

**LIVING NEAR... AND MAKING A LIVING FROM...
THE NATION'S COASTS AND OCEANS**

**Prepared for the
United States Commission on Ocean Policy**

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October 2003

Table of Contents

Executive Summary	3
1. Introduction.....	6
2: Defining the Coast.....	7
3. Trends in Population and Housing.....	8
National Trends	8
Regional Trends in Population Growth	9
Trends in Housing Growth	11
4. The Coastal and Ocean Economy of the United States.....	13
5. The Coastal and Ocean Economy Beyond the Market Place.....	22
6. Implications	24
7. The Future of Understanding the Coastal and Ocean Economy	26
Tables	29
Table 1 Population Change in the Three Tiers of the Coast	29
Table 2 Population Density in the Coastal Regions	29
Table 3 Population in Coastal Tiers by Coastal Region.....	30
Table 4 Population Growth by Coastal Tier and Urban/Rural County.....	31
Table 5 Total Coastal Economy	32
Table 6 Private Ocean Economy.....	33
References.....	34
About the Author and Acknowledgments	35
Notes	36

Executive Summary

More than thirty years ago, the Stratton Commission identified growing population pressures on the coasts as a major reason for increased federal government attention to managing the resources of the coasts, oceans and Great Lakes. Socio-economic changes have continued to affect the nation's oceans and coasts over the three decades since the Stratton Commission report, but in much more complex ways than simple population growth alone. More people live on and near the coasts, but it is population growth away from the coast that may be the greatest cause for concern. Population growth near the coast is being outstripped by even faster employment growth, and in industries which appear clean but whose cumulative effects on the environment are significant.

The ocean has always been an important part of the economic life of the nation, but this too is undergoing dramatic change. Economic activity associated with the ocean contributed more than \$200 billion to the U.S. economy in 2000, but employment in such traditional marine industries as fishing and marine transportation is declining, while employment in tourism and recreation industries is exploding. Some industries, such as ocean minerals and maritime transportation are producing more with fewer employees, while others such as commercial fishing are declining in both output and employment.

Changes in the socio-economic environment affecting the nation's oceans and coasts are essential to any consideration of public policy. This is so for three reasons:

1. Changes in how people use the ocean and coasts have profound effects on the natural resources.
2. The changes in the resources feed back to changes in the demographic and economic uses altering our uses and perceptions of the coasts and oceans.
3. To manage a resource you must manage the people who use it. Whatever form it takes, policy affects people's behavior, and so how people interact with the environment is the key to the future of the oceans.

This report explores key changes in the socio-economic environment of the nation's oceans and coasts using the latest data from the Census and a special study of the coastal and ocean economies of the United States prepared for the Commission by the National Ocean Economics Project, an independent investigation of the national ocean economy funded by NOAA and EPA. Major conclusions from this analysis include:

1. The term "coast" requires precise definition for measurement. The socio-economic definition of the coast includes at least three tiers, ranging from the near shore, the areas covered by state coastal management programs, and the counties that include coastal watersheds.
2. Population growth since 1970 in coastal watershed counties exceeded 37.5 million people, but this reflected the same rate of growth as the nation as a whole. This means that the coasts are not the destination of disproportionately large growth, but the sheer increase in the population on the same relative small land base still produces major effects.
3. Population and housing growth is shifting inland away from the shoreline. Expensive real estate and past growth have resulted in slow growth near the oceans and Great Lakes, while upland areas have absorbed more of the growth over the past decade and will likely continue to do so.

4. The largest population growth has been along the Atlantic and Pacific coasts, but the fastest population growth by far has been along the coasts of the Gulf of Mexico. The Great Lakes have seen a slight decline in population, but housing growth has continued.
5. Rural areas of the coast have seen much faster growth than urban areas. The farther from cities, the faster the population growth has been. Both year round and seasonal population and housing growth in rural counties have been substantial.
6. The coastal economy is different from the ocean economy. The coastal economy is the sum of all economic activity taking place in the coastal area, while the ocean economy is the economic activity using the ocean as an input.
7. While coastal *populations* have been growing consistent with national trends, the coastal *economy* has been growing faster. And while population has been growing more slowly near the shore than in the nation, the *economy* has been growing much faster. The region nearest the shore also accounts for 11% of the U.S. economy, while comprising just 4% of its land area.
8. The ocean economy, comprised of the living resources, minerals, construction, transportation, and tourism & recreation sectors, also grew slightly faster than the national economy over the last decade. But tourism and recreation was the only ocean economy sector to show employment growth; all other sectors saw declines in employment in the last decade.
9. The ocean economy is overwhelmingly urban in location, with over 90% of the jobs in the ocean economy located in metro areas. But the ocean economy is proportionately twice as important in rural counties as a proportion of the economy.

Data supporting these conclusions are presented in this paper. For a detailed discussion of the methods used to derive the data used see (Colgan 2003).

In addition to the importance of the ocean and coasts to the national economy, recent research on the value of ocean and coastal resources has also begun to reveal the huge economic values that lie beyond what is reflected in measures such as employment and industrial output. While no single number can encapsulate these values, these studies show additional evidence of the importance of the oceans and coasts for recreation, and has begun to make clear how important resources such as coral reefs and estuaries are to the economic life of the nation.

There are numerous implications of these trends for the management of the nation's coastal and ocean resources. Policy responses to the impacts of "sprawl" development must address different types of sprawl in different parts of the coast. Population growth trends indicate continued large increases in population density on the coast, but at different rates in different parts of the coast. Population and housing impacts in recent years are focused more on the upland areas of the coastal watersheds and less on the near shore areas. But exactly the opposite trend is occurring in commercial and overall employment growth, where the near shore areas growing more rapidly- and more intensely- than upland areas.

Attempts to improve the "land-side" aspects of coastal and resource management must therefore focus on a number of issues about which there has been relatively little discussion. Economic growth in the near shore area has tended to focus in the trade and service industries (like the rest of the economy), which uses more land per unit of output than other types of activity. Managing the impacts of such commercial growth is very important, particularly because a high

proportion is directly related to tourism and recreation uses of the coast. The coasts, particularly the near shore areas, are also the location for very high short-term population growth- from commuters, seasonal vacationers, day-use recreationists, and others. The population pressures on the near shore area are many times those implied by the year-round populations measured by the Census and reported here.

The changes in the ocean economy will also require thinking about how we use the ocean in some new ways. Clearly rebuilding the fish stocks to sustainable levels is a vital part of improving both the natural and economic health of the oceans. Other economic uses of the ocean, such as offshore oil and gas and maritime transportation, will play important even growing roles in the national economy, but will likely do so with stable or even shrinking employment levels. And tourism and recreation, which has come to dominate much of the ocean economy, will only grow further in economic importance- and impacts on coastal and ocean resources, as society gains in wealth and leisure and moves towards a huge increase in retirees over the next two decades.

The insights offered by the data analyzed in this report are useful but still incomplete. Our understanding of the economic values of coasts and oceans economies is weak. In contrast to areas like agriculture where the federal government spends over \$100 million a year on economic research, the federal government makes no sustained or significant effort to monitor and expand our understanding of the economic values associated with the coasts and oceans. A sustained effort of \$8-10 million a year is needed to catalyze a cooperative effort among NOAA, the federal statistical agencies, related federal agencies (NSF and EPA), and the university and private research community to develop data and analysis to improve our understanding in this area.

1. Introduction

A constant theme in discussions of the nation's coasts and oceans, including the Great Lakes, is what the Stratton Commission called the "intensifying use of coastal area" (Commission on Marine Science Engineering and Resources 1969). One particular concern has been a large and steadily increasing population. A frequently cited figure is that the coast contains over half of the population of the U.S., but just over 11% of the area. ((Rappaport and Sachs 2001);(Bookman, Culliton et al. 1998)) Another concern has been the level of economic activity taking place in coastal areas and its effects on resources. There is no doubt that the pressure of population and economic activity on the limited resources of the coasts and oceans is large and growing. The U.S. Ocean Policy Commission received substantial input to this effect. But the socioeconomic forces at work are at once more subtle and dramatic than are usually cited.

Reshaping America's policies towards the oceans in the future must rest on an understanding of those forces. This report examines major trends over the past one to three decades in the socio-economic forces affecting America's coasts and oceans. The report uses primary Census and economic data from federal and state sources to explore how population, housing, employment and earnings, and production in the coastal regions are changing. The data in this report includes standard Census data as well as special analyses of economic data prepared for the Commission by the National Ocean Economics Project, an independent research effort funded by NOAA and EPA. This data on the coastal and ocean economy has not been previously available.

The report begins by examining the term "coast" to provide some definitional clarity to a term that has been used with so many different meanings that it is almost impossible to compare one study to another. Next, it explores population and housing trends, both over the thirty years since the Stratton Commission report as well over the most recent decade. It then explores the coastal and ocean economy, making a distinction between the myriad of economic activities that take place in coastal regions and those that are directly tied to the oceans and Great Lakes. This analysis focuses on the measurement of economic activity involving market transactions and measured by widely-used statistical series. Beyond these measures, researchers are uncovering important evidence that the size of the economic values associated with the coasts and oceans are much larger than conventional measures capture.

The report then examines the implications of these trends for coastal and ocean resource management policy, and concludes with a discussion of the need for future commitments to maintain and improve our understanding of the socio-economic environment of the oceans.

