areas along the Eastern United States seaboard where in some areas oyster diseases have had an impact on harvestable populations there are hundreds of millions of individual oysters in their coastal areas.

Could the answer to my question be that someone is trying to impact the livelihood of thousands for a personal political agenda by using the Endangered Species Act? If this is the case, which it appears to be, then maybe Congress needs to look at significant changes to this act!

The petition to list the Eastern Oyster as Endangered or Threatened Under the Endangered Species Act is targeted at concerns in the Chesapeake Bay. For a number of years Congress has funded oyster research in this area and some successes have occurred! Thomas Jefferson our third President said, "Nothing can stop the man with the right mental attitude from achieving his goal; nothing on earth can help the man with the wrong mental attitude." I believe that Congress has had the right mental attitude in funding this research and should continue to do so. I believe that the petitioner may have the wrong mental attitude relating to this concern.

We must continue to press forward on resolving whatever concerns are presented to the oyster community. As Babe Ruth said, "We must never let the fear of striking out get in your way."

Thomas J. Watson a successful businessman said, "Would you like me to give you a formula for success? It's quite simple, really. Double your rate of failure...You're thinking of failure as the enemy of success. But it isn't at all...You can be discouraged by failure—or you can learn from it. So go ahead and make mistakes. Make all you can. Because, remember that's where you'll find success." I believe that we are getting closer to narrowing in on significant success in the Chesapeake's oyster challenge. But without a viable ability to market a product the incentive to invest in oyster reef and crop expansion will be lost. And if we lose a generation of harvesters, farmers and processors we may never see a recovery of the oyster or oyster communities in this area.

A few years ago my oldest son graduated from Brigham Young University and was trying to decide if he was going to become the eighth generation in our family to continue in the oyster community. I told him of the great potential and future that our family business had and how with good management and research and development we could grow and continue to be successful. He is now the eighth generation of our family in the oyster community, where his younger brother who just graduated from the University of Utah will be joining him this September. We must continue to do the necessary research and development (with it's associated failures and successes) with academia and the oyster community to once again help it thrive.

Raul Armesto said, "The world isn't interested in the storms you encountered, but whether or not you brought in the ship." This is one ship worth bringing in!

Let me once again speak of things that are happening in the Gulf of Mexico. The oyster community has supported at Louisiana State University the development of a small oyster hatchery in Grand Isle, Louisiana. My Father, Brother and Nephew are working on a project with the hatchery that they believe may double our company's oyster production in 3 to 5 years! That means we may harvest an additional 45 to 75 million individual oysters annually.

Henry Ford once said, "You can do anything with if you have enthusiasm. Enthusiasm is the yeast that makes your hopes rise to the stars. With it, there is accomplishment. Without it, there are only alibis." We must foster the enthusiasm that exists to resolve the challenges that are before us!

We do not support the petitioners request to have Eastern Oysters listed under the Endangered Species Act as either threatened or endangered! We do support appropriate changes to the Endangered Species Act that will not allow successful and viable resources to be subjected to this type of review and continued funding for research and development in this area.

The CHAIRMAN. Thank you.

Mr. Gergela?

STATEMENT OF JOSEPH M. GERGELA, III, EXECUTIVE DIRECTOR, LONG ISLAND FARM BUREAU

Mr. GERGELA. Good afternoon. My name is Joe Gergela. I am Executive Director of Long Island Farm Bureau, a 7,200-member

general farm organization of farmers, fishermen, landscape contractors, and citizens interested in a rural quality of life. In fact, we have several hundred members that are commercial baymen, lobstermen, fishermen, and aquaculturalists.

I personally grew up on a 200-acre potato and vegetable farm on North Fork of Long Island, and I farmed with my dad until 1987. I have been executive director of Long Island Farm Bureau for 17 years.

Thank you for allowing me to present testimony regarding the petition to list the eastern oyster as endangered or threatened under the Endangered Species Act. Where I come from, farmers, baymen, and fishermen are the endangered species. I am not a scientist, nor pretend to be one, nor an expert on the science of the petition. I am, however, the advocate for commercial fishing and aquaculturalists on Long Island and in New York State.

Long Island Farm Bureau, as an organization, joins our State Senate delegation in strong opposition to the listing of the eastern oyster as threatened or endangered as it relates to the Endangered Species Act. Since the eastern oyster is an invertebrate, the entire species would have to be listed under the Act if it is endangered or threatened. We don't think that that is the case.

After reading the petition document by W. Dieter Busch, it appears to us at Long Island Farm Bureau and my members that while the petitioner raises legitimate concerns for the future of the Chesapeake Bay shellfish industry, this petition is a back-door effort and an inappropriate use of the Endangered Species Act to prevent the Asian oyster from being introduced into the Chesapeake ecosystem. We believe stand-alone legislation by the Congress to address that issue would be a far better way to prevent a possible invasive species from being introduced into the ecosystem.

It appears that the petitioner is using the ESA to usurp local decision-makers by asking the Federal Government to weigh in by using the act. That, in itself, is a dangerous precedent as this could have serious and detrimental effects on the oyster producing industry in New York State and many other States—Louisiana, Connecticut, Rhode Island, New Jersey, Delaware, and on and on.

The economic impact of the ESA ruling at this point is impossible for us to anticipate. The ESA ruling could take many different forms, with varying impacts upon the individuals and companies and locations of operations that engage in the wild harvest or established aquacultural businesses. In the absence of specific regulations, which would be imposed upon listing, Long Island Farm Bureau would speculate that the effect could range from minimal or to a total elimination of a $12 million a year industry in New York State.

Regulations from a listing may preclude aquacultural shellfish farming, which has seen a positive trend in New York State. In 1990, there were 18 licensed permit holders for oysters, and as of today, there are over 50. And that is according to our State Department of Conservation Bureau of Shellfisheries located on Long Island.

The shellfish industry on Long Island, together with our elected officials, have worked together through innovation and science to

raise the production totals of 9,000 bushels in 1999 to nearly 50,000 bushels in 2004 dockside landings. It is reasonable to anticipate that regulations would likely result in across-the-board increases in costs of operation.

If there are no other species to farm as an alternative, investment would stop. Capital would likely be withdrawn. And when facilities decline, they are likely to be shut down rather than be repaired or improved. The impact would be devastating to the industry, affecting businesses, families, and the economy of our State.

In the essence of time, I have a lot of historical information in the testimony if you care to read it later on. In 1855, the first planting took place in New York waters. And as early as 1850, the town of Brookhaven in Suffolk granted the first leases for aquaculture for oyster cultivation.

I am going to change course a little bit and mention a couple of things which we are doing to address the resource concerns in New York. In 1983, we had our first aquaculture plan, and at that time, there was conclusion that we could continue to have a viable, healthy, and vibrant industry.

Last year, our State legislature in 2004 adopted a change in the State statute to allow in Suffolk County the creation of a program for the leasing of bay bottoms in the Great Peconic Bay estuary system, and we are working on rule-making right now to allow that to happen. There is a huge interest in small companies that are bringing back oyster production into the east end of Long Island, into the Great Peconic Bay systems.

Also, 1992, the Peconic Bay estuary was formally adopted into the national estuary program. We have been, in fact, participating in programs to reduce the impacts of agricultural nutrient and pesticide loadings into the estuary program.

In addition to that, I want to just mention a couple of things about real-life impact on some of our members. Frank Flowers and Sons, one of the first in the country to be a family that has an oyster hatchery, started in 1887. They employ 50 people. They have 50 million oysters and 50 million clams in their waters off of Oyster Bay, Long Island.

One of my board members, Karen Rivara, her company is fairly new in the last 10 years. They grow 4 million oysters and 500,000 hard clams, and they expect that their business will be growing 20 to 40 percent a year.

One last one is K&B Seafood, and Mr. Kehoe, one of the proprietors is here. It is a $5 million a year business that sells oysters. In addition to them, there are 60 companies on Long Island alone and 190 that make their living in New York State selling oysters.

In conclusion, in addition to the economic impacts, if New York shellfish farmers are not permitted to grow the eastern oyster due to this listing, there will be less oysters in the environment, creating less habitat, spawning less offspring, filtering less water, and removing less nitrogen.

Thank you for the opportunity to comment.

[The statement of Mr. Gergela follows:]

Statement of Joseph M. Gergela, III, Executive Director, Long Island Farm Bureau

Good afternoon, I am Joseph Gergela, Executive Director of Long Island Farm Bureau, and a 7,200-member general farm organization of farmers, fishermen, landscape contractors and citizens interested in a rural quality of life. In fact, Long Island Farm Bureau has several hundred members that are commercial baymen, lobstermen, fishermen and aquaculturalists. Long Island Farm Bureau is part of the federation of counties that comprise New York Farm Bureau and at the national level the American Farm Bureau Federation. I personally grew up on a 200-acre potato/vegetable farm on Long Island's North Fork and actually farmed with my father until 1987. I have served as Executive Director of Long Island Farm Bureau for last 17 years.

Thank you for allowing me to present testimony regarding the Petition to List the Eastern Oyster as Endangered or Threatened under the Endangered Species Act.

I am not a scientist, nor pretend to be one, or an expert on the science of the petition. I am, however, the advocate for commercial fishing and aquaculturalists on Long Island and in New York State. Long Island Farm Bureau as an organization joins our New York State Senate (Attachment #1) in strong opposition to the listing of the Eastern Oyster as threatened or endangered as it relates to the Endangered Species Act.

Under the ESA, a listing determination can address a species, sub-species or a distinct population segment (DPS) of a vertebrate species (16 U.S.C.1532 (16)). Since the Eastern Oyster is an invertebrate, the entire species would have to be listed under the ESA (or sub-species if information indicates that there are sub-species of the Eastern Oyster) if it is endangered or threatened. A species is endangered if it is in danger of extinction throughout all or a significant portion of its range. (ESA section 3 (6)). It is threatened if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its ranges (ESA section 3 (19)).

Under section 4(a)(1) of the ESA, a species shall be listed if it is determined to be threatened or endangered as a result of any one of the following factors:

1. present or threatened destruction modification or curtailment of habitat or range
2. over utilization for commercial, recreational, scientific or educational purposes
3. disease or predation
4. inadequacy of existing regulatory mechanisms or
5. other natural or manmade factors affecting its continued existence.

In addition, Listing determinations are made solely on the basis of the best scientific and commercial data available, after conducting a review of the status of the species and taking into account efforts made by any state or foreign nation to protect such species. This is the basis by which you are holding this hearing today.

After reading the Petition document by W. Dieter H. Busch it appears to Long Island Farm Bureau and its members that while the Petitioner raises legitimate concerns of the future of the Chesapeake Bay shellfish industry, this Petition is a back door effort, and an inappropriate use of the ESA to prevent the Asian Oyster from being introduced into the Chesapeake ecosystem. We believe stand alone legislation by the Congress to address that issue would be a far better way to prevent a possible "invasive" species from being introduced into the ecosystem. It appears that the Petitioner is using the ESA to usurp local decision makers by asking the Federal Government to weigh in by using the ESA.

That in itself is a dangerous precedent as this could have serious and detrimental affects on the Oyster producing industry in New York State and other states such as Louisiana, Connecticut, Rhode Island, New Jersey, Delaware and so on as the ESA requirements could make the Eastern Oyster endangered throughout the entire population range without justification or consideration of the variation of the 5 criteria of ESA.

The Economic impact of the ESA ruling at this point is impossible to anticipate. The ESA ruling could take many different forms with varying impacts upon the individuals and companies and locations of operations that engage in wild harvest or established aquacultural businesses. In the absence of specific regulations which would be imposed upon listing, LIFB could speculate that the effect could range from minimal or to total elimination of a 12 million dollar a year industry in New York State. Regulations from an ESA listing may preclude aquacultural shellfish farming which has seen a positive trend here in New York State. In 1990 there were 18 licensed permit holders of oysters, as of today there are over 50 according to New York State Department of Conservation Bureau of Shellfisheries located on Long Island. The shellfish industry on Long Island together with our elected officials have worked together through innovation and science to raise the production totals of

9,020 bushels in 1999 to nearly 50,000 bushels in 2004 dockside landings (Attachment #2). It is reasonable to anticipate that regulations would likely result in across the board increases in costs of operation. If there are no other species to farm as an alternative, investment would stop. Capital would likely be withdrawn and when facilities decline, they are likely to be shut down rather than be repaired or improved. The impact would be devastating to the industry affecting businesses, families and the economy of our state.

From a historical perspective, oystering has been prevalent as a way of life on Long Island for centuries. In the 1640's when the first English-speaking settlers arrived in Orient, they called the tiny village on the tip of the North Fork, Oysterponds. One only needs to look at the historical data to realize that there were many peaks and valleys of dockside landings for hundreds of years. Pollution from point and non-point sources, storm water runoff, pathogens, disease, predators, over harvesting and the whims of Mother Nature contributed to the rise and fall and rise again of the oyster industry. Companies such as Frank M. Flowers and Sons have been in the business since 1887 by developing new technology and adapting to changes in the mariculture process and estuary environment. Mariculture and Aquaculture is being used today to assist in production of high quality seafood. The most dramatic influence that farming the sea has had so far in New York State has been in the oyster business. It has basically saved this historically significant industry. Forty percent of the oysters eaten today are the product of the mariculture industry. New York State has been a national leader in development of mariculture. As early as 1784 officials in Oyster Bay realized that the oyster was in need of protection from over harvesting and was the first community to pass an ordinance concerning shellfish. That particular law prohibited all but local baymen from taking oysters from Oyster Bay. In fact, Oyster Bay received its name in 1639 from a Dutch sea captain who was so impressed by the abundance of tasty oysters in this area. When he arrived, he discovered huge mounds of oyster shells, obviously the result of many years of feasting by Indian tribes. The shells provided Oyster Bay with one of its earliest industries, the production of lime by grinding of the oyster shells. There was no full-scale business relating to the oyster during Colonial times, as oystering during this period was part of the general search for food and was conducted on an individual gleaning basis.

The real Long Island industry got started in the Great South Bay in the early 19th century and remained an important enterprise for many years. As the taste for the nutritious mollusk grew in demand, the local industry became a national and international large-scale industry. As the business flourished more and more, baymen harvested the vast natural beds in the Great South Bay around a community known as Blue Point. Because of the "Blue Point Oyster's" compact size and hardiness, it was shipped to San Francisco and London. By 1823 the quantities and quality of oysters began to decline. With this problem occurring, the south shore baymen sought new areas to harvest oysters and found new beds along the north shore of Long Island. From Queens to Port Jefferson the bivalve was plentiful. Soon, these areas were also over harvested and thoughts and energies turned to planting the fished out beds with fresh seed oysters from the still bountiful Chesapeake area. In 1855 the first planting took place in New York waters. In planting the seed oysters, the baymen introduced an extremely important dimension to the oyster industry; that planting and harvesting was feasible and not entirely dependant on natural production. As early as 1850 the town of Brookhaven in Suffolk County granted the first leases of town waters for oyster cultivation and soon after other towns granted leases as well. The naturally productive areas of Long Island's bays were not leased and left open for natural harvest. In 1881 Brookhaven began one of the first public mariculture projects in town beds in response to a declining natural harvest by seeding open waters in its jurisdiction. In 1886 Eugene Blackford of the New York State Forest, Fish and Game Commission wrote "the oyster industry is rapidly passing from the hands of the fisherman to those of the planter and oyster culturalist".

Oystering equipment also changed and in 1874 the first steam driven dredge was used. The invention would do the work equivalent to 300 men using tongs. Later the suction dredge was developed and could do the work of 4 regular dredges or 1200 oystermen.

Attention to the east end of Long Island to the waters of Gardiner, Great Peconic and Little Peconic Bays were found to be conducive to maturation of seed oysters around 1890. Up to that time, fishing and scalloping were the premier industries in those waters. By 1900 the East End waters became an important maturation area as the industry moved west to east from New York City. Staten Island, Flushing Bay, parts of the Hudson and East River were areas of production of oysters. By 1927 and since that time, no oystering has been done when New York State

condemned the waters around New York City for shellfish harvesting. The early years of oystering on Long Island were from 1855 to 1916, the time mariculture techniques were applied. By the 1880's New York State had become the center of the northern oyster industry and led the country in overseas and transcontinental shipments of oysters.

Oyster production went from its high in 1900 to its low in the 1960's. At the peak there were 150 companies working in the Long Island Sound with hundreds of boats and thousands of men. By the 1960's the number of boats and companies were down to a dozen. Part of the downfall of the industry was attributed to increased pollution that came from commercial and residential development around the natural oyster beds that diverted river and stream flows, which resulted in a marked change of salinity. These problems were accompanied by over harvesting, oyster disease, and major storms that destroyed the major beds. In addition, there was an increase in predators such as starfish. All of these factors resulted in almost a total wipe out of the natural oyster in Long Island Sound and Great South Bay.

From that point in time in the 1960's, Frank M. Flowers and Sons and other companies and also with help from New York State, New York Sea Grant Institute and Cornell University efforts were undertaken to save the industry by developing hatcheries and new technologies for oyster production. In 1983 the industry got a big boost when the State of New York authorized New York Sea Grant of State University of New York and Cornell University College of Agriculture and Life Sciences to undertake a study and develop a statewide aquaculture plan. In 1983 the first draft was published and later concluded that aquaculture in New York could continue to be a viable healthy and vibrant industry.

In 2004, New York State passed new legislation: Laws of New York 2004 Chapter 425 (Attachment #3) "An Act to amend the environmental Conservation Law in relation to ceding underwater lands at Gardiners and Peconic Bays to Suffolk County for the purpose of establishing an aquaculture management program for the cultivation of shellfish and to repeal Chapter 990 of the law of 1969 related to same".

In 2002, Suffolk County Resolution 1229-2002 directed the Suffolk County Department of Planning, the Division of Environmental Quality in the Department of Health Services, and County Department of Public Works to prepare a plan for the conduct of a survey of underwater lands in Gardiners and Peconic Bays for the purpose of cultivation of shellfish. (Attached #4) This is a copy of the policy guidance document on shellfish cultivation in Peconic and Gardiners Bays conducted by the Suffolk County Department of Planning. While the county is only beginning to promulgate regulations for such a leasing program, an ESA listing for the eastern oyster will most likely make such a program moot, as most of today's shellfish farmers are growing the eastern oyster. It is expected that any expansion of mariculture in New York will also primarily involve the eastern oyster, the only oyster allowed by law to be cultivated in New York State.

In 1992, the Peconic Bay Estuary system was formally adopted into the National Estuary Program. Comprehensive Management Plan was adopted in 2002 after many years of the various government agencies at all levels, as well as stakeholder and citizen groups, to prioritize the actions and programs needed to protect and remediate environmental and economic resources of the ecosystem. In fact, as part of the CCMP, Long Island Farm Bureau has been working with the PEP to develop and implement a nutrient and pesticide management plan for the agricultural industry modeled upon the New York State Agricultural Environmental Management Program (AEM). Long Island Farm Bureau is currently working with the New York State Legislature on proposed legislation to further implement recommendations from the CCMP. In the latest version of the PEP newsletter, front-page article, it states, "Compared to other estuaries nationwide the Peconic Estuary is a relatively healthy system." (Attachment 5)

The point being that New York State has been and is currently addressing the issues facing the ecosystem from all the affects of the societal impacts upon the estuary.

While we could continue to dwell on the past, it is time to go forward with the fact that with all of the challenges, there continues to be an opportunity to revitalize and expand the oyster industry on Long Island and in New York.

For your information I have chosen 3 Long Island Farm Bureau members to profile their respective companies to demonstrate the real life human impact upon our members if the Eastern Oyster listing were to happen.

Frank M. Flower and Sons was established in 1887 by the Flower family. The company flourished until the late 1950's when oysters seriously declined. At that time. H. Butler Flower had the foresight to build one of the first major oyster hatcheries. As a result of oyster and clam aquaculture, Frank M. Flower remains as the last of the traditional shellfish companies in New York State.

This multi-million operation employs 50 local individuals. Six vessels ranging from 50 to 90 feet are used to harvest oysters and clams from 1800 acres of underwater lands leased from the Town of Oyster Bay. Some of these vessels date back to the early 1900's. The underwater lands are stocked with 50 million oysters and 50 million clams from the 5000 sq. ft. company hatchery every year. Frank M. Flower is also the major supplier of shellfish seed to aquaculturists and Town shellfish programs in New York.

Aeros Cultured Oyster Company Inc. was incorporated in New York in 1996. It is owned by Karen Rivara* and James Markow. They grow oysters, hard clams and bay scallops. The majority of their production consists of Eastern Oysters. It took them five years to work out a cultivation regime that would protect their crop from predators and allow them to manage around disease pressure.

They have a shellfish hatchery, three nursery system sites, and underwater cultivation grounds totaling 350 acres (250+ in New York.). In 2000 they founded the Noank Aquaculture Cooperative, which now has 14 members in New York and Connecticut. Since 2001, Aeros has increased their plantings of oysters by no less than 20% annually. This season they will plant 4 million oysters and 500,000 hard clams. They will donate several hundred thousand shellfish seed to town sponsored cultivation programs in New York and Connecticut. Their hatchery sells seed to other growers. The total hatchery production will be 9 million oysters, 600,000 hard clams and 400,000 bay scallops. Next year they expect this demand to increase by 20-40% for oysters. They also work with community groups to restore shellfish, mainly oysters, in local estuaries.

Their company has grown to earn income for 2 families and to employ 4 part time workers. Their gross sales for 2005 will approach $500,000. The economic multiplier for shellfish aquaculture is 2.5, although multipliers as high as 4.0 have been used for some operations.

The economic impacts would be as follows:

Crops under cultivation	$ 800,000
Boats	175,000
Nursery System	60,000
Hatchery	60,000
Seed	90,000
Equipment	90,000
Grounds	45,000
Total Investment	$1,320,000

*Karen Rivara currently is on Long Island Farm Bureau's Board of Directors and is its Secretary.

K&B Seafood Inc. started in 1992 by Thomas J. Kehoe and Roger S. Boccio is located in East Northport, New York. Tom Kehoe serves as President and Roger Boccio as Treasurer.

K&B Seafood has annual sales of $5,000,000. The company employs 14 individuals. K&B Seafood currently ships "Eastern Oysters" all across the United States, Canada, and overseas to Hong Kong and Japan. They are currently developing new markets in other countries.

In addition to K&B Seafood, there are more than 60 companies engaged in the interstate sale of Eastern Oysters on Long Island, and a total of 191 companies across New York State. In addition, there are over 50 individuals and companies actively growing Eastern Oysters on Long Island. This does not include the thousands of restaurants, retail fish markets, and supermarkets that trade oysters daily. Thousands of jobs that would be lost due to the frivolous listing of our oyster as endangered.

In addition to the economic impacts, if New York shellfish farmers are not permitted to grow the eastern oyster due to an ESA listing, there will be less oysters in the environment, creating less habitat, spawning less offspring, filtering less water, and removing less nitrogen.

Thank you for the opportunity to speak today on behalf of our industry. I would be happy to answer any questions.

NOTE: Attachments to Mr. Gergela's statement have been retained in the Committee's official files.

The CHAIRMAN. Thank you.

Mr. Bean?

STATEMENT OF MICHAEL J. BEAN, ATTORNEY, ENVIRONMENTAL DEFENSE

Mr. BEAN. Good afternoon, Chairman Pombo. It is a pleasure to be here. Thank you, members of the Committee.

I am Michael Bean. I am with Environmental Defense. I am the head of its wildlife program and the co-director of the Center for Conservation Incentives.

I am not here to take a position on the petition, although I would point out I am not aware that the petition has any support from any environmental organization. But I do want to draw your attention to a couple of policy issues that I think the petition raises because I know of the Chairman's broader interest in how the Endangered Species Act functions.

I have two important points to make, and the first has to do with the flexibility under the Act or, rather, the lack of flexibility under the Act to deal with invertebrates as the Act deals with vertebrates.

In Mr. Gilchrest's State of Maryland, the brown pelican has recovered and is no longer on the endangered species list. But in your State of California, Mr. Pombo, the brown pelican remains on the endangered species list. And that is because the Endangered Species Act allows for vertebrates the differential protection of different populations. So the eastern population or recovered population is no longer protected by the act, but the western population, still endangered, keeps that protection.

For invertebrates, the Act does not allow that same flexibility. For invertebrates, it is an all or nothing choice. You either list the species everywhere it occurs, or you list it nowhere at all.21And as the gentlemen at this table have indicated, the health of this particular organism appears to be quite different in the Gulf of Mexico, for example, than in Chesapeake Bay. And yet the flexibility to deal with those different situations through listing it in one place and not in another does not exist currently in the act.

I am aware that Mr. Jindal, I believe, has introduced a bill that would allow for this species the listing according to distinct population segments for the oyster, just as the law currently does for vertebrates.

The law, I must say, was not always that way. When it was passed in 1973, it allowed the same flexibility for invertebrates as it allowed for vertebrates. Congress changed that in 1978 at the behest of the House to reduce or eliminate that flexibility for invertebrates. So that is the source of the problem.

The second point I want to make has to do with the potential consequences of a listing. I think here what I want to do is to underscore the fact that under the Endangered Species Act, those

consequences could be quite different, depending upon whether it is listed as endangered or threatened.

If, for example, this species—or for that matter, any species—were listed as a threatened species, the Act gives the Secretary of Commerce in this case, or interior in the case of other species, the authority and the discretion to tailor the regulations to suit the needs of the species in particular places.

And so, for example, at least in theory, if the protections of the Act were really needed in Chesapeake Bay, they could be applied there. And yet the requirements or restrictions elsewhere might be substantially less or none at all. That is an important point to keep in mind.

In addition, of course, to the very fundamental point that this is, at this point, a petition on which the National Marine Fisheries Service has made a preliminary determination that the petition presents substantial evidence. There is a multi-month process still to be resolved as to whether or not they will act on the petition in a way in which the petitioner seeks. I rather doubt that would be the case, but that process is ongoing.

But because I think those two points are important points to underscore about the lack of flexibility to deal with invertebrates in the way in which the law allows it to be done for vertebrates and the potential flexibility with the threatened designation to tailor regulations, to tailor restrictions so that they are restrictive where they need to be and where they are not at all restrictive where they need not be—that flexibility is in the Act with respect to a threatened designation.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Bean follows:]

Statement of Michael J. Bean, Environmental Defense

Environmental Defense appreciates the opportunity to present this testimony to the Resources Committee. I am Michael J. Bean, co-director of Environmental Defense's Center for Conservation Incentives, which promotes the use of incentive-based strategies to achieve a variety of conservation goals, including the conservation of endangered species. For nearly thirty years, I have worked to further the conservation of endangered species throughout the country. My colleagues and I have worked cooperatively with farmers in California, ranchers in Texas and Utah, forest landowners in North and South Carolina, and other landowners elsewhere in an effort to find workable and effective means of conserving imperiled species. In addition to my duties at Environmental Defense, I have served on the Board on Environmental Studies and Toxicology of the National Research Council of the National Academy of Sciences and on the Board of Directors of the Environmental Law Institute. Very recently, I have joined the Board of Directors of Resources for the Future. My book, The Evolution of National Wildlife Law, is a leading text on the subject of wildlife conservation law in the United States.

