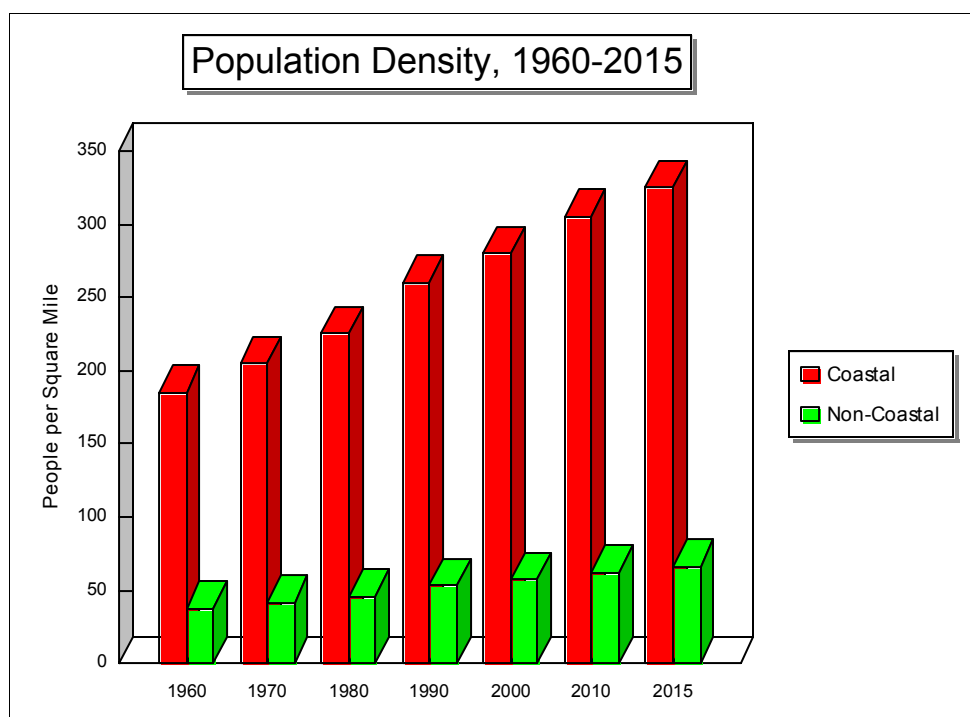


## Presentation to the Commission on Ocean Policy January 14, 2002

### Title Slide

Thank you for the opportunity to speak to the commission about development and the health of coastal ecosystems. We appreciate the time and energy you are putting into the challenges facing our oceans and estuaries. This committee's initiative may very well be lauded 50 years from now as the turning point in the decline of the earth's most valuable resource.

There are many pressures on the oceans – overfishing, introduced species, and agriculture among them. But coastal development is one of the most daunting. The effects of poorly planned, dysfunctional growth are essentially irreversible. And because land use is fundamentally a local matter, there is no single governmental entity or user group that can change coastal land use policies and patterns. Instead, reforms must be made by the tens of thousands of cities, counties and towns that govern land use in the coastal zone. If land use changes are necessary, which I hope this presentation will convince you is the case, it is important to begin the job now, because benefits from those changes will take years and even decades to be realized.

