Statement of Tommy Leggett, waterman and shellfish farmer
to the House Natural Resources Committee
Subcommittee on National Parks, Forests and Public Lands and
Subcommittee on Insular Affairs, Oceans and Wildlife

Field hearing on Climate Change and the Chesapeake Bay
June 23, 2009

Chairman Grijalva, Madame Chair Bordallo, and members of the Natural Resources Committee, thank you for inviting me to participate in the joint field hearing on "The Impacts of Climate Change on the Chesapeake Bay". My name is Tommy Leggett. I am a resident of Gloucester County, Virginia, and I reside in a small fishing community known as Guinea Neck, at the confluence of the York River, Mobjack Bay, and the Chesapeake Bay. I have had the good fortune to live within two miles of a Virginia tributary of the Bay my entire life. It is fitting that this hearing is being held along the Chesapeake Bay in a coastal community that will be so severely impacted by sea level rise and climate change. What I will present to you is applicable to this community and many others around the Chesapeake Bay, as well as to coastal communities worldwide.

By way of background, I am not a technical expert on climate change, but I do consider myself an expert on matters related the Chesapeake Bay, its fisheries, and its cultural heritage. I am a shellfish farmer and waterman. I grow native Eastern Oysters and hard clams on a small farm in the York River. I am not representing any group or organization here today, but like the thousands of individuals that reside and depend on the Chesapeake Bay for a livelihood, I have many concerns about the ability of future generations to make a living off the natural resources of the Bay as we face the effects of climate change. After receiving a bachelor of science degree in biology from Old Dominion University in 1977 and a masters degree in Marine Science from the Virginia Institute of Marine Science (VIMS) of the College of William and Mary in 1980, and being enrolled in the PhD program at VIMS for one year in 1981, I realized that academia and research was not for me and I taught myself how to make a living on the Chesapeake Bay as a waterman, or commercial fisherman. The term waterman is a carryover from British river workers who transferred passengers across and along the city center rivers in Britain prior to the settlement of North America. Today

there are nearly 3,000 of us still working the Bay in Virginia and around 5,000 working the Bay in Maryland. I am one of only a handful of watermen in the Bay who have degrees in biology and marine science and it provides me a very unique perspective on the challenges we face in restoring the Bay and maintaining fisheries in the face of increasing pollution, population growth, use conflicts, and more recently, climate change.

I worked the water commercially on a full time basis from 1982 until 1998, crabbing, fishing, clamming and oystering. I was able to raise my family as a sole proprietor with my own 40 foot work boat. In 1995 I realized that commercial fishing would not continue to be as profitable; I saw sweeping changes in the crab resource, decreasing abundance of hard clams, and the plight of the oyster fishery is all too familiar. I was desperate to continue working on the water, feeling far more comfortable carving a living out of the Bay as opposed to justifying my existence to funding agencies by writing grants and doing research in academia, so I began to explore other opportunities.

I received a Coast Guard Captain's license in 1995 that would allow me to carry passengers for hire on charter fishing boats and I started toying with the idea of farming clams and oysters. By the end of the year, I had a small quantity of both clams and oysters growing on leased oyster ground in the York River. I continued to work in the hard clam fishery, using a mechanical harvesting device know as patent tongs, while working my way into the aquaculture business. Of all the public fisheries that I participated in, clamming was by far the most gratifying to me. I worked my boat alone, with no dependence on a crew, and the profits were respectable, with low operating expenses. Unfortunately, the clam population began to plummet, clammers began to drop out of the fishery and take land jobs such as trucking, and I soon followed after being offered a job as an environmental educator/captain on one of the Chesapeake Bay Foundation's (CBF) education vessels in Virginia. I did environmental education for two years in Hampton Roads aboard the Baywatcher while maintaining my commercial fishing licenses and developing my shellfish aquaculture business, and in 2000 began working in CBFs Environmental Restoration and Protection Department as a fisheries scientist, doing oyster restoration.

I had come full circle at that point. Today, I am employed by CBF and produce millions of oysters annually for restoration projects and I still have my own clam and oyster farm, selling shellfish to restaurants. In addition, I still maintain my commercial fishing licenses and even though I am employed by CBF, I still consider myself a Chesapeake Bay waterman; it is who I have been for 27 years. My son Tom dabbled in commercial crabbing for a time but in 2001, he realized how difficult it would be to pursue the life of a Chesapeake Bay waterman, and joined the Coast Guard and is currently stationed at Coast Guard Station

Sandy Hook, in New Jersey. There are very few watermen of Tom's generation entering the Chesapeake Bay fishery and I suspect this pattern is seen world wide. Adding climate change into the mix only exacerbates the problem of a shrinking population of watermen in Chesapeake Bay, and as daunting a task as improving the health of the Bay is, climate change can easily erase all of the progress made towards saving and restoring the Bay.

Effects of Climate Change on Fisheries and Natural Resources

I want to offer you some sense of what climate change is likely to do to the Chesapeake Bay, based on my own experience and the reading I have done. Much of what I present to you today can also be found in a publication by the National Wildlife Federation entitled, "Sea-Level Rise and Coastal Habitats of the Chesapeake Bay".[1] If possible, I would ask that you include this publication in today's hearing record.