The petition to list the eastern oyster as an endangered or threatened species under the Endangered Species Act highlights a number of important conservation policy issues. Environmental Defense has not taken a position on the petition itself. The petition's scientific merits—and the law is clear that a decision on the action the petition requests must be based on scientific evidence—can be better addressed by other witnesses. What I can address in this testimony are some of those important policy issues that the petition raises. In doing so, I hope to illuminate some of the options that exist, and to dispel some of the misperceptions that may also exist.

The first thing to note is that since 1978, Congress has allowed less flexibility under the Endangered Species Act with respect to invertebrate wildlife than with respect to vertebrate wildlife. That is, for invertebrates that may be in conservation trouble, the law allows only two choices: list them everywhere or list them nowhere. For vertebrate wildlife, on the other hand, the law allows a third choice: list them

only where they are at risk of extinction, while leaving them unlisted everywhere else. There are a number of examples in which the administrators of the Act have done just that. The bog turtle, for example, is listed in the Northeast, but unlisted in the southern portion of its range. The gopher tortoise is listed in the western portion of its range along the Gulf coast, and unlisted in the eastern portion of its range. The brown pelican is listed on the Pacific coast, but unlisted on the Atlantic coast. This flexibility makes it possible to focus both the resources and the regulatory requirements of the Endangered Species Act where they are most needed, and avoids the unnecessary imposition of such requirements where they are not.

For invertebrates, as I have noted, this same flexibility no longer exists. But it once did. When the Act was originally passed, Congress drew no distinction between vertebrates and invertebrates. Both could be listed at the species, subspecies, or population level. In the 1978 amendments to the Act, however, and at the behest of the House of Representatives, Congress reduced that flexibility, taking away the authority to list invertebrates at the population level. The legislative history for this action sheds little light on its rationale, but at least two possibilities seem likely. The first is that some in the House may have simply thought that invertebrates were less important that vertebrates. That view, though not uncommon, is seriously misinformed. Many invertebrates have exceptional economic as well as ecological importance. The most valuable commercial fishery in the United States, for example, is not directed at a fish, but rather at shrimp, which are invertebrates. Oysters are of obvious value economically, and are also of considerable ecological value because of their considerable role of filtering water. Sadly, both the economic and ecological values of oysters have been greatly diminished as a result of the failure of our land use, water pollution, and fishery management laws to maintain this enormous natural bounty. If one looks at a map of coastal communities along the East Coast, one sees places with names like Bivalve, New Jersey, Oyster, Virginia, and Shelltown, Maryland. Those names are testament to the importance that the once-rich natural bounty of oysters had for once-thriving communities. Most of those communities are thriving no more: the price of our inability to properly manage and sustain a once-abundant invertebrate resource has been lost jobs, devastated communities, a nearly vanished way of life, and towns with names that now seem like quaint historical artifacts.

Thus, providing less authority for, and less flexibility in, the protection of invertebrates than of vertebrates on the grounds that invertebrates are less important than vertebrates is a misguided policy. Another possible justification for the different treatment of vertebrates and invertebrates stems from the fact that invertebrates are far more numerous than vertebrates. Because invertebrate species greatly outnumber vertebrate species, the authority to list and protect distinct population segments of invertebrates might impose upon the Fish and Wildlife Service and NOAA Fisheries obligations that they lack the resources to fulfill. This is a legitimate concern, at least at current levels of funding for the endangered species program. The annual core budget for the Fish and Wildlife's Service's administration of the Endangered Species Act is almost exactly equal to the projected cost of building one mile of the Intercounty Connector highway in nearby Maryland. Thus, if Congress is only willing to give the Fish and Wildlife Service each year the equivalent of one highway mile's worth of funding with which to try to conserve some 1,264 species in 50 states and several territories, there may be no practical alternative to the current all or nothing options for the listing of invertebrate species.

The second matter I wish to address is what the regulatory consequences of listing the eastern oyster would be. It is on this topic that I think there may be some misunderstanding. The concern has been expressed that the listing of the eastern oyster would result in the imposition of highly restrictive, uniform federal rules throughout the range of the oyster. In fact, this need not be the case, at least if the species were listed as threatened rather than endangered. Under a threatened designation, it would be possible to have one set of rules in areas where oysters are most acutely imperiled—Chesapeake Bay, for example—and entirely different rules in other areas. Indeed, in the latter areas, existing state rules could continue in effect, at least if NOAA Fisheries concluded that it was neither necessary nor advisable for the conservation of the oyster to promulgate different rules. That is because under section 4(d) of the Endangered Species Act, NOAA Fisheries would have the authority, in the event that it listed the oyster as a threatened fishery, to fashion such rules regarding taking and trade as it deemed necessary and advisable for the conservation of the species, including having no such restrictions at all in some areas.

There is one qualification to the foregoing statement. A threatened designation would not eliminate the requirement that federal actions that affect listed oysters would have to be reviewed pursuant to the consultation procedures of Section 7 of

the Endangered Species Act. Thus, coastal dredging projects, federally funded expansions of coastal sewage treatment facilities, and other actions with similar potential to adversely affect oysters would receive scrutiny for their impacts on oysters, and might be required to reduce or offset any adverse impacts to the oyster resource. From the point of view of those undertaking such actions, that surely represents unwanted additional scrutiny and potentially additional cost for environmental mitigation. From the point of view of those trying to make their livelihoods by harvesting oysters, added scrutiny of those types of activities is probably welcome, inasmuch as it is activities such as those that have contributed greatly to the diminishment of our oyster resource and to the economic decline of the communities that once prospered from that resource.

The CHAIRMAN. Thank you. I thank all the panel for their testimony.

I am going to begin with Mr. Gilchrest and allow him to ask the first round of questions.

Mr. GILCHREST. Thank you, Mr. Chairman.

I would agree with Mr. Bean and also my colleague Mr. Jindal about the putting vertebrates and invertebrates under the same category as they were prior to the change in the late 1970s, and I think that would be one of the things that as we go through the process of reforming the Endangered Species Act can be one of the improvements.

Also I think it should be clear about, and I am glad Mr. Bean brought this up, that the difference between the flexibility of law concerning endangered or threatened. Certainly is one of those considerations that needs to be more clear and understood.

I have a couple of questions for the panel, though. Could the gentleman from Long Island—actually, I guess there are two gentlemen from Long Island. Is Dr. Rheault? Dr. Rheault, are you from Long Island or Connecticut?

Dr. RHEAULT. Rhode Island.

Mr. GILCHREST. Rhode Island. But you represent the Long Island Sound?

Dr. RHEAULT. Yes, sir. I represent growers from Maine to Florida.

Mr. GILCHREST. It is an island, Rhode Island.

[Laughter.]

Mr. GILCHREST. I never realized that. Mr. Gergela and Dr. Rheault, Bob and Joe.

[Laughter.]

Mr. GILCHREST. Can you tell me the breakout between wild harvest and aquaculture of oysters in Long Island Sound?

Mr. GERGELA. There is some production in Long Island Sound. Very little is wild harvest. The majority of our industry is actually mariculture and through oyster farming.

Because of all the water quality issues that you are facing in the Chesapeake, we have encountered that already in New York waters over a long period of time, and it decimated the industry. But because of perseverance, good science, commitment, our waters are cleaning up. There is commitment by our growers, and they are bringing it back.

Mr. GILCHREST. I am sorry. Because I only have a limited time. Most of the harvest in Long Island Sound, you would both agree, is through aquaculture? Oyster farming?

Dr. RHEAULT. That is correct through most of New England. Yes.

Mr. GILCHREST. Mr. Cowart?

Mr. COWART. Yes, sir.

Mr. GILCHREST. Can you give me a breakout in the Virginia waters of the Chesapeake Bay between wild harvest and aquaculture of oysters?

Mr. COWART. Representative Gilchrest, in Virginia, traditionally, the production was private. But in recent years, it has been probably half and half. As opposed to what happened in Maryland, as you well know, because that is a public industry, unlike Virginia. We have about 100,000 acres of private bottoms in Virginia.

We have 240,000 acres of public held, survey bottoms that are held in public trust. But at the same time, traditionally, the production has been private more traditionally in numbers in Virginia than what has been public.

Mr. GILCHREST. I see. A number of you have mentioned that this is a back-door way, the listing of virginica, to stop the introduction of this Asian oyster that has been discussed in Maryland and triploid use of it in the Virginia waters. I am going to say Joe and Mike again, can you tell us how you feel about the introduction of Asian oysters into the Chesapeake Bay via the Maryland plan? Are you in favor of that, opposed to that, or neutral to that?

Mr. GERGELA. I am not an expert in it. So I would defer to my colleagues that are far more expert. But in reading the petition and also meeting with growers and discussing the issue, they feel that that is a concern that the petitioner is trying to use the Endangered Species Act to stop another action.

Mr. GILCHREST. Well, if we could put the petition aside for a moment and just say the petition never happened, is there any concern up in Long Island Sound about the introduction of Asian oysters to the Chesapeake Bay?

Mr. GERGELA. Yes, there is. And in fact, New York State law allows only the eastern oyster to be produced in New York waters. So we are very specific and concerned.

As an example, the mussel—the zebra mussel that got into the St. Lawrence Seaway, now into the Great Lakes and some of the rivers, it became an invasive species, and that is the type of thing—not only that, but we have encountered that with other pest problems for agriculture.

Mr. GILCHREST. Thank you. Dr. Bob, any comment on Asian oysters in the Chesapeake Bay?

Dr. RHEAULT. As President of the East Coast Growers Association, I have members who are supporting it and opposed to it. As a grower from Rhode Island, we have come out strongly opposed. We fear that it has tremendous potential to come up the bay and displace the natural population.

Mr. GILCHREST. All right. Thank you very much. My time has expired.

The CHAIRMAN. Mr. Melancon?

Mr. MELANCON. Thank you, Mr. Chairman.

Mike Voisin, please, if you would. Assuming that the mid-Atlantic oyster can be listed or would be listed as an endangered species or endangered separately from the other sub-species of oysters, is there any anticipated effect on oyster sales for the species not listed? Do you think that——

Mr. VOISIN. Yes. If the eastern oyster was listed, that would leave in this country the gigas oyster on the West Coast, which is the largest volume oyster, which is a Pacific oyster, other than the eastern oyster. I would expect an explosion in sales growth for the Pacific oyster from the Pacific Northwest—Oregon, California, and Washington. I would expect the stop of sale of the eastern oyster.

Mr. MELANCON. And what would happen with Louisiana's?

Mr. VOISIN. Well, Louisiana, the total economic impact of our industry is around $280 million a year. So that economic impact would close. And pending what would happen in relationship to the implementation of the act, we may have near-shore oil and gas development stop because of oysters being endangered species. We may have coastal restoration, which is a huge concern in our area, be halted in its footsteps because if you introduce fresh water, you might kill oysters.

We might have sport fishing and the ability to use our waterways be halted at certain times when oyster larvae was in the water because it may kill—the propellers on recreational boats may kill oyster larvae. I don't know how far this would go, but potentially, you could bring a screeching halt to the whole economy in south Louisiana. The oil and gas needs of the country would be pretty well devastated.

Mr. MELANCON. Usually, as far as it can go, it ends up going.

Dr. Rheault, the argument from Chesapeake Bay harvesters is that water degradation is the cause behind declining oyster populations. And how does that water quality compare to the conditions in which you grow your oysters, and why are they having trouble and you aren't?

Dr. RHEAULT. Well, the oyster is a tremendously hearty species. It thrives in some tremendously polluted waters. It has been around since the age of the dinosaur and is tremendously adaptable.

When I was doing my thesis research, we looked at growing oysters in marinas. And while we suspected problems from the heavy metals in the bottom paints and the fuel spills, we discovered 100 percent survival and growth rates as fast as any reported in literature.

And I now grow my entire crop of 3 million seed under the docks of a gas dock in a marina with 100 percent survival. And we grow them out in clean water. So I question whether the water quality issues raised by the petitioner are the direct cause for the decline of the oyster.

And why are the wild populations and the cultured populations different? It is because we protect our oysters. They are our pets. Everything eats a small oyster. Little crabs, little fish, jellyfish will eat the larvae. The little shrimp you see in the water, they will eat a baby oyster. And if you leave a baby oyster out unprotected, it is going to get eaten. And we protect our babies.

And that is why aquaculture is able to thrive in areas where wild harvests are suffering because there have been new predators introduced. We have a new Japanese green crab. Now there is a cute new fiddler crab, new exotic crab. Other exotic species are coming in all the time, and these are all threats to the wild oyster that they are not threats to cultured oysters protected by farming.

Mr. MELANCON. Thank you, sir.

Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Jindal?

Mr. JINDAL. Thank you, Mr. Chairman, for calling this hearing. I want to thank our witnesses as well.

I have only got just three questions. First of all, I want to reiterate a point that has been made several times. The fact that we are talking about a species, we are talking about oysters that are harvested currently and whose range range from all the way from the Gulf of St. Lawrence all the way down to the Yucatan Peninsula. We have heard today about the fact that there are billions—I am going to repeat that—literally billions of these oysters.

And so, where there may be legitimate concerns about what is happening in Maryland and the Chesapeake, I certainly want to make sure that everybody hears that we need to make sure we don't approach this with a one-size-fits-all solution that actually ends up causing more damage and more harm than actually it helps to repair. And it certainly doesn't make any sense from a Louisiana perspective or from some of these other perspectives to declare this entire range of species endangered.

Having said that, I have three questions. The first is you have heard some comments about a piece of legislation I have introduced that would allow, as we have heard, the invertebrates to be treated as are vertebrates and allow the status of endangered species to be applied based on geography. So that the species is thriving in one area, it is not artificially claimed or declared to be endangered because of the way it is doing in another area.

My first question to the various folks here on the panel is, is that an approach that you could support? I know some of you mentioned in your testimony, but I didn't hear everybody comment on that. And for the sake of time, I will lump in my second question. In addition to that specific approach, would you also be in support of an approach that gives States and regions more flexibility to protect the species, that works best based on those geographies?

I am going to lump my first two questions together and allow the members of the panel to respond to those two questions.

Mr. COWART. In the Chesapeake Bay, we don't feel like that our species, even if you discount the Gulf coast or the Northeast coast, we don't feel like we have a threatened or an endangered species. And we feel like that the States, particularly Virginia—I am not familiar with all the work that goes on Maryland. But the State of Virginia has taken appropriate actions to try to actually reinvigorate these oyster populations.

The oyster in the Chesapeake Bay is the solution to the problem. It is not the problem. The problem is something else. But obviously, if invertebrates are reclassified, we probably wouldn't have the Gulf coast guys here today in opposition to what is taking place perhaps with this particular listing that is proposed.

Mr. JINDAL. Thank you.

Dr. RHEAULT. As I said in my testimony, I believe this is a local fisheries management issue, and I believe that the local authorities should be dealing with it in their own way. However, if we were to list this on a local basis, unfortunately, the consumer tends not

to be very savvy. And if they hear that oysters are in trouble somewhere, they are likely to shy away from the product everywhere.

When red tide hit in New England, even though all the product that was on the market was safe, and no one had even gotten sick, you couldn't sell an oyster in Boston. The consumer is going to hear that oysters are in trouble, and they are going to say, "Well, I shouldn't be eating an endangered species or a threatened species."

They are not going to be able to differentiate between one harvested from the Gulf. They are going to shy away. Our markets will evaporate, and our industry will suffer.

Mr. VOISIN. Thank you, Representative Jindal, for the question.

While I am not an expert in the Endangered Species Act and/or the bill that you introduced, it appears to have a set of direction that needs to be directed at, and that is changes to the Endangered Species Act. My fear, though, is that if you are to say we are a subpopulation or a different group, what happens if the eastern oyster is declared endangered and Hurricane Andrew comes through Louisiana again?

Do we all of a sudden see in the Terrebonne Bay system or in the Barataria Bay system when the oysters are wiped out, all of a sudden somebody says, well, now they are endangered in that area, and we have a subpopulation of the Louisiana industry or the Louisiana oyster. And so, they are endangered there. Which would prohibit what we do, which is rebuild those because the oysters farmers get back in and scrape the bottom, get the mud off, move the grassy materials and the marsh that has sunk on top of the beds.

My fear is if we start looking subpopulation basis-wise. It makes sense. Logically, it all makes sense. But what happens is do we begin to open the door for people to say because of a one-time catastrophic event, it is endangered, and then it may take a generation or two without economic incentive to rebuild that area?

Mr. JINDAL. My time is about to run short. I will give you my third question. If we have time, I will let the panelists respond. And I certainly appreciate the comments.

I guess what I am hearing out of this panel's testimony is the fact that we do need to be more flexible than what we are currently allowed to be. We need to have more options, in other words, currently available to us.

I am aware, and I hope in future panels we will hear more. I know that there have been aggressive restoration plans put in place as recently as 2000-2001. I would like to hear more about the progress of those plans, whether there is something short of classifying the species as endangered that would allow these oysters to thrive.

I would like to hear more about what is already being done. It seems like a short amount of time has passed since 2000-2001 for us to be taking drastic action so quickly. I am sorry that the rest of the panel didn't get a chance to respond to the question. But what I am hearing from everybody is the fact that we do need to be more flexible in our approach.

Thank you. Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Voisin, you talk about the incentives that exist currently to rebuild the oyster beds if they are disrupted and

losing that particular incentive. I have a question, and this is where we have a very difficult way of dealing with this because when you talk about listing population segments, it is one thing if you are talking about the brown pelican and whether it is recovered in Maryland or not recovered in California. That is something that science can tell you whether or not you are at a sustainable population.

When you are dealing with a commercially traded species, you have another layer of bureaucracy that comes on top of that, and that is where I have concerns about listing a particular population segment, and ultimately, what does that mean?

I am familiar with at least one case in commercially traded product where the new layer of bureaucracy that is on top of that makes it almost impossible for them to sell their product within the United States because it is endangered, and the cost of meeting that is a concern. Is that a concern that you have?

I mean, you are coming out of the Gulf. If we listed the Chesapeake Bay as an endangered population, how do you prove where your oysters came from?

Mr. VOISIN. Well, that is not an easy answer. I mean, you would have to have a scientist at every restaurant or oyster bar to make a determination and maybe do a DNA test or something like that. But Dr. Rheault, I think, did a great job of explaining that the consumer is savvy today, savvy enough to understand that there may be some potential concern.

Yet when they hear about it, when he talked about the red tide outbreak in Massachusetts recently, oyster sales in Louisiana were impacted as well, and clam sales in Florida were impacted, where we were thousands of miles away from the concern. Because the consumer reads a little bit or hears a little bit, the confusion out there draws them away from the market.

But the concern I see is that when there is an economic incentive to be able to get a return on an investment, I see that businessman getting with his congressman, getting with his local community leaders, and trying to accomplish something to rebuild versus when there is none, what I have seen—and I can't point to any specific situation. But in a general sense, if it is an environmental movement or a feel-good movement in a community, it wanes as time goes on.

So that if you lose a generation, if you lose a generation, what is happening in the Chesapeake right now is a lot of the waterfront is actually being developed for things other than oyster processing plants. In fact, I was with an oyster processor last night that has now retired and sold his facility, and they are going to develop some really nice developments where his facility was. That is one more that we won't have when the bay comes back.

And I say "when the bay comes back" because the bay will come back. It is a matter of time and energy, and the research and development is there to do that. So that is my biggest fear is we will generationally lose something, and in a generation or two, you are not going to grow oyster shuckers back. You are not going to grow the entrepreneurial spirit that oyster processors and farmers have today and the management of water bottoms and the ability to grow that product if there is not an economic incentive to do that.

The CHAIRMAN. Mr. Bean, I know that you probably understand the incentives as well as anybody in the environmental movement, and it is something you have been talking about for a while. And I do want to broach that with you in terms of taking away the economic incentives that some of the other panelists have for recovering populations in certain areas. And when we talk about the Chesapeake, how do we create an economic incentive there to recover the species?

Mr. BEAN. I don't have a specific answer to that question. I agree with you that creating an incentive to do that is vitally important, but the main problem—certainly, one of the main problems in the Chesapeake is the new introduced diseases that occur there. And although I am hardly an expert on the matter, it is my understanding is that we don't really know quite how to deal with those diseases just yet.

So unless and until we can overcome that, we may be facing problems that economic incentives alone can't address. But I certainly would agree that anything that encourages and rewards and induces oyster growers and others to be part of the effort to clean up water, to reduce some of the sources of pollution, to reduce some of the disturbances from dredging of ports and waterways and so forth, that is clearly needed.

Whether the Endangered Species Act is needed, that is a different question. I don't know that it is. For the reasons I have indicated, it may not be.

I would like, if I may, to add one point to what has been said about the willingness of consumers or the potential confusion of consumers. I think there is actually a good test case of that already available. There are a number of populations of salmon that are endangered, have been listed as endangered for a number of years. But the consumption of salmon by the American consumer does not seem to have been adversely affected by that.

So the distinction between illegal salmon, if you will, or endangered salmon and non-endangered salmon doesn't seem to have created any confusion in the marketplace.

The CHAIRMAN. I believe initially with the salmon on listing it was impacted. But I guess my fear in that particular case is when you have groups that start going after the farm-raised salmon and saying that it is not as healthy or it is polluted or whatever. And that is where some of the guys who are really into aquaculture get in trouble.

You know, it is one thing when you list a wild population as endangered, but then when groups start going after the farm-raised as not being as good, it is like, okay, what do you want? And that is one of the problems that we run into.

Mr. Gilchrest, did you have any further questions?

Mr. GILCHREST. Thank you, Mr. Chairman.

Just an interesting observation, I think. I don't know. I shouldn't even make this statement in public that I don't think the virginica is going to be designated as endangered, maybe not even as threatened. So I don't think we are going to get that far.

But one of the things we might want to pursue with the reforming of the Chesapeake Bay—I would like to reform the Chesapeake Bay. Put me in charge of the Chesapeake Bay.

[Laughter.]

Mr. GILCHREST. But when we look at the Endangered Species Act and if, let us say, this eastern oyster was threatened or declared endangered as a sub-species in the Chesapeake Bay, what effect would that have on the aquaculture operation in Virginia? Or the aquaculture operation on the Long Island Sound?

That would be because those are thriving, and they are bringing oysters back. It would affect the wild stock, we all can assume. But how about the farm-raised oysters, which have come back quite well in the Long Island Sound? So that is just an observation I have. I don't know if anybody wanted to comment on that?

Mr. BEAN. Well, I would say, Mr. Gilchrest, that at least potentially one could distinguish farmed or maricultured oysters from wild oysters if the listing were threatened rather than endangered. There would be the flexibility to do that. Whether NOAA would choose to do that, I couldn't say. But they would have that authority if it was appropriate.

Mr. GILCHREST. Thank you. And I just thought of another one I might want to ask the gentleman from Virginia. I am just curious, as being someone from Maryland, you guys down in Virginia have greater aquaculture operations going. Many of my friends, including my brother-in-law, harvest oysters. He does that out of Crisfield, and he is a very successful waterman. Deals with a lot of different things, and he has been doing it now for probably 30, 35 years.

I am just curious as to, from your perspective, Maryland's approach to this Asian oyster is different from Virginia's approach to the Asian oyster. Do you have an opinion on Maryland's approach to the introduction of the Asian oyster to the Chesapeake?

Mr. COWART. Representative Gilchrest, I believe Maryland's proposal to the Asian oyster is based on a public fishery, and that is what a Maryland fishery is because almost 100 percent of that is public. And obviously, as you know, the Maryland oysterman is also a Maryland crabber during the summer months. So he depends on crabs in the summer months, takes the pressure off of crabs when he has oysters to harvest in the winter months. And he is able to continue to be a waterman.

Unfortunately, a lot of Marylanders are now working for prison systems and other things. They are not watermen anymore in Maryland, which really hurts us in Virginia as oyster processors because from October 1 until March the 31st, our plant and other plants in Virginia depend on those Maryland waters for our oyster resource. And we can't do that anymore.

But in Virginia, we look at aquaculture and the non-native oyster as a resource that will live in our waters in the face of diseases, grow to the point where they are harvestable, and triploid oysters are really what we target. The watermen in the State are more interested, of course, in diploid because they would reproduce and be available for public harvest.

So I think it depends on the way the industry is structured in the two States. But I think that the Maryland watermen depend on Virginia processing houses, and we depend on the Maryland watermen for resources.

Mr. GILCHREST. Thank you very much. Maybe we can sit down continually and integrate these two different systems to be more compatible.

Mr. COWART. We would appreciate that opportunity. If it were available, we would certainly appreciate that opportunity.

Mr. GILCHREST. Thank you very much.

Thank you, Mr. Chairman.

The CHAIRMAN. Mr. Melancon?

Mr. MELANCON. Mr. Chairman, thank you.

Just as a closing, because I have always left the conversation needing questions in my mind, is there anything that you feel needs to be said here that you feel might have some effect that has not been brought out yet?

Mr. VOISIN. Charlie, I think we have brought it all out. I think that the Endangered Species Act—in the last couple of days, I have talked to a lot of people—it must have some flat tires. If it is a car, it has flat tires. Maybe the engine is broke.

Something needs to be fixed when I am producing billions of oysters in Louisiana, there are hundreds of millions on the East Coast, and we are here, coming to Washington, to sit before you to talk about it being listed as endangered. So that I believe we need you, Congress, working with us, someone needs to fix the flat tires or the broken engine. It doesn't make sense.

You know, it takes away from our family business for me to be up here, which I don't mind being up here. I come up here and enjoy the fellowship of working with you. But the fear that my son, who is coming to work with us in September, has right now. He is saying, "Dad, will I have a job after January 11, 2006?"

He just got out of the University of Utah. We just made a deal with him, and he is a pretty good negotiator. He got more money than I would have normally paid him. These business schools are pretty good. And he is afraid that, you know, potentially this could impact his generation.

And then my other son says, "What about my son, who is now the ninth generation? Where is he going to go?" We have investment plans. We have a 10-year plan in our company. We are producing hundreds of millions of oysters. We support the challenges they are having by supporting research and development on the East Coast. And you guys have supported it as well, and we appreciate that support.

But as far as I guess one thing I would ask is that maybe the proceedings of this hearing, if you would forward them to the status review team that the National Fisheries Services put together, I would appreciate it. If we could get that forwarded to them so they can see what the comments were here.

Mr. MELANCON. Thank you. And I understand the concern with a business that might be put out. I grew up in the sugar business. Thank you.

[Laughter.]

The CHAIRMAN. Well, Mr. Voisin, we are trying to fix those flat tires and looking at the engine. And every time we talk about fixing that old car, we have people running around saying there is nothing wrong with that old car. It looks great to them. So it is an ongoing battle.

But I appreciate your comments, and I appreciate the testimony of all of the panel. I know that this is an extremely important issue to you or else you wouldn't have taken the time to be here. And I thank you for that.