2: Defining the Coast

What is meant by the “coast”? The figures cited above that more than 50% of the U.S. population is “on the coast” includes the population in all counties¹ within 50 miles (80 km) of the shoreline. The 50 mile boundary reflects both the resident population of the coast and those who live “within a day’s drive” and thus are likely to be frequent visitors to the shore. This definition of the coast encompasses a substantial amount of inland geography that would not be immediately recognized as coastal by either residents or visitors. To get a better picture of the population trends affecting the coast requires three different perspectives on the idea of “coast”:

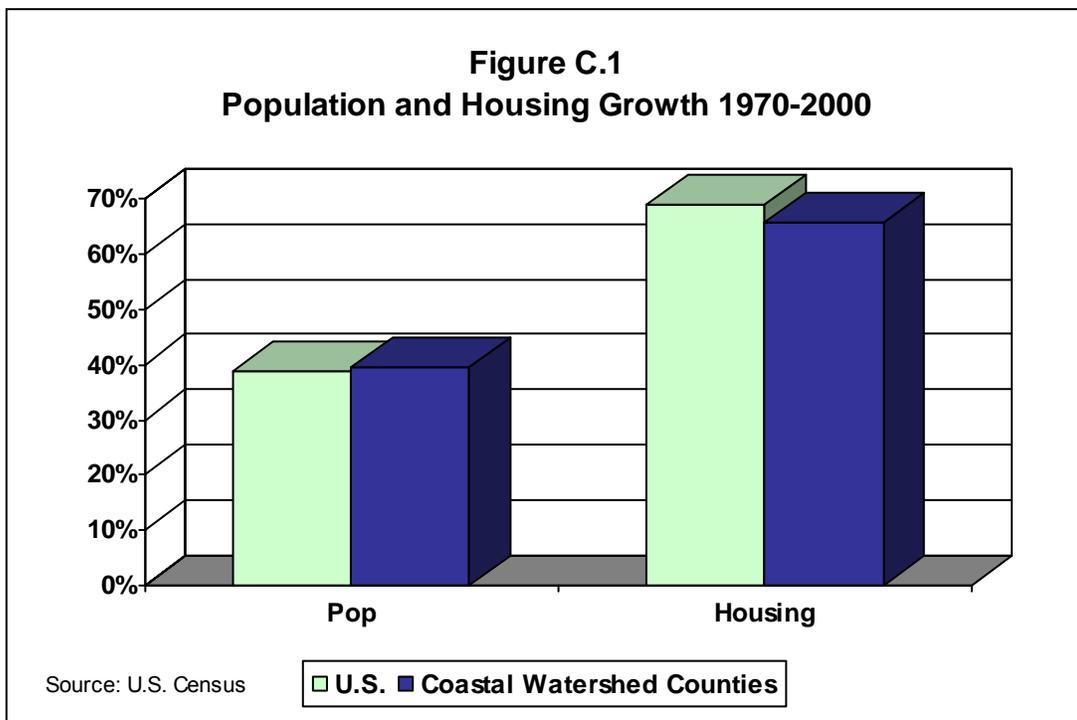
- *Near shore* The population in the region closest to the shore area and thus the population with the greatest effect on the fragile shoreline. In this report, the near shore population is measured by the population living in zip codes adjacent to the shore as defined by the Census Zip Code Tabulation Areas. (Bureau of the Census 2003) Employment, wages, and output of the near shore area is defined by the zip code of reporting establishments in the Bureau of Labor Statistics employment data.
- *Coastal Zone Counties.* This is the population living in the counties which are included in whole or in part in the coastal zone as defined by the states for purposes of the Coastal Zone Management Act.² The coastal zone defined by the states varies significantly from state to state. In four states,³ the coastal zone includes the entire state. In other states the coastal zone is defined by political jurisdictions such as towns and counties⁴ and while still others define it by natural features. This wide variation makes the “coastal zone” a difficult basis for comparison, but as the Coastal Zone Management Program is one of the most significant accomplishments stemming from the Stratton Commission, it requires examination.
- *Coastal Watershed Counties* The boundaries of the near shore and coastal zone are largely determined for political and administrative purposes, and thus intersect natural regions only by chance or in those states that explicitly define their coastal zone to match natural boundaries. Another important perspective is to look at counties that include the watersheds of coastal areas, since the effects of population growth in upland areas sooner or later flow to the sea down coastal rivers and streams. Coastal watershed counties have been defined by NOAA as a means of more closely aligning political and natural boundaries. (National Oceanic and Atmospheric Administration 2001)

3. Trends in Population and Housing

National Trends

Population growth pressures are probably the most frequently cited socioeconomic force affecting the coast. Analysis of Census data from 1970 to 2000 shows that population growth in coastal areas has indeed been substantial, but as the coast is more complicated than a single term can encompass, so have been the population and housing dynamics. Table 1 (all tables may be found on pages 29 and following) provides the data overview of the most important changes. These include:

- From 1970-2000, the population in coastal watershed counties increased by more than 37.5 million people, an amount equivalent to adding the total (year 2000) populations of California and Oregon to the United States.
- Coastal Zone counties grew by more than 28 million people, an amount larger than the 2000 populations of Texas and Virginia.



- The population growth rates of coastal zone and coastal watershed counties have not been consistently more rapid than the nation as a whole. In fact, over the thirty year period, both tiers of coastal counties grew slightly more slowly than the nation. Both types of coastal counties did grow more rapidly than the nation during the 1980s, but not in the 1970s or 1990s. In the 1970s, population growth was rapid in inland areas associated with energy development. In the 1990s population growth was rapid in the inter-mountain west and southeast in the wake while the coastal regions endured the effects of a prolonged slump in growth.

- Over the last decade, population growth has been fastest away from the shoreline but also in the *counties* adjacent to the shore. When all three tiers are examined in the 1990s (data for the near shore area is available only for 1990 and 2000), the slowest growth was in the near shore tier, while the fastest growth was in the coastal zone counties. This inland shift of population results from the fact that much of the coastline is already developed and tends to be among the most expensive real estate. But rapid population growth has not yet shifted towards the farther reaches of the watersheds. Growth remains concentrated near, but not on, the shoreline.

The proportion of the total United States population in the coastal watershed and coastal zone counties has declined slightly over the past thirty years, but the proportion of population in these counties remains nearly twice their proportion of the land area of the country. (Table 2) The proportion of the population in the *near shore* coastal area in 2000 is more than three times the proportion of land area of the near shore.

This means the population density of the coastal regions is significantly higher than the nation as a whole. The national density of 79 persons per square mile of land area (in 2000) is exceeded substantially in the near shore area, where there were more than 230 persons per square mile.⁵ While the population density increased by 22 people per square mile nationally from 1970 to 2000, it increased by 43 people per square mile in the coastal counties.

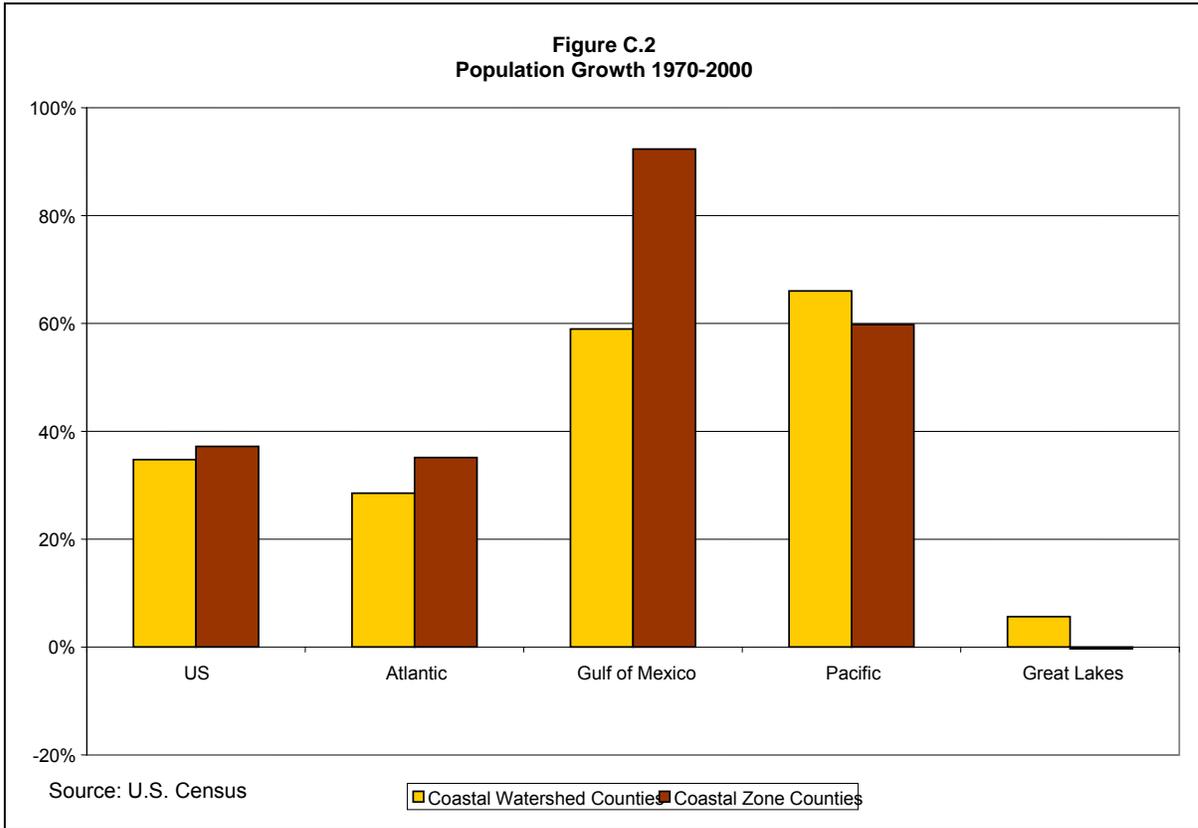
Regional Trends in Population Growth

Trends in population growth in coastal regions have not been consistent across the nation. Figure 2 summarizes the population change from 1970 to 2000 by region⁶. (See also Table 3)

- The Atlantic and Pacific regions show the largest population growth, but the Gulf of Mexico region shows by far the fastest population growth. The coastal zone counties along the Gulf almost *doubled* in population over the past thirty years. Much of this growth occurred in Florida.
- The Great Lakes region saw a population decline in the coastal zone counties from 1970-2000, primarily due to trends in the 1970s. This was due in large part to population declines in cities such as Detroit and Cleveland.
- Population growth trends differed in each region across the three decades, but the 1990s saw the greatest absolute *amount* of growth in all regions.
- Growth accelerated across the decades in the Atlantic region and the Great Lakes, recovered from a population loss in the 1970s to a gain in the 1990s. Growth rates were faster in the 1980s in the Pacific. The Gulf of Mexico saw the fastest growth in coastal zone counties in all three decades.
- The fastest growth in the near shore region over the past decade was in the Gulf of Mexico, the slowest in the Great Lakes.