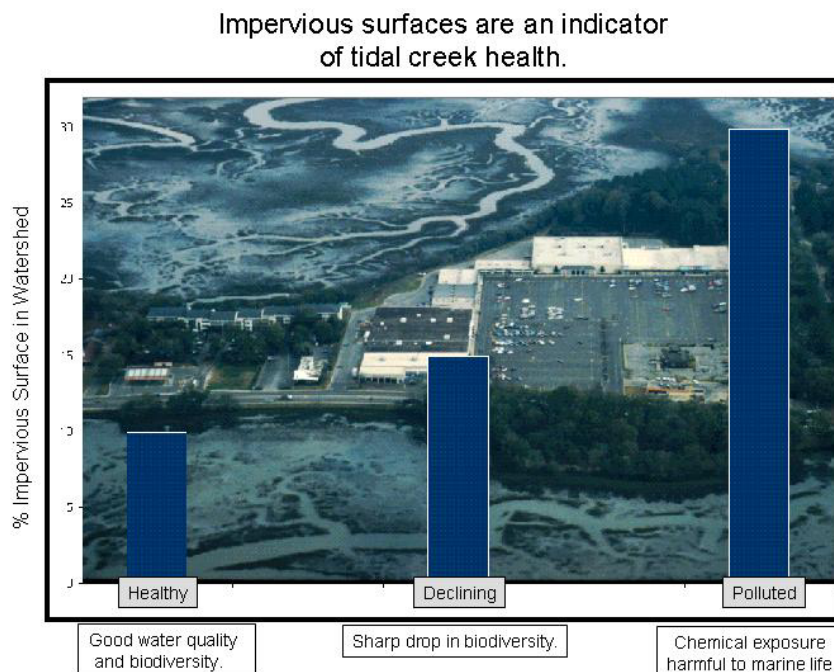


## Population Density

Most people would say that coastal development is basically a population issue. But that assessment is only partly true. Coastal counties cover 17 percent of the land area of the US. (This approximates the often-used definition of the coastal zone as a band stretching 50 miles inland from the ocean.) Coastal watersheds, as described by the Department of Agriculture, represent just 13 percent of the nation's acreage. But the coastal zone is home to more than half, (53%, to be precise,) of the US population. That has been the case since 1960 and is projected to remain so through 2025. Today's coastal populations are just the tip of the iceberg. Over the next fifteen years, 26 million additional people, more than half of the nation's population increase over that period, will be funneled into this narrow corridor along the edge of the ocean.

Today the coast is by far the most densely-settled part of the country. Fourteen of the nation's 20 largest cities are on the coast, as are 19 of the 20 most densely populated counties. At more than five times the density of the interior of the country, coastal population pressure is already great. Over the coming decades, these pressures will rise substantially.

## 10 Percent Rule Picture



The pattern and extent of coastal development is profoundly important in light of recent research on aquatic ecosystems. Dozens of studies over the past 20 years converge on a central point: When more than 10 percent of the acreage of a watershed is covered in roads, parking lots, roof tops, and other impervious surfaces, the rivers and streams within those watersheds become seriously degraded.

**10 Percent Rule Research (next page)**

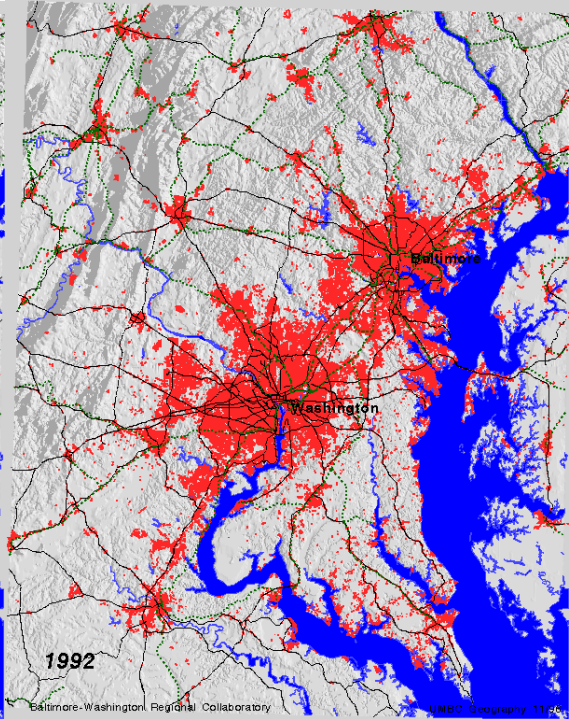
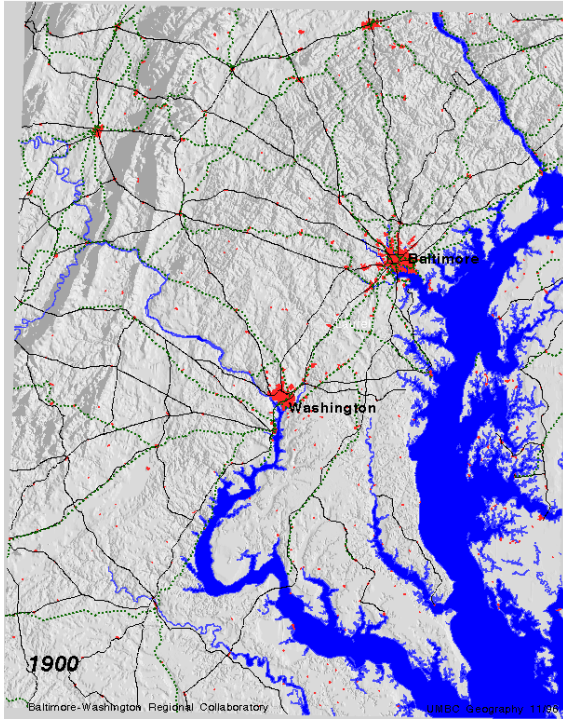
- Seattle, Booth, 1991 – Channel Stability and Habitat Quality Declined Rapidly  
After 10 % Imperviousness.
- Maryland, Galli, 1994 – Abundance and Recruitment of Brown Trout Declined  
Sharply at 10-15% Imperviousness.
- New York, 1990, Limburg and Schimdt – Resident and Anadromous Fish Eggs  
and Larvae Declined Sharply In 16 Tributary Streams Greater than 10% Imperviousness.
- Delaware, 1994, Shaver et al. – Insect Diversity at 19 Stream Sites Dropped  
Sharply at 8-15% Imperviousness.
- Maryland, 1992, Shueler and Galli – Fish Diversity Declined Sharply, Beginning  
at 10-12% Imperviousness.
- Maryland, 1992, Shueler and Galli – Insect Diversity Metrics In 24 Watersheds  
Shifted from Good to Poor Over 15% Imperviousness.
- Seattle, 1993, Luchetti and Fuersteburg – Shift from Less Tolerant Coho Salmon To  
More Tolerant Cutthroat Trout at 10-15%  
Imperviousness.
- Ontario, 1988, Steedman – Biotic Integrity Indicator Decline Beginning at 10-15%  
Imperviousness.
- Seattle, 1983, Steward – Marked Reduction in Coho Salmon Populations At 10-15%  
Imperviousness.
- Seattle, 1993, Taylor – Plant and Amphibian Density Showed Sharp Reductions  
Over 10% Imperviousness.
- South Carolina, 1996, Holland – Variety and abundance of food available for juvenile fish