The CHAIRMAN. I am going to dismiss this panel and call up our second panel of witnesses: Dr. John Kraeuter, Dr. Sammy Ray, Mr. Patrick Gaffney, and Dr. Matthew Hare.

If I could have all of you stand and raise your right hand?

[Witnesses sworn.]

The CHAIRMAN. Thank you. Let the record show they all answered in the affirmative. Welcome to the Committee. I remind the witnesses that your entire written statements will be included in the record, but if you could limit your oral testimony to 5 minutes, it would help us to better stay on schedule. Thank you.

Dr. Kraeuter, we are going to begin with you.

STATEMENT OF JOHN N. KRAEUTER, ASSOCIATE DIRECTOR, HASKIN SHELLFISH RESEARCH LABORATORY, INSTITUTE OF MARINE AND COASTAL SCIENCES, RUTGERS UNIVERSITY

Dr. KRAEUTER. Mr. Chairman, members of the Committee, I am Dr. John Kraeuter.

The CHAIRMAN. You have to pull that mike right up to you.

Dr. KRAEUTER. Mr. Chairman, members of the Committee, I am Dr. John Kraeuter, Associate Director of the Haskin Shellfish Research Laboratory of Rutgers University. I am here today to provide testimony on the petition to list the eastern oyster as endangered and threatened.

I have submitted the written testimony, and I would appreciate if that is incorporated. This is excerpts from that.

I have polled my academic colleagues on their opinion about listing oysters as endangered and threatened. Within this list, there are three individuals who were on the National Academy of Sciences panel that produced the volume on non-native oysters in the Chesapeake Bay, and one who has served on the National Academy Review of the Endangered Species Act.

Of the 17 I was able to contact, none thought that listing the eastern oyster as endangered or threatened was scientifically justified. Some voiced the opinion that while the disease and habitat destruction were issues relative to the oysters' abundance, they do not fundamentally affect the potential for extinction of the species. These experts thought the most important factor was that local managers in some areas have not managed the resource in a way that the oyster population and oyster habitat was maintained.

My professional opinion is the same. There is no scientific justification for listing the eastern oyster as endangered or threatened. Such a listing would hurt existing efforts on habitat restoration of this species by placing unneeded and unnecessary bureaucratic hurdles in the way.

There are a number of important societal and ecological reasons for having large populations of filter feeders in our near-shore systems. To do this, we simply need a management system that provides long-term population goals, quantifiable data on the status of the resource, and the will to implement the means of achieving the goals based on the data.

I would like to focus attention on Delaware Bay and, if I could have the first figure, the chief oyster producing area in New Jersey. Our laboratory has been active in oyster research on Delaware Bay since the early 1900s. Since 1953, we have had an annual sampling program that assessed the natural oyster seed areas. That is those little black dots up there. We have landing records that date from 1880, but we know that oyster harvest within the bay began much earlier.

The system of moving oysters from the upper bay to the lower bay for additional growth was firmly in place by the middle of the 1800s, and seed were imported in the system from at least 1829. This practice was halted when the oyster parasite MSX entered the bay in 1957 and caused heavy mortality on the planted oysters. At least half the drop in landings post MSX were due to the loss of these imported seed and do not reflect changes in the natural oyster population or its production within the bay.

Our systematic records date from 1953, just before the MSX epizootic in 1957. These data, Figure 2, if you will, indicate that the oyster abundance—that is the diamonds—was low prior to MSX and remained low until the early 1960s, when recruitment increased. That is the little squares.

Although MSX removed over 90 percent of the oysters in the lower bay planted grounds and probably half the New Jersey population in 1957-1958, there was no evidence for change in the abundance of young oysters. In the early 1960s, the increased spat set—spat are young oysters—began a period of high abundance, which lasted until the middle of the 1980s, when another MSX epizootic (1985), associated with a severe drought, reduced the numbers of adult oysters in the system.

This second outbreak seems to have increased resistance to the introduced disease. There is some evidence that the adult population began to recover. See the slight increase in 1987 and 1988. But another parasite, Dermo, reached epizootic levels in 1990.

The net effect of the 1985 MSX and the 1990s Dermo induced mortalities that we are now in a second period of low abundance. The most recent decrease is due to the Dermo and the 5 years of poor spat settlement. We are very concerned about this condition, and allocation for harvest in 2005 is half that of 2004 and amounts to less than 1 percent of the marketable oysters on the seed beds.

In spite of the low abundance, there are approximately 1.9 billion oysters in the seed bed area of the New Jersey side of Delaware Bay. This does not include Delaware or the areas of the bay we do not sample. There could easily be as many oysters outside the sampled area as within the sampled area.

Mortality and recruitment are as important as standing stock. And over the past 50 years, the year of highest spat abundance yielded only approximately 3.5 spat per adult oyster. The long-term (50-year) average is only 0.79 spat per adult. This means that restoration will require a concerted effort over a relatively long period of time and that science-based management is critical.

In Delaware Bay, we are enhancing the resource by a three-pronged strategy—reduced harvest, planting of shell to enhance recruitment on the seed beds, and planting of shell in areas of high spat set and moving of that set to high survival areas. This is nec-

essary because in an area with a salinity gradient such as Delaware Bay, the areas of best recruitment of spat are not the best areas for survival.

The 3-year enhancement program is being funded approximately equally by the Federal Government, the State government, and the self-imposed tax on the commercial oyster industry. The program is designed to become self funding, as the oysters harvested from the enhancement will provide greater landing-fee receipts—that is, taxes—to sustain the program.

In summary, in the past 50 years, the Delaware Bay oyster resource has experienced two periods of low abundance, separated by an equal period of high abundance. Plans are being implemented this year to assist in habitat, resource, and commercial recovery. In terms of the charge of this committee, I can find no scientific evidence that would support listing the eastern oyster as endangered or threatened.

Are there estuaries and oyster populations in need of immediate attention and restoration? Unequivocally, yes. Is there a need for a concerted, scientifically designed, quantifiable, documented long-term habitat and oyster restoration efforts at the Federal, State, and local levels? Yes. Is there a need to support aquaculture of oysters and other filter feeders as part of overall improvement of our estuarine systems? Yes.

All this said, I would caution the Committee that oyster habitat restoration is necessary to restore oysters. We need a mechanism to move forward with time-tested restoration efforts without wasting time and, therefore, money jumping through needless environmental impact statements just to be sure everyone can place the blame elsewhere.

Thank you for your time. I would be happy to answer any questions you have or provide any follow-up materials you may want. Thank you.

[The prepared statement of Dr. Kraeuter follows:]

Statement of Dr. John N. Kraeuter, Associate Director, Haskin Shellfish Research Laboratory, Institute of Marine and Coastal Sciences, Rutgers University

Mr. Chairman, members of the Committee. I am Dr. John Kraeuter, Associate Director of the Haskin Shellfish Research Laboratory, Institute of Marine and Coastal Sciences, Rutgers University. I am here today to provide testimony on the status of the Eastern Oyster and the Petition to List the Eastern Oyster as Endangered and Threatened.

My Curriculum Vitae is appended to the disclosure document.

This is document supports my testimony before your committee.

I have polled my academic colleagues, who I think are familiar with the biology, ecology and status of Crassostrea virginica, on their opinion about listing it as Endangered and Threatened. I purposefully did not contact the many state and federal biologists, or industry members with advanced degrees to avoid potential for conflict of interest. Within this list are three individuals who were on the National Academy of Sciences Panel that produced the volume on Nonnative Oysters in the Chesapeake Bay, and one who has served on the National Academy Review of Endangered Species. Of the 17 I was able to contact, not one individual thought that listing the eastern oyster as endangered or threatened was scientifically justified, many thought it would hinder restoration efforts. Some voiced the opinion that while disease and habitat destruction were issues relative to the oysters abundance they do not fundamentally affect the potential for extinction of the species. These experts thought the most important factor was that local managers in some areas have not managed the resource in a way that the oyster population and the oyster habitat

was maintained. The problem is not one of biology, but of the interactions between science, management and the political process.

My professional opinion is the same: There is no scientific justification for listing the eastern oyster, Crassostrea virginica as endangered or threatened. Furthermore such a listing would hurt existing efforts on habitat restoration for this species by placing unneeded and unnecessary bureaucratic hurdles in the way. In addition these hurdles would greatly hinder other efforts to restore our estuaries, again by placing bureaucratic hurdles where they will simply deter rather than enhance. Quite simply we need a management strategy system that provides long term population goals, quantifiable data on the status of the resource, AND the will to implement the means of achieving the goals based on the data.

That said, there are a number of important societal, and ecological reasons for having large populations of filter feeders (oysters, clams, scallops, mussels etc.) in our nearshore systems:

Filter feeders assist in maintaining water quality by removing both phytoplankton and other suspended materials from the water and depositing it on the bottom. This can augment in nutrient recycling, and improve water quality, at least locally;

Filter feeders support recreational, and commercial (fishing and aquaculture) activities thus connecting our increasingly urban population to the natural system. By doing so shellfish are ready made ambassadors for good water quality (you can swim in water that is microbiologically unsafe for shellfish harvest);

Reef forming filter feeders such as oysters provide a hard substrate in an area dominated by soft bottom (sand and mud) habitats. This hard substrate is essential for oyster recruitment and allows many other species to inhabit an otherwise uninhabitable area.

I'd like to now focus my attention on an area I am most familiar with, Delaware Bay.

In New Jersey the chief oyster producing area is Delaware Bay (Figure 1). Our laboratory has been active in oyster research in Delaware Bay since the early 1900's. Since the middle 1950's we have had an annual sampling program that assessed the natural oyster seed area in this estuary.

We have landing records that date from 1880, but we know that oyster harvest within the bay began much earlier (Figure 2). The system of moving oysters from the upper bay (seed beds) to the lower bay (planted grounds) was in place by the middle of the 1800's. Seed were exported from Delaware Bay to growing areas in Massachusetts and Connecticut in the early 1800's and imported into the system from at least 1829 (the opening of the Chesapeake and Delaware Canal. This practice was halted when the oyster disease MSX (Haplosporidium nelsoni) entered the bay and caused heavy mortality on the planted oysters. At least half of the drop in landings post MSX was due to the loss of imported seed and does not reflect changes in the natural oyster population or its production within the bay.

Our systematic records date from just before the incursion of MSX, but were initiated because of concern about the declining production before MSX. We have recently been working through the records (they were recorded as numbers of oysters per bushel of sample) and converting these to numbers of oysters per square meter. These data represent the most productive areas of the seed beds, and indicate (Figure 3) that oyster abundance was indeed low in the 1950's prior to MSX and remained low until the early 1960's when recruitment increased. Although MSX removed over 90% of the oysters in the lower bay planted grounds (probably half the NJ population) in 1957/58 there was no subsequent change in the abundance of spat (Figure 3). In the early 1960's increased spat set began a period of high abundance (in spite of the continued low levels of MSX) which lasted until the middle of the 1980's when another MSX epizootic (1985), associated with a severe drought, reduced the numbers of adult oysters in the system. This second outbreak, while causing widespread losses, seems to have yielded increased resistance to the introduced disease in the oyster population. There is some evidence that adult population began to recover (see slight increase in 1987 and 1988), but dermo (Perkinsus marinus) reached epizootic levels in 1990. The subsequent reduction in adult oysters in the lower portion of the seed beds (or some other factor (s)) appear to have set the oyster population at a lower level. There is reasonable evidence that the increase in dermo was due to the increase in water temperatures during the same period.

The net effect of the 1985 MSX, and the 1990's dermo induced mortalities is that we are now in a period of low abundance. The most recent decrease is due to the dermo coupled with 5 years of poor spat settlement. We are very concerned about this condition and have been reducing the allocation for harvest as this condition persists. In 2005 the allocation is about half that of 2004, and amounts to less than 1% of the marketable oysters on the seed beds.

In spite of the low abundance there are approximately 1.9 billion oysters on the seed bed area of the New Jersey side of Delaware Bay. Of these about 100 million oysters, 2.5 inches and greater, are present on the most productive parts of these beds. These figures do not include areas of the bay we do not sample, the oyster populations is tidal creeks fringing the bay and the planted grounds down bay (Figure 1). There could easily be as many oysters outside the sampled area as in the sampled area.

The standing stock of oysters is only part of the story. What is equally important is the mortality rate and the recruitment rate. Contrary to general opinion, the eastern oyster is not well adapted to quick recoveries. The chart shows the record from Delaware Bay for the past 50 years (Figure 4). Note that even in the year of highest spat abundance the adults produced only approximately 3.5 spat per adult. The long term (50 year) average is only 0.79 spat per adult. This means that restoration efforts will require a concerted effort over a relatively long period of time.

In Delaware Bay we have embarked on a program to enhance the resource by a three pronged strategy: Reduced harvest, planting of shell to enhance recruitment on the seed beds, and planting of shell in areas of high spat set (Figure 4). It is often startling to people who haven't studied oysters in an area with a salinity gradient such as Delaware Bay, that the areas with the best recruitment of spat are not the best areas for survival. The seed beds are in an area where spat set and subsequent growth is modest, but survivorship is high. The areas of highest spat set are often areas of good growth, but poor survival. This is the genesis of using the seed bed as a source for oysters that were larger (seed) and could survive better in the higher salinity. The higher salinity areas in Delaware Bay also produces oysters with better meat quality. A pilot-scale shell planting in 2003 by the State of New Jersey showed that the setting rate on clean shell in areas of high settlement was 75 times greater than the natural rates on the seed beds. Current projections indicate that the $40,000 spent on this program should yield 20,000 to 40,000 bushels of marketable oysters in 2006. At current prices this is an ex-vessel value of $700,000 to $1,000,000, and at the current tax of $1.75 per bushel yield between $35,000 and $70,000 for the resource development account. We know the science of how to restore oyster populations. We should study these attempts to indicate how we can do oyster restoration more efficiently.

The enhancement program for 2005 to 2007 is being funded by $100,000 per year from the Federal Government through the empowerment zone, $150,000 from the Corps of Engineers, $100,000 per year from the State Government and a self imposed Tax on the commercial oyster industry. The latter currently has $178,000 in the account and it will be added to as oysters are harvested. We believe we have sufficient funds to continue it for 3 years. The program is designed to become self funding as the oysters from the enhancement effort are harvested they will provide greater landing-fee receipts (taxes) which can sustain the program.

While such a program sounds great, it is only for 3 years, and it took a number of dedicated individuals several years to secure funding. Even at the last minute there was an attempt to derail the program by suggesting that oyster shells could cause a contaminant problem, and that the organization handling the funding could be liable for their removal from the system. This is in spite of centuries of experience throughout the world using oyster shell to enhance settlement. The biology of how to do oyster restoration is well

In summary, the Delaware Bay oyster resource has experienced both a historical and a recent significant decline, but plans are being implemented to assist in its recovery and the recovery of commercial production.

In terms of the charge of this committee. I can find no scientific evidence that would support listing the eastern oyster Crassostrea virginica as an endangered or threatened species.

Are there estuaries and oyster populations that need immediate attention and restoration. Unequivocally yes.

Is there a need for concerted, scientifically designed, quantifiable, documented long term habitat and oyster restoration efforts at the federal, state and local levels? Yes.

Is there a need for improving the water quality in the estuaries? Yes.

Is there a need to support aquaculture of oysters and other filter feeders as part of the overall improvement of our estuarine systems? Yes.

All this said, I would caution the committee that oyster habitat restoration (clean shell on the bottom being a key feature), is a necessary precursor to other efforts. This is a long term effort and the federal system can help by providing consistent long term (on the order of a decade or more) support. Please resist the temptation to provide large infusions of support for short periods, because experience suggest such efforts are less likely to succeed.

We also need a mechanism to move forward with time tested (although often not well documented) restoration efforts with species native to the area without wasting time (and therefore money) jumping through needless "environmental impact statements" just to be sure everyone can place the blame elsewhere.

Thank you for your time, and I'd be happy to answer and questions you may have now, or follow up on any of the materials I have submitted.

Delaware Bay Oyster Seed Beds

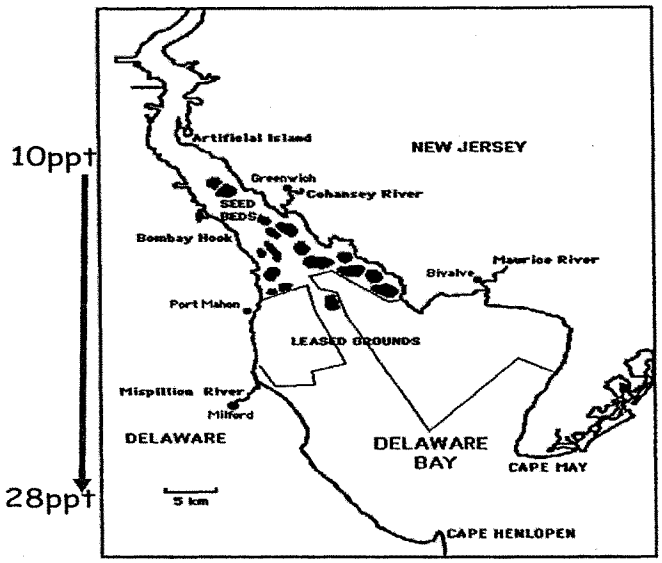


Figure 1. Delaware Bay Oyster Seed Beds. The arrow on the left of the chart indicates the approximate long term salinity gradient within the system (Source, Dr. Susan Ford)

Delaware Bay Oyster Landings

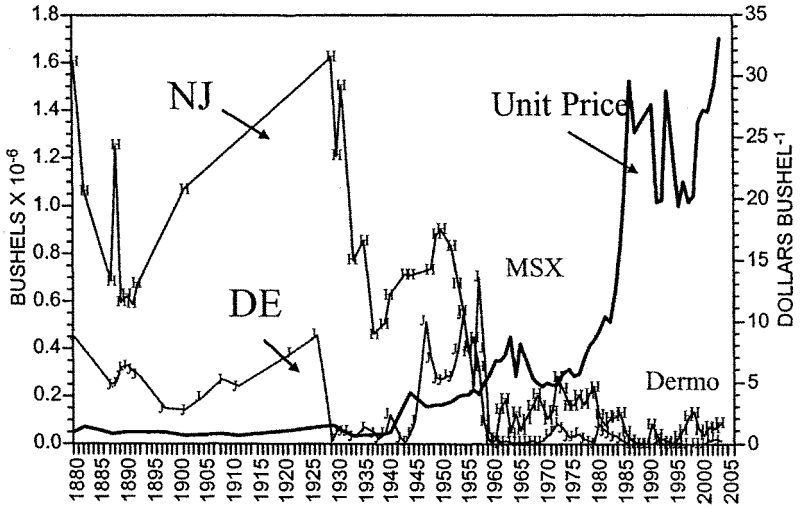


Figure 2. New Jersey (Blue) and Delaware oyster landings. Price per bushel is in green. The large drop in the middle 1950's and in 1985 is due to the oyster parasite MSX. The parasite Dermo became important in 1990.

Delaware Bay Seed Beds

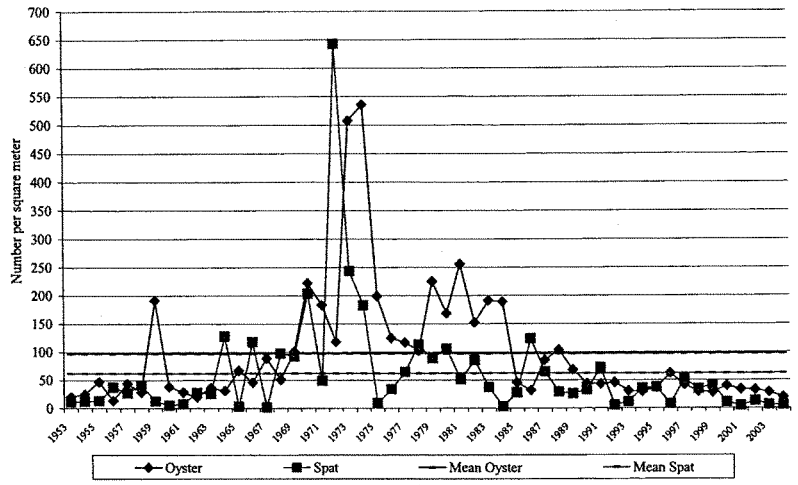


Figure 3. Annual abundance and long term average abundance of adult and young (spat) oysters on the New Jersey Delaware Bay seed beds from 1953 to 2004.

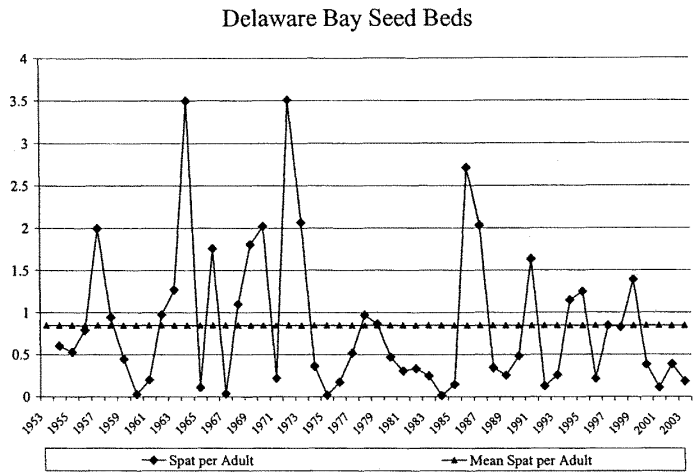


Figure 4. Annual average and long term average number of young oysters (spat) per adult oyster for the New Jersey Delaware Bay Seed Beds 1953 to 2004.

Enhance Natural Sets

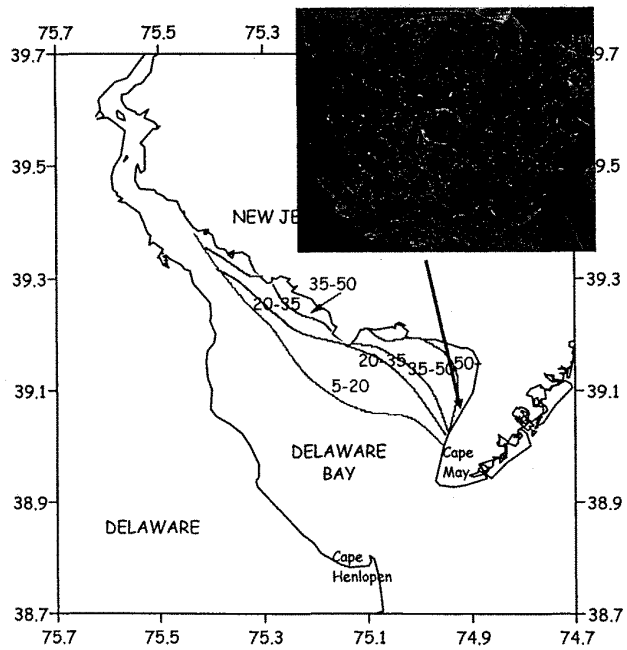


Figure 5. Percentage of years in which initial spat survival on the New Jersey side of Delaware Bay will be at least 20 spat per clean oyster shell surface. The insert is an oyster spat collector placed in the 50+ zone showing newly set spat. (Source, Dr. Susan Ford).

The CHAIRMAN. Thank you.

Dr. Ray?

STATEMENT OF SAMMY M. RAY, PROFESSOR EMERITUS, MARINE BIOLOGY DEPARTMENT, TEXAS A&M UNIVERSITY

Dr. RAY. I am Sammy Ray, professor emeritus at Texas A&M, and I am an oyster research scientist with nearly 60 years of experience. And I thank you, the Resource Committee members, for allowing me to have my say. It is often I have found that people do not want me to have my say. So I am going to take this opportunity to do it.

I oppose the petition to include the eastern oyster as endangered or threatened under the Endangered Species Act. My opposition is based on three claims. The oyster is in no way threatened or endangered. Listing the oyster as endangered species is a misuse of and possibly a threat to the Endangered Species Act. And three, a drastic, geographically broad solution—banning all oyster harvest—is proposed for a geographically narrow failure. That is a failure to manage oyster, fresh water in-flow, and water quality management.

The eastern oyster is not endangered or threatened. On the contrary, one of the most common invertebrates in mesohaline environment, they occur in prodigious numbers, are extremely fecund, form massive reefs, and support valuable fisheries.

And I am going to talk only about Texas. Texas has landed a minimum of about 3 million pounds of oyster meat for the past 10 years. And recently, in calendar years 2003, 2004, the harvest has amounted to 4.3 and 5.1 million pounds, respectively. Moreover, the 2005 Texas production is likely to exceed 5 million pounds due to favorable rainfall conditions for the past 2 years.

The Endangered Species Act should be reserved for species that are truly threatened or endangered. If the eastern oyster is considered endangered, the designation criteria are so broad as to make ESA biologically meaningless and politically vulnerable.

Valuable and viable sustainable oyster fisheries exist over much of the range. Designation of the eastern oyster as endangered would destroy successful oyster industries of the Gulf and the Atlantic States without saving the industry of Chesapeake Bay.

I find it difficult to understand the rationale for this approach. Declaring the eastern oyster as endangered throughout its broad range will do nothing to correct the environmental problems of Chesapeake Bay. If the proponents of this measure truly believe that cessation of oyster harvest will promote its recovery, why not have the States of Maryland and Virginia halt all oyster harvest from Chesapeake Bay and its tributaries?

It is my understanding that the most recent annual harvest from the bay amounted to about 50,000 bushels. I might, as an aside, 100-acre oyster lease in Galveston Bay produces that many oysters year after year.

So as not to harm the watermen who depend on oysters for their livelihood, I propose to subsidize the estimated harvest at a premium of $25 a bushel. We pay farmers not to grow crops. I see nothing wrong with paying oystermen not to harvest oysters. In

Texas and other Gulf States, the oyster production is cyclical and is positively related to rainfall amounts.

In periods of prolonged droughts, populations decline due to the ravages of predators and Dermo disease. In extremely wet years, we experience freshwater kills in the upper regions of the bays. In either case, the recruitment returns when normal salinity conditions exist. Often we have complete failures in an area, and 2 years later, we are harvesting commercial quantities of oysters.

As long as we have adequate freshwater flows in Texas, substantial oyster populations will exist. Without doubt, production is tied to rainfall cycles.

Now at this point, I wish to paraphrase a business adage as it relates to my long experience as an oyster biologist. It has often been stated that there are three important factors in a business. One, location. Two, location. Three, location.

And it is my belief of many years there are also three factors related to successful oyster production. One, salinity. Two, salinity. Three, salinity. And I wish to make a quick comment about the importation of the Asian oyster, Crassostrea ariakensis, to augment Chesapeake Bay's oyster population.

In my opinion, this would be a horrible ecological mistake. This oyster is a cold-water, fast-growing, and thin-shelled oyster. It may be disease resistant, but I am convinced that it is not mud-worm, or Polydora, resistant.