Wetlands

Virtually all of the fisheries in Chesapeake Bay depend on wetlands as nursery areas. Wetlands vegetation is completely dependent on varying degrees of water inundation and saltwater intrusion. Each species of vegetation has its own tolerance of water, whether it is salt or fresh. Sea level rise resulting from climate change will ultimately flood wetlands and eliminate vital habitats that species such as crabs and many finfish require at some point in their life cycle. Many acres of wetlands have already been lost as a result of population growth and the development of coastal areas. If sea level rises as a result climate change the loss of wetlands will be the nail in the coffin for the Chesapeake Bay seafood industry. No wetlands, no seafood, it's as simple as that.

Wetlands and salt marshes also provide shoreline protection for coastal communities. My home in Guinea Neck is only 6-8 feet above sea level and my shore line is completely vegetated with salt mash species as is most of the creek where I live. Vegetated shorelines provide vital habitat for many estuarine species, reduce erosion and run off, and protect upland areas from the impacts of waves during severe storm events. Sea level rise will result in the loss of vegetated shorelines throughout the Chesapeake Bay and the result will be the eventual loss and inundation of coastal communities and the entire infrastructure associated with them such as roads and utilities, and more importantly, the cultural heritage of those communities that have fished the Chesapeake for many generations. The loss of coastal communities will also make inland areas more susceptible to storm surge as the incidence of tropical cyclones increases. One only has to look to the island chains of the Chesapeake Bay that terminate with Smith, Tangier and Fox Islands. Many of my island friends have described

in detail the process by which their ancestors moved homes from one part of the island to the other as the land subsided and sea level crept up. Many of the once thriving island fishing communities such as Watts and Holland are now completely uninhabited. It is only a matter of time before we lose what is left of Tangier and Smith Islands, as the rate at which they are disappearing is increasing as the saga of sea level rise plays out.

Underwater Grasses (or SAV – Submerged Aquatic Vegetation)

Underwater grass beds also provide vital habitat for many commercially important seafood species; most notable is the blue crab. Eel grass in particular is crucial in the life of blue crabs, providing shelter to juvenile life stages of the crab as larvae and the first crab stage migrate into and up the Chesapeake Bay. The once-dense meadows of this underwater grass are only a fraction of what they were 100 years ago as a result of degradation of the Chesapeake Bay. The Chesapeake is at the southern geographic range for eel grass, meaning that areas south of the bay are too warm for it to thrive. As our climate warms and our oceans warm, eel grass will be completely removed from the southern portion of the Chesapeake. This was very obvious in 2005 when the lower Bay experienced water temperatures in excess of 80 degrees; temperatures which are lethal to eel grass. Vast meadows of the grass completely disappeared and are only now recovering after 4 years as summer water temperatures come back to near normal levels. Areas that I had to run my boat carefully through at low tide were completely devoid of eel grass for nearly two years. Crabbers in Tangier and Pocomoke Sounds, the epicenter of soft shell crab production in the Bay, reported huge die-offs of eel grass and corresponding reductions in their take of peeler crabs, or the crab stage that eventually results in a soft shelled crab.

Sea level rise will also affect meadows of underwater grass .The Bays underwater grass beds are primarily limited to very shallow areas because the Bay is too turbid, or cloudy, from algae blooms and suspended sediment for grasses to grow in water deeper than about 3 feet .The grasses are dependent on sunlight for photosynthesis. A two foot rise in sea level will virtually eliminate all of the underwater grasses in the lower Bay because sunlight only penetrates about three feet during summer months when algae blooms and suspended sediment are most abundant.

Grass beds also help control sediment transport. Just as grass and vegetation along a shoreline reduces runoff, underwater grass limits sediment movement in the Bay. This phenomenon is very obvious on my sandy bottom oyster ground lease. Patchy grass beds were once prevalent on my lease and sediment transport in those areas was limited. There are currently no underwater grass beds on my lease and I constantly contend with shifting sands

around my oyster cages. Underwater grasses would tend to knock suspended sediment out of suspension.

Shellfish and Climate Change

Shellfish such as clams and oysters require calcium carbonate to form their shells. Even the free swimming larvae of these species have a shell, although it is transparent under a microscope. As CO2 levels in the atmosphere increase from the burning of fossil fuels, the oceans take up more and more of the greenhouse gas and it is converted to carbonic acid, which converts to either carbonate or bicarbonate ions. More and more carbonic acid tips the scale to a more acidic level (ocean acidification) which creates more bicarbonate, and results in less carbonate for shellfish to form shells. Too much carbonic acid can even cause the erosion of existing shell. The larval stages of oysters and clams are particularly vulnerable to ocean acidification since their shell material is very susceptible to erosion at low pH levels.