Trends in the large regions examined here illustrate some of the major variations in population growth across the country. Important additional variations exist within each of the

regions between and within states. One of the most important of these variations is the different rates of growth in urban and rural areas (Table 4).⁷



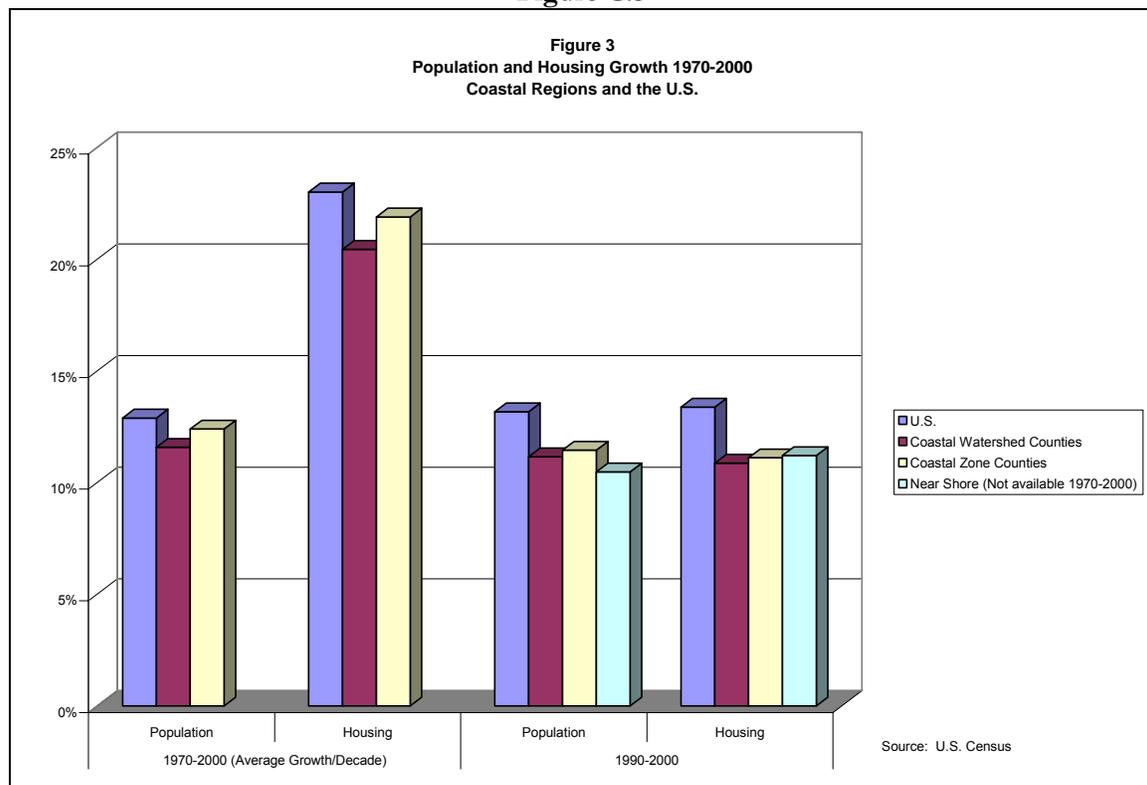
Over the past thirty years, the population growth rate in rural areas substantially exceeds that of urban areas. Rural coastal zone counties grew by more than 57% from 1970 to 2000, compared with 38% growth in urban coastal zone counties. Population growth has been most rapid in those urban region counties which are furthest from the central city and in those rural counties furthest from the city with at least one large community.⁸

Trends in Housing Growth

The potential for population growth's impact on coastal and ocean resources extends beyond the sheer number of people who reside in coastal areas. That potential is also driven by the growth in the number of housing units in a region, which is a principal source of demand for land that may otherwise be used for wildlife habitat, wetlands, etc. Much of the growth in America takes place in a pattern which has come to be called "sprawl", which involves extensive spreading out of housing and economic activity across the landscape. Coastal areas are very much characterized by sprawling patterns of growth. (Beach 2003)

Figure 3 shows the comparative growth rates of housing and population in coastal watershed and coastal zone counties from 1970-2000. Over the whole period, housing growth has substantially exceeded population growth, although the differences in rates diminished by the 1990s. The trends of faster housing growth than population growth is particularly strong in the Great Lakes region, which saw a slight decline (0.4%) in the population in Coastal Zone counties of over the three decades, but an increase in housing in the same counties of nearly 25%.

Figure C.3



Rural coastal zone counties also grew substantially faster in housing than urban coastal zone counties. From 1970-2000, the number of housing units in rural coastal counties more than doubled (a 107% growth rate), while housing grew 63% in urban counties over the same period. Smaller coastal zone counties in urban regions saw very fast housing growth rates. Coastal zone counties at the fringe of urban areas had the fastest rate of housing growth in any of the urban-rural county types, with an increase of over 150% from 1970-2000.

Two major factors drive these trends in housing relative to population growth. A certain amount of housing growth is required for population growth, but a major factor is the falling size of U.S. households. In 1970 the average household consisted of 3.14 persons; by 2000 this was reduced to 2.59 persons. (Bureau of the Census 2001) This change alone accounts for more than half of the growth in housing. Another factor that heavily influences rapid growth in coastal regions is the growth in seasonal housing, which tends to be concentrated in rural counties.

Summary of Population and Housing Trends

Population growth continues to place significantly increased pressure on coastal regions. Total population growth has not been disproportionately located in coastal counties, but the sheer magnitude of that growth on the limited land area of coastal regions creates a much heavier “footprint” than in other parts of the country. Population densities in coastal areas are two to three times as high as in the nation as a whole, reflecting both the attraction of the coast and the intensity of use.

The population of coastal regions is shifting inland, away from the shore and towards the upland areas of coastal watersheds. This trend is most noticeable in the counties closest to the shore. The fastest population growth is occurring in the counties bordering the Gulf of Mexico, particularly in Florida. The largest population growth has been occurring in the Pacific, particularly in California. Population growth has been occurring much more rapidly in rural coastal zone counties than urban coastal zone counties, and in those counties at the fringe of urban regions.

Housing growth exceeds population growth in the coastal areas, especially in the Great Lakes region and in rural coastal zone counties. This pattern of growth puts stresses on natural resources well in excess of that suggested by simple measurement of population growth. In 1969, the Stratton Commission noted that the pressures on the coastal zone were expanding seaward. While this is true, the expansion of population pressures inland and away from the urban areas may be the most important trend over the past thirty years. These trends will almost certainly continue well into the future, since they reflect both fundamental economic forces such as land value that affect where housing is affordable.

Restoring and enhancing the nation’s coastal resources will require increased attention not only on the land forms, such as the Big Sur coast of California or the beaches of the Atlantic that form the coast of the popular imagination. It will require increased attention on the less populated rural parts of the coast where change is occurring most rapidly and on the upland areas of watersheds where the accumulation of subtle changes are magnified in the water rivers, streams, and lakes of the area as water flows to the sea.

4. The Coastal and Ocean Economy of the United States

It is no exaggeration to say that the American economy began on the coasts and oceans. Of course all the early European settlements were along the coast, and from these sprouted not only many of America's great cities but America itself. But even before the first permanent settlements in Virginia and Massachusetts, Europeans were venturing across the Atlantic to fish. (Innis 1940) Native Americans were using the shore as their summer home centuries before the mansions of Newport were built. (Larrabee, Fowler et al. 1998) The nation grew around the ports, and trade they made possible. So the connection of the economy to the sea has been, and remains a vital one in the livelihood of the nation.

Seeing the importance of the ocean in America's past is not difficult. Understanding the role of the ocean and coasts in today's huge and complex economy is more difficult. There are many isolated facts that have been collected about the nation's ocean and coastal economy which attest to the continued importance of the ocean to the economy, but little in the way of systematic measurement has been available.⁹ A major effort to develop a systematic and consistent measurement of economic activity associated with the coasts and ocean, the National Ocean Economics Project, has provided new insights into how the nation's economy depends on its coasts and oceans- and how that dependence is undergoing dramatic changes.¹⁰

The terms "ocean" and "coastal" economy are often applied in a way that implies they are synonymous, but they are not.

The *ocean economy* is that portion of the economy which relies on the ocean as an input to the production process or which, by virtue of geographic location, takes place on or under the ocean.

The *coastal economy* is that portion of economic activity which takes place on or near the coast.

The reason for this distinction stems from the fact that the "ocean" and "coast" are two different resources. The "ocean" provides a variety of products and services such as food, recreation, and transportation. The "coast", on the other hand is a region which provides access to the services of the ocean as well as being a specific economy within larger regions. The coast contains both ocean and many non-ocean related economic activities, and is much larger than the ocean economy. The coast economy describes the category of economic activity that creates much of the impact on coastal resources, while the ocean economy is the direct connection between the sea, the Great Lakes, and the nation's overall economic growth.

The ocean economy can be divided into the following broad sectors and industries:¹

- *Living resources* (fisheries harvesting and processing, aquaculture, seaweed harvesting)
- *Marine construction* (construction of piers and wharves, dredging, beach reconstruction)
- *Ship and boat building*
- *Marine transportation* (transportation of both freight and passengers)
- *Minerals* (oil and gas, sand and gravel, miscellaneous other mineral resources)
- *Tourism and recreation* (restaurants, lodging, recreation services, marinas, boat dealers)
- *Scientific Research* (oceanographic, biological, ecological)
- *Government* (Federal, state, and local agencies that use or manage ocean resources).

Some of these industries are related to the ocean by what they do, such as marine transportation of goods and people. Other industries are ocean-related because of where they are. Tourism and recreation industries such as hotels or recreation services are ocean related when located in the near shore area, defined by being in a shore-adjacent zip code.

The data used in this analysis are based on the ES-202 data employment and wage data series collected by the U.S. Department of Labor Bureau of Labor Statistics. It is based on establishment-level monthly reports of employment and wages. Estimates of gross output are based on the gross state product estimates from the U.S. Department of Commerce Bureau of Economic Analysis. For more information see (Colgan 2003).

Table 5 shows establishments, employment, wages, and output (share of gross state product) for the total economy of the coastal regions (the near shore zip-code defined regions plus the coastal zone and coastal watershed counties) in 1990 and 2000.¹¹

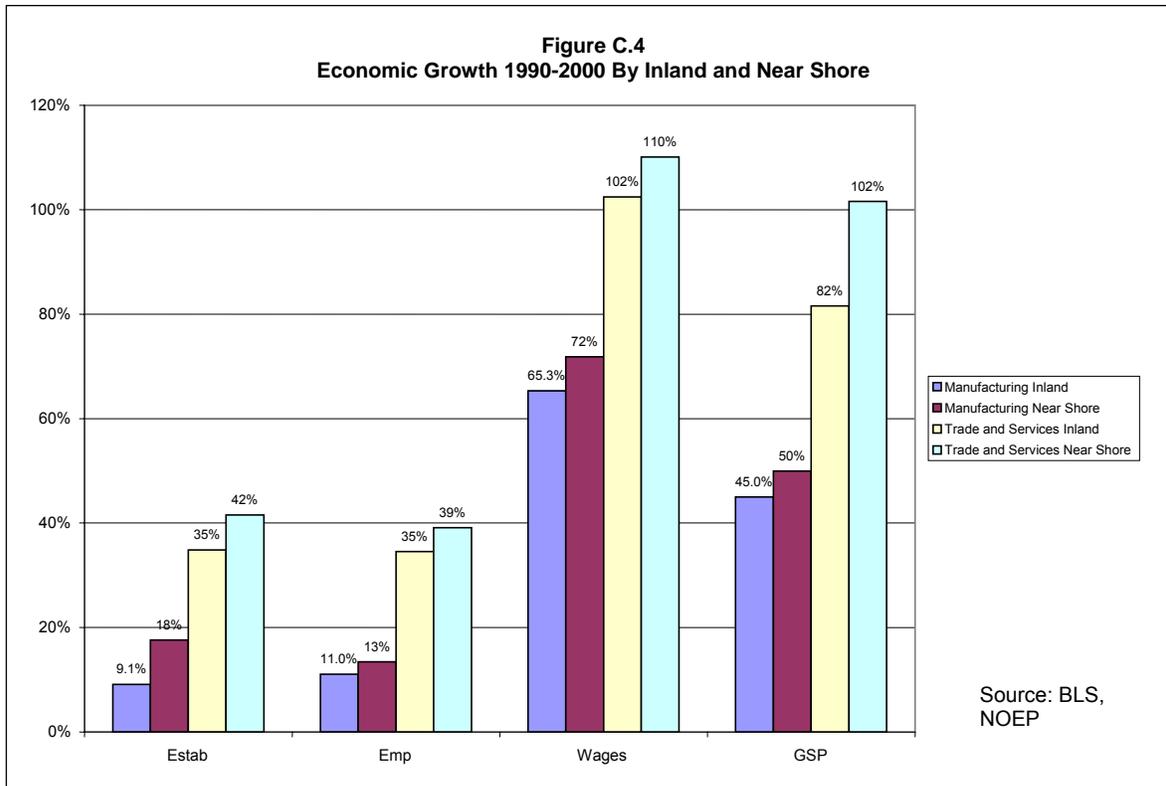
Major conclusions from Table 5 include:

- The coastal states account for about three quarters of the U.S. economy measured by employment and value added in 2000.
- The proportion of the U.S. economy in the coastal states increased from 1990 to 2000.
- Coastal watershed counties account for just under half of the U.S. economy and coastal zone counties for about one-third of the economy.
- All of the tiers of the coast, from the near shore area to the coastal states, grew faster than the U.S. economy over the past decade.
- With 4.6% of the U.S. land area, the coastal near shore region had more than 11% of the U.S. economy in 2000.
- The near shore area was also the fastest growing area of the coast from 1990 to 2000, which grew faster in employment, wages, and value added than coastal zone or coastal watershed counties.

This comparatively rapid growth in the *economy* of the near shore area is in marked contrast to the relatively slower growth of the *population* in this area, suggesting the socio-economic pressures on the near shore area arise from more than population growth. From 1990-2000, the population of the near shore region grew by 3.6 million (see Table 1), but the number of jobs grew by more than 3.8 million.

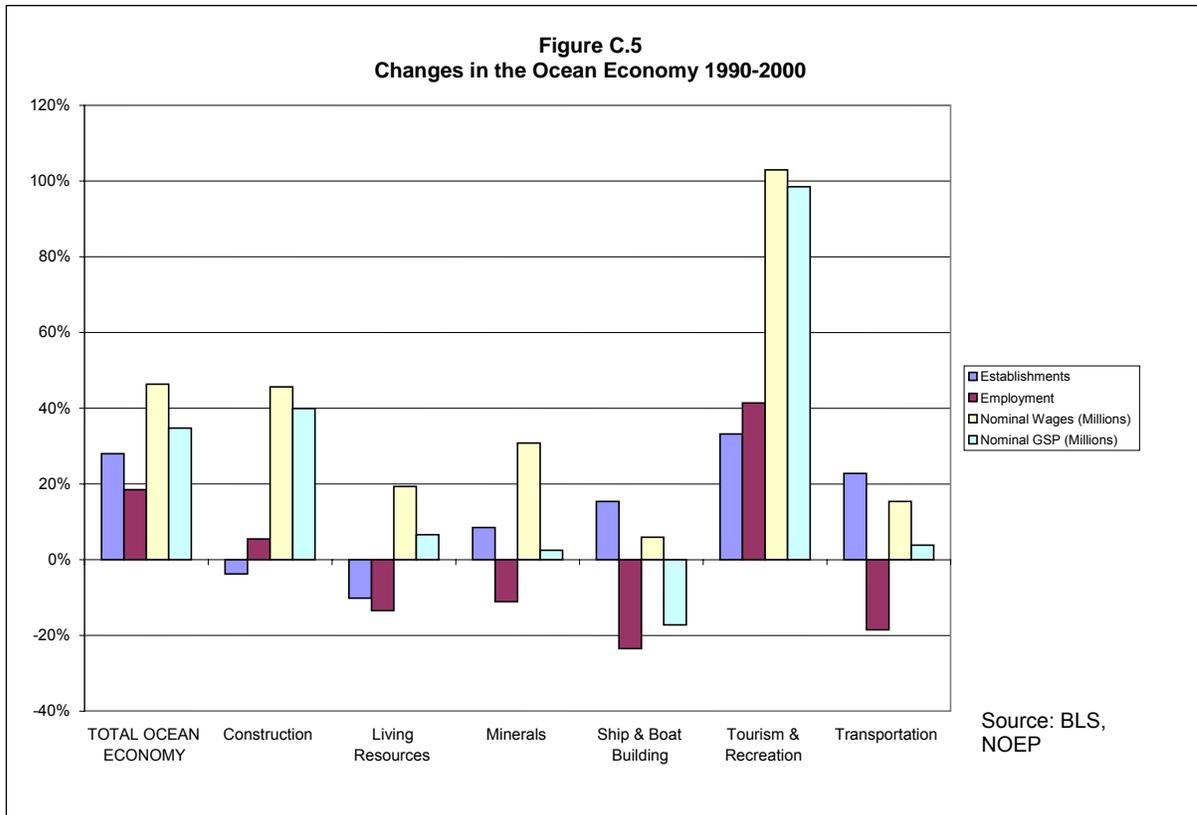
In sum, the economic trends over the past decade have generally shown greater emphasis on coastal regions, with the fastest growth occurring in the areas near the shore. While much of the discussion of the relationship between socioeconomic trends and the health of coastal and ocean

resources has concentrated on population growth, the effects of growth in economic activity have been ignored. But economic activity, the growth in employment and output in the near shore area may be even more important than pure population growth. To understand why requires understanding of the composition of growth.



From 1990-2000 the United States gained 22 million jobs.¹² Despite overall economic growth, manufacturing jobs declined by over 600,000, while trade (wholesale and retail) plus services grew by nearly 17 million, accounting for nearly 80% of the job growth. The decline in manufacturing industries such as steel production, ship building, and chemicals reduced (often at great expense to local communities) the source of many major environmental impacts in the coastal area. Their replacement by hundreds of thousands of smaller establishments in the services and trade industries has allowed employment growth to continue, and even accelerate. But the sum total of those additional establishments has required more and more land for buildings, parking, roads, and other infrastructure, placing proportionately an even heavier demand on coastal lands and resources than the “old” economy.

This shift in the nature of the economy has also greatly affected how we earn our living from the ocean. Table 6 shows the data for the private sector ocean economy of the United States for 1990-2000, while Figure 5 highlights changes in the ocean economy over the same period. The government and scientific research sectors are not included in the ocean economy because of data limitations, so the discussion in this paper is limited to the private ocean economy.¹³



Overall in 2000, the ocean economy accounted directly for 1.6% of employment and 1.4% of the total U.S. private economy. While these may seem like small proportions, they should be considered in context:

- The ocean economy would be the 27th largest state economy in the nation in 2000.
- In 2000, the ocean economy was almost 2.5 times larger than the agricultural economy in terms of output, and over 150% larger than employment in the farm sector. This employment figure for the ocean sector does not include employment in fisheries harvesting.¹⁴
- In employment, the ocean sector is larger than every manufacturing industry.¹⁵

The ocean economy has followed this overall pattern of growth in the U.S. economy, shifting away from goods-oriented and towards service oriented production. From 1990 to 2000 there were sharp declines in establishments and employment in the living resources, minerals, and ship and boat building industries, while there was a substantial increase in the establishments and employment in the tourism and recreation sector. The heavy construction sector located in coastal areas grew by 36% in output, but employment grew by only 4% from 1990-2000. It should be noted that this sector is poorly measured under the Standard Industrial Classification system and is subject to strong influence from the business cycle when measured at any two particular years. (Colgan 2003)

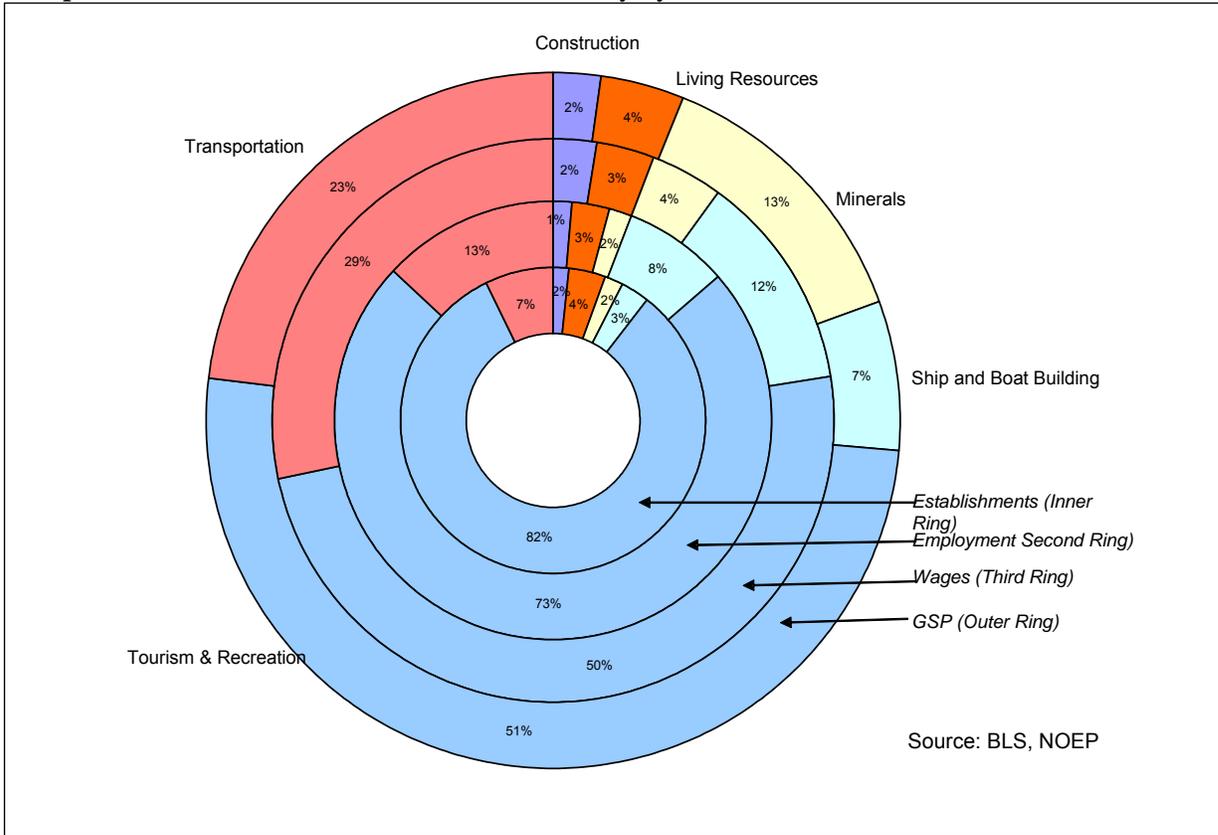
The dramatic shift towards tourism and recreation and away from the goods producing sectors has many causes. The growth in tourism and recreation is clearly consistent with long term increases in overall affluence and increases in leisure time. The enduring appeal of the ocean as a

source of recreation has not only been sustained, but enhanced by the rise of such industries as cruise ships.¹⁶ At the same time there have been substantial changes in the goods producing sectors.