I wish to remind the proponents of this importation of the results of bringing the Pacific oyster, Crassostrea gigas, to the Gulf of Mexico. In early 1930s, Dr. Martin Burkenroad brought the Pacific oyster to Louisiana, and he found that the mud-worm was very destructive to this cold-water, fast-growing, thin-shelled oyster. Let us learn from our mistakes and not repeat them.

In summary, I consider the petition to list the eastern oyster as endangered to be biologically unjustified, procedurally inappropriate, politically unwise, and economically devastating. I strongly urge its immediate denial. Thank you.

[The prepared statement of Dr. Ray follows:]

Statement of Dr. Sammy M. Ray, Professor Emeritus, Marine Biology Department, Texas A&M University

Honorable members of the Resources Committee:

As an oyster research scientist with nearly 60 years of experience, I oppose the petition to include the eastern oyster as an endangered or threatened species under the Endangered Species Act (ESA). My opposition is based on three claims: (1) the oyster is in no way a threatened or endangered species, (2) listing the oyster as endangered species is a misuse of and possibly a threat to the ESA, and (3) a drastic, geographically-broad "solution" (banning all oyster harvest) is proposed for a geographically-narrow failure (oyster, freshwater and water quality management in Chesapeake Bay).

The eastern oyster is not endangered or threatened. On the contrary, oysters are one of the most common invertebrates in mesohaline (5-25 ppt) environments. They occur in prodigious numbers, are extremely fecund, form massive reefs and support valuable fisheries. In Louisiana alone, 10 to 12 million pounds of oyster meat are harvested year after year. Furthermore, Texas has landed a minimum of about 3 million pounds of oyster meat for the past 10 years. Recent commercial harvests (calendar years 2003 and 2004) have amounted to about 4.3 and 5.1 million pounds of meat, respectively. Moreover, the 2005 Texas production is likely to exceed 5 million pounds of meat due to favorable rainfall conditions for the past two years.

The ESA should be reserved for species that are truly threatened or endangered. If the eastern oyster is considered endangered, then the designation criteria are so broad as to make the ESA biologically meaningless and politically vulnerable.

Valuable, viable and sustainable oyster fisheries exist over much of the range of the eastern oyster. Designation of the eastern oysters as endangered would destroy successful oyster industries of the Gulf and Atlantic States without saving the industry of Chesapeake Bay.

Oyster populations in the Chesapeake, except for moderate recoveries in the 60's and 70's, have steadily declined since 1957. In the last 10—15 years the decline has been precipitous and has just about hit "rock bottom". The reasons generally given for this population collapse are: (1) over-fishing, (2) pollution and (3) diseases.

This sad situation prevails despite the fact that Chesapeake Bay was the first estuary to be selected for rehabilitation and special protection through the National Estuary Program. Through this program and many other Federal, State, and private conservation initiatives, millions have been expended in efforts to restore this great estuary to a semblance of its former productivity. Many of the various approaches that have been used throughout the years to bring back the Chesapeake oysters appear to have been based on the best scientific information available, yet none have proven successful. These tremendous recovery efforts have been a colossal "failure". Yet, in desperation, some must believe that declaring the eastern oyster "endangered" will solve the Chesapeake's monumental environmental problems.

I find it difficult to understand the rationale for this approach. Declaring the eastern oyster as endangered throughout its broad range will do nothing to correct the environmental problems of Chesapeake Bay. If the proponents of this measure truly believe that cessation of oyster harvest will possibly promote its recovery, why not have the states of Maryland and Virginia halt al oyster harvesting from Chesapeake Bay and its tributaries. It is my understanding that the most recent annual oyster harvest from the bay amounted to about 50,000 bushels. So as not to harm the "watermen" who depend on oysters for a livelihood, subsidize the estimated oyster harvest at a premium of $50.00 per bushel. We pay farmers not to grow crops, I see nothing wrong with paying oystermen not to harvest oysters.

In Texas and other Gulf States, oyster production is cyclical and is positively related to rainfall amounts. In periods of prolonged droughts populations decline due to ravages of predators and dermo disease. In extremely wet years we experience freshwater kills in the upper regions of the bays. In either case, the recruitment following return to normal salinity conditions often result in commercial quantities of oysters within two years. As long as we have adequate freshwater inflows into Texas bays substantial oyster populations will exist. Without doubt oyster production is tied to rainfall cycles.

Although not part of this hearing, I cannot resist commenting on the proposal to bring in the Asian oyster (Crassostrea ariakensis) to augment the Chesapeake's oyster population. In my opinion this would be a horrible ecological mistake. This oyster is a cold-water, fast-growing and thin-shelled oyster. It may be disease resistant but I am convinced that it is not mud-worm (Polydora) resistant. I wish to remind the proponents of this importation of the results of bringing the pacific oyster (Crassostrea gigas) to the Gulf of Mexico. In the early 1930's Dr. Martin Burkenroad brought the pacific oyster to Louisiana. He found that the mud-worm was very destructive to this cold-water, fast growing and thin-shell oyster. Let's learn from our mistakes, not repeat them.

In summary, I consider the petition to list the eastern oyster as endangered to be biologically unjustifiable, procedurally inappropriate, politically unwise and economically devastating. I strongly urge its immediate denial.

The CHAIRMAN. Thank you.

Mr. Gaffney?

STATEMENT OF PATRICK GAFFNEY, PROFESSOR, UNIVERSITY OF DELAWARE, COLLEGE OF MARINE STUDIES

Mr. GAFFNEY. Thank you very much. My name is Pat Gaffney. I am a professor at the College of Marine Studies at the University of Delaware. I work on the population genetics of marine and fish and shellfish, especially on oysters.

And my comments today will be excerpted from my written statement, and they are fairly narrowly focused rather than dealing

with the wisdom of the Endangered Species Act or this particular petition. I am just going to talk about some issues that do bear on this, and that is namely the genetic evidence for the subdivision of the species.

In other words, we have talked about is this a single species? Does it exist as several sub-species which, as I understand it, could be listed separately? And whether the Chesapeake Bay population, for example, might be one of those. So I am just going to sort of make some general comments without going into great detail.

This species occupies a very wide environmental range from the cold waters of Canada to the subtropical waters of the Yucatan and is enormously adaptable, as you have probably heard already. So for more than, say, 50 years, oyster biologists have suggested that there were distinct physiological races, and this was based on the observations that they spawn at different times. They have different temperature, salinity optimum, and so on.

And it was never really clear whether this reflected simply adaptation occurring during an oyster's lifetime or whether these were genetically adapted different populations. If the latter were true, that is of interest to people who are interested in preserving biodiversity and the genetic resources of the species, whether you are talking about for wild populations or future aquaculture.

So starting in about the 1980s, when genetic tools became more available, scientists started looking at this. And the initial suggestion was that, basically, oysters were the same all over from Canada to Mexico, with the possible exception of the very peripheral populations in Canada and southern Texas, in the Lower Laguna Madre, which is sort of a special habitat. And that made sense at the time because oyster larvae are in the water column for several weeks, and it was thought that because of that dispersal, you had genetic mixing all across the range from Atlantic through the Gulf.

That view changed very much in the early 1990s, when research was done, DNA technology developed, and to make it short, studies in mitochondrial DNA, which is used extensively in human genetics and a variety of other arenas, showed that, in fact, Gulf and Atlantic populations are quite distinct and probably have been separated evolutionarily for at least a million years. And this is consistent with a wide variety of other species which show the same patterns.

The work in my lab has basically agreed with that, confirmed that, and extended it. And so, I don't think there is any question that Gulf and Atlantic, from a genetic point of view, are different enough that they might be viewed as separate sub-species, although I should mention that biologists agree that the term "subspecies" is a very liquid term. It is very hard to define. It is much more difficult than defining a species.

So moving on, we have since looked at variation—looking at my time there—within the Atlantic. And originally, it was thought that, well, perhaps Gulf and Atlantic are separate and distinct, but within these two basins there is not much differentiation. And in fact, that is probably generally true, but there is some differentiation—and I am not sure if I can see my first figure? I didn't know how many people would have the handouts and if they have the color images. But I can just describe what is in them.

Basically, I have several figures showing patterns of genetic differentiation among the populations. So if you have your first figure and if you are fortunate enough to have a color copy, basically, what you see is if you look along the Atlantic seaboard, you will see that these different colors and the size of the bars refer to different genetic types.

And basically, there is some pattern going from the south, meaning from about Cape Canaveral, northwards up to Canada. But if you look at compare Atlantic and Gulf, you will see the differences are larger. The same is true. That is Figure 1. More detailed, looking at actual DNA sequence variation directly supports again a wide separation of Gulf, and those are the green dots on the left, from South Atlantic versus North Atlantic. And the final picture is another class of markers. Those are nuclear genes. Again, supporting that and showing that the Texas population is really out there.

So to sum that up, I would say basically Gulf and Atlantic populations are quite distinct. There is regional variation within the Gulf and within the Atlantic not at the level one would normally ascribe to sub-species. And as far as Chesapeake Bay being different, they do not look, as far as we can tell, to be very different from Delaware Bay or actually any other North Atlantic populations.

Finally, I would just like to comment on a point that was raised in the petition whether the potentially introduced Asian oyster, ariakensis, how it could impact the native oyster by hybridization or other means. And as it was mentioned earlier, there is evidence that hybrids are not viable. However, the eggs and sperm can cross-fertilize, at least in the laboratory. So hybrids can be formed, but they don't survive past about a week of age.

That might be a concern if both native and Asian oysters are in the water next to each other, if they spawned at the same time, and if the eggs and sperm have equal preference for each other, you could have the phenomenon of sort of a biological control, where basically the sperm of one species forms inviable hybrids with eggs of the other and essentially gets taken out of the game.

And there is a work going on now to determine whether that is a likely possibility. At this point, I don't think it is. But again, we don't have the data.

And I think that pretty much summarizes my comments. So I will call it quits and answer any questions.

[The prepared statement of Mr. Gaffney follows:]

Statement of Patrick Gaffney, Professor,
University of Delaware, College of Marine Studies

The eastern oyster Crassostrea virginica inhabits estuarine and coastal waters from the Gulf of St. Lawrence to the Yucatan Peninsula, tolerating a wide range of temperature and salinity. More than fifty years ago oyster biologists postulated the existence of distinct "physiological races", adapted to their local environmental conditions. It was not clear, however, whether differences in features such as growth rate or spawning season reflected underlying genetic differences among populations, or merely acclimation to local conditions occurring during an oyster's development.

During the 1980s, researchers examined geographical patterns of variation in tissue proteins and came to the conclusion that oysters from Cape Cod to Corpus Christi were genetically very similar, while peripheral populations in Nova Scotia and southern Texas (Laguna Madre) were distinct. These findings were interpreted to mean that the primary oyster population (Cape Cod to Texas) was genetically

homogeneous as a result of gene flow facilitated by the dispersal of planktonic larvae, which spend several weeks in the water column before settling on hard surfaces and metamorphosing into juvenile oysters. The northern and southern peripheral populations were hypothesized to be genetically distinct as a result of long-standing isolation by hydrographic features (temperature, salinity and currents).

This view of a single large unit stock ranging from Cape Cod to Corpus Christi was challenged in the early 1990s as the result of several lines of evidence. Techniques for assessing genetic variation in populations had advanced considerably in the previous decade, and now it was possible to examine genetic variability at the DNA level, which afforded higher resolution and less bias than the analysis of protein variation. A seminal study from the lab of John Avise at the University of Georgia using mitochondrial DNA showed a deep genetic division between oysters from the Atlantic coast and those from the Gulf of Mexico. This division dates back several million years, to the late Pliocene and Pleistocene. A similar genetic break between Atlantic and Gulf is seen for a variety of organisms, and marks the two populations as "evolutionarily significant units". This picture has been developed further using other genetic markers (nuclear DNA) in studies by students of Avise and in my laboratory.

During the last decade, my laboratory has continued to examine geographic variation in both mitochondrial and nuclear genes throughout the global range of the eastern oyster. In addition to confirming the genetic distinctness of the Gulf and Atlantic populations, we have asked whether population subdivision exists within the Gulf and Atlantic regions. Experimental evidence that genetically distinct stocks or subpopulations might exist within the Atlantic was provided in 1991 by researchers at the Rutgers Haskin Shellfish Laboratory, who showed that despite six generations of culture in Delaware Bay, oysters of Long Island Sound origin maintained their original (Long Island) pattern of gonadal development and spawning. My laboratory subsequently found evidence of genetic differences between North and South Atlantic oysters, using both mitochondrial and nuclear DNA markers. However, the difference is much less pronounced than that separating Atlantic and Gulf oysters, which may indicate that this pattern of population subdivision has developed much more recently, and may be confounded by the human movement of oysters up and down the Atlantic seaboard. Figure 1 shows the distribution of mitochondrial DNA sequence variants (haplotypes) detected by restriction enzymes, indicating geographic variation in haplotype frequencies with both Gulf and Atlantic regions. Along the Atlantic coast, some haplotypes are distributed widely but are most common in either the north Atlantic (blue) or south Atlantic (red).

A similar picture emerges from direct sequence analysis of a single mitochondrial gene (Figure 2). We see clear separation between Gulf Coast and Atlantic haplotypes, while Atlantic coast haplotypes are more closely related to each other, and are more widely distributed. For example, the common north Atlantic haplotype (marked DB) is found from Canada through Virginia. Sequence analysis of other regions of the mitochondrial genome show the same pattern.

Although the currently available data are limited in geographic coverage and sample size, nuclear genes tell a similar story. A two-dimensional plot illustrating genetic relatedness (Figure 3) shows a cluster of north Atlantic populations ranging from North Carolina to New Brunswick (blue) separate from south Atlantic populations (orange) and Gulf Coast populations (green). Outliers include a western Florida site, Cedar Key (which also possesses a mix of Atlantic and Gulf Coast haplotypes) and Texas.

My interpretation of the genetic data described here is that the species Crassostrea virginica is subdivided into two major "evolutionarily significant units", or subspecies. There is additional population structure within each of these, but the degree of genetic differentiation is smaller, and the boundaries are currently not well defined. The south Atlantic population occupies the coast from Cape Canaveral northwards to somewhere in North Carolina (perhaps Cape Hatteras, a well-known biogeographical boundary). The north Atlantic population ranges from North Carolina to Canada. (Preliminary data also suggest that some populations in Canada appear to be genetically distinct, probably owing to small size and isolation.)

We have not found any indication thus far that the Chesapeake Bay oyster population is genetically different from oysters found in Delaware Bay or other north Atlantic sites.

On a separate issue, it may be appropriate to comment on the possibility of hybridization between the eastern oyster and the Asian oyster C. ariakensis, which may be introduced into Chesapeake Bay. We have shown that the Asian oyster cannot form viable hybrids when crossed with the eastern oyster. Cross-fertilization can be achieved in a hatchery, but the embryos die after 7-10 days. Thus the possibility of hybridization between the two species seems negligible.

However, the potential for cross-fertilization does raise concerns about interactions among the two species, if the Asian oyster were to be introduced. That is, if the two species lived side by side and spawned at the same time, it is possible that cross-fertilization would result in the loss of large numbers of gametes from both species. For this to happen, two things are necessary. First, the two species must spawn at the same time, so that the eggs and sperm from both species are in the water together. Second, cross-fertilization must be able to occur when eggs and sperm from both species are in the water together. In this situation, it is likely that eastern oyster eggs will be more successful at fertilizing eastern oyster eggs than Asian oyster sperm are; if this is the case, gamete mixing will not lead to gamete wastage. Experiments are now underway to evaluate reproductive interactions among the two species.

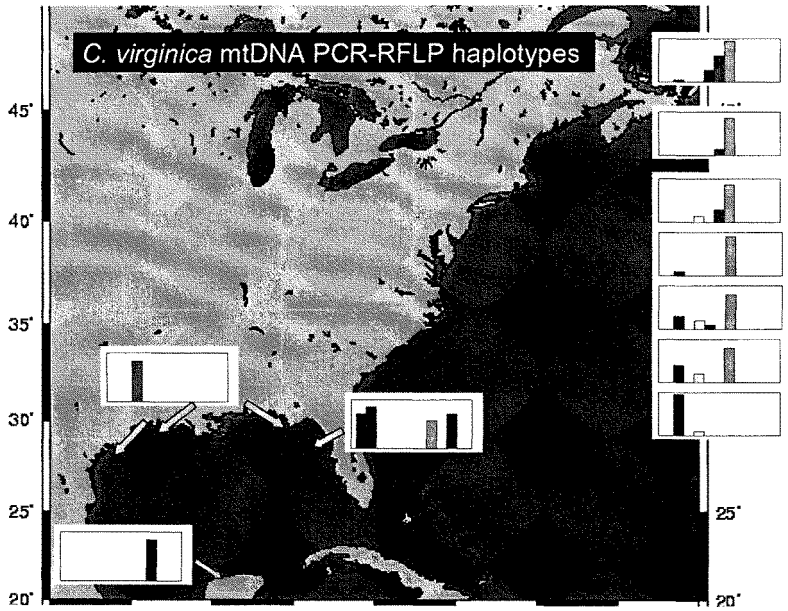


Figure 1. Frequencies of mitochondrial haplotypes detected by restriction enzymes.

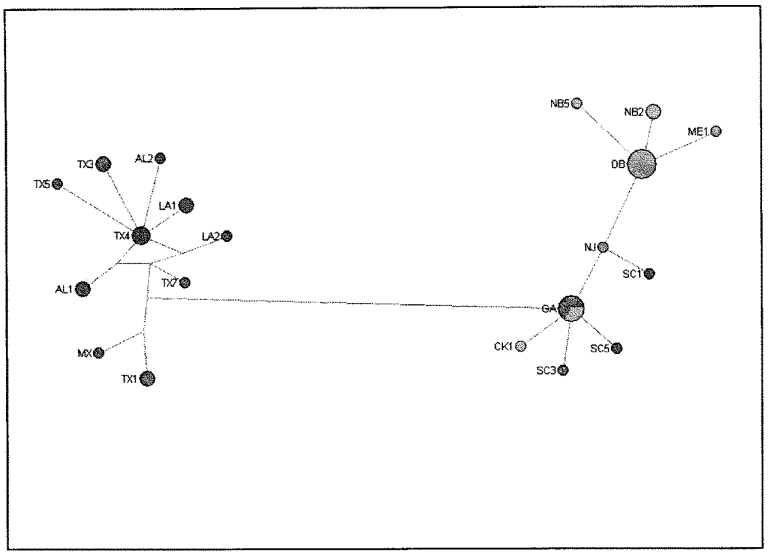


Figure 2. Mitochondrial DNA haplotypes fall into three clusters: Gulf Coast (green circles, including Alabama, Louisiana, Texas and Mexico), South Atlantic (orange circles, including Georgia and South Carolina) and North Atlantic (blue circles including Chesapeake Bay, Delaware Bay, New Jersey, Maine and New Brunswick). The common South Atlantic haplotype is also found in one Gulf Coast location, Cedar Key (western Florida, grey).

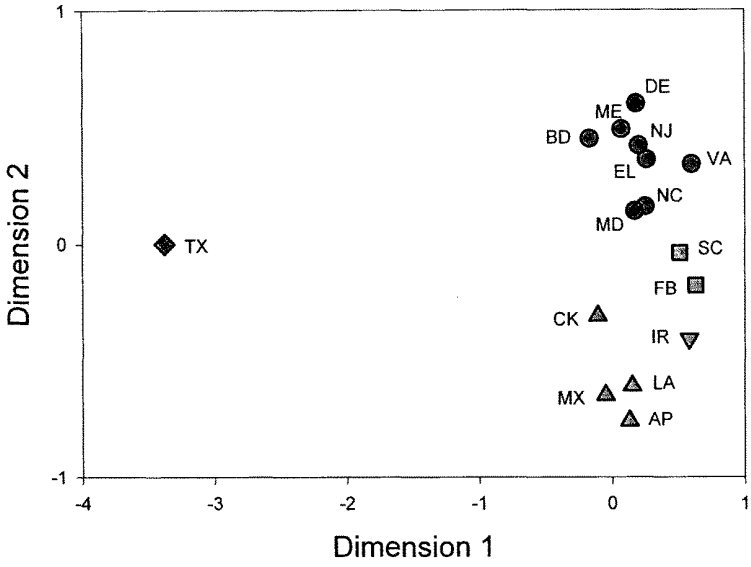


Figure 3. Nonmetric multidimensional scaling of genetic distances among eastern oyster populations, based on four nuclear genes.

The CHAIRMAN. Thank you.

Dr. Hare?

STATEMENT OF MATTHEW P. HARE, ASSISTANT PROFESSOR, DEPARTMENT OF BIOLOGY, UNIVERSITY OF MARYLAND

Dr. HARE. Thank you, Mr. Chairman.

My name is Matthew Hare. I am an assistant professor at the University of Maryland, Biology Department, College Park.

I have been working on eastern oysters since 1991. I am a geneticist who uses genes to understand organisms and population histories, rather than focusing on the intricate workings of the genes themselves. Thus, I will speak of genetic markers, and by this, I mean segments of DNA that trace their ancestry through the extended pedigree of a population and can, therefore, be used as markers of migration and differentiation.

My testimony will summarize the evidence for distinct populations in the Atlantic and Gulf. And then I will provide my evaluation of the genetic health of the Chesapeake Bay populations based upon recent data.

The population genetics of oysters has been studied more extensively than nearly any other native marine invertebrate in U.S. waters. This interest was generated by some of the biology that Dr. Gaffney described. Long-lived larvae in the water column should lead to a lot of population connectivity.

Genetic markers, however, have shown every imaginable pattern of variation when compared across Atlantic and Gulf of Mexico populations, from homogeneity across the regions to alternate fixation for different DNA sequences. This latter pattern means that for a particular gene, the Atlantic and Gulf populations do not share any of the same DNA sequences.

It is conventional to interpret this genetic exclusivity under the assumption that it was produced by genetic drift over an extended period of reproductive isolation. Doing so in this case leads to an estimate that Atlantic and Gulf populations were isolated approximately 1.2 million years ago and evolved independently in isolation until relatively recently.

Many other genes show strong differentiation between Atlantic and Gulf oysters. Our preliminary estimates are that 2 to 4 percent of genes in the oyster genome show extreme differentiation between Atlantic and Gulf despite the fact that these populations are now reunited and exchanging some migrants along the Atlantic coast of Florida.

In eastern Florida, where the historically Atlantic and Gulf populations now converge, genetic variation shows a sharp geographic transition. This is illustrated in Figure 1. In a species such as the oyster with the capacity for long distance dispersal, this sharp and stable genetic transition is only possible if physical conditions along eastern Florida create a barrier to larval dispersal or strong natural selection maintains the genetic distinctions that have evolved between Atlantic and Gulf oysters.

Research in my laboratory is currently focusing on measuring the relative importance of these two factors. I suspect that both are important, but one recent result will illustrate how selection may be differentially favoring different oyster phenotypes across this

latitudinal transition. We compared growth rate of Atlantic-like and Gulf-like oysters in two locations, one north of the genetic transition and another site south of the transition along eastern Florida.

Growth rate is widely considered to be an important phenotypic determinant of overall fitness in bivalve mollusks, with faster growth leading to an advantage in competition for space, larger body size, greater fecundity, and a higher probability of producing successful offspring.

Our preliminary results indicated that these two populations of oysters each grew faster as juveniles in their home environment than in the opposite environment. This is the definition of local adaptation. Genetically determined higher performance leading to higher relative fitness in one environment relative to another. These results provide the first experimental indication that oysters in the Atlantic and the Gulf of Mexico are locally adapted to their environments, but conclusions must remain tentative until the experiments are replicated.

My additional comments pertain to the Chesapeake Bay population of eastern oysters. The potentially broad larval dispersal of oysters has always led to the assumption that Chesapeake Bay oysters, and any regional set of populations for that matter, all evolved as a well-mixed interbreeding unit. Several published genetic studies supported this assumption because evidence for population structure within Chesapeake Bay was nonexistent or weak.

We examined DNA markers with greater sensitivity than had been previously examined and found the first evidence that oysters in different parts of Chesapeake Bay evolved somewhat independently. Specifically, we found that the amount of genetic divergence between two Chesapeake Bay oyster samples depends on their physical proximity. Two samples in adjacent tributaries show greater relatedness on average than two samples from different sides of the bay.

This result is consistent with theoretical expectations for continuously distributed populations in which migrants are primarily shared among adjacent sites. The implications of this result are quite profound for restoration of oysters because they imply that even on a time scale of decades, the vast bulk of dispersing larvae that successfully settle, grow, and reproduce are staying close to home, probably remaining within the same Chesapeake tributary where their parents were.

The good news is that restoration efforts directed locally within a tributary or region are likely to have local payoffs, rather than having the effort dissipated when larvae scatter. The bad news, however, is that this type of population structure, coupled with the fact that oyster populations are severely reduced and fragmented today in the Chesapeake, makes the risks of inbreeding and genetic deterioration of the population a serious concern.

Work in my lab on the Chesapeake Bay oysters shows that they have retained large amounts of genetic variation compared with populations outside the bay. Thus, the most obvious indication of inbreeding risks, the loss of genetic diversity, is rejected by these data.

However, much more subtle inbreeding effects are predicted by theory in this species, and these have not yet been tested. Also, the increased planting of hatchery-bred stock exacerbates the population fragmentation by introducing genetically depauperate stocks into the bay.

Furthermore, the recent move by the Army Corps of Engineers and other restoration efforts to plant selectively bred, disease-tolerant strains of C. virginica for restoration is likely to further lower the overall genetic health of Chesapeake Bay oysters.

Thus, to summarize, I would say that inbreeding is not currently the most serious risk to Chesapeake Bay oysters. Certainly, environmental degradation and disease take that prize. Nonetheless, there is no such thing as "the end justifies the means" in restoration biology. The degree of long-term success that we can expect from restoration will depend upon the means that we take to get there. Unfortunately, there are no quick, simple, or inexpensive solutions.

Thank you.

[The prepared statement of Dr. Hare follows:]

Statement of Dr. Matthew P. Hare, Assistant Professor, Department of Biology, University of Maryland, College Park, Maryland

I have been asked to summarize my research on the eastern oyster, Crassostrea virginica, as it pertains to the health of Chesapeake Bay populations, evidence for population structure, and the scientific basis for designating subspecies. I am a geneticist who uses genes to understand organisms and population histories, rather than focusing on the intricate workings of the genes themselves; Thus, I will speak of genetic markers, and by this I mean segments of DNA that trace their ancestry through the extended pedigree of a population and can therefore be used as markers of migration and genetic drift.

I have been working on eastern oysters since 1991. Most of what I will report today has been published in the peer-reviewed literature by myself and others. However, I will also report on NOAA/Sea Grant-funded research on Chesapeake Bay oysters that is currently under peer review as well as preliminary results that bear directly on the questions at hand. My use of the term oyster will always refer to C. virginica unless otherwise indicated.