Clammers in Virginia continue to see low recruitment of new clams into the fishery, even as take is reduced from the attrition of many clammers and restoration projects stockpile broodstock in sanctuaries to promote more successful reproduction. The number of patent tong clammers in Virginia has dropped from over 80 to around 24 since the 1990s. It is likely that the clam population in Chesapeake Bay remains depressed as a function of environmental factors, predation, pollution, or perhaps ocean acidification. Similarly, oyster restoration is proceeding slowly, but that is largely a result of disease, lack of adequate funding for restoration projects, and predation. However, recruitment is often sporadic and inconsistent in areas that historically recruited very well. Ocean acidification could already be having an effect on oyster restoration in Chesapeake Bay.

Just last week, news articles reminded us that the oyster fishery and aquaculture industry on the west coast of the United States has reported recruitment failure since 2005 and ocean acidification is suspect. There is a strong indication that cold acidic waters from the Pacific are upwelled into the estuaries of the west coast and the resulting corrosive waters are preventing oyster larvae from forming shells. Shellfish farmers and scientists expected that phenomenon would occur sometime in the future but it appears to be happening at the present.

Ocean Acidification and the Shells of Plankton

Microscopic planktonic, or free floating organisms, are at the base of the ocean and estuarine food chains. Many planktonic organisms, in particular certain protozoans called foraminifera (forams) that have calcium carbonate shells, are also at risk of shell loss from

ocean acidification. Researchers have found that forams in southern ocean core samples that predate the industrial age have thicker shells than modern day forams. The researchers conclude that modern day foram shells are thinner due to their inability to extract calcium carbonate from ocean water as a result of ocean acidification.[2] This alarming finding strikes at the heart of the oceans food web and threatens the balance of the entire oceanic and estuarine ecosystem.

Concluding Personal Observations

My watermen friends on Tangier Island are seeing more frequent flooding events on the island during typical northeasterly storms; storm events that are associated with low atmospheric pressure, north east winds, and more water moving into the bay and onto low lying coastal areas. Tangier Island is only five feet above sea level and they are situated in the center of the Bay, five miles south of the Maryland State line. The Bay water doesn't just go into marshes on the Island; it covers streets and rises up to some of the foundation of the homes. Reasons for this include subsidence of the island from freshwater withdrawal to supply the demands of an increasing population of people on the Delmarva Peninsula, or Eastern Shore, and tipping of the continental plates from melting glaciers to the north. As the glaciers melt, the weight on the continental plates decreases and the those to the south subside.

Just in my lifetime I have seen changes in the seasons. We seldom have heavy freezes and when we do, they are shorter than in the past. When I moved to Gloucester County in 1977, it was common place for many of the creeks and even the York River to freeze over periodically. I haven't seen significant ice on the lower York River in over 20 years. We haven't had single digit temperatures since the early 1980s. Several of the local ponds would freeze over every year and serve as a source of ice for ice companies in the 1800s and early 1900s. Ice would be cut out of the pond, carried by horse drawn cart and stored at ice plants in salt hay and insulation until it was needed in the summer. Ice is now manufactured at commercial ice plants, but Haynes Mill Pond in Gloucester has not frozen over enough to supply any quantity of ice that I can remember since living in Gloucester.

Our winters are starting later and are routinely milder. This is very evident in the Chesapeake Bay crab dredge fishery, which used to start December first, after crabs had begun to burrow in the bottom of the Bay. When I was crab dredging in the 1990s, the month of December was rarely cold enough for crabs to burrow in the bottom and the dredge boats usually spent the first half of the month chasing migrating "schools" of crabs around the Bay

until they settled down in January. It was typically warm enough that the crabs would scurry off the deck of the boat during the winter, when they should be nearly dormant.

Shorter and milder winters may have benefits in that a longer agricultural growing season occurs, but that comes at a price for another resource. Longer warm seasons and shorter winters were suspect in the ability of oysters to go through full maturation, or ripening, prior to spawning in 2008 at the VIMS shellfish hatchery, which led to their inability to produce oyster larvae and seed in sufficient quantities for research and production. Whether or not this is the beginning of a pattern is yet to be determined, but it is a sign of what is yet to come as our climate changes and marine and estuarine organisms respond.

Mr. and Madame Chairman and members of the committee, we humans have done a huge amount of damage to the Chesapeake Bay. Coastal communities of people dependent on the Bay for their livelihoods are engaged in a desperate struggle to restore the Bay and the bounty that lives in it. We are only now beginning to realize what we are also doing to the atmosphere and the oceans, and the effect that it will have on the Bay and other estuaries and coastal areas worldwide. On behalf of coastal people in communities around the globe, I urge you to do all you can to slow down the effects of climate change. Thank you.

References

[1]*Sea-Level Rise and Coastal Habitats of the Chesapeake Bay. 2008. National Wildlife Federation. 11100 Wildlife Center Drive, Reston VA, 20190, 703-438-6000, http://www.nwf.org/sealevelrise/chesapeake.cfm*

[2]*Andrew D. Moy, William R. Howard, Stephen G. Bray & Thomas W. Trull. 2009. Reduced calcification in modern Southern Ocean planktonic foraminifera.* Nature Geoscience *2, 276 - 280 (2009).*