- The *ship building* industry was at a post-World War II peak in employment in 1990 as the end of the Reagan-era naval expansion was occurring. Since almost all ship building in the United States is done for the Navy, the end of the Cold War and the subsequent reduction in ship procurement for the Navy had a profound effect on this industry. Shipbuilding employment declined by 37% between 1990 and 2000, while output declined by 12%. There was a significant increase in boat building employment (35%) and output (82%), primarily for the recreational market, but this was not enough to offset the decline in employment in ship building.
- The *living resources* sector saw dramatic declines as overfishing in key areas such as New England, the Pacific, and Gulf of Mexico led to enforced reductions in fishing effort. While the fisheries harvesting sector is not fully reflected in these figures¹⁷, the overall trend towards declines in employment and output in this sector is clear. Seafood processing employment, which will mirror trends in seafood harvesting, declined by 11%. The value of output in the seafood processing industry rose (by 34%) as declining catches resulted in higher-valued output. Those declines were only slightly offset by the growth of aquaculture, which grew by 30% in employment and 26% in output, but remains a small industry.
- *Minerals* production, primarily offshore oil and gas, declined somewhat over the decade as older fields in the Gulf of Mexico were played out. Employment fell by 11% while contribution to gross state product grew slightly (2.5%). More importantly, there was a reduction in the number of employees needed in the oil and gas industry as more and more technology was employed to find and produce the ocean's mineral resources. The relatively small coastal limestone, sand & gravel industry did show significant growth, nearly doubling in employment and more than doubling in output. This was most probably due to increasing demand for construction aggregates for the foundations of new homes, commercial buildings, and roads throughout the coastal states.
- Ocean related *transportation* declined in employment, but grew in importance. The declines in employment were primarily in deep sea freight handling (down 31%) and in search and navigation equipment (down 42%). In the case of marine freight handling industries, the volume of ocean-going trade increased over the decade but the number of people required to handle the trade declined as containers and automation allowed fewer people to work the docks. The decline in search and navigation equipment was heavily related to post-Cold War military procurement reductions. On the other hand, ocean related passenger transportation increased significantly (up 62% in employment and 133% in GSP), from cruise ships, ferry services and tour boats¹⁸.

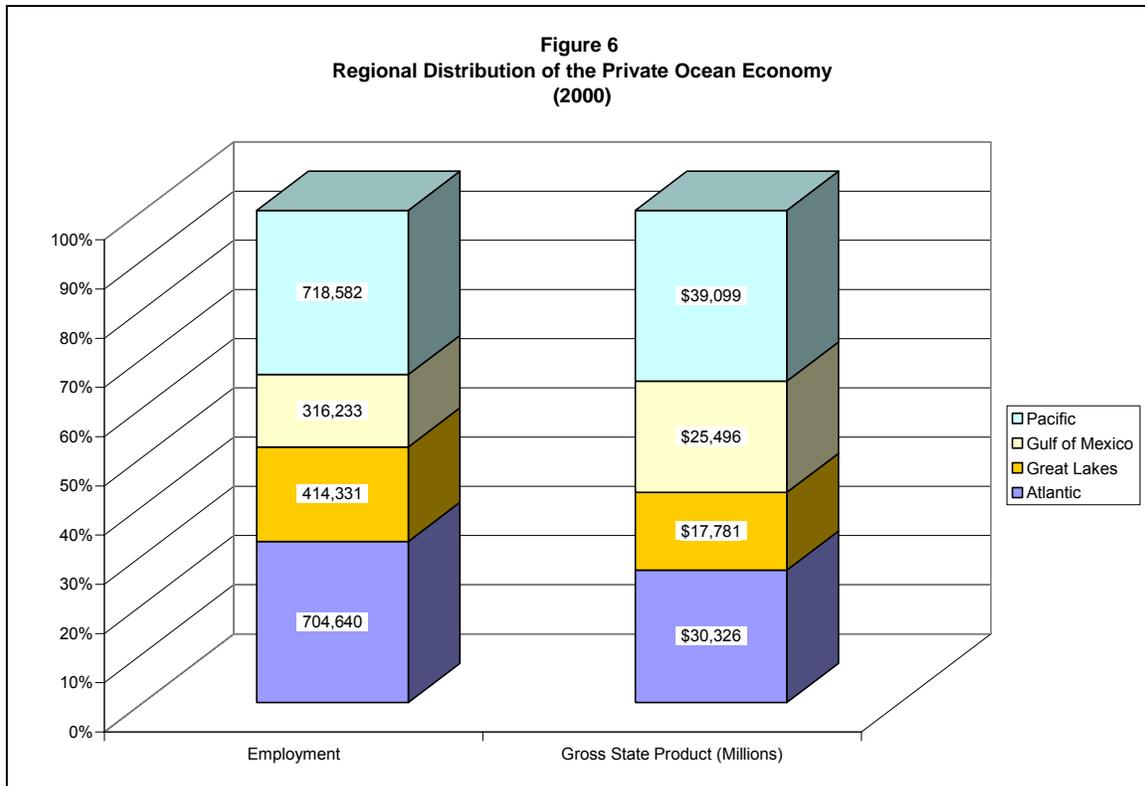
The changes in the ocean economy away from goods-producing activities should, not, however, obscure the continued importance of goods-related activities. Figure 4 compares the distribution of establishments, employment, wages, and output from the ocean sectors for 2000. Tourism and recreation dominates the number of establishments and employment, with three quarters or more of the ocean economy accounted for by this sector. When wages and output are considered, the goods producing industries are much more important, particularly the minerals sector. Accounting for 2% of employment, minerals accounts for nearly ten times the proportion of ocean economy output.

Figure C.5
Composition of the Private Sector Ocean Economy by Different Measures: 2000

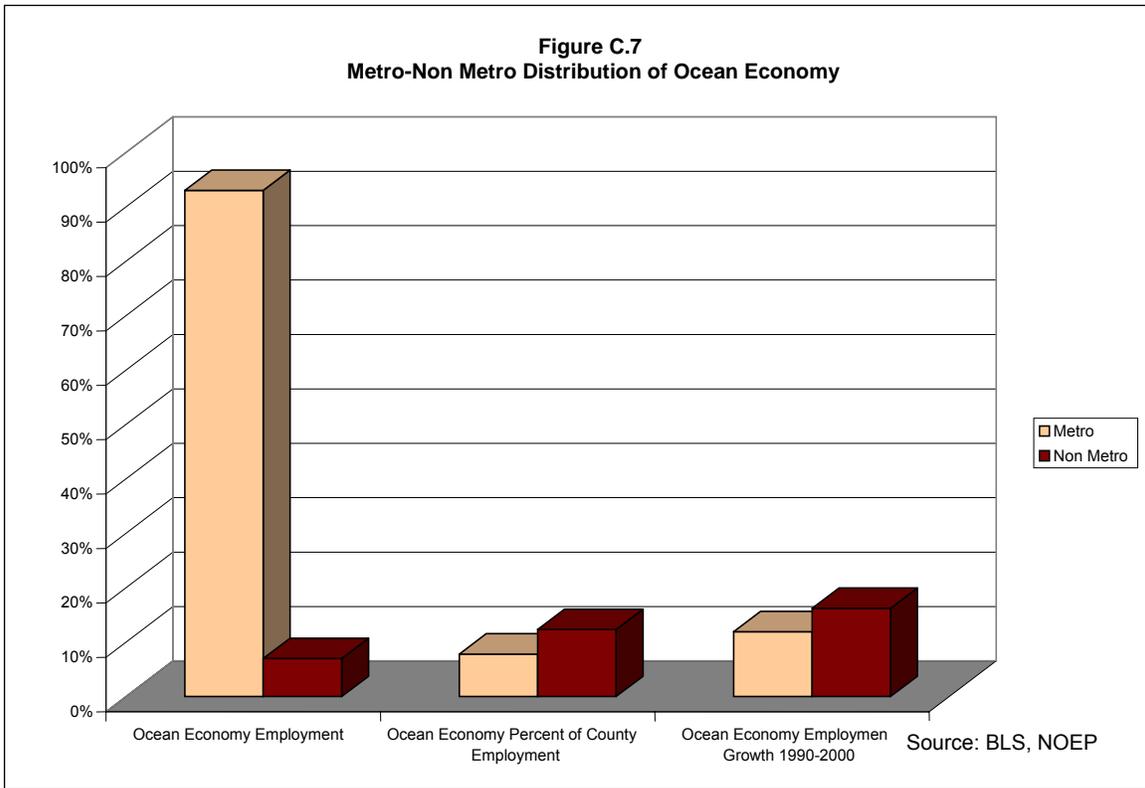


This difference in importance based on which measure is used also influences which of the coastal regions of the U.S. can claim the largest share of the ocean economy. Figure 6 shows the distribution of the ocean economy in 2000 by both employment and output. The Pacific region is the largest region on both measures, with 34% of employment and output. The Gulf of Mexico region accounts for 15% of employment and 22% of output because of the large contributions to gross output by the minerals sector, which is concentrated in the Gulf of Mexico.

Figure C.6



The geographic distribution of the ocean must also be considered in terms of the ocean economy's role in both urban and rural locations. (Figure 7) The ocean economy is overwhelmingly an urban economy; 93% of employment in the ocean industries is in metropolitan area counties, and two thirds of employment is in counties in metropolitan areas with a total population of one million or more.¹⁹ It is perhaps not surprising that the ocean economy is very much an urban economy given the large number of America's principal cities that exist on the coast, but the extent of the concentration of what is a natural-resource based economy in the urban centers of the U.S. speaks to a unique role of the ocean in the American economy. Of all the major natural resources such as farmland and forests, the oceans and Great Lakes are the only resource so intimately connected to the cities, rather than just the country.