My testimony will be in three parts. I will begin with a very brief summary of those biological attributes of oysters that most directly affect their propensity for dispersal, population admixture and population viability. Second, I will summarize the evidence for distinct oyster populations in the Atlantic and Gulf of Mexico. Third, I will provide my evaluation of the genetic health of Chesapeake Bay oyster populations.

Eastern oysters are a very old species, proliferating in estuarine waters for the last 20 million years while many other mollusk species have come and gone in the western Atlantic. It is remarkable that such a successful species can now be imperiled by the cumulative effects of human activities, so it is instructive to examine the characteristics of oysters that have probably conferred evolutionary success. Eastern oysters are extremely fecund, with females routinely producing 25 million eggs each year. This not only provides a capacity for prolific population growth under good conditions, but the genetic diversity generated among those eggs by meiotic recombination also buffers oysters against environmental heterogeneity. Oysters begin life as a larva that feeds in the water column for two to three weeks before locating suitable hard substrate and cementing itself for the rest of its sessile existence. Depending on tidal and ocean currents, a three week duration in the water column could disperse the average oyster larva hundreds of kilometers, promoting population connectivity. Although there is good evidence that larvae do not drift as passive particles, but rather swim vertically to effect retention within tidal estuaries, only recently have we had the proper genetic markers and analytical power to measure these effects in wild populations. Finally, the oyster has a very plastic phenotype. In the same way that it grows its shell in whatever configuration the substrate and adjacent organisms allow, its physiology and growth is also modified in response to the local salinity, temperature, etc. The eastern oyster has physiological

limits, for example it does not survive well at oceanic salinities, but the broad geographic range of this species from New Brunswick, Canada to Yucatan, Mexico, speaks to its evolutionary success as a generalist.

The population genetics of oysters has been studied more extensively than nearly any other native marine invertebrate in U.S. waters. This interest did not stem primarily from the commercial value of this species, but rather because of the population biology described above, and was further instigated by scientific controversies over interpretation of the observed population genetic patterns (Appendix 1). In total, genetic markers have shown every imaginable pattern of variation when compared across Atlantic and Gulf of Mexico (Gulf hereafter) populations—from homogeneity across the regions to alternate fixation for different DNA sequences. This latter pattern means that for a particular gene (for 26 genes, in fact, all on the maternally-inherited mitochondrial DNA) the Atlantic and Gulf populations do not share any of the same DNA sequences. It is conventional to interpret this genetic exclusivity under the assumption that it was produced by genetic drift over an extended period of reproductive isolation. Doing so in this case leads to an estimate that Atlantic and Gulf populations became isolated approximately 1.2 million years ago and evolved independently in isolation until relatively recently. Many other genes show strong differentiation between Atlantic and Gulf oysters—our preliminary estimate is that two to four percent of genes in the oyster genome show extreme differentiation despite the fact that these populations are now reunited and exchanging some migrants.

In eastern Florida, where the historically Atlantic and Gulf populations now converge, genetic variation shows a sharp geographic transition (50 to 75 percent gene frequency shift over 20 km; Figure 1). In a species such as the oyster with the capacity for long distance dispersal via larval drift, this sharp and stable genetic transition is only possible if physical conditions along eastern Florida truncate dispersal distances (i.e., a dispersal barrier) and/or strong natural selection maintains the genetic distinctions that have evolved between Atlantic and Gulf oysters. Research in my laboratory is currently focused on measuring the relative importance of these two factors. I suspect that both are important, but one recent result will illustrate how selection may be differentially favoring different oyster phenotypes across this latitudinal transition. We compared growth rate of Atlantic-like and Gulf-like oysters in two locations, one north of the genetic transition and another site south of the transition along eastern Florida. Growth rate is widely considered to be an important phenotypic determinant of overall fitness in bivalve mollusks, with faster growth leading to an advantage in competition for space, larger body size, greater fecundity, and a higher probability of producing successful offspring. After taking into account complicating factors such as the density of oysters, our preliminary results indicated that these two populations of oysters each grew faster as juveniles in their home environment than in the foreign environment. This is the definition of local adaptation; genetically-determined higher performance leading to higher relative fitness in one environment relative to another. These results provide the first experimental indication that oysters in the Atlantic and Gulf of Mexico are locally adapted to their environments, but conclusions must remain tentative until the experiments are replicated with controls for potential confounding factors.

My final comments pertain to the Chesapeake Bay population of eastern oysters, arguably the most anthropogenically degraded and depauperate population in the species. I speak of it as a population out of convenience, not because of any evidence or belief that it is demographically isolated from adjacent stocks along the Atlantic coasts of Virginia and Maryland. The potentially broad larval dispersal of oysters has always led to the assumption that Chesapeake Bay oysters all evolved as a single interbreeding unit, at least on an evolutionary time frame. Several published genetic studies supported this assumption because evidence for population structure within the Bay was nonexistent or weak. We examined DNA markers with greater sensitivity than had been examined before and found the first evidence that oysters in different parts of the Bay evolve somewhat independently. Specifically, we found that the amount of genetic divergence between two Chesapeake Bay oyster samples depends on their physical proximity. Two samples in adjacent tributaries show greater relatedness than two samples from different sides of the Bay. This result is consistent with theoretical expectations for continuously distributed populations in which migrants are primarily shared among adjacent sites. The implications of this result are quite profound for restoration of oysters because they imply that even on a time scale of decades, the vast bulk of dispersing larvae that successfully settle, grow and reproduce are staying close to home—probably remaining within the same Chesapeake tributary where the parents were. Our results indicate that local dispersal is not only a feature of oysters in a few "trap-like" tributaries, but rather a general characteristic of oyster populations in the Chesapeake. The good news is

that restoration efforts directed locally within a tributary or region are likely to have local payoffs, rather than having the effort dissipated when larvae scatter. The bad news is that this type of population structure, coupled with the fact that oyster populations are severely reduced and fragmented today in the Chesapeake, makes the risks of inbreeding and genetic deterioration of the population a serious concern.

Inbreeding in natural oyster populations and its consequences is a complicated subject that is under active investigation in several laboratories. My work on Chesapeake Bay oysters shows that they have retained large amounts of genetic variation compared with populations outside the Bay. Thus, the most obvious indication of inbreeding risks, the loss of genetic diversity, is rejected. However, much more subtle inbreeding effects are predicted by theory in this species and these have not been examined. Also, the increased planting of hatchery-bred stock exacerbates the population fragmentation by introducing genetically depauperate stocks. Furthermore, the recent move by the Army Corps of Engineers and other restoration biologists to plant selectively-bred, disease tolerant strains of C. virginica for restoration is likely to further lower the overall genetic health of Chesapeake Bay oysters (with the hope of infusing genes underlying disease tolerance into wild stocks, a highly speculative proposition). Thus, to summarize, I would say that inbreeding is not currently the most serious risk to Chesapeake Bay oysters—environmental degradation and disease take that prize. Nonetheless, there is no such thing as "the end justifies the means" in restoration biology; the degree of long term success we can expect from restoration will depend on the means we take to get there. Unfortunately, there are no simple, quick or inexpensive solutions.

Appendix 1

One controversial hypothesis regarding oysters involved the interpretation of genetic patterns of population structure. I summarize the controversy here in an effort to clarify the issue and suggest its resolution so that it does not unduly muddy the deliberations on population distinctions. In Atlantic and Gulf oysters are genetically homogeneous when examined with some genetic markers, whereas other genes show strong differentiation. It is expected that genes on different chromosomes can evolve independently within the same set of populations and might be shaped by different evolutionary forces (e.g., selection, genetic drift) into various patterns of population structure. So pattern variation among markers is not controversial, but one study found different levels of Atlantic—Gulf differentiation in two classes of markers (protein-level polymorphisms in metabolic enzymes versus polymorphisms in nonfunctional DNA). I think it is fair to say that subsequent work has rejected the hypothesis that certain classes of genetic marker are shaped by distinct evolutionary forces in oysters. Instead, it appears that the evolutionary history of these populations, in which Atlantic and Gulf oysters evolved in isolation for a considerable period and recently reunited, has created widely varying patterns of differentiation among genes.

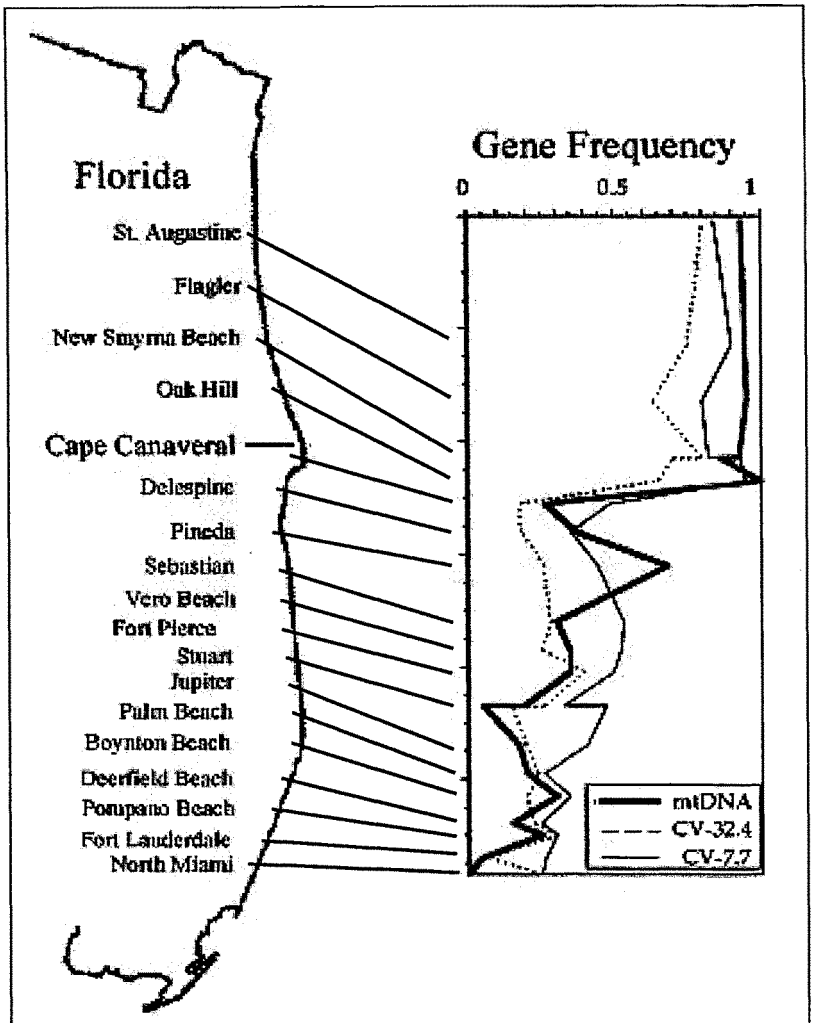


Figure 1. Gene frequency clines for one mitochondrial (mtDNA) and two nuclear loci shown in relation to the eastern Florida geography (samples collected in 1991; Hare and Avise 1996, Evolution 50:2305-2315).

The CHAIRMAN. Thank you.

I am going to begin with Dr. Kraeuter. You testified that seed was imported into the Delaware Bay since 1829. How can the Atlantic coast eastern oyster be a separate species if you have been importing seed into the Delaware Bay since 1829?

Dr. KRAEUTER. I will have to defer that to my genetic colleagues over here to explain it. But massive quantities of oysters have been moved up and down at least the mid-Atlantic and North Atlantic

coast since the middle 1800s. We are talking about millions and millions of bushels being moved in any one year.

We have records from the Delaware in the late 1800s, where a million to 2 million bushels of Chesapeake seed arrived in Delaware Bay. Chesapeake, there are records of Delaware seed moving down to Chesapeake Bay. We also had oysters from Long Island Sound and the eastern shore of Virginia moving into Delaware Bay. These were sustaining the industry because Delaware Bay, in and of itself, could not produce enough seed even in the 1800s to sustain the growth of the industry. In that lower portion of the bay, you saw those planted grounds.

This was all done by sailboats. Remarkable. But I will let the geneticists tell you how you could sustain that population differentiation in lieu of those kind of movements.

The CHAIRMAN. Somebody want to take a shot at it?

Mr. GAFFNEY. I will take a shot at it. Basically, most of that movement was within the Atlantic, and most of it was within the North Atlantic, if we define North Atlantic as from Cape Hatteras north. So that was movement of genetically somewhat similar oysters. We are not talking about moving Gulf oysters around Florida by sailboat up to replenish the Delaware or Chesapeake Bay's or New England.

The CHAIRMAN. But if I could stop you there, I have been told that in an effort to develop a disease-resistant oyster that Gulf oysters have also been planted in the North Atlantic.

Mr. GAFFNEY. Yes. Small numbers have been. And——

The CHAIRMAN. When you say "small numbers," are we talking millions of bushels or——

Mr. GAFFNEY. We are talking millions of oysters, but in an oyster world, that is a small number. So you have to just add on lots of zeroes to everything.

We are seeing the genetic evidence suggests that whatever Gulf oysters have been brought into the Chesapeake have not left many offspring or, for that matter, hardly any, I should say. So you can still easily tell them apart.

The CHAIRMAN. You are the expert on this, and I am not a scientist. But in my business, if I bring in a Brahma bull and put him with my cows, I got a different sub-species all of a sudden. And they look a lot different, and they are still cows, but they look different because I put another bull in. And if I put an Angus bull the next year, I get something completely different coming in.

Now if you are planting Gulf oysters over here and a different North Atlantic oyster over here, in that area, you are going to end up with a different sub-species, or I think the term is an evolutionarily significant unit that develops there. Is that not accurate?

Mr. GAFFNEY. That is true if they lived. But if they don't live, then they have no impact.

The CHAIRMAN. If they interbreed at all, you have changed it?

Mr. GAFFNEY. Right. They have to make it to the point of interbreeding. They have to survive a year or two. Most oysters don't make it, and we are just not seeing——

The CHAIRMAN. But if any do, it does have an impact on what you end up with, the population in that area?

Mr. GAFFNEY. It would. Sure. And we are not seeing any evidence of that happening.

The CHAIRMAN. Dr. Hare?

Dr. HARE. If I could on that same question? The significance of the preliminary data I described suggesting local adaptation of Atlantic versus Gulf oysters is that even if oysters brought from the Gulf into the Atlantic, into Chesapeake Bay, say, survived to reproduce, those genes are not well adapted to the environment in Chesapeake Bay.

And so, to the extent that we have populations of oysters that are locally adapted, I think you could have quite a lot of human-induced migration, not really perhaps introducing some new alleles, some new genetic variation. But selection is a very strong sieve through which that is going to maintain the integrity of what is the populations in Chesapeake Bay and Delaware Bay.

Now I think there is a lot more work that needs to be done to understand the degree to which selection is enforcing those local properties. But I don't think it follows that if there is human-induced migration that it necessarily eliminates the integrity of a population.

The CHAIRMAN. Well, like I said, I am no scientist, but after watching the cattle industry my whole life, I can tell you that even if you put a bull in that doesn't necessarily fit with the climate and the area that I live in and not many of the offspring survive, two or three generations down, you are going to end up with one that looks like that bull.

And this is what my concern is because they start talking about listing different populations, the possibility of listing different populations as threatened or endangered. And with what you are able to do in looking at DNA and differentiating between populations, we end up with a situation like we have on the West Coast with the salmon, where every river becomes an evolutionarily significant unit, and those end up being listed as threatened.

And we end up with, you know, 50 or 100 different populations of oysters, which could either be listed as threatened or endangered. And whereas I think everybody would agree, when we have gotten millions or billions of oysters that as a population, they are probably not endangered. But if you start breaking it down enough, you might find one that is.

And that is what my concern is. Because you guys can break this down to which ones came out of which little bay, if you start doing your DNA testing and everything else. And that significantly changes the entire debate.

Dr. HARE. I think, sir, that is a very reasonable concern, especially with species in which there is no clear line that you can draw, say, between Chesapeake and Delaware oysters or Chesapeake and North Carolina, although there is a very clear line down in Florida between Atlantic and Gulf.

However, I would only comment that I think the Endangered Species Act is explicit with respect to vertebrates that it not be applied in a trivial sense when you apply the distinct population segments. So a one-time storm would not apply. And its application then, it becomes a judgment call.

And geographic settings which have particularly degraded environments and habitats might justify then a different treatment than another population that has a better habitat. So it just becomes a judgment call.

The CHAIRMAN. The original language in the committee report on the amendments on the population segments stated that the Congress saw great potential for abuse and cautioned that it be used very sparingly, which is one of the reasons why invertebrates were left out of that because you could end up with every bay, every little population being considered a separate evolutionarily significant unit. And I have concerns about where we end up once we start going down this path, which is one of the reasons why we are doing the hearing on the eastern oyster today is because this is something that significantly impacts the management in every single bay where those oysters are.

So as this moves on, we are going to have to really go through this because it does have an impact, and it is significant. And you know, a lot of folks on the East Coast don't realize how this can be applied and where we end up with as those of us from the west have seen that they can really stretch this thing out if they want to and control a lot of things under the Endangered Species Act.

I want to recognize Mr. Gilchrest.

Mr. GILCHREST. Thank you, Mr. Chairman.

We just want to restore the healthy abundance of the oyster to the way it was when John Smith came. That is not impossible, is it? I will ask the scientist. Just kidding on that question.

The CHAIRMAN. They produce billions of them.

Mr. GILCHREST. It should be trillions. But this is a good hearing, Mr. Chairman. A lot of things are coming to light. I have a question. I am going to go back to MSX and Dermo for a minute. And I guess, Dr. Hare, you can answer this, or anybody on the panel can take a shot at it. First of all, do you have MSX in the Gulf of Mexico?

Dr. RAY. No.

Mr. GILCHREST. Okay. You don't have that, but you have Dermo in the Gulf of Mexico?

Dr. RAY. We have lots of it.

Mr. GILCHREST. You have lots of Dermo. Are there any oysters down there resistant to Dermo?

Dr. RAY. No. There is said to be some in South Bay that it didn't occur, but that is an absolute fallacy.

Mr. GILCHREST. Oh, so there is no oysters anywhere——

Dr. RAY. I need to tell you. I have worked on Dermo since 1950, and I am still working on it.

[Laughter.]

Mr. GILCHREST. Okay. Will genetic diversity help with resistance to MSX and Dermo?

Dr. RAY. Well, I don't know. The only thing that I know that will help is the good Lord giving ample rainfall.

Mr. GILCHREST. Hmm. Well, we have had a lot of rain in the last few days.

Dr. RAY. Well, but I hope later I will be able to make a comment about that.

Mr. GILCHREST. All right.

Dr. HARE. That rain probably is helping this year. Broadly speaking, yes, genetic diversity is what a species needs to be able to respond to any insult, disease being one of them. The epidemiology, however, of this disease in oyster populations is such that anywhere where oysters occur, they are going to use a gradient of habitats, some of which Dermo is very prevalent in and has a strong intensity of infection. Others, where there is a reserve, a refuge from the parasite.

And that dynamic between those populations makes it very difficult for oysters as a species or as a population to evolve resistance. So at least in theory, it is understandable why Dermo has been persisting without the evolution of resistance.

Mr. GILCHREST. I guess taking the relatively short period of time that they have been exposed to Dermo, I guess since the 1950s or the 1930s, whichever one, MSX and Dermo, the oyster hasn't had the time to evolve or gain resistance to those two diseases?

Dr. HARE. Sir, I don't think it is known how long Dermo has been in the Gulf of Mexico.

Dr. RAY. I can give some comments. Oh, excuse me.

Dr. HARE. Please.

Dr. RAY. At the time of the big oyster mortalities in the late 1940s before Dermo was discovered, the view was that something had happened in the oil operation that had promoted the development of Dermo. So Dr. Mack Owen had some oysters that were at a world fair in 1919 in Chicago, with prime oysters, and they were in the Cabildo Museum. So he had those sectioned after they learned about Dermo, and there is definite records that Dermo occurred in Louisiana oysters as far back as 1919.

Mr. GILCHREST. The oysters, if given enough time, can develop resistance to MSX and Dermo. I am going to assume that. Does MSX and Dermo develop resistance—I mean, get stronger as time goes on then, that it makes it more difficult to develop resistance to it?

Dr. RAY. Well, I know it has been said that there are different strains of Dermo, some more virulent than others. And it has been said, well, maybe the Gulf oysters are more resistant to Dermo or our Dermo is not as virulent.

But I think one of the reasons why, our oysters can reach market size within 18 to 24 months, and they just simply grow faster, and I think they can just outgrow the disease. And not every oyster in a population is infected. But I don't think anyone has been able to pick the ones that survive long periods of disease, like 5 or 6 years, and take those and then from that develop a genetic or find those particular individuals that have survived for 5, 6 years.

Always in the intertidal zone, there are oysters that survive. But efforts to take those and then use those as broodstock has not resulted in a resistant strain of oyster, to my knowledge.

Mr. GILCHREST. Thank you.

Dr. KRAEUTER. Can I make a comment on the resistance? I can't say too much about Dermo. But in Delaware Bay, where MSX was first found in the middle 1950s, we had a major epizootic, and we began a breeding program. And the breeding program has resulted in development of strains that resist MSX. They are not immune to the disease, but they resist it and persist much longer.

As I mentioned in my testimony, there was another MSX epizootic in 1985, and there are a number of individuals in our laboratory who suggest that second epizootic has increased the resistance in the native population. The problem is it takes a lot of time, and you have to have these epizootics to have that because you have to reduce that population down.

And the base population is arrayed along a salinity gradient. So the disease does not affect the entire population within a bay. If you have a gradient like we have in Delaware Bay, the fresh water, as Sammy has said, has a great deal of influence on what happens in the oyster population. So this is not a simple one-to-one kind of a thing.

And whether you can develop resistance to a disease that apparently has been with the native oyster for a long period of time, like Dermo, as opposed to an exotic disease, which is MSX, is an interesting scientific question in my mind. And I quite frankly don't know how to answer it. But——

Mr. GILCHREST. Thank you.

The CHAIRMAN. Mr. Costa?

Mr. COSTA. Thank you very much, Mr. Chairman. I, too, want to commend you for your efforts in putting this hearing together this afternoon.

I would like to address my question to Dr. Hare and Mr. Gaffney, and it really kind of follows the line of questioning that the Chairman was asking just a moment ago with regards to in the broader context how the Endangered Species Act is applied.

And it has been the troubling part that I have dealt with in California, but I know it has been an issue around the country that when we look at a species that is listed, in this case we are talking about the eastern oysters—it is interesting to see how everyone pronounces "oyster" a little bit differently depending upon where you are from. But I think we are all talking about the same thing.

And that is once we list something, and how the Act works in our country, and then how we develop a recovery plan. And I find it particularly perplexing and frustrating, having carried legislation that has provided literally hundreds of millions of dollars for restoration efforts in the San Francisco Bay delta and elsewhere in California, between the competing efforts and what we know now today between native and non-native species, which I think we were touching upon as it relates to the East Coast.

It would be nice in a perfect world if we could go back 100 years, and I think that was stipulated earlier in the line of questioning. But where do we draw the line as policymakers in terms of our best efforts when we talk about, in this case, limited Federal dollars in terms of recovery in the efforts of species where non-native species have been introduced? And we are attempting to try to correct nature, so to speak, or go back to a time when man had little impact or any impact.

It just seems to me some of it is the art of the possible and some of it is not. And where can we conclude in the law under the Endangered Species Act as to that to which is achievable under recovery and that which is not? Who wants to take a crack at that? Mr. Gaffney or Dr. Hare?

Dr. HARE. Um.

Mr. COSTA. It is an easy question.

Dr. HARE. Yes.

[Laughter.]

Dr. HARE. I don't think I would want to stake the claim here of what restoration biology can accomplish because it is a rapidly growing and advancing field, both in marine and terrestrial systems. I think we can accomplish a lot more than we are currently accomplishing in Chesapeake Bay with the oysters and with the estuarine habitats and organisms in general. So I am not sure how to answer your question more specifically.

Mr. COSTA. Well, I mean, we are talking about a Federal law here that has been obviously under tremendous scrutiny. We are talking about Federal dollars that are limited. We have States that are applying State resources. We are often, in our habitat conservation plans or recovery efforts, trying to put more resources from the private sector when we require mitigation. It just doesn't seem like that is enough of an answer, that we can do better.

Dr. HARE. Well, it seems to me that what I got——

Mr. COSTA. I mean, how do I define ''better'' if we are looking at a change in the law?

Dr. HARE. Well, from the discussion here today, it seems to me that the challenge that you have in revising the ESA is in establishing enough flexibility to allow for a situation such as the oyster in which you have a very broad distribution, a very generally hearty organism, but is suffering extremely in some portions of its range.

And on the other hand, you don't want it to be abused. And so, you have to put in elements that allow for judicious use. I don't know a way out of that conundrum.

Mr. COSTA. But you understand, for those of us who on some occasions have been critical of the Endangered Species Act, where we are struggling in terms of how we provide that flexibility. Where do you cut your losses, I guess, is another way to look at it.

Mr. Gaffney, do you want to take a stab at it?

Mr. GAFFNEY. Well, it is dangerous to ask a scientist to opine on policy, but I guess it works the other way, too. I guess I would say that——

Mr. COSTA. I am not trying to opine on the science.

Mr. GAFFNEY. No. I suppose the one area that could use addressing is there seems to be a resistance or a concern about a species being subdivided into sub-species or segments of interest. It seems to me, as sort of novice in this area, that the criteria for evaluating significance of these distinctions are not really well defined.

I would say that things that are very clearly sub-species that have had a long evolutionary separation are genetically distinct and, therefore, provide separate reservoirs of genetic diversity. Those, under virtually any imaginable circumstance, merit protection.

But when you get to the lower levels of distinction that are increasingly more possible with all the DNA techniques we now have, then you have to have some sort of criteria for saying, well, yes, I can tell an oyster from this bay from one from that bay. Or maybe better said, I can tell a population. If you give me 100 oysters, I can tell you which bay they came from.

That is not the same as saying those genetic differences are highly important from an evolutionary or ecological or biological sense. It may be the case, but it is not guaranteed. So that doesn't seem to have been well addressed, and so that would be my comment on how things could be improved.

Mr. COSTA. Thank you. I was going to follow up, but I will just let it go.

The CHAIRMAN. Mr. Gilchrest?

Mr. COSTA. There is a number of places I could go. But——

The CHAIRMAN. Mr. Gilchrest?

Mr. GILCHREST. Thank you, Mr. Chairman.

Two quick questions. One, how do you increase genetic diversity in the population in the Chesapeake Bay, and are reefs better than bars? Actually, I have more than two questions. How do you increase genetic diversity? Are reefs or oyster reef better than an oyster bar?

Can you create oyster reef corridors? You make I think some reference to that, Dr. Hare, or maybe I just misread you. Oyster corridors, can you create an oyster reef corridor in the Chesapeake Bay, and would that help genetic diversity?