These studies cover a wide range of topics. They examine changes in particular pollutant levels, changes in the physical structure and habitat quality of streams and creeks, and changes in the number of species and the abundance of aquatic life. By virtually every measure of ecosystem health, the streams, creeks, marshes and rivers that are surrounded by hardened watersheds are less diverse, less stable, and less productive than those in natural watersheds. If the percentage of the coast that is developed rises sharply over the next 25 years, as it is poised to do, these studies point to an irreversible decline in coastal aquatic ecosystem health.

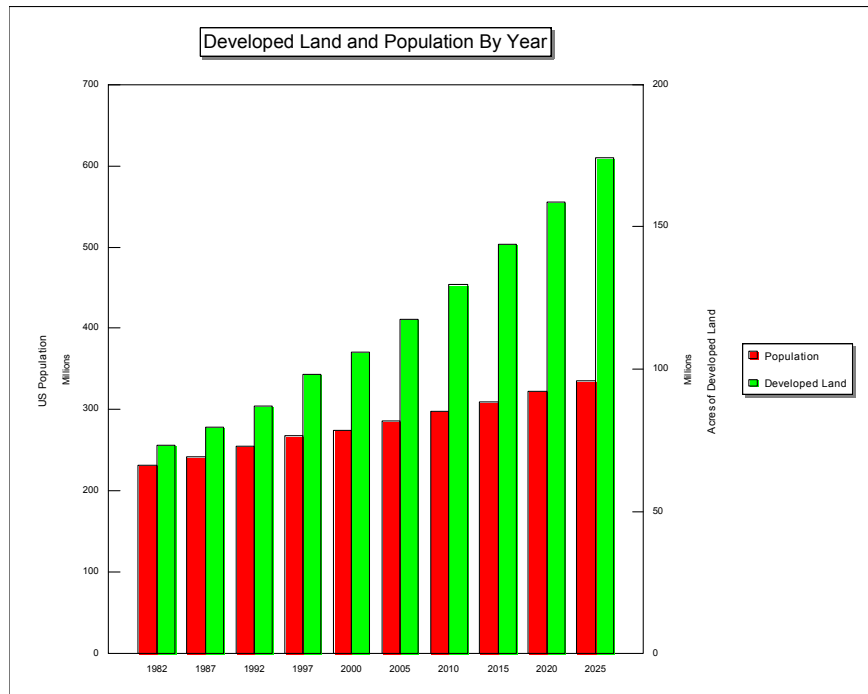
### **Land Use In America**

With the 10 percent rule in mind, let's return to the issue of coastal growth. If coastal population growth rates translated directly into land development, protecting coastal ecosystems would be a great challenge. The situation is considerably more difficult, however, because in almost every coastal area, land consumption is occurring at rates of up to 10 times the rate of population growth. That is particularly bad news for coastal ecosystems.