However, the importance of the ocean economy to rural economies should not be lost. While the employment in the ocean economy is overwhelmingly urban, it comprises less than 8% of the economy in urban areas, but more than 12% of the economy in rural counties. Moreover, the growth rate in ocean sector employment in rural counties over 1990-2000 was one third faster than in urban counties (16% in rural counties v. 12% in urban counties). Recalling that almost all of the growth in employment occurred in the tourism and recreation sector, the increasing importance of the ocean economy in rural counties is closely tied to their roles of providing an escape for urban dwellers looking for recreation.

Summary of Economic Trends

Total economic activity on the coast accounts for a substantial portion of the American economy. Over three quarters of U.S. domestic economic activity takes place in the coastal states, and nearly half in the coastal watershed counties. The proportion of economic activity in the near shore area is more than twice the proportion of land area, and the total volume of economic activity in the near shore area may have a more profound effect on coastal resources than the more frequently cited figures about population pressures.

The ocean economy is a small proportion of America's huge 10 trillion dollar economy, but it is still larger than all but the largest state economies. At over \$117 billion in 2000, it represents a significant level of economic activity. But the way in which we use the ocean is changing dramatically and rapidly.

Mirroring larger trends in the economy, the services of tourism and recreation have provided almost all the growth in employment and much of the growth in wages and output, while goods related sectors such as the fisheries, transportation, ship and boat building, and minerals have declined in employment and their growth in wages and output have lagged behind the overall economy. All of the ocean economy sectors remain important to the nation, and a major focus of

policy towards the use of the ocean must be to balance the demands of a fast growing tourism and recreation sector with the needs of still-vital uses of the sea for living resources, minerals and fuel, transportation, and ship and boat building. Conflicts over the uses of the scarce coastal and ocean resources will only increase in intensity in the future given these trends.

Most of the employment in the ocean economy is to be found in urban areas, where the competition for land and the impacts of human activity are at their greatest, but where the ocean provides a key component making our cities both competitive and livable. At the same time, the ocean economy plays a proportionately much larger role in the rural regions of the U.S., where overall economic growth has been much slower. The vitality of rural areas on the coast remains very much tied to the sea.

5. The Coastal and Ocean Economy Beyond the Market Place

The preceding analysis examines the role of ocean and coastal economic activity using the conventional measures of employment, wages (income), and output. These measures tell a vital, but incomplete story of the role of ocean and coastal resources in the economic life of the nation. What is left out is are the economic values associated with a family spending a day at the local beach, or of surfers or sailors who are passionate about their use of the oceans, which may result in little spending each year that winds up being measured in the national income accounts but is an essential part of peoples' economic lives. Also missing are the economic values that natural resources such as estuaries or coral reefs perform as nurseries for fisheries as natural pollutant cleansing mechanisms and buffers against storm damage.

These economic values are very real, but are not measured as systematically as with market transaction-based economic activity. Economists have made substantial progress in developing methods to measure these values, but studies of these "non-market" values are sporadic. Some types of resources, such as recreational resources, have been studied regularly, but only some coastal regions have been studied and many areas have never been examined. Other resources are studied only when damaged by events such as an oil spill for purposes of federal law.²⁰ The result is that it is not possible to provide an overview of these economic values of the ocean and coasts, but only to provide examples of these values and why they are important.

Estuaries are perhaps the most diverse of coastal environmental systems, and so are recognized as being among the most valuable. A number of studies have been done of the economic values associated with estuaries, particularly those which are covered by the National Estuary Program administered by EPA. One such study of the Indian River Lagoon area of Florida examined the economic values associated with recreational fishing in the region, as well as resident's willingness to pay to restore and enhance the Lagoon's environmental quality. (Apogee Research and Resource Economic Consultants 2000) Estimates of the value of marine recreational fishing in excess of expenditures range from \$100 to \$589 per angler, resulting in an estimate of \$140 million per year in recreational fishing values. This figure is limited to the residents of the five-county region around the Lagoon, and does not include recreational anglers from other areas.

This study also examined the willingness to pay to improve the environmental quality of the estuary through programs such as stormwater management, protection of wetlands, and acquisition of lands for conservation purposes. The median values of these actions per household were estimated to be \$40, \$25, \$19, and \$29 respectively. These values were reported whether or not those asked actually used the Lagoon or not. Aggregated across the population of the five-county region, the value of the environmental quality of the Indian River Lagoon was found to range between \$14.6 million to \$25.9 million depending on which package of environmental improvements residents were asked to value.

Coral Reefs are also one the most important marine resources and one of the most threatened. Understanding the economic value of the reefs has become an important element in developing restoration and management strategies. A recent study (Cesar, Beukering et al. 2002) of parts of the reef systems in the Hawaiian Islands estimates the values of the rich coral reefs of that state to be at least \$384 million per year. The vast majority if this benefit is from tourism and recreation, but it also derives from the enhanced value of real estate in areas bordered by coral reefs, the value of the biodiversity of the reef ecosystems, and the values of enhanced commercial and recreational fisheries productivity.

Estimating the **value of lost resources** from events such as oil spills has become an integral part of the response to such disasters. One of the most important of such estimates was the study of

the value lost to Americans from the damages caused by the grounding of the tanker *Exxon Valdez* in 1989. Studies done for the State of Alaska (Carson, Mitchell et al. 1992) found that Americans were highly aware of the damage from that spill, and were willing to pay to avoid the losses caused by that oil spill. These studies found a median willingness to pay to avoid the damages of \$31 per household, or about \$2.8 billion for the U.S. as a whole. This study became the basis for the litigation and a settlement arising from what was the largest oil spill in U.S. waters.

The value of beach recreation Beaches are among the coast's most important recreational resources. Their economic value is comprised of the expenditures that visitors make to visit the beach and the value to the beach-goer over and above what they spend. A significant body of research has attempted to measure these values. While the research methods and approaches have differed, most of the research has shown that the non-market values of the use and enjoyment of beaches are significant.

Southern California has among the most famous beaches in the world. The beaches of Orange County attract upwards of 150,000 visits per day in the summer. Studies of the value of use and enjoyment²¹ of southern California beaches range from \$18.00 per day for Santa Monica beaches to \$23.00 per day for Huntington Beach. (Hanneman 2001) The beaches of Ohio are less well known, but just as important to the residents and visitors. Studies of the northern Ohio beaches of Headlands State Park and Maumee Bay found values similar to California of \$15.60 per day for the former and \$25.60 per day for the latter. (Sohngen, Lichtkoppler et al. 1999) Summed over a year, the value of using Santa Monica beach is estimated at over \$200 million for the 12 million visitors to these beaches. The comparable value for Huntington Beach is over \$12 million, while the Ohio beaches are valued at \$6.1 million (Maumee Bay) and \$3.5 million (Headlands) based on the lower number of visitors. These studies illustrate both the potential size of the non-market values of beaches, and the lack of data which exists in many other beach-oriented coastal regions from Maine to Hawaii.

Because of the complexities in estimating these non-market values, it will probably never be possible to compile a single picture of these values of the ocean and coasts in the same way we can with measures such as employment, wages, and output. But these illustrations show that these non-market values are often large and understanding them is vital to our ability to manage ocean and coastal resources to best advantage.

6. Implications

The changes in the coastal and ocean socio-economic environment that have been underway will shape policy for the coasts and oceans in a number of important ways. Much of the health of the oceans depends on what happens on the land, as the Stratton Commission recognized. Shaping policy towards the management of the land and water resources of the coastal areas will have to take into account the increases in population density throughout the coast, but also the faster population growth in upland areas and the faster economic and employment growth near the shore. The upland areas of watersheds require more attention as a result of the first trend, while the impacts of rapid commercial growth near the shore require attention as a result of the second.

Population impacts must also be reconsidered as resulting from more than the people who live on the coast. The real population growth on the coasts is not from permanent residents near the shore but the large number of people who come to the shore for short periods of time. These include the large number of employees who must commute into the near-shore region to take the growing number of jobs there but who cannot live there because of high real estate prices. It also includes people who commute to the near shore area for shopping or to utilize the growing retail and service industries there. Finally, it includes large numbers of tourists and recreationists who increase the population in coastal areas several fold, primarily in the summer. These populations are poorly measured, but are clearly implied by the trends in the economy and housing.

The sum of the “short term” and “resident” populations means that the public must plan for and build a transportation infrastructure to serve a much larger population in coastal areas than actually live there. Because of rapid employment growth in near shore areas, transportation infrastructure must have the capacity to move employees on a daily basis and tourists on a seasonal basis. This large transportation infrastructure must be provided in such a way that it minimizes impacts on the very resources that make the coast special, and allows community character to be maintained.

The complex dimensions of population, housing, and economic changes are clearly challenging federal, state, and local agencies. Inevitably questions arise about whether the high degree of both functional and geographic fragmentation in the jurisdictions of public agencies is a barrier to effective policy. Such concerns lead often lead to calls for new “regional” levels of government, in which jurisdictions match appropriate ecological and socio-economic boundaries. The question of matching jurisdictions with responsibilities is an important one.

While new forms of organizations may be needed in some cases, there are a number of organizations integrating federal, state and local governments with responsibilities appropriate to managing coastal and ocean resources. These include coastal zone management agencies under the Coastal Zone Management Act, the National Estuary Programs established under the Clean Water Act, and the Metropolitan Planning Organizations established under the Intermodal Surface Transportation Efficiency Act. These organizations can play an important role in addressing many of the issues raised by the evolution of socio-economic trends discussed here and the changes in the natural environment noted in other information provided to the Commission.

The changes in the ocean economy point to a number of different conclusions:

Fisheries It is clear that the severe problems with America’s fisheries resources have had significant negative effects on the economy of many communities. The losses in jobs reflected in the processing industry figures reported here are magnified several times in the unreported employment figures of harvesting sector employment. While many fisheries remain vital sources of employment and economic output, a significant restoration of abundance in fish stocks to sustainable levels will

provide important economic boosts to many regions. Aquaculture is also an important new industry, but it does not appear to be replacing the employment levels lost in the capture fisheries.

Maritime Transportation The role of the maritime transportation industry in the economy is changing dramatically. While the volume of goods being moved across the oceans and along the coasts comprises a large and growing share of the American economy, competitive pressures on the transportation industry and improved technologies are reducing the demand for labor, particularly in the handling of freight. Expansions and improvements to maritime freight transportation will continue to be a key to the success of the ocean and national economies.

The rapid growth of the cruise ship industry, now operating in virtually all coastal regions, represents both an important new dimension to the marine transportation industry and is a part of the rapidly growing tourism and recreation industry. The cruise ship industry offers both significant economic development opportunities to the communities served by the industry and new challenges in community planning and environmental management as the equivalent of major resort hotels move up and down the coast.

Minerals The offshore oil and gas industry remains an important source of energy for the nation, albeit a controversial one. Like maritime transportation, employment in this industry is declining as efficiency improvements and changing output levels affect the industry. Also like maritime transportation, offshore oil and gas will continue to play an important part in the economy. Uses of other ocean minerals, like sand and gravel, are not currently large enough to play a significant role in the ocean economy, but may play a larger role in the future.