Dr. HARE. This species has more genetic variation in its natural state than most every other species on the planet. It is an extremely genetically diverse organism, partly because of its very large fecundity and also because of the large population sizes. So I don't think there is a problem with having enough genetic diversity. In fact, more probably wouldn't help. You would add as much bad stuff as good.

I think we certainly want to keep it from losing genetic diversity in local areas where we want it, where it needs to be able to adapt to——

Mr. GILCHREST. Is there a threshold of numbers that would do that?

Dr. HARE. That is not an easy question to answer. It is shades of gray.

Mr. GILCHREST. I see. Are reefs better than bars?

Dr. HARE. Can you define the two?

Mr. GILCHREST. An oyster reef, something that, you know, starts at the bottom and goes up 10, 12, 20 feet. A regular reef, oyster reef as opposed to an oyster bar that we have mostly in the Maryland portion of the bay, where it is just flat.

Dr. HARE. As far as I know, that distinction is less important than having a living reef. Having a reef in which oysters are growing in their natural form. Also they are forming a matrix that a lot of other species use, and that keeps accruing so that the reef grows. I think that can happen on both a reef and a bar.

Mr. GILCHREST. I think Virginia, for example, I think has some 100 or they are working toward 100 oyster reef sanctuaries in their portion of the Chesapeake Bay.

Dr. Ray, and I am sorry for these quick answers and questions. You made a comment, and I would like the gentlemen from Delaware and Maryland to comment on it. You made a comment, Dr. Ray, about your opposition to introducing the Asian oyster to the Chesapeake Bay.

Dr. RAY. Yes, sir.

Mr. GILCHREST. Would the two gentlemen from Delaware and Maryland like to respond to Dr. Ray's opposition to that introduction?

Dr. HARE. I completely agree with his views.

Mr. GILCHREST. Oh, well.

Mr. GAFFNEY. I am firmly on the fence.

Mr. GILCHREST. Firmly on the fence?

[Laughter.]

Mr. GILCHREST. Yes, sir?

Dr. KRAEUTER. I am still waiting for more evidence, myself. I think it is in light of today's discussions about genetics, I find it interesting that on one hand we are saying, oh, this species is going to be introduced and take over, and it is going to destroy the genetic diversity of the eastern oyster, even though, generally, it can't interbreed. And yet we are saying you can move massive numbers of eastern oysters into an area, and they don't survive well enough to interbreed with their own species.

So it looks like we are talking out of both sides of our mouths, which is not unusual for scientists. But there are some real problems here that we are not addressing very well, and it comes down to definitions.

I, quite frankly, have been sitting here biting my tongue. I think the Endangered Species Act is an offense to biology in that you are not talking about species. If you are going to actually look at the legislation, decide what level of genetic diversity you want to call the endangered whatever act.

Mr. GILCHREST. I just want Dr. Ray to come in. I appreciate that. Thank you very much. And I apologize for interrupting. But you have about 30 seconds, Dr. Ray. Can you tell us in two sentences why the Asian oyster is not a good fit for the Chesapeake Bay?

Dr. RAY. Well, I am concerned about what the mud-worm, Polydora, will do to it, particularly in the summertime. And we have some history of what a semi-species, fast-growing, cold water, and a thin-shelled species was brought into Louisiana in the early 1930s. I am just saying I think the mud-worm itself, much has been said about disease resistance and what not. But I just think that when it is all done, particularly in the summertime, that the mud-worm—and I know nothing about the oyster, that particular oyster.

I am just saying based on the experience with the Pacific oyster. And in areas such as Australia and places, mud-worms have been a serious problem, and oysters have had to be lifted off the bottom to be grown in culture. So I see that as a detriment to bringing it in and will probably not be successful. That is simply an opinion of an old man.

Mr. GILCHREST. Well, thank you very much, sir.

Thank you, Mr. Chairman.

The CHAIRMAN. Your opinion is important. That is why we invited you.

I want to thank this panel for your testimony. It was very helpful, very interesting, and there may be follow-up questions. I know I have a few additional that I would like to ask, and I will submit those to you writing. And if you could answer those in writing so

that they can be included in the hearing record, I would appreciate it. Thank you.

The CHAIRMAN. Let me dismiss this panel and call up our third panel: Dr. Jim Wesson, Mr. William S. Perret, and Mr. Chris Judy.

If I could have you remain standing and raise your right hand?

[Witnesses sworn.]

The CHAIRMAN. Thank you. Let the record show they answered in the affirmative.

Welcome to the Committee. I apologize for the lateness. I realize that you have been sitting here a long time. So we are going to begin with Dr. Wesson.

STATEMENT OF JAMES A. WESSON, PH.D., DEPARTMENT HEAD OF CONSERVATION AND REPLENISHMENT, VIRGINIA MARINE RESOURCES COMMISSION

Dr. WESSON. Good afternoon, and thank you.

Just starting off, I am the resource manager for the oysters in Virginia's part of the Chesapeake Bay, which is when you are talking about this at a sub-species level, we will be the epicenter for the effects on us.

And my agency, which is the Virginia Marine Resources Commission, as well as the Commonwealth of Virginia, strongly opposes the listing of the eastern oyster as either endangered or threatened. We don't really consider the eastern oyster as a separate subspecies, and we see no evidence that the entire species is being in danger of extinction within the bay nor any part of its native range.

The eastern oyster still supports a significant commercial industry within the Chesapeake Bay. It is actively managed by the Marine Resources Commission to ensure both ecological and commercial benefits from the oyster and is the focus of significant Federal, State, and private efforts to restore current population levels to greater abundance.

As was mentioned earlier, we have 240,000 acres of public oyster grounds in Virginia's portion of the bay, and the coastal embayments of our eastern shore. We also have more than 100,000 acres of State bottom that is managed by private entities under leases.

Obviously, if you have my written testimony, oyster landings have declined dramatically, especially over the last 45 years. But if you look at the little chart that I put in there for you, there is a lot of misconceptions on the decline. And one of those comes from the difference in the periods of the decline. From the late 1800s through the early 1920s, the decline in oysters in our part of the Chesapeake Bay was definitely from harvesting.

And the reason was the shells had value, and the shells were used on land and were not returned to the water. And because of that, the harvesting actually removed the oyster reefs. After the 1920s and we got a better road system and we could get rocks in the fall line, the Commission of Fisheries, which was the precursor of our agency and private industry, began following the advice of scientists and began putting the shells overboard.

And if you look at the period of the 1920s through the late 1950s, through our husbandry in putting oyster shells back overboard, the

oyster populations were actually increasing. And if you extrapolate out to the day, had nothing happened, we probably would have been at the levels that we had seen prior to the 1800s.

But in the 1950s, as we have all mentioned, we had an oyster disease that was introduced, which began the rapid and sustained decline in oyster populations and oyster production to the low levels that we currently have in Virginia's bay waters. That newly introduced disease, which was called MSX, in combination with our native Dermo, almost have totally decimated the oyster industry, with harvests today reduced to less than 1 percent of only 45 years ago.

The small oyster processing industry that remains in the Commonwealth survives almost exclusively from the processing of imported oyster shell stock, primarily from the Gulf States. And the Virginia shucking industry remains at a competitive disadvantage in the marketplace due to the costs of importation, and more shucking houses close with each passing year. The oyster shucking industry in the Chesapeake Bay is far more endangered or threatened in its existence than the oyster itself.

Our agency along with the Virginia Institute of Marine Science have jointly monitored oyster stocks quantitatively beginning in the early 1990s. We actually have a quantitative estimate of the entire standing stock in the Chesapeake Bay. And though the populations are low relative to historical levels, we still have billions of oysters left in the Chesapeake Bay.

The intensity of the oyster disease is controlled primarily by salinity. And over the past four decades, almost all of the historically productive oysters grounds in Virginia have been impacted by disease. But primarily, the impact is on the large oysters. Small oysters have continued to spawn and maintain the population of oysters throughout all of Virginia's historic range.

Spat sets have been dependable throughout all of the oyster grounds in Virginia's portion of the Chesapeake Bay. And though populations are low in comparison to historic numbers, population levels are stable and trend more in relation to rainfall and salinity than they do from either harvest or the significant oyster restoration efforts that we have been doing for the past 15 years.

VMRC and VIMS have worked together on countless strategies, research projects, and restoration programs to combat the disease-controlled decline in oyster populations since the 1950s. The private oyster industry has invested and lost many millions of dollars in strategies to grow oysters within the disease-dominated conditions. Private investment in on-bottom aquaculture has mostly been suspended because of the inherent risks and losses in producing market-sized oysters.

Selective breeding for disease resistance began in the early 1960s at VIMS, and it continues to the present time. Eastern oysters from throughout its geographic range that have potentially exhibited disease tolerance to one or the other diseases have been crossbred and tested in the Chesapeake Bay. And certain genetic crosses have shown enough tolerance to entice modest efforts toward intensive oyster aquaculture.

Results have been mixed in the Chesapeake Bay, but a small industry has begun for the more lucrative half-shell or raw bar

trades. Intensive aquaculture has remained uncompetitive for the shucking industry because of the availability of imported shell stock and the lower price margin due to the competition from oysters processed locally in the Gulf States and from the West Coast.

The oyster restoration effort has been especially ambitious since the 1990s with, as Representative Gilchrest mentioned, we have three-dimensional oyster reef restoration projects, and we have set aside large areas as sanctuaries. We have had strict control of the wild harvest. The 3-D reef restoration and sanctuary program implemented by the Marine Resources Commission has become the model for the bay-wide oyster restoration efforts.

The 3-D reef restoration sites duplicate oyster reefs that were observed prior to harvesting activities. These reconstructed reefs improve the juvenile oyster survival. They allow oysters to grow faster, and they actually physically position the oysters close to one another to allow better fertilization success. Broodstock oyster populations on these reefs have been allowed to either develop naturally or have actually been augmented by genetic stocks that have disease resistance.

Since the early 1990s, more than $40 million in State, Federal, and private money to rebuild these reefs have been spent, and there are more than 100 of these reefs throughout the Chesapeake Bay. The significant infusion of money and effort to rebuild oyster reefs in the short term has not resulted in any immediate increase in oyster populations in the bay.

Since the reef restoration efforts began in 1993, the standing stock of native oysters has fluctuated more closely with rainfall than with the restoration activity. Oyster diseases still dominate the survival of large oysters, as you can see in some of the charts that I have included in the testimony.

Newly constructed reefs are rapidly colonized by oysters in all areas. The oyster grow very fast for the first 2 years, but most of the oysters, even on the ideally constructed sanctuary reefs, succumb to disease within 2 to 4 years. Virginia remains committed to the restoration of the native oyster populations and to the restoration of the commercial fishery. Restoration efforts continue to adapt based on the results from monitoring, and research continues to try to find solutions to counteract oyster disease.

Oyster populations, though at historically low levels, remain stable and are distributed throughout the historic range. There is no evidence that the eastern oyster in the Commonwealth is either endangered or threatened at this time.

[The prepared statement of Dr. Wesson follows:]

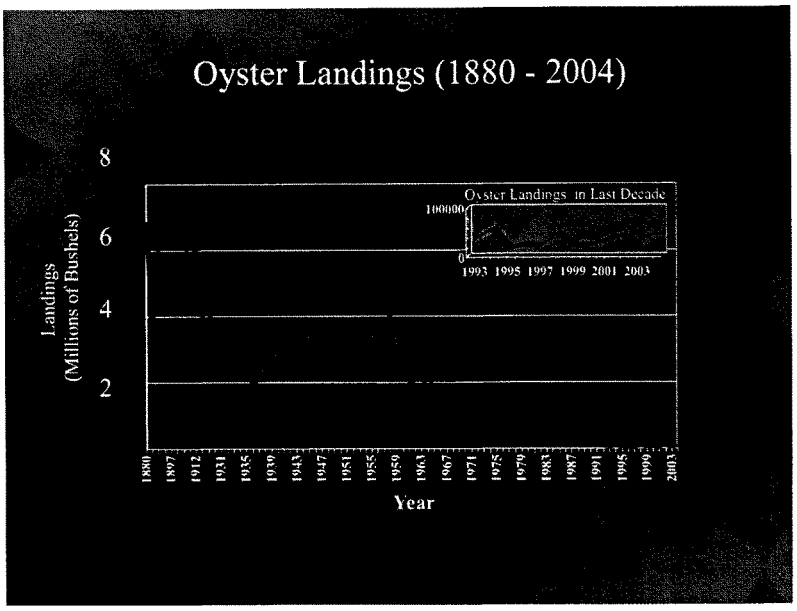
Statement of James A. Wesson, Ph.D., The Virginia Marine Resources Commission, Division of Fisheries Management, Department of Conservation and Replenishment

The Virginia Marine Resources Commission and the Commonwealth of Virginia strongly opposes the listing of the eastern oyster (Crassostrea virginica) as either a threatened or endangered species. We do not consider the eastern oyster in the Chesapeake Bay as a separate subspecies. We see no evidence of the entire species being in danger of extinction within the Chesapeake Bay nor any part of its native range. The eastern oyster still supports a significant commercial industry within the Chesapeake Bay, is actively managed by the Marine Resources Commission to insure both ecological and commercial benefits from the oyster, and is the focus of

significant federal, state, and private efforts to restore current population levels to greater abundance.

There are more than 240,000 acres of public oyster grounds in Virginia's portion of the Chesapeake Bay and the coastal embayments of the Eastern Shore. There is a new map atlas of the 200,000 acres of public oyster grounds in Chesapeake Bay that has recently been completed which is available on the Virginia Institute of Marine Science website (www.vims.edu/mollusc/oyrestatlas/index.htm). Significant oyster populations exist throughout all of these public grounds. Additionally, nearly 100,000 acres of state bottomlands are leased by private entities and oyster aquaculture operations are conducted on the private leases.

Obviously, oyster landings have declined dramatically over the past century, but most dramatically in the last 45 years.



For the period from 1880 through the 1920's, the decline in harvest was directly related to harvesting activities. The value of the harvested shell as a building commodity on land resulted in significant reef loss because the shells were not placed back in the bay once harvested. Oyster populations declined significantly with the loss of habitat. Oyster restoration began when the Commission of Fisheries and the private oyster industry in Virginia began putting shells back on the oyster "rocks" or reefs in the late 1920's. At that time, the value of the shell as a building material had declined due to the availability of quarry stone and a better highway transportation system to the bay shore communities. As shells were returned to the oyster rocks, oyster populations and commercial production increased significantly between the late 1920's and the 1950's. Oyster management and private oyster husbandry maintained and increased oyster populations and Virginia became a worldwide leader in oyster production.

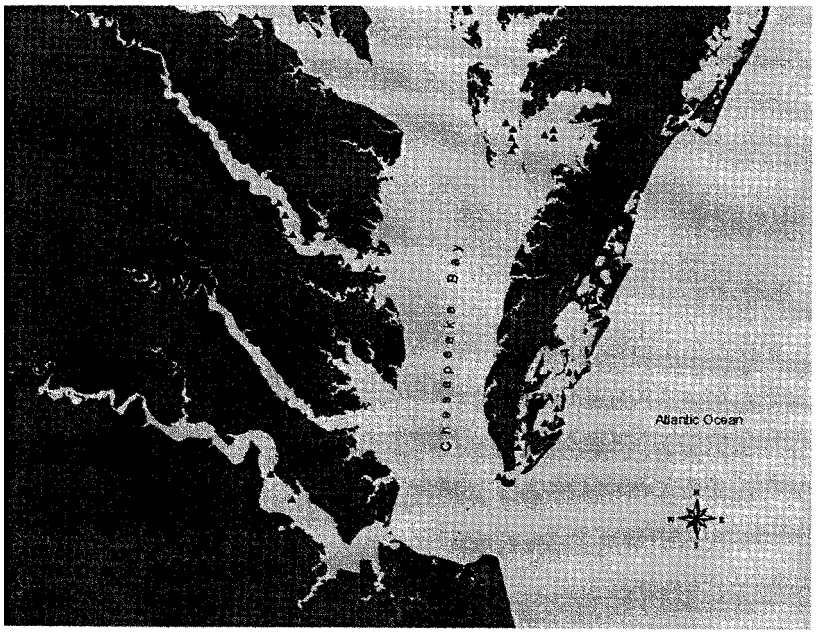
In the late 1950's, a new oyster disease was introduced to the Delaware and Chesapeake Bays, which began the rapid, and sustained decline in oyster production and population levels to the low levels that we currently have in Virginia's Bay waters. The newly introduced disease called MSX, in combination with the native disease called DERMO, have totally decimated the oyster industry, with oyster harvest reduced to less than one percent of levels only 45 years ago. The small oyster processing industry that remains in the Commonwealth survives almost exclusively from the processing of imported eastern oyster shellstock primarily from the Gulf States. The Virginia shucking industry remains at a competitive disadvantage in the marketplace due to the costs of importation, and more oyster shucking houses close with each passing year. There were more than 400 shucking houses in Virginia in the late 1950's, while currently no more than 15 still continue any significant

amount of shucking activity. The oyster shucking industry in the Chesapeake Bay is far more endangered or threatened in its existence than the oyster itself.

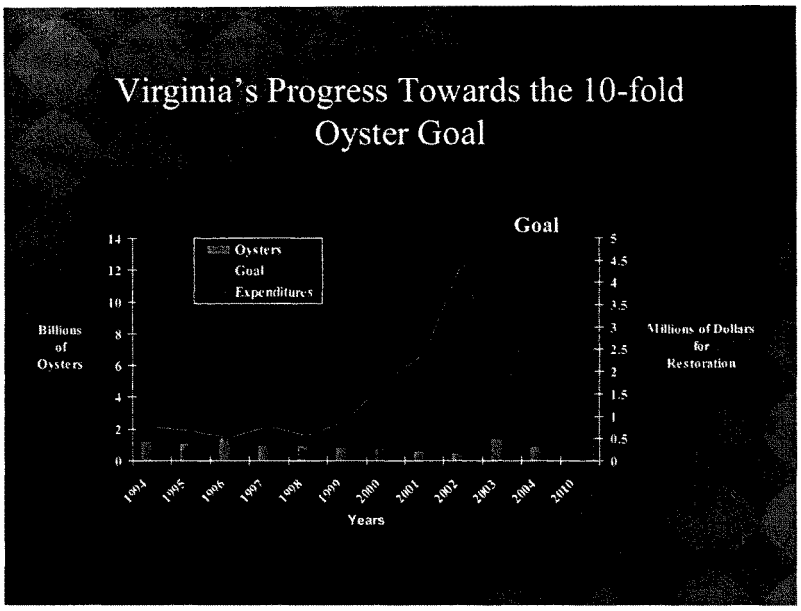
The Virginia Marine Resources Commission (VMRC) and the Virginia Institute of Marine Science (VIMS) have jointly monitored oyster stocks in a quantitative fashion since 1993. We have a quantitative estimate of the standing stocks of oysters throughout Virginia's portion of the Chesapeake Bay. Though the populations are low relative to historic numbers, billions of oysters remain on the public beds. The intensity of the oyster disease is controlled primarily by salinity. Over the past four decades almost all of the historically productive oysters grounds have been impacted by disease, with the impact primarily on the large oysters. Small oysters have continued to spawn and maintain the population of oysters in all of the historic range. Spatsets have been dependable throughout most of the oyster grounds in Virginia's portion of the Chesapeake Bay. Though populations are low in comparison to historic numbers, population levels are stable and trend more in relation to rainfall and salinity changes in the Bay, rather than from either harvest or the significant effort that has been devoted to restoration during that same time period.

The VMRC and VIMS have implemented countless strategies, research projects, and restoration programs to combat the disease-controlled decline in oyster populations since the 1950's. The private oysters industry has invested and lost many millions of dollars in strategies to grow oysters within the disease dominated conditions in the Bay. Private investment in "on-bottom" aquaculture has mostly been suspended because of the inherent risks and losses in producing market sized oysters. Selective breeding for disease resistance began in the early 1960's at the VIMS, and it continues to the present time. Eastern oysters from throughout its geographic range, that have potentially exhibited "disease tolerance" to one or the other diseases, have been crossbred and tested in the Chesapeake Bay. Certain genetic crosses have shown enough disease tolerance to entice modest efforts toward intensive oyster aquaculture. Results have been mixed in the Chesapeake Bay, but a small industry has begun for the more lucrative "raw or half-shell" trades. Intensive aquaculture has remained uncompetitive for the shucking industry because of the availability of imported shell stock and the lower price margin due to the competition from oysters processed locally in the Gulf States and from the Pacific oyster industry on the West Coast.

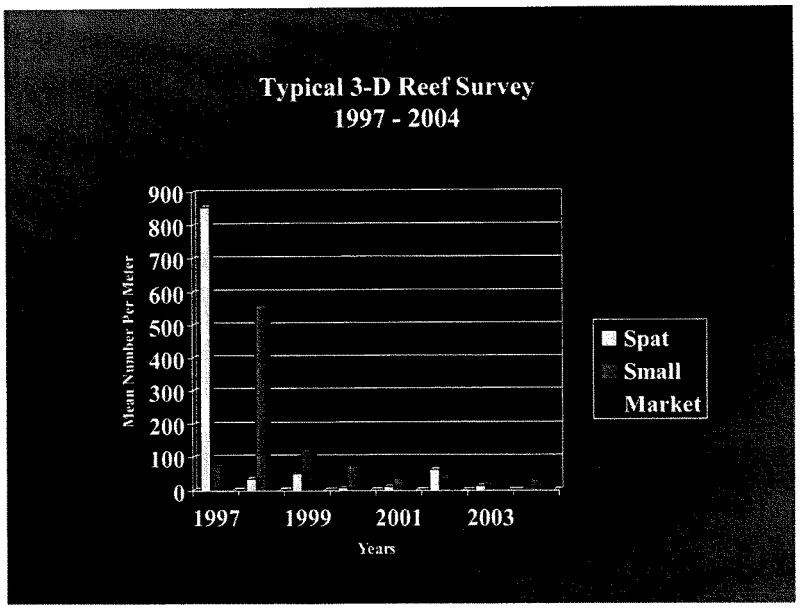
The oyster restoration effort has been especially ambitious since the early 1990's with a combination of 3-Dimensional (3-D) oyster reef reconstruction projects, the setting aside of large acreage of sanctuary areas, and the strict control of wild oyster harvest. The 3-D oyster reef restoration and sanctuary program implemented by the Marine Resources Commission has become the model for baywide oyster restoration efforts. The 3-D reef restoration sites duplicate oyster reefs that were observed prior to harvesting activities. These reconstructed reefs improve juvenile oyster survival (resulting in improved spatset), allow oysters to grow faster (resulting in improved fecundity or reproductive capacity) and physically position oysters in the most optimal configuration for spawning success (resulting in improved fertilization rates). Broodstock oyster populations on these reefs have been allowed to either develop naturally, or in many cases, have been augmented with genetically selected oyster broodstock. Since there has been baywide consensus that the restoration of 3-D reef structures, and the establishment of oyster sanctuaries, throughout the bay is the best way to achieve the Chesapeake Bay 2000 goal of a ten-fold increase in native oyster population by 2010, there has been an influx of more than $40,000,000 in state, federal, and private monies to rebuild these reefs in Virginia. Since 1993, more than 100 of these reefs have been constructed throughout Virginia's portion of the Chesapeake and coastal bays.



The significant infusion of money and effort to rebuild oyster reefs in the short term has not resulted in an immediate increase in oyster populations in the Bay. Since the reef restoration effort began in 1993, the standing stock of native oysters has fluctuated more closely with rainfall than with the magnitude of the restoration efforts.



Oyster diseases still dominate the survival of large oysters as can be seen from the monitoring results from the restored 3-D, sanctuary reefs.



Newly constructed reefs are rapidly colonized by oysters in all areas, the oyster grow very fast for the first one to 2 years, but most oysters, even on the ideally constructed, sanctuary reefs, succumb to disease within 2 to 4 years.

Virginia remains committed to restoration of the native oyster populations and to the restoration of the historic commercial fishery. Restoration efforts continue to adapt based on the results from monitoring, and research continues to find solutions to counteract oyster disease. Oyster populations, though at historically low levels, remain stable and are distributed throughout the historic range. There is no evidence that the eastern oyster in the Commonwealth is either endangered or threatened in its existence.

The CHAIRMAN. Mr. Perret?

STATEMENT OF WILLIAM S. PERRET, MARINE FISHERIES DIRECTOR, MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

Mr. PERRET. Thank you very much, Mr. Chairman, members.

I certainly appreciate the opportunity to be here, and I want to start out, first, by thanking you and the other members of the Congress for your past assistance to this industry. Some of the Gulf States were severely impacted by Hurricane Ivan last year, and the Congress was most generous in providing some disaster assistance to us.

I never follow my notes, and I am going to just talk. And when the lights start changing, then I am going to speed up my conversation.

You have had terms thrown at you, real technical terms. Seed, spat, cultch, so on and so forth. And those of us that deal with those terms every day kind of take for granted that others understand.

One management tool that we use in the Gulf States very effectively is cultch planning. Cultch is any hard substrate. We prefer oyster shells. We can't always get oyster shells. This is crushed limestone. This was a plant made in Mississippi on May 26th and June 7th. We checked this plant after the last two hurricanes to see if we had some damage. And there is a lot of spat, spat being the small oyster.

When the larvae settles out, when the shell begins to form, if it sits on a hard, clean substrate, generally you get a set, which we have here, and there are 8 or 10 spat on this one. Not as many on the crushed limestone.

Dr. Wesson mentioned the problem of enough cultch material, oyster shells. We have the same problems in the Gulf. We can't always get the shells we need. We have severance on them, but still oysters move in trucks. They go to different parts of the country. They do have a value as in roadbed, and so on.

If that could be passed up, please? That is my show and tell. Congressman Gilchrest questioned the percent of oysters that come from, I think, aquaculture versus public or wild. And just let me summarize for the Gulf, 90 plus percent, 90 percent of Florida's production comes from the public reefs in Apalachicola Bay.

In Alabama, practically all production comes from the public reefs, which only make up about 2,000 acres. There is some other acreage that with cultch plants and so on, those reefs would be more productive.

In Mississippi, the State I am in, we have about 10 or so productive acres in the western part of Mississippi Sound. It is all public reef. We have very, very few private leases in the State of Mississippi.

In Louisiana, due to the vast estuarine area—and I spent 30 years of my professional career in Louisiana, so I do know a little bit about Louisiana. Louisiana has oyster reefs from basically the Mississippi-Louisiana line to the Louisiana-Texas line. And some of my friends in the oyster industry keep pushing that Mississippi-Louisiana line more eastward. They keep wanting to get more of our Mississippi oysters.

But Louisiana has approximately just under 400,000 acres of private leased water bottoms for oyster culture and some 2 million or so acres of public water bottoms. Now in that 2 million acres, that is not all reefs, but there are reefs scattered throughout those 2 million acres of public water bottoms.

In Texas, production, for the most part, comes from Galveston Bay and from the public reefs of Galveston Bay. Texas does have a leasing program. They have a small amount of acreage, just a few thousand. But primary production comes from the public grounds in Galveston Bay.