This slide from Henry Diamond and Pat Noonan's Land Use in America illustrates this phenomenon. Between 1970 and 1990, Chicago's population grew 4% while its land area expanded 46%, New York's population grew 8% and its land area 65%, Los Angeles' population growth was 45% and its land area 300%, and Seattle's population grew 38% compared to a physical expansion of 87%. **Here are images of the Baltimore/Washington region, New York, San Francisco, and Charleston.**



## Developed Land vs. Population, 1960 – 2025



National statistics confirm this trend. According to the US Department of Agriculture's National Resources Inventory (NRI), between 1982 and 1997 developed land in the contiguous U. S. increased by 25 million acres, or 34 percent (NRI, 2001). This means that more than one-fourth of all of the land that has been converted from rural to urban and suburban uses since European settlement was converted in just 15 years. This 25-million acre expansion represents an area roughly the size of Ohio.

During the same 15-year period, between 1982 and 1997, population grew by about 15 percent (US Census). Thus, land consumption occurred at more than twice the underlying rate of population growth. Further, the mismatch between land development and population growth is widening, about 50% higher during the 90s than the 80s.

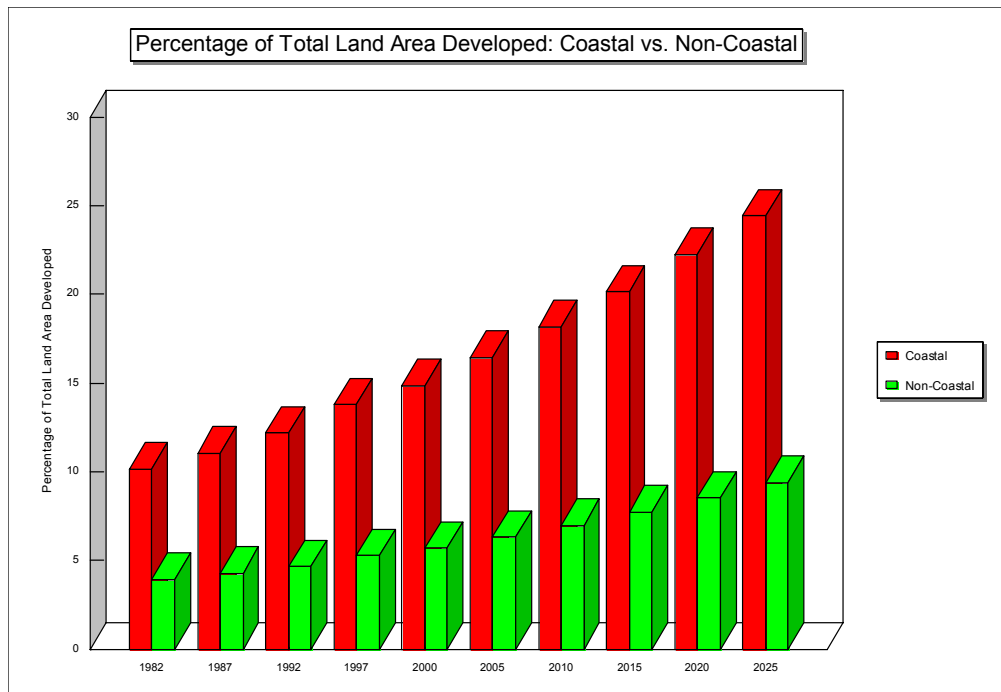
Between 2000 and 2025, the US population is projected to grow by 22 percent. If the land use/population relationship in the last decade continues, there will be 68 million more acres of developed land in the contiguous US than there are today. This newly developed acreage, equivalent to the land

area of Wyoming, will almost match the amount of land developed from the founding of the country until 1983.

## Two NRI Slides, Percentage of Watershed Developed

These next two images show the change between 1983 and 1997 in development. Specifically, these two colors represent watersheds that are 10% or more developed. Watersheds with this level of development increased by 60% nationwide over that 15 year period.