Tourism and Recreation The explosive growth of coastal and ocean tourism and recreation dominates the story of the ocean economy over the last decade, and this is likely to be the case for the foreseeable future. The growth in tourism and recreation is part of the reason for the rapid growth in employment and economic activity in the near shore regions, meaning that the issues discussed above concerning those trends are part of the story of tourism and recreation growth. Seasonal population and housing growth is also part of the story. While much attention has been devoted to promoting sustainable forms of “ecotourism” in coastal regions, it is clear that it is the overall growth of tourism and recreation activities in coastal areas that requires the greatest attention. There is also likely to be an increasing tie between population growth and tourism and recreation growth in coastal areas. As the baby boom generation moves into retirement in the next two decades, many will seek to permanently re-locate to the coastal regions where they have previously enjoyed vacations. Many coastal regions will develop sharp age structure imbalances, coming to be dominated by retirees and the aged.

7. The Future of Understanding the Coastal and Ocean Economy

Despite the size and importance of the ocean and coastal economy, the Federal government invests very little in trying to monitor and understand it. While the National Marine Fisheries Service and the Special Projects Office have ongoing economic research programs, they are limited to generating information directly related to NOAA programs. There is no organization with a general purpose economic research program or funding within NOAA comparable to the Economic Research Service in the Department of Agriculture, which has an annual budget of over \$100 million. None of the major economic statistics agencies of the Federal government, including the Department of Commerce's Bureau of the Census and Bureau of Economic Analysis or the Department of Labor's Bureau of Labor Statistics, have either mandate or money to study the ocean and coastal economy.

The economic statistics cited in this report are the result of a NOAA and EPA-sponsored National Ocean Economics Project, a multi-year research study being conducted at several universities. This research program is providing critical information, but research is not a substitute for the kind of ongoing commitment to generating data that can be used to monitor and study the coastal and ocean economy. As part of its recommitment to ocean policy, the Federal government needs to establish an ongoing program of using its existing statistical resources to continue the measurement of the coastal and ocean economy and to generating additional data resources and analysis in this field.

A sustained effort to monitor and improve understanding of the coastal and ocean economy requires a cooperative approach among a number of different federal and nonfederal organizations. Seven organizations will play key roles.

1. **NOAA.** As the principal federal agency with responsibility for the oceans, NOAA must play the lead role, working with other agencies to set agendas for research and publication of data, as well as enhancing the use of economic data to assist decision making at the federal, state, and local levels.
2. The **Bureau of Labor Statistics.** BLS, in cooperation with the states, collects the most basic employment and wage data on the economy. The economic data presented here is based on the Longitudinal Data Base maintained by the Bureau. This data will continue to be the fundamental element of monitoring the coastal and ocean economy from national to local levels.
3. The **Bureau of the Census** is the other major collector of primary data on the economy, including the censuses of population and housing and of the major sectors of the economy. The Department of Agriculture has responsibility for the Census of Agriculture, which includes data on aquaculture.
4. The **Bureau of Economic Analysis.** BEA uses data inputs from the data collecting agencies to maintain the most important measure of annual economic activity, the national income and product accounts, the best-known element of which is the gross domestic product. Related measures such as the gross state product are key to understanding regional economies, as is the measurement of self employment.
5. **EPA.** The Environmental Protection Agency undertakes substantial economic research in the fields of land, water, and air pollution that affect ocean and coastal resources at many points. EPA's economic research focuses particular attention on nonmarket values, and provides an important supplement to NOAA's work in this area.

6. The **National Science Foundation** is the provider of support for much of the basic research in the sciences, including the social sciences. It has recently undertaken new initiatives to better link the natural and social sciences in the aid of improved management of the environment and natural resources, which fits well within the framework of socio-economic research on the coasts and oceans.
7. **Universities and Other Researchers.** As with marine science in general, the key research in measuring the coastal and ocean economy is a cooperative arrangement between the federal government and researchers in the nation's universities and in private research organizations. The interaction among federal, academic, and private researchers, with the federal government providing a key catalytic role with funding, takes advantage of the strengths of multiple perspectives and organizational missions.

The future of socio-economic information for the coasts and oceans will require the successful creation of a network among these and other organizations who are concerned with the coasts and oceans. That network must be built around the following functions:

- *Data Collection.* Standard measures of employment, income, and output for the ocean and coastal economy need to be developed and maintained. The work by the National Ocean Economics Project provides the foundation for this work. In addition, special measures must be developed for the unique aspects of the coastal and ocean economy. In particular, the influence of the coasts and ocean on land values needs to be understood throughout the range of different coast types. The vital role of the oceans in tourism and recreation needs to be better understood in terms of both market and nonmarket values, and the economic values of the ecosystem service roles of the coasts and oceans better measured.
- *Data Distribution.* Data must be collected, but they must also be widely distributed both to be available to policy makers to factor into decisions and to spur further research. The availability of contemporary database and Internet delivery systems makes this function easier and cheaper than ever.
- *Data Analysis* Data are only useful when they are transformed into information through analysis. Data analysis should be driven in large part by the needs to support decision making at the federal, state, and local levels about the management of ocean and coastal resources. This will mean both analysis of socio-economic trends on their own, and, increasingly, the ability to analytically link changes in the socio-economic sphere to changes in the environment, and vice versa.
- *Education and Research.* Outside of the fields of fisheries and mineral economics, the field of ocean and coastal socio-economic studies is still relatively new and confined to a fairly small group of specialists. There must be an expansion of the field through training of both researchers and policy specialists to generate and use this information. Research must also continue to improve our measurement of non-market values, to develop measures of the use of coastal and ocean resources such as beaches, and to improve the data systems for standard measures such as employment and output. Current work in these areas represents a beginning, not an end to these endeavors. The advent of geographic information systems also substantially eases the integration of socio-economic with natural resource data, and this integration needs to be another focus of research so that the interactions between the human and natural environments in the coastal areas can be better understood.

Given these resources and needs, the federal government should commit to an ongoing program of socio economic research of trends and values of the nation's coasts and oceans. That program should include the following elements:

- Designation of a specific socioeconomic research and data collection function within NOAA.
- An interagency group, chaired by NOAA, of researchers and data providers in the federal agencies concerned with data for the coasts and oceans.
- An Advisory Board, reporting to NOAA and the interagency group, of outside researchers with appropriate expertise, to help set agendas, design programs, and evaluate progress.
- A statutory requirement that the Bureau of Labor Statistics and Bureau of Economic Analysis prepare an annual report on the employment, wages, and output associated with the coasts and oceans of the United States.
- A special effort to make available key data that are missing from the current suite of economic statistics, particularly employment and incomes in the fisheries harvesting sector.
- Regular funding for research into improved measures of both the market and non-market economic values of the coasts and oceans. An area of particular importance is establishing the economic value of the nation's ocean and coastal resources as assets in which we invest.
- An Internet based data archive and distribution system that links key sources of coastal and ocean socioeconomic data and research.

Funding for these efforts should be in the \$8-10 million range annually, with funds provided to both data using and data providing agency for sufficient staff and other costs. This is particularly the case for the data providing agencies such as the Bureau of Labor Statistics, Bureau of the Census and Bureau of Economic Analysis who cannot play their roles without additional resources. Partnership arrangements with nonfederal organizations like the National Ocean Economics Project should be maintained and expanded.

It should be noted that at a time of scarce budgetary resources, this amount may seem like a substantial sum. But it is less and than 1/10th of what the federal government currently spends on economic research in the agriculture sector, which is actually smaller than the ocean sector in the overall economy.

TABLES

Table C.1 Population Change in the Three Tiers of the Coast

		Population (Millions)							
		1970	1980	1990	2000				
United States		202.55	225.90	248.16	280.85				
Coastal Watershed Counties		107.99	117.56	130.89	145.49				
Coastal Zone Counties		75.51	82.87	92.94	103.59				
Near Shore*				35.26	39.11				
		Change							
		1970-80		1980-90		1990-2000		1970-1990	
		N (millions)	Percent	N (millions)	Percent	N (millions)	Percent	N (millions)	Percent
United States		23.36	11.5%	22.25	9.9%	32.69	13.2%	78.30	38.7%
Coastal Watershed Counties		9.58	8.9%	13.33	11.3%	14.60	11.2%	37.50	34.7%
Coastal Zone Counties		7.36	9.7%	10.08	12.2%	10.64	11.5%	28.08	37.2%
Near Shore*						3.85	10.9%		
* Data available only for 1990 and 2000									
Source: US Census									

Table C.2 Population Density in the Coastal Regions

	Land Area*	Percent of U.S.			Population Density (Persons per Square Mile)	
		Area	Population 1970	Population 2000	1970	2000
United States	3,537,377	100.0%	100.0%	100.0%	57.3	79.4
Coastal Watershed Counties	871,216	24.6%	53.3%	51.8%	124.0	167.0
Coastal Zone Counties	663,528	18.8%	37.3%	36.9%	113.8	156.1
Near Shore*	164,113	4.6%		13.6%		232.6
*In Square Miles. Excludes surface water area such as wetlands, lakes, and rivers)						
Source: US Census						

Table C.3 Population in Coastal Tiers by Coastal Region

		Population* (Millions)							
		1970	1980	1990	2000				
United States Total		202.55	225.90	248.16	280.85				
Atlantic	Coastal Watershed Counties	39.22	41.32	45.49	50.41				
	Coastal Zone Counties	28.47	30.54	34.21	38.47				
	Near Shore**			14.2	15.7				
Gulf of Mexico	Coastal Watershed Counties	13.18	15.70	17.80	20.95				
	Coastal Zone Counties	6.12	8.32	9.95	11.77				
	Near Shore			6.0	7.1				
Pacific	Coastal Watershed Counties	22.84	26.95	33.21	37.92				
	Coastal Zone Counties	20.84	24.41	29.6	33.30				
	Near Shore			8.1	8.9				
Great Lakes	Coastal Watershed Counties	30.34	30.30	30.36	32.04				
	Coastal Zone Counties	20.06	19.67	19.21	19.99				
	Near Shore			5.40	5.52				
		Change							
		1970-80		1980-90		1990-2000		1970-2000	
		N (millions)	Percent	N (millions)	Percent	N (millions)	Percent	N (millions)	Percent
United States Total		23.36	11.5%	22.25	9.9%	32.69	13.2%	78.30	38.7%
Atlantic	Coastal Watershed Counties	2.10	5.4%	4.17	10.1%	4.92	10.8%	11.19	28.5%
	Coastal Zone Counties	2.07	7.3%	3.67	12.0%	4.26	12.5%	10.00	35.1%
	Near Shore					1.50	10.3%		
Gulf of Mexico	Coastal Watershed Counties	2.52	19.1%	2.10	13.4%	3.15	17.7%	7.77	59.0%
	Coastal Zone Counties	2.20	35.9%	1.63	19.6%	1.82	18.3%	5.65	92.3%
	Near Shore					1.10	18.3%		
Pacific	Coastal Watershed Counties	4.11	18.0%	6.26	23.2%	4.71	14.2%	15.08	66.0%
	Coastal Zone Counties	3.57	17.1%	5.19	21.3%	3.70	12.5%	12.46	59.8%
	Near Shore					0.80	9.9%		
Great Lakes	Coastal Watershed Counties	-0.04	-0.1%	0.06	0.2%	1.68	5.5%	1.70	5.6%
	Coastal Zone Counties	-0.39	-1.9%	-0.46	-2.3%	0.78	4.1%	-0.07	-0.3%
	Near Shore					0.12	2.2%		
*Data available only for 1990 and 2000									
Source: US Census									