Because of the primary location of the reefs—in Florida, Apalachicola Bay; in Alabama, Lower Mobile Bay; in Mississippi, West Mississippi Sound; and in Texas, Galveston Bay—they are extremely susceptible to extreme damage if a hurricane hits in those areas. Louisiana is susceptible to the same amount of damage, but because they have resources so widely spread out that they generally are able to have successful production from some of those areas that are not necessarily impacted by a storm.

We have all heard that the oyster is an invertebrate, and as such, the complete range of the species must be considered. While I am sympathetic to the plight of the eastern oysters in the Chesapeake Bay area, I assure you the eastern oyster, Crassostrea virginica, is neither endangered nor threatened, especially in the Gulf of Mexico.

If you use the same period of time that the petitioner went back and used, from 1880 through 2003, we have seen Gulf landings fluctuate tremendously. But all resource surveys and current production for the past few years are well, well within historical levels. In fact, for the average for 2000 through 2003, the pounds of oyster meat was in excess of 25 million pounds of oyster meat. Only about 43,000 pounds shy of the all-time high average, which occurred in the 1980s.

The eastern oyster is the most important mollusk by far the Gulf of Mexico States. In 2003, when nearly 14 million pounds of meat were harvested in Louisiana, this produced over $286 million to the economy and 3,000 full-time jobs. In the year 2000, in Mississippi, the oyster industry created 1,594 jobs with a value to the economy of over $70 million, when 3.5 million pounds of meat were harvested.

Oyster populations, let us skip that. Since oysters are located primarily in the estuaries, they come under the State aid natural resource agency jurisdiction. Various management measures are in place, which include seasons, bag limits, quotas, size limits, gear restrictions, oyster relaying, cultch planting, which is extremely, extremely important. And the public agencies, like myself, learn cultch planning and oyster relaying from the oyster fishermen themselves. They were doing it on their private leases. The State regulators paid attention, learned from them.

Oysters in the Gulf States are an excellent example of the renewability of a fishery resource. After approximately 125 years of commercial exploitation and habitat modifications, the oyster resources in the Gulf States flourish. We do have some localized problems.

While these past successes may be at least partially attributable to the vastness of the Gulf's estuarine systems, the oyster industry's fate 125 years in the future will certainly be determined by the resolve of management and industry and certainly not by placing this species on the endangered species list.

And my agency, my commission has gone on record and unanimously voted against placing the eastern oyster on the endangered list. And that was submitted for the public record.

So, thank you, Mr. Chairman.

[The prepared statement of Mr. Perret follows:]

Statement of William S. Perret, Marine Fisheries Director, Mississippi Department of Marine Resources

According to the Federal Register, Vol. 80, No. 95 (May 18, 2005), ''Under the Endangered Species Act (ESA), a listing determination can address a species, subspecies, or a distinct population segment (DPS) of a vertebrate species (16 U.S.C. 1532 (16)). Since the eastern oyster is an invertebrate species, the entire species would have to be listed under the ESA (or a subspecies, if information indicates that there are subspecies of the eastern oyster) if it is endangered or threatened. A species is endangered if it is in danger of extinction throughout all or a significant portion of its range (ESA section 3 (6)). It is threatened if it is likely to become

endangered within the foreseeable future throughout all or a significant portion of its range (ESA section 3 (19)).''

The Federal Register goes on to identify the range of the eastern oyster: ''The eastern oyster is distributed from the Gulf of St. Lawrence to the Gulf of Mexico and south through the Caribbean to the Yucatan Peninsula.''

While I am sympathetic to the plight of eastern oysters in the Chesapeake Bay area, I assure you that the eastern oyster Crassostrea virginica is neither endangered nor threatened, especially in the Gulf of Mexico. In the same period cited by Mr. Busch (petitioner) (1880 through 2003), the Gulf of Mexico has seen landings fluctuate dramatically, primarily due to changing environmental conditions, from state to state and within a state. When viewed over these 120+ years, however, or in the shorter period of 1961 to 2004, (Table 1) there is no clear evidence of any continuing pattern of decline. In fact, current levels of harvest throughout the Gulf of Mexico suggest a thriving species. The Gulf has clearly dominated U.S. oyster production since the early 1980's and continues to do so. For the period 1997-2001, the Gulf states contributed 59% of the total United States production (Figure 1). Of this total, Louisiana produced 32%, Texas 13%, Mississippi 8%, Florida 5% and Alabama 1%. In 2003, the Gulf states produced 91% of the eastern oysters in the United States (Maine through Texas).

The eastern oyster is the most important commercial molluscan species in the five states of the Gulf of Mexico. In 2003, 3318 licensed commercial harvesters in these five states were dependent upon this resource. Louisiana had the highest number (1046), followed by Florida (753), Alabama (672), Texas (462) and Mississippi (385). In Louisiana alone, the economic impact of this industry was estimated to exceed 286 million dollars. The industry supported over 3,000 full-time jobs in 2003 when nearly 14 million pounds of oyster meat were produced. Posadas reported that in 2000 the Mississippi oyster industry created 1,594 jobs with a total industry contribution of over 70 million dollars when over 3.5 million pounds of oysters were harvested.

The oyster fishery in the Gulf has a long, varied and diverse history. Just when commercial oyster fishing first began is not known, but subsistence catches date to the earliest inhabitants of our coastal areas. Early colonists developed the industry during the 1800's and its growth has continued to its present day form.

Earliest records of landings for the eastern oyster in the Gulf of Mexico go back to 1880 when harvests of 2.1 million pounds of meat were reported (Table 2). Since the 1960's, oyster production in Florida has ranged from a low of 1.3 million pounds in 1988 to a high of 7.2 million pounds in 1981 with 90% of the production coming from the Apalachicola Bay public reef area. Alabama's production has fluctuated from a low of 5,000 pounds in 1989 to a high of 2.1 million pounds in 1967 with nearly all production coming from the Mobile Bay public reefs. Mississippi's oyster production is almost entirely dependent upon the public reefs in the western part of Mississippi Sound, and has ranged from a low of 21,000 pounds in 1980 to a high of 4.8 million pounds in 1964. Louisiana, due to its vast estuarine acreage with oyster reefs located throughout the coastal area from the Mississippi state line to the Texas line, produces by far, the greatest volume of oysters. Production has ranged from a low of 4.7 million pounds in 1966 to a high of over 15 million pounds in 2001 (Table 1). Historically, private leases produced as much as 90% of production, in recent years however, about 50% comes from private leases and 50% comes from public reefs. Texas production has ranged from 889,000 pounds in 1979 to a high of nearly 8 million pounds in 1983. The vast majority of this production comes from the public reefs in Galveston Bay. These fluctuations are examples of the wide variances in annual production among and between the Gulf states.

Oyster production Gulfwide and statewide has fluctuated widely over time due primarily to environmental (including water quality) changes annually, seasonally and historically. These wide harvest fluctuations indicate the degree of dependence oysters have upon their environment. In spite of this, Gulfwide oyster production has remained fairly stable and even increased in some geographic areas, unlike declining production in other areas of the country (Table 1). A closer review of Table 1 indicates that Gulf production from the 1961-1965 average through the 2001-2004 average shows that for the 2001-2004 period, production of 25,514 million pounds of oyster meat was higher than for any other 5-year period except the 1981-1985 period when 25,557 million pounds were harvested, a difference of only 43 thousand pounds.

It should be understood, however, that natural and manmade environmental fluctuations can and do cause extreme oyster population variations within a state and even within a certain water body. These environmental fluctuations may benefit oyster populations on one reef and be detrimental on another reef. For example, flooding will benefit oyster reefs located away from the fresh water source by

lowering higher salinities, but will have negative effects on those reefs in the close proximity of the fresh water discharge, by lowering salinities below acceptable levels.

In contrast to the other oyster producing regions of the United States, the Gulf states have basically maintained and even increased its harvest throughout this century (Table 1 and 2). Environmental degradation is most often blamed in areas where oyster production has decreased. The Gulf states, however, have not been immune to changes within its coastal oyster producing environment. Louisiana, for example, has been losing its coastal vegetated wetlands at a rate of 50 square miles per year. This land loss has had a dramatic effect on the distribution and quality of aquatic habitat that is suitable for oyster production.

The Gulf's eastern oyster population thrives best at mid-level salinities ranging from 10 to 30 ppt. and near freshwater discharges. These discharges dilute the Gulf's higher saline waters and provide nourishment. Oyster reefs are most productive when they are shielded from high saline waters and their predators and disease. Additionally, bottom type is important for suitable oyster production. Gulf coast estuaries generally contain silt or mud deposited from freshwater sources. Since this material is soft, oysters can sink and become covered with silt. Thus, a firm clay and sandy substrate is necessary to prevent this from occurring.

Since oysters are sessile they are subject to many environmental changes, and as such their populations are subject to wide fluctuations due to these changing conditions. These include floods, droughts, predators (black drum, stone crabs, oyster drills), disease (Dermo and Hazardous Algal Blooms), parasites, deterioration and loss of habitat, estuarine development, and modifications of freshwater inflow. Additionally, man's encroachment into the coastal area has had other negative impacts on their populations. These impacts include domestic and industrial pollution, agricultural runoff, and chemical spills. Unfortunately, due to poor water quality not suitable for direct shellfish harvest, many oyster reefs are either seasonally or permanently closed to shellfish harvest to protect the health of consumers. Though these issues have detrimental impacts on the oyster resources, they are being addressed by state health and resource agencies as well as industry representatives.

The eastern oyster is distributed throughout the estuarine areas of the U.S. Gulf of Mexico. In some areas of the Gulf, oyster reefs are located in the states' territorial sea and even in the Gulf Exclusive Economic Zone (EEZ). Reefs are most abundant in shallow (less than 40 feet) estuaries with salinities ranging from 5 to 20 ppt. Oysters are present in practically every major estuarine system of the Gulf; however, their distribution varies greatly within and among estuaries.

Since oysters are primarily located in the estuarine areas of the states, they almost exclusively fall within the management jurisdiction of the individual states' natural resource agencies. For the Gulf these agencies are:

- Alabama Department of Conservation and Natural Resources
- Florida Fish and Wildlife Conservation Commission
- Louisiana Department of Wildlife and Fisheries
- Mississippi Department of Marine Resources
- Texas Parks and Wildlife Department

Since these natural resource agencies are responsible for implementing rules, regulations, ordinances and/or statutes, they can and do have a dramatic effect on fishery management. All five Gulf states have and will continue to utilize management practices that ensure the viability of the resource and strive to maximize production from existing reefs. This is done by implementing regulations that include, but are not limited to, quotas, seasons, daily bag limits, size limits, gear restrictions, harvest time restrictions, private leasing of water bottoms, limited entry, relaying, cultch planting, water quality monitoring, data collection, licensing and enforcement.

The oyster fishery in Florida and Alabama is primarily comprised of small shallow draft fishing vessels (18-25 feet) from which oysters are harvested with hand tongs (sometimes called rakes). Tongs are attached at the ends of long handles some 12 to 16 feet in length, thus restricting harvest to shallow waters. In Mississippi, tongs and dredges are used to harvest oysters. Dredges vary in size from state to state but are approximately 3 feet wide and weigh about 120 pounds. Dredges are attached to a chain and pulled from a winch. They are usually raised and lowered from the side of the vessel. Dredge boats generally range from 25 to 60 feet in length. Virtually all oyster production in Louisiana and Texas is done with dredges. In Mississippi, 90% of the harvest is with dredges.

A major management practice utilized by all of the Gulf states is to enhance production of oyster reefs through cultch plantings. Cultch material consists of oyster shells, clam shells, limestone, or other suitable materials for deposition. Deposit of these cultch maintains and increases or enhances oyster reef acreage and provides

a hard substrate for the oyster larvae to set. The planting of oyster shells or other suitable materials has long been accepted as a management tool that provides tremendous benefits to oyster resource management. Cultch plant sites are selected by surveying bottom conditions and sediment types, turbidity, current patterns, salinity, water temperature and historical catch from the area. Additionally, oyster fishermen are consulted to obtain information on the areas to be selected for plantings. It has been estimated that for each dollar spent in cultch plants that as much as $20 is returned to the industry in oyster harvest over the years

Florida, for example, since 2000, has planted nearly one million bushels of oyster shells to develop habitat on its public reefs. Additionally, they have contracted with local oyster associations to relay and transplant over one million bushels of live oysters from conditionally approved and restricted harvesting areas to public reefs where water quality and environmental conditions are more favorable.

The major goal of managing a renewable natural resource like oysters is to ensure the viability of that resource and to optimize production for the benefit of the harvester, packer, shucker, processor, distributor, the fishing community and ultimately consumers. Proper oyster reef management also benefits the environment by increasing habitat and diversity of fauna. Since oysters are filter feeders they are also helpful in reducing suspended silt and phytoplankton.

Intensive management and ambitions oyster relaying and cultch planting programs, however, have not solved all of the oyster industry's problems. Hurricanes, droughts, periodic floodwaters and inferior sanitary water quality in oyster growing areas continue to plague the industry. Even more disturbing is that these problems will become more severe as the Gulf's coastal habitat deteriorates (by natural and man made factors), unless we have the will to prevent further deterioration.

Oysters in the Gulf states are an excellent example of the renewability of a fishery resource. After approximately 125 years of exploitation and habitat modifications, the industry flourishes. While these past successes may be at least partially attributable to the vastness of the Gulf's estuarine systems, the oyster industry's fate 125 years in the future will certainly be determined by the resolve of management and industry.

In the Petition submitted by Ecosystem Initiatives Advisory Service to List the Eastern Oyster as a Threatened or Endangered Species Under the Endangered Species Act of 1973 not a single reference was found identifying a problem or potential problem with eastern oysters in the Gulf of Mexico.

Therefore, even though the eastern oyster has had wide fluctuations in abundance, since the 1880's these variations are largely a result of changing environmental conditions. Oyster populations are well within historical levels and issues with oysters in the Gulf are being addressed by each state's natural resource agency. Additionally, oyster resource assessments conducted by each Gulf state's natural resource agency show that oyster resources are well within historical limits. All oyster survey data as well as oyster landing statistics (Tables 1 and 2) dramatically indicate that the eastern oyster in the Gulf of Mexico is IN NO WAY THREATENED OR ENDANGERED, and should NOT be considered in this petition for listing as such.

Under the ESA Statutory Provisions and Policy Consideration, National Marine Fisheries Service (NMFS) is required to make a finding as to whether a petition to list a species presents substantial scientific or commercial information indicating the petitioned action may be warranted. ESA regulations define "substantial information" as the amount of information that would lead a reasonable person to believe the measure proposed in the petition may be warranted (50CFR 424.14(b)(i). Once NMFS considers all pertinent information, I am confident that they will agree that NO REASONABLE PERSON would find the eastern oyster to be threatened or endangered, especially in the Gulf of Mexico.

NOTE: Input from Florida provided by Mark Berrigan; Alabama, Mark Van Hoose; Mississippi, Scott Gordon; Louisiana, Patrick Banks; and Texas, Lance Robinson.

Table 1: Historical Oyster Production among Gulf States, 1961-2004

Year	FL	AL	MS	LA	TX	Total 1,000 lb
1961	3,255	509	3,241	10,139	1,096	18,240
1962	4,952	443	2,073	10,160	1,210	18,838
1963	4,283	995	4,680	11,563	2,618	24,139
1964	2,793	1,005	4,829	11,401	3351	23,385
1965	2,789	493	2,696	8,343	4,835	19,156
1961—1965 average:						
	3,614	**689**	**3,504**	**10,321**	**2,623**	**20,752**
1966	4,157	1,304	2,232	4,764	4725	17,182
1967	4,578	2,087	3186	7,743	3,553	21,747
1968	5,318	1,211	3,786	13,122	3,302	26,739
1969	4,912	481	1,430	9,178	3,764	19,765
1970	3,573	279	548	8,639	4,675	17,714
1966—1970 average:						
	4,508	**1,072**	**2,356**	**8,689**	**4,004**	**20,629**
1971	3,529	250	1215	10,528	4,744	20,266
1972	3,231	1,069	1,220	8,805	3,935	18,260
1973	2,409	591	612	8,953	2,349	14,914
1974	2,653	733	276	9,972	1,244	14,878
1975	2,134	638	1,080	13,687	1,756	19,295
1971—1975 Average:						
	2,791	**656**	**881**	**10,389**	**2,806**	**17,523**
1976	2,602	1,236	1,516	12,334	3,881	21,569
1977	4,072	1,549	1,384	10,065	2,600	19,670
1978	5,882	760	682	9,662	1,097	18,891
1979	6,125	460	272	7,714	889	15,461
1980	6,756	55	21	6,947	1,738	15,517
1976—1980 average:						
	5,058	**812**	**775**	**9,344**	**2,203**	**18,222**
1981	7170	1,330	467	9,093	1,309	19,366
1982	4,782	1,497	2,576	12,621	3,633	25,150
1983	4,307	336	3,333	13,229	7,941	29,165
1984	6,621	477	1,378	13,952	5,168	27,596
1985	4,392	1,442	1193	14,347	5,134	26,509
1981—1985 Average:						
	5,454	**1,016**	**1,789**	**12,648**	**4,637**	**25,557**
1986	2,084	946	1,202	12,654	5,607	22,493
1987	3,518	88	132	12,027	2,897	18,662
1988	1,314	103	147	13,254	1,671	16,269
1989	1,698	5	100	11,606	2,407	15,816
1990	2,055	83	96	8,153	1,905	14,750
1986-1990 average:						
	2,134	**245**	**494**	**11,539**	**2,897**	**17,309**

Year	FL	AL	MS	LA	TX	Total 1,000 lb
1991	1,793	255	101	7,265	2,916	12,330
1992	2,498	1,202	707	9,183	2,498	16,088
1993	2,701	920	1,258	10,315	2,964	18,158
1994	2,011	712	674	11,328	4,614	19,339
1995	1,458	710	2,248	13,800	5,496	23,712
1991-1995 average:						
	2, 092	**760**	**998**	**10,378**	**3,698**	**17,926**
1996	1,411	621	1,624	12,935	5,586	22,177
1997	1,867	687	3,500	13,221	4,579	21,987
1998	1,503	313	2,389	12,856	3,438	20,499
1999	2,235	345	2,793	12,128	6,411	23,912
2000	2,520	792	3,548	11,513	6,187	24,560
1996-2000 average:						
	1,907	**538**	**2,771**	**12,553**	**5,240**	**23,009**
2001	2,559	623	2,653	15,133	4,700	25,668
2002	1,943	759	2,738	13,962	4,708	24,110
2003	1,750	811	4,042	13,607	6,834	27,044
2004	1,669	909	3,184	13,903	5,569	25,234
2001-2004 average:						
	1,980	**775**	**3,154**	**14,151**	**5,453**	**25,514**

Source: 1961-2000 data, National Marine Fisheries Service

Source: 2001-2004 data, Alabama, Mark Van Hoose, Florida, Mark Berrigan, Louisiana, Patrick Banks, Mississippi, Scott Gordon, Texas, Lance Robinson

Figure 1.

AVERAGE ANNUAL PERCENT CONTRIBUTION BY STATE TO U.S. OYSTER LANDINGS (1997 - 200

(All species combined, pounds of meat)

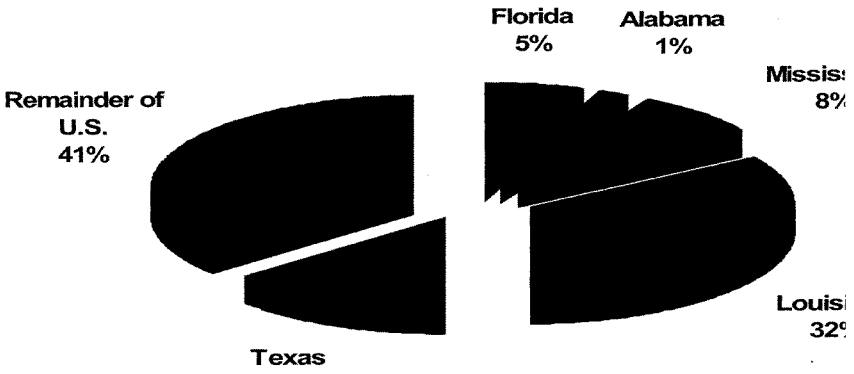


Table 2.

GULF FISHERIES

HISTORICAL CATCH STATISTICS

OYSTERS, 1880–1965

(THOUSANDS OF POUNDS)

YEAR	FLORIDA, WEST COAST 1/	ALABAMA	MISSISSIPPI	LOUISIANA	TEXAS	TOTAL
	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
1880	270	327	62	1,189	324	2,172
1887	(2)	(2)	1,447	2,733	1,240	(2)
1888	623	238	1,910	2,902	1,652	7,525
1889	1,229	1,372	2,105	3,367	1,745	9,818
1890	1,611	1,506	2,008	3,392	2,133	10,650
1897	797	798	1,568	3,866	1,723	8,752
1902	3,057	1,068	5,989	4,830	1,661	16,625
1906	3,670	1,678	2,657	11,953	2,369	22,327
1911	1,140	1,162	1,621	12,419	1,766	18,108
1918	1,511	376	3,168	4,522	2,312	11,889
1923	1,053	730	4,224	4,119	1,742	11,868
1927	1,238	521	6,693	6,640	1,910	17,002
1928	1,736	1,886	5,049	6,246	1,250	16,169
1929	1,505	179	6,643	4,549	1,729	14,605
1930	1,501	287	4,896	4,646	1,157	12,687
1931	1,406	769	3,438	3,590	982	10,185
1932	1,109	859	5,222	2,978	981	11,149
1934	1,357	392	4,904	5,591	1,312	13,556
1936	917	992	5,771	5,743	823	14,246
1937	817	1,235	12,894	8,048	1,190	24,184
1938	858	1,359	2,241	10,222	1,356	16,036
1939	742	1,358	7,706	13,586	987	24,379
1940	669	936	2,270	12,412	1,297	17,584
1945	1,496	1,606	255	9,884	719	13,970
1948	(2)	1,531	1,309	9,016	579	(2)
1949	1,086	1,586	462	9,688	299	13,121
1950	873	2,070	508	8,716	125	12,292
1951	681	2,191	27	8,164	456	11,519
1952	542	1,842	23	11,402	628	14,637
1953	564	1,450	318	9,435	1,069	12,836
1954	667	739	977	8,361	699	11,443
1955	630	1,581	1,731	9,396	543	13,881
1956	857	769	846	10,056	985	13,513
1957	710	1,291	863	10,490	953	14,307
1958	795	456	579	8,255	311	10,408
1959	1,415	895	333	9,667	1,411	13,721
1960	1,931	1,169	2,391	8,311	2,296	16,099
1961	3,255	509	3,241	10,139	1,096	18,240
1962	4,952	443	2,073	10,150	1,210	18,838
1963	4,283	995	4,680	11,563	2,618	24,139
1964	2,793	1,005	4,829	11,401	3,357	23,385
1965	2,789	493	2,696	6,343	4,835	19,156

1/ FROM 1880 TO 1929, INCLUDES CATCH OF OYSTERS ON THE EAST COAST OF FLORIDA.
2/ NOT AVAILABLE.

Source: NMFS

The CHAIRMAN. Thank you.
Mr. Judy?

STATEMENT OF CHRISTOPHER JUDY, SHELLFISH PROGRAM DIRECTOR, MARYLAND DEPARTMENT OF NATURAL RESOURCES

Mr. JUDY. Mr. Chairman and Committee, thank you very much for inviting me today. I will focus most of my comments on the Chesapeake Bay in Maryland. But as you have heard today, there is a wealth of evidence from around the Gulf and Atlantic coasts that the eastern oyster is not endangered or threatened.

The Department of Natural Resources does not support the petition to list the eastern oyster as threatened or endangered. This oyster is neither at risk of extinction, which is the key mark of endangered. It is not at risk of extinction. Nor is it threatened that it may become at risk of extinction, which is basically the definition of threatened. It does not qualify for ESA listing.

There are two components central to the department's position. One is the status of the oyster. You have heard a lot of information today about the status of the oyster. If the status review team looks at the oyster status along the coasts, it will be clear that it is not at risk as a species. The oyster reproduces. There is broodstock intact throughout its range. The oyster is viably distributed throughout its historic range, and habitat exists throughout its historic range.

We also need to look at the status of the petition. We hope that the status review team will closely look at the petition. We note that there are numerous factual errors in the case for listing the eastern oyster. And Mr. Chairman, I congratulate you on your insightful analysis when the meeting started.

I will now expand on the status of the eastern oyster in Maryland. There definitely is a low population. That is a fact. Everyone knows it well. The department testified in October 2003 before the Subcommittee on Fisheries Conservation, Wildlife, and Oceans to that fact. The population is clearly in need of recovery. It is in trouble, and it needs help.

Please note in the Chesapeake Bay area, in Maryland and Virginia, by age 4, up to 90 percent of the oyster population has died from disease. We are losing many, many oysters from the Chesapeake. Many historically productive bars are no longer productive commercially. But there is an important distinction to be made. And I think again, Chairman Pombo, you made this distinction early on.

Harvest data has a serious limitation when analyzing the situation. Harvest data refer to trend for market oyster populations because that is what watermen catch. Those are oysters in Maryland 3 inches and greater. But harvest data do not accurately reflect the status of the younger oysters in the overall population, nor of the broodstock, which are the reproducing oysters, nor of the potential of the species to repopulate itself. Market data are about market oysters.

The collapse of the fishery, which was clearly obviously before all of us, the collapse of the fishery and the collapse of the market population does not signal a collapse in the oyster broodstock or the ability of the population to produce progeny. The diseases MSX and Dermo kill larger, older oysters primarily, but many of the younger, smaller oysters survive. Because oysters reproduce before they

reach market size, the majority of the oysters in the bay are small, submarket, but they are reproductive.

Therefore, concluding that an organism is unable to sustain itself as a species based upon harvest data and market collapse is an inaccurate analysis. What is more accurate to look at on the issue of extinction is reproduction. How is the species continuing itself into future generations?

Oysters become sexually mature adults and begin spawning at about 1 year old. And again, market oysters are around 3 years old, if I left that out earlier. So around 1 year old, the small oysters are becoming reproductive. Since the market size category, oysters 3 years old and older, have mostly been lost due to disease and the small oysters are not harvested because they are sublegal and illegal, the majority of the broodstock in the bay are small oysters, and they are there.

As they grow, they typically spawn at least twice before being harvested or lost to disease. Therefore, the oyster population contains broodstock, and these oysters do reproduce and yield spat. Significant spat sets have been observed since the 1980s. And I use that time period, if you look at your graphs at your convenience, you will see from the mid-1980s in Maryland, we have had a dramatic decline in harvest. That is when the diseases were killing off so many of our market size oysters.

So in this period from the mid-1980s forward, when we have had really low populations, we have seen significant spat sets, sometimes dominant year classes. Now conversely, during the 1970s, when oysters were much less abundant, we saw low spat sets. So we have a situation in Maryland and in other areas it is true, oyster reproduction is not closely linked to the abundance of oysters. So, therefore, while the oyster's ability to rebuild its once abundant, older age classes has been negatively affected by disease mortality, the survival of the species is not impaired.