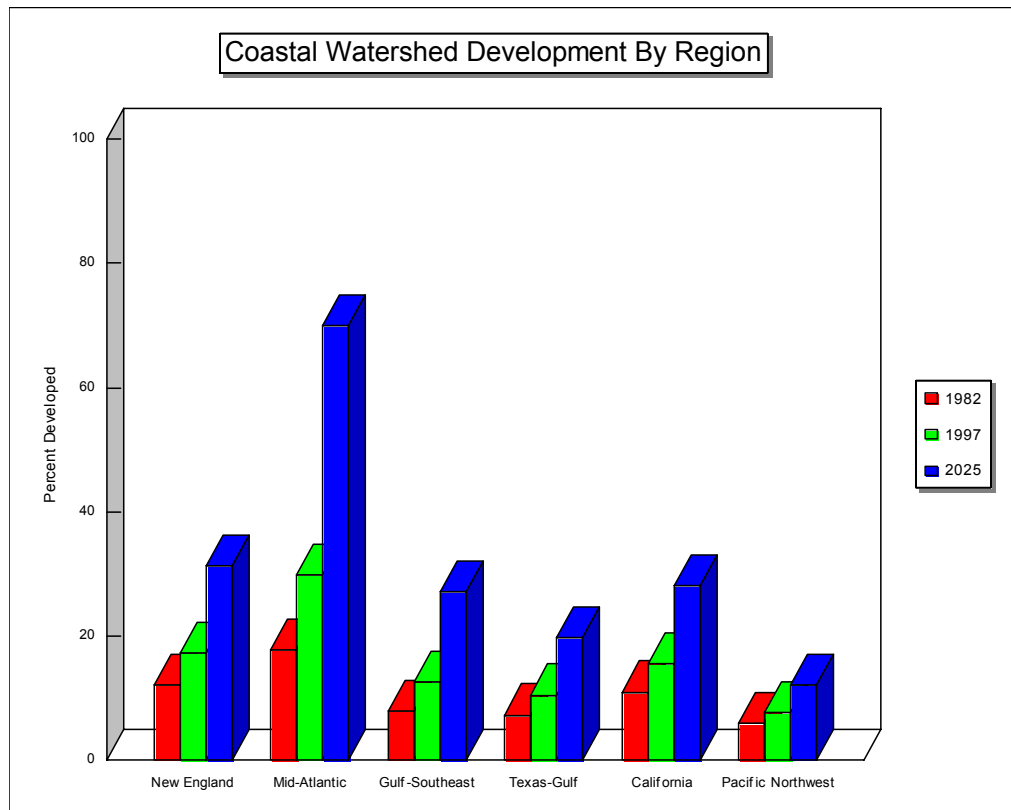
### Percentage developed, coastal vs. non-coastal.



Because the coast hosts half of the US population on less than 1/5 of the nation's land area, the impact of land conversion on aquatic ecosystems is greatly magnified. In 1982, developed land covered 53 million acres, or 3 percent of the non-coastal watersheds in the contiguous US. In contrast, 10 percent of the acreage of coastal watersheds was developed. By 1997, 71 million acres, or 4.2 percent, of the US interior was developed. The coastal portion had risen to 27 million acres, or 13.7 percent of the land area. Current trends suggest that by 2025, 25% of the land area of the coast will be developed.



## Percentage of coast developed by region.



These percentages varied with each region of the country. The coastal watersheds of the mid-Atlantic region were 30 percent developed in 1997, up from 22 percent in 1982. New England's coastal watersheds were the second most heavily developed, at 17 percent in 1997, followed by California's at 15 percent and the South Atlantic/Gulf region at 12.5 percent. In contrast, development covered no more than 10.5 percent of any region's non-coastal watersheds.

By 2025, the mid-Atlantic region will see development covering more than 60 percent of its coastal watersheds, while between 25 and 30 percent of the coastal watersheds of New England, California, and the South

Atlantic/Gulf regions would be developed. As a point of comparison, only four states in the nation presently have more than one quarter of their land area developed.

### **Marsh scene**

These land development statistics combined with 20 years of research on aquatic ecosystems and watersheds paint a bleak picture for the future of coastal ecosystems. If today's development trends continue, our estuaries will experience a sharp and irreversible decline in health and productivity. The present system of Coastal Zone Management, with its emphasis on site level measures like detention ponds, swales, and filters, will not change this outcome. We will feel the effects of this decline in our economy, in our recreational pursuits, and in our quality of life.

We must change the pattern of coastal development if we are to maintain healthy estuaries. This will not be easy. Fortunately, new technology for mapping and analysis provides tools we have never had before. And we know what development patterns will sustain coastal ecosystems. In other words, we've identified the disease and we know the cure. The question is whether we will exert the energy and the leadership to apply it.

### **Aerial of Charleston**

Most encouraging is the fact that the patterns of growth that are "sustainable" are not strange or experimental. Quite the contrary, they are essentially the patterns that characterize some of the most beloved cities in America. One shining example is Charleston. While you are enjoying this 300 year old city, you should also observe that many of its enduring features are precisely the features needed to sustain a healthy coast. Thank you for your time and for your efforts on this critical endeavor.