I will close here in a few seconds, actually. There are hundreds of millions of oysters in the bay, based on stock assessment. You have heard Dr. Wesson testify about billions of oysters in the total bay system. In Maryland, we see hundreds of millions. And that number does not include spat. It does not include tens of millions of oysters planted in restoration projects.

We see in 2003 and 2004, with the heavy rains we have had, oysters are surviving better. The biomass or the weight of the oysters, if you were to shuck an oyster, its body weight would be the biomass. The biomass index, which tracks oysters, is increasing. So we have a situation under favorable salinity, conditions of good survival, the oyster population is slightly increasing, and the biomass is slightly increasing.

So I would like to echo Dr. Sammy Ray's comment, salinity, salinity, salinity is as true in Maryland as it is in his area. It determines survival. It determines growth. It determines longevity of the population and disease. Unfortunately, in the bay system, the salinity often is not favorable for survival.

So, in closing, it is important to note on the issues of extinction or near extinction that the biomass index has recently increased slightly, indicating the population is responding to a previous spat set that occurred. And those spat survived, and now they are

growing because of the rainfall. And let me observe a threatened or an endangered population would not likely experience spat set survival and enhanced biomass growth. That is an upward trend, not a downward trend.

Oyster stock abundance is low. The low abundance is due primarily to disease mortality. This low abundance is not impacting reproductive success, but it is negatively affecting the number of larger, older adult oysters in the population.

The department does not support the petition to list the eastern oyster as threatened or endangered because it simply isn't the case, and we will be glad to provide a wealth of information to the status review team as they discuss the issue further.

Thank you very much.

[The prepared statement of Mr. Judy follows:]

Statement of Christopher Judy, Shellfish Program Director, Maryland Department of Natural Resources

Mr. Chairman and Members of the Committee, thank you for inviting me to testify on this issue of importance to the Eastern oyster and implementation of the Endangered Species Act (ESA). Clarity about the oyster's status and risk of extinction are critical. The public and key decision makers need to be well informed to appropriately declare a species threatened or endangered. The establishment of the Status Review Team by the National Marine Fisheries Service (NMFS) is a needed step in bringing clarity and accuracy to this issue.

Oysters are a critical component of a healthy Chesapeake Bay ecosystem, with an unparalleled ability to filter water and remove nutrient pollution. The State of Maryland and the Department of Natural Resources (DNR) are committed to restoring a viable oyster population in the Chesapeake Bay.

DNR does NOT support the petition to list the Eastern oyster as threatened or endangered under the ESA. This oyster is neither at risk of extinction nor threatened such that it may become at risk of extinction, and thus does not qualify for ESA listing. Data clearly demonstrates this. My testimony is limited to Maryland's situation, however an abundance of supporting data from other Eastern and Gulf Coast areas exists.

There are two components central to our position:

1. The status of the oyster: A review of the oyster's status will demonstrate that it is not at risk as a species. The oyster reproduces, broodstock are intact, the oyster is widely distributed throughout its historic range, and habitat exists throughout its historic range.
2. The status of the petition: It is anticipated that a review of the petition will reveal possible factual errors in the case for listing the Eastern oyster. We urge the Status Review Team to closely examine the petition.

I will now expand upon the status of the Eastern oyster in Maryland.

Low Population Abundance

Oysters are essential to the Bay's ecology and an abundant population is needed to improve water quality.

The oyster population is at very low abundance. (DNR testified as such in October 2003 before the Subcommittee on Fisheries Conservation, Wildlife and Oceans.)

The population is clearly in need of recovery. By age four, up to 90 percent of the oyster population die from disease. Many historically productive oyster bars are no longer commercially productive. Attachment 1 documents oyster harvests since the 1870s; Attachment 2 indicates more recent harvest trends.

Harvest data have a serious limitation. They reveal the trend for market oyster populations (oysters equal to or greater than 3 inches) but do not accurately reflect the status of younger and smaller oysters, or of broodstock (reproducing oysters) and the potential of a species to repopulate itself.

The collapse of the fishery and the market population does not signal a collapse in oyster broodstock or the ability to produce progeny. Diseases kill larger, older oysters but many younger, smaller oysters survive. Because oysters reproduce before they reach market size, the majority of brood oysters are small (submarket) and still in the Bay.

Areas with low to no harvest are not devoid of oysters. Since all oysters are not harvested, both market oysters and small oysters remain present on oyster bars. If

conditions support spat sets (young oysters that have attached to oyster shells), then spat are present as well. DNR surveys hundreds of oyster bars each year. The results confirm that broodstock populations remain intact and reproducing. Survey results can be made available for study by the Status Review Team.

Therefore, concluding that an organism is unable to sustain itself as a species based upon harvest data and market collapse is an inaccurate analysis.

While neither an abundant population nor widespread recovery is at hand, neither is extinction or near-extinction. The definition of endangered under ESA is that a species is in danger of extinction. Threatened means a species is likely to become endangered in the foreseeable future. As stated earlier, the Eastern oyster does not fit the criteria for either category because of successful reproduction, intact broodstock and wide distribution of habitat and population throughout its historic range.

Reproduction

The oyster population can be divided into three broad size categories: spat, smalls and market oysters.

- Spat are new oysters less than 1 year old. They typically do not spawn.
- Smalls are oysters about 1 to 3 inches in size, which tend to be about 1 to 3 years old.
- Market oysters are oysters 3 inches or greater, and tend to be about 3 to 4 years old in Maryland.

Oysters become sexually mature adults and begin spawning at about 1 year old, when they are young smalls. Since it is the market size category that has mostly been lost due to disease and smalls are not harvested, the majority of broodstock in the Bay are small oysters. As they grow, they typically spawn at least twice before being harvested or lost to disease. The oyster population contains broodstock and these oysters reproduce and yield spat. The species is functional and replenishes itself. The population is at low abundance due to disease mortality of older, larger oysters.

Attachment 3 shows the historical record of spat set, measuring reproductive success. Survey results indicate stocks exist in sufficient numbers and are reproducing dominant year classes under suitable environmental conditions. Significant spat sets are observed since the mid-1980s, even though diseases were killing many oysters and populations fell to record low levels. During the 1970s oysters were much more abundant than today and market oysters were also abundant. In spite of this, spat sets were low.

The conclusion is that reproduction in Maryland is highly variable and not closely linked to the abundance of oysters. Attachments 3 and 4 illustrate spat setting patterns, which indicate reproduction is driven more by salinity patterns due to rainfall than by population abundance.

The 1970s were wet as were other times of low sets such as 1984, “88, “89, 1993, “94, “96, “98, and 2003 and 2004. Periods of drought and higher salinity typically, though not always, yield higher sets, as in 1980, “81 and “85, 1991 and “97, and 1999 to 2002. Low salinity is more of an impediment to reproductive success than the low oyster population.

Low sets in any given year or geographic region (Attachments 3 and 4) do not mean the oyster is at risk of being lost. Sets were low in the 1970s, but rebounded during the “80s and “90s. Set was poor in 1988 (a wet year) but a record in 1991. After the low set of 1996, there was a record high set in 1997. The low sets of 2003 and 2004 are not a sign of crisis. Both years were very wet and reproduction can be expected to improve.

Therefore, while the oyster's ability to rebuild its once abundant, older age classes has been negatively affected by high mortality due to disease, the survival of the species is not impaired.

Current Population Levels and Biomass

Based on calculations from a recent Chesapeake Bay Program project, the most recent population estimate for Maryland is in the hundreds of millions of oysters. This includes markets and smalls. This number does not include spat, or the tens of millions of seed oysters resulting from various restoration efforts.

Maryland's oyster population is now surviving better than during the drought of 1999-2002 due to the rains of 2003 and 2004 that lowered salinity and decreased disease mortality. The result is that these oysters are growing and increasing their biomass (weight). Biomass is another measure of the oyster population that is not linked to skewed harvest records.

The population levels and biomass are doing best in areas that have experienced both a spat set and a reduction in disease mortality. This combination of factors

provides new oyster stocks as well as encourages their survival and growth. Examples of such areas are Tangier Sound and St. Mary's county.

Maryland oyster biomass began declining in 2001, due to the drought that started in 1999 and increased disease and mortality levels (Attachment 6). Harvest declined as well. Biomass reached a low point in 2003, but has increased slightly due to better survival during the rains of 2003-04. The biomass index measured by DNR is now .88 compared to the low point of .5 in 2003 (Attachment 5). The baseline standard is 1994, which had an index value of 1.

It is important to note, on the issue of "extinction" or "near extension" that the biomass index has recently increased, indicating the populations' response to spat sets that survived and grew. A threatened or endangered population would not likely experience spat set followed by enhanced survival and biomass growth.

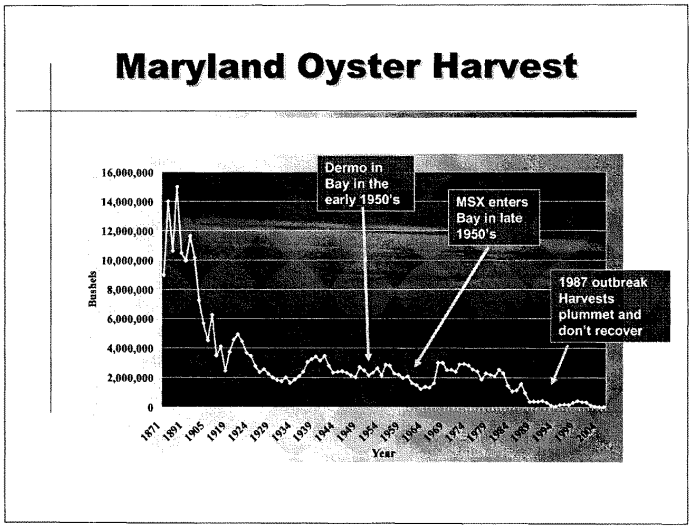
Are these signs that the oyster is coming back to its historic abundance? No. Diseases are entrenched and a chronic problem that suppresses broad recovery. But this data shows that as a species the oyster is functional and successfully replenishing itself and inhabiting oyster bar habitat.

Summary

Oyster stock abundance is low. This low abundance is due primarily to disease mortality. It does not appear that low abundance is impacting reproductive success, though it is negatively affecting the number of large adults in the population.

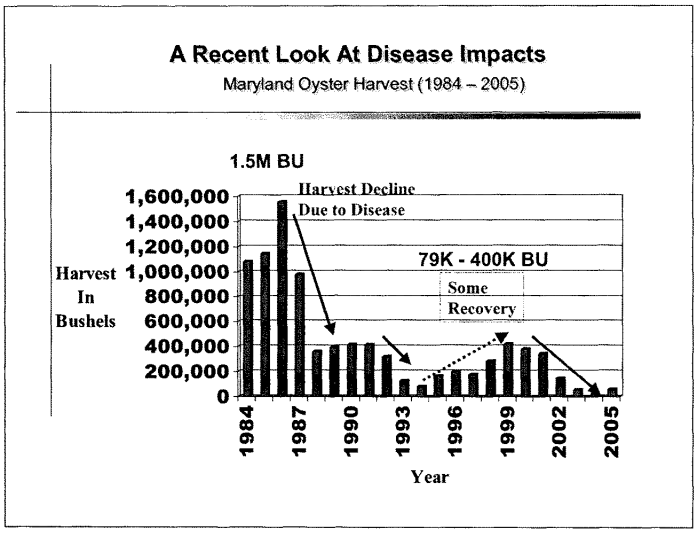
The Department does not support the petition to list the Eastern oyster as threatened or endangered.

Attachment 1: Maryland's Historical Oyster Harvest



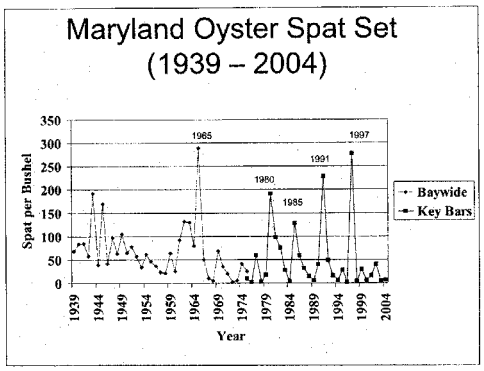
- Declining harvests in the early 1900s was due to over-harvesting.
- Restrictive laws and regulations controlled harvest and a period of relative stability resulted from about 1920 to the early 1980s.
- Diseases became an increasing problem in the early 1980s and especially in the mid 1980s. Diseases continue to be a chronic and widespread problem today.
- Harvests fell as market oysters were mostly killed by diseases.

Attachment 2: Recent Oyster Harvest



- The decline from the mid 1980s is highlighted in this graph.
- The slight rebound during the late 1990s (dotted line) was due to rainfall that lowered disease mortality and improved survival.

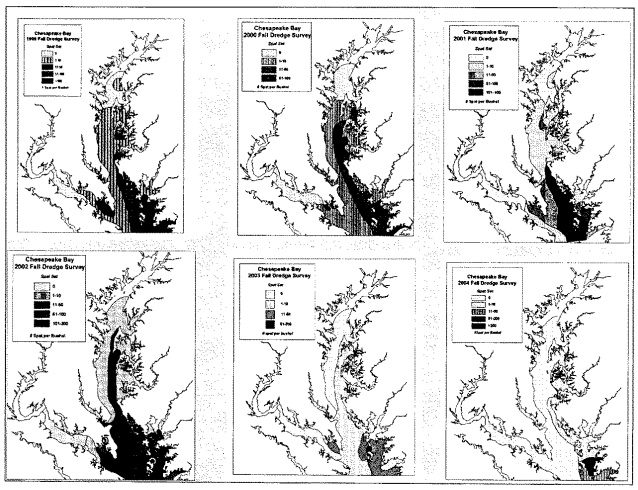
Attachment 3: History of Maryland Spat Set



- Years of high stock abundance can have low sets (1970s for example)
- Years of high stock abundance can have high sets (mid 1960s for example)
- Years of low stock abundance can have high sets (1980s for example)
- Years of low stock abundance can have low sets (some years in the 1980s and 1990s for example)
- Overall, stock abundance is not a significant factor for spat sets. Salinity as determined by rainfall is the main influence on set.
  - Fresher years correlate strongly with low sets.
  - Drier years correlate strongly with higher sets.
- Set is highly variable and mostly determine by rainfall.

Attachment 4: Geographic and Yearly Variability in Spat Set

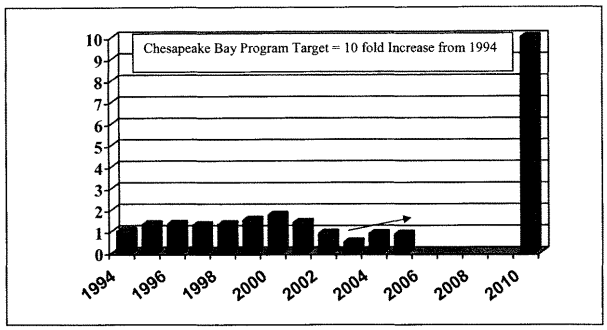
Maryland Spat Set: data expressed as the number of spat per bushel.



- These maps show variability in spat set by year and geographically throughout Maryland.
- Some areas typically receive low sets, while others typically receive moderate to high sets.
- The current low setting pattern is largely due to the high rainfall of 2003-04 that lowered salinity and impaired spat sets.
- During the 4-year drought of 1999-2002, sets were higher than they are currently.
- After periods of low sets due to rainfall, spat sets typically increase. See the annual data in Attachment 3.

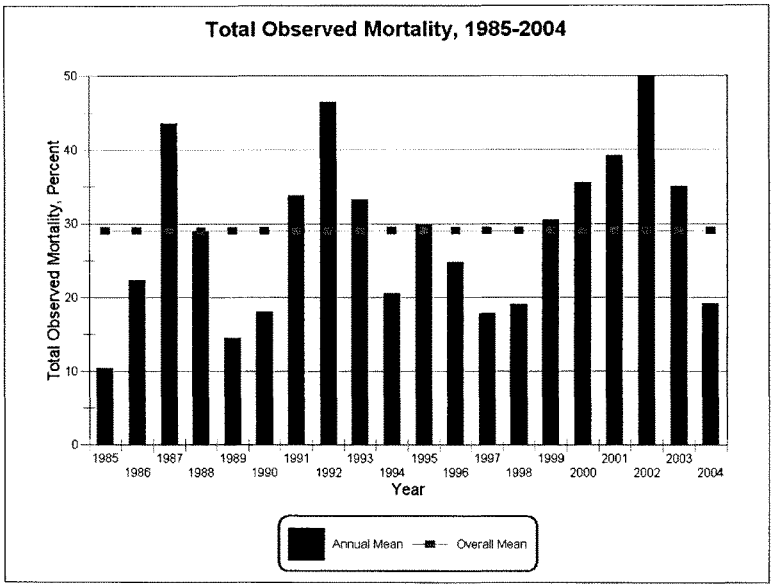
Attachment 5: Maryland Biomass Index

1994 Baseline = 1
2005 = .85
2003 lowpoint = .5



- The Chesapeake Bay program committed to a 10-fold increase in oyster biomass by 2010, based on 1994 as a baseline, under the Chesapeake Bay Agreement of 2000.
- The goal is designed to improve the oyster population, spat set, water filtration and ecological diversity.

Attachment 6: Oyster Mortality Due to Disease



- Historical baseline oyster mortality has been about 10% annually, as seen in 1985 (the last year such levels existed).
- In 1986 and especially 1987, diseases spread and became a significant problem and mortality escalated.
- Mortality rates peak during drought years and decline during wet years, but the historical mortality rate of 10% (a favorable rate for oysters) has never been achieved again.
- Mortality rates of approximately 30% or greater do not allow the oyster population to regain its historic level of abundance.
- The loss of oysters is directly and significantly linked to disease mortality and not the fishery, which has declined in the number of harvesters and bushels harvested, and become a minimal factor affecting oyster population

---

The CHAIRMAN. Thank you.

Mr. Gilchrest?

Mr. GILCHREST. Thank you, Mr. Chairman.

Can either Dr. Wesson or Mr. Judy give me an estimate of the biomass of virginica in the Chesapeake Bay in 1890 versus 2005?

Dr. WESSON. No. I don't think there is any way that we could.

Mr. GILCHREST. Is there any way to determine what it is now?

Dr. WESSON. We know exactly what it is now.

Mr. GILCHREST. What is it now?

Dr. WESSON. In our part of the bay, for last year, it was about a billion oysters, small and markets.

Mr. GILCHREST. What would it likely have been in 1890 if the bushels that were taken out of the bay exceeded 10 million? Is there any way to calculate that?

Mr. JUDY. That can be provided later. That is possible.

Mr. GILCHREST. Okay. I am just curious just to see what the range is we are working on now. Without that calculated biomass comparison between 1890 and 2005, I have heard a figure of about 2 percent of what it was in 1890. I am assuming that 2 percent is the harvested level. But compared to what was likely there in 1890, you know, let us say that is 100 percent threshold. What is the percentage of oysters in the bay now compared to that number?

Mr. JUDY. The commonly accepted number that is often used in many oyster meetings is that the oyster population is 1 percent of its historic level. That is, I think, usually referred to as a biomass percentage, 1 percent of the historic biomass. So, clearly, whether it is 1 percent or 2 percent, another number that is circulated, from the 1880s, it has dropped dramatically. That is obviously clear.

Mr. GILCHREST. In the 1880s, were there still oyster reefs, and are oyster reefs the historic habitat for oysters versus the oyster bar?

Mr. JUDY. I can speak to Maryland, and Dr. Wesson can refer to Virginia. In Maryland, we still see reefs. The major difference, again, I think quite obviously is the historic reefs were thickly populated with dense populations of oysters.

Now under that thick population, which you could call perhaps a living veneer of oysters clumped together perhaps in a lot of different areas or perhaps single oysters in other areas, that living veneer was upon a structure often called the oyster reef. I tend to view the oyster reef as the living community upon the bar or reef, whatever term you prefer to use.

Now in Maryland, we still see many of these three-dimensional historic reefs in existence, but that living veneer has dropped dramatically in population. So perhaps it is a different viewpoint, but we do have many three-dimensional reefs, three-dimensional bars, large three-dimensional——

Mr. GILCHREST. Are we working toward what Dr. Wesson said are the 3-D restoration effort with I think you said, Dr. Wesson, 100 3-D restoration efforts or sanctuaries under way?

Dr. WESSON. That is correct. We have more than 100, and all that Chris said is the same for Virginia. We still have reefs. The reefs were definitely probably more dramatic historically, more like the three-dimensional reefs that we have been creating.

But what we see in monitoring the reefs that we have created is that when we prepare the ideal historic habitat, then the theory is that the oyster will be the biogenic builder that will then take the veneer and keep the reef alive.

Mr. GILCHREST. Is that happening? Has that happened?

Dr. WESSON. That does not happen. Within 5 years, the three-dimensional reefs look identical to the neighboring——

Mr. GILCHREST. Even though the oysters, you have reproduction oyster, spat, on the hardshell doesn't develop its own hardshell and continue to grow? You are saying the oyster reef doesn't grow?

Dr. WESSON. No. Because of the disconnect between those oysters dying at 2 years old versus the shells that we build the reefs from

are the Gulf of Mexico large, 4-, 5-, 6-inch shells. The veneer that gets put on those shells never gets more than an inch or two, and then they die. And in that time period, the rest of that reef that we created gets colonized by other things. And so, it loses all the habitat that used to be there.

Mr. JUDY. May I add a distinction?

Mr. GILCHREST. Yes, sir.

Mr. JUDY. In Maryland, because we have some areas which are lower salinity, lower disease areas, and have better survival, we do have projects where we take hatchery seed oysters, plant them on a constructed reef or perhaps a natural reef, and re-establish that living veneer. And because disease pressure is lower in these lower salinity areas, we do see that population living longer, growing larger, and being more like that historic cluster population.

But being lower salinity areas, that reef has not repopulated itself with larvae and spat because it is compromised by the low salinity.

Mr. GILCHREST. Thank you. My time is up. Thank you.

The CHAIRMAN. Ms. Drake?

Ms. DRAKE. Thank you, Mr. Chairman. And certainly, I apologize for not being here for the whole hearing, but I am certainly glad to be here for the three of you. And Dr. Wesson, it is very nice to see you.

I have heard very clearly, just to put your words a little differently than you said them, that low population does not, by any means, mean danger of extinction. You would all agree with that?

The WITNESSES. Yes.

Ms. DRAKE. And you all agree—I notice from everything that I read prior to this meeting that everyone seemed in agreement that the oyster should not be on the Endangered Species Act. And I have heard that from, I think, all three of you today as well.

Mr. PERRET. I agree with that.

Ms. DRAKE. Dr. Wesson and Mr. Judy, would you agree with me that the tools and the practices that are put in place by both Virginia and Maryland and the work that is being done in our communities, in the Chesapeake Bay Commission, and our different State agencies, do you think those tools are appropriate to protect the oyster? Do you think there are additional tools, other than this Endangered Species Act petition, that you would like to have?

Or do you think things are moving along like you would like to see them? We would all want it to be better, but certainly I think there have been significant things that have been done.

Dr. WESSON. And I agree with that. There has been a lot of money that has been given to us, and it has been very helpful to moving forward. Every restoration project that we still do in Virginia, when we put new shells out, we get rapid colonization and have an abundance of small oysters. But we still falter when the salinities get high enough, the diseases come back.

So we are constantly depending on research to help solve the problem, if it is possible, to get a tolerant oyster either for aquaculture or, hopefully down the road, for restoration of larger bodies of water naturally. But the Endangered Species Act is certainly, if anything, it will hold us back from doing further work with the

oysters because our private industry is our biggest partner in Virginia.

I mean, they have all the equipment that we use for restoration. They are all our contractors. And if there is no incentive for them to stay in the business, then we will have to gear up entirely different to do restoration.

Ms. DRAKE. I wondered that last night, reading it. That if it were on the endangered species and they couldn't work anymore, if we would see the creativity and the work on the part of those watermen and those companies to help us fix the problem. So it sounds like, too, that even if we didn't harvest another oyster, if that salinity changed and the disease came back, they would be gone anyway?

Dr. WESSON. We have very, very good data that shows that these large areas that we have set aside as sanctuaries where we do the same restoration that we do in the harvested areas, that the populations are identical.

Ms. DRAKE. Thank you.

And Mr. Chairman, I am going to yield back my time. I know we have to go vote. And thank you very much for being here.

The CHAIRMAN. We did get called to votes. But I just wanted to ask one question before I adjourn the hearing. And it is kind of following up on Ms. Drake's question because if the species, if the population in the Chesapeake Bay is listed as an endangered species, it severely limits what you can and can't do with that population.

And I guess my question is what happens with the seeding operations and the operations that both Maryland and Virginia are conducting right now to increase the population? Because if it is listed as endangered, you now fall under all the regulations of the Endangered Species Act, and that severely limits your ability to do a lot of the work that you are currently doing.

Mr. JUDY. That is an important issue. Of course, I don't know the answer. I am not a lawyer. But that would definitely be a flag that goes up in Maryland. There are some techniques that actually dig into the bottom, some techniques that move oysters to clean an area of disease to the extent possible.

So the question would be, would some of these, let us call them, say, invasive techniques that manage the bottom, would some of these be at risk if that habitat and that oyster are protected?

The CHAIRMAN. That would be a take of an endangered species, and under the law, you wouldn't be allowed to do it.

Mr. JUDY. Well, you have answered my question.

The CHAIRMAN. You know, listening to you talk about disease being the major problem, and as I was sitting here listening to the questions and to your testimony, I thought about the desert tortoise, which is listed as an endangered species. And the main reason it has become endangered is because of an upper respiratory disease which has limited the population in certain segments. Not without its entire range, but only in certain segments.

It was listed as an endangered species throughout its entire range and is now managed as an endangered species throughout the entire area, even though only a limited area had a disease problem that was causing numbers to go down. I can see this being

listed as an endangered species throughout its entire range because of a disease problem in the Chesapeake Bay and the impact that would have throughout the entire area and the impact that would have on the industry.

I think we have a perfect case right in front of us today of an industry working with the natural resource folks in order to bring a species back, and I think this is really the way we ought to be trying to bring species back instead of a lot of the stuff that we are doing in other parts of the country. So this has been very informative for me and has been, I think, a very good hearing for us.

So I appreciate your testimony. I will say that I ask unanimous consent for Members to submit written materials and questions for the record for 10 days, and the hearing record will be held open. I know that there were Members who, because of other markups and other hearings that were going on, could only stay for a short period of time.

Those questions will be submitted to you in writing. If you could answer those in writing for the Committee, it would be appreciated. So thank you very much.

The CHAIRMAN. If there is no further business before the Committee, the Committee stands adjourned.

[Whereupon, at 4:55 p.m., the Committee was adjourned.]

○