Table C.4 Population Growth by Coastal Tier and Urban/Rural County

	Population (Millions)					
	Urban			Rural		
	1970	1990	2000	1970	1990	2000
Coastal Watershed Counties	100.82	121.69	135.13	7.16	9.19	10.36
Coastal Zone Counties	73.15	90.69	101.38	3.75	5.12	5.89
Near Shore		31.58	34.87		2.97	3.29
	Change					
		1970-2000		1990-2000		
		N (millions)	Percent	N (millions)	Percent	
Urban	Coastal Watershed Counties	34.31	34.0%	13.44	11.0%	
	Coastal Zone Counties	28.23	38.6%	10.69	11.8%	
	Near Shore			3.29	10.4%	
Rural	Coastal Watershed Counties	3.20	44.7%	1.17	12.7%	
	Coastal Zone Counties	2.14	57.1%	0.77	15.0%	
	Near Shore			0.32	10.8%	
Source: US Census						

Table C.5 Total Coastal Economy

	1990			
	Establishments	Wage & Salary Employment	Wages (Millions)	Gross State Product (millions)
Total U.S. Economy	NA	109,043,000	\$2,743,643	\$5,706,658
Total Coastal States	4,998,116	76,477,272	\$1,850,303	\$3,887,225
Coastal Watershed Counties	3,101,001	49,068,567	\$1,246,219	\$2,584,802
Coastal Zone Counties	2,267,894	36,359,010	\$884,366	\$1,865,741
Near Shore*	776,991	10,784,785	\$264,346	\$558,634
	2000			
	Establishments	Wage & Salary Employment	Wages (millions)	Gross State Product (millions)
Total U.S. Economy	NA	131,720,000	\$4,834,254	\$9,415,552
Total Coastal States	6,495,532	100,452,156	\$3,632,333	\$7,023,413
Coastal Watershed Counties	3,831,358	60,696,525	\$2,334,920	\$4,512,357
Coastal Zone Counties	2,906,685	44,659,916	\$1,698,336	\$3,264,539
Near Shore*	1,065,576	14,574,973	\$536,196	\$1,058,596
	Percent Change 1990-2000			
	Establishments	Wage & Salary Employment	Wages	Gross State Product
Total U.S. Economy	NA	20.8%	76.2%	65.0%
Total Coastal States	30.0%	31.3%	96.3%	80.7%
Coastal Watershed Counties	23.6%	23.7%	87.4%	74.6%
Coastal Zone Counties	28.2%	22.8%	92.0%	75.0%
Near Shore*	37.1%	35.1%	102.8%	89.5%

Sources: Bureau of Labor Statistics, Bureau of Economic Analysis, National Ocean Economics Project.

Table C.6 Private Ocean Economy

1990				
Ocean Economy Sector	Establishments	Employment	Wages (Millions Current \$)	Gross State Product (Millions Current \$)
TOTAL	91,203	1,924,014	\$38,064	\$87,074
Construction	2,144	30,198	\$937	\$1,854
Living Resources	5,098	71,819	\$1,540	\$4,421
Minerals	1,829	45,099	\$1,860	\$15,043
Ship & Boat Building	3,192	230,097	\$6,564	\$9,769
Tourism & Recreation	71,958	1,182,809	\$13,447	\$29,978
Transportation	6,982	363,992	\$13,716	\$26,008
2000				
TOTAL	116,736	2,279,006	\$55,704	\$117,318
Construction	2,064	31,835	\$1,364	\$2,594
Living Resources	4,580	62,184	\$1,838	\$4,714
Minerals	1,984	40,097	\$2,432	\$15,414
Ship & Boat Building	3,684	176,098	\$6,952	\$8,089
Tourism & Recreation	95,850	1,672,156	\$27,292	\$59,497
Transportation	8,572	296,634	\$15,826	\$27,009
Change 1990-2000				
	Establishments	Employment	Nominal Wages (Millions)	Nominal GSP (Millions)
TOTAL	25,533	354,993	\$17,640	\$30,244
Construction	(80)	1,638	\$427	\$740
Living Resources	(518)	(9,636)	\$298	\$293
Minerals	155	(5,002)	\$572	\$371
Ship & Boat Building	492	(53,999)	\$388	-\$1,680
Tourism & Recreation	23,892	489,346	\$13,845	\$29,519
Transportation	1,590	(67,357)	\$2,110	\$1,001
Per Cent Change 1990-2000				
TOTAL	28.0%	18.5%	46.3%	34.7%
Construction	-3.7%	5.4%	45.6%	39.9%
Living Resources	-10.2%	-13.4%	19.3%	6.6%
Minerals	8.5%	-11.1%	30.8%	2.5%
Ship & Boat Building	15.4%	-23.5%	5.9%	-17.2%
Tourism & Recreation	33.2%	41.4%	103.0%	98.5%
Transportation	22.8%	-18.5%	15.4%	3.8%

Source: Bureau of Labor Statistics, Bureau of Economic Analysis, National Ocean Economics Project

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Comments on earlier drafts of this paper were provided by Tom Kitsos and Peter Hill of the Ocean Commission Staff, Dr. Linwood Pendleton of the University of Wyoming, Dr. Karen Polenske of the Massachusetts Institute of Technology, Dr. Michael Hanemann of the University of California-Berkeley, and Dr. Rodney Weiher, Chief Economist of the National Oceanic and Atmospheric Administration.

Dr. Judith Kildow of California State University-Monterey Bay and Principal Investigator of the National Ocean Economics Project coordinated the overall research project.

The fundamental research into the ocean and coastal economy is funded primarily by the Coastal Services Center, National Ocean Service, National Oceanic and Atmospheric Administration. Margaret Davidson, the Director of the Coastal Services Center, has provided the assistance required to sustain the research.

The Bureau of Labor Statistics Office of Employment and Unemployment Statistics has provided access to its data files in order to build the unique data sets used in the project under their Research Fellowship Program. Richard Clayton, David Tallan, and Amy Knaup of OEUS have provided much assistance in creating and managing the data sets.

NOTES

¹ “Counties” in this context includes not only political jurisdictions that function as counties, including parishes in Louisiana and boroughs in Alaska. It also includes Census-designated areas in some states. These are areas defined by the Census bureau as sub-state regions for statistical purposes even though there is no governmental function. Counties in Connecticut, Rhode Island, and Massachusetts, along with some regions in Alaska fall into this category. In Virginia, independent cities, which have functions similar to counties, but are not classified as counties under state law, are included when they fall within defined coastal areas.

² Boundaries of coastal zone are provided by the Office of Coastal Resource Management, NOAA.

³ The four states which define the entire state as the coastal zone are Florida, Rhode Island, Delaware, and Hawaii.

⁴ Examples of states using county boundaries include Washington, South Carolina, Mississippi, and North Carolina. States using municipal boundaries include Maine and Connecticut. In New York, the coastal zone includes counties along the Hudson River as far north as Albany, as well as counties along both the Atlantic and Great Lakes coasts. Pennsylvania defines its coastal zone only along Lake Erie and not along the Delaware River. In this analysis, Cook County Illinois is included in the coastal zone county definition, although Illinois does not participate in the CZM program to provide complete coverage of the nation.

⁵ This figure is based on the decennial census, which measures population on April 1 of the year. It does not include seasonal peak populations, which can be orders of magnitude higher in a number of coastal regions.

⁶ The Atlantic region is defined as coastal zone and coastal watershed counties from Washington County, Maine to Miami-Dade County, Florida, including the Chesapeake Bay counties of Maryland and Virginia. New York counties exclude counties on the Hudson River, beginning with New York County. Monroe County, Florida is counted in the Gulf of Mexico region. The Pacific region includes Hawaii and Alaska. Cook county is included in Illinois in the coastal zone definition, although Illinois does not participate in the CZM program.

⁷ For purposes of defining urban and rural, the Urban Influence Codes of the Department of Agriculture's Economic Research Service are used. These codes define counties as urban or rural based on the population of the largest city or town, the location within a Census-defined metropolitan area, and the adjacency of the county to largest central city (if in a metro area) or to a metro area. For more information, see <http://www.ers.usda.gov/briefing/rurality/UrbanInf/>.

⁸ “Large community” is defined as a population in 1990 of 20,000 or more.

⁹ There have been periodic attempts over the past three decades to define an ocean economy, beginning in the 1970's when the Bureau of Economic Analysis sponsored the first estimation of the “ocean economy”. This work was updated by Pontecorvo See Pontecorvo, G., M. Wilkinson, et al. (1980). "Contribution of the Ocean Sector to the U.S. Economy." *Science* **208**(30): 1000-1006.}and extended somewhat in a later study of the coastal economy by Luger See Luger, M. (1991). "The Economic Value of the Coastal Zone." *Environmental Systems* **21**(4): 278-301. A number of state and regional agencies have undertaken studies of local coastal economies in order to better understand the role of the ocean and coasts in their areas (e.g. Colgan, C. S. and J. Plumstead (1993). *Economic Prospects for the Gulf of Maine*. Augusta, ME, Gulf of Maine Council on the Marine Environment, Moller, R. and J. Fitz (1997). *California's Ocean Resources: An Agenda for the Future*. Sacramento CA, California Resources Agency.).

¹⁰ The National Ocean Economics Project is funded by NOAA and EPA. It involves researchers at the University of Southern California, University of Vermont, and University of Southern Maine. For more information see www.oceaneconomics.org

¹¹ Establishments are “places of business”, not firms. A firm may operate many establishments. Employment is defined as wage and salary employment in industries covered by the unemployment

insurance laws. This definition excludes self employment, many of the employees in the railroad industry (who are covered under a separate federal statute), and farm employment. It also excludes harvesting sector employment in the fisheries. The Living Resources sector excludes harvesting sector employment, which is not collected nationally. Data for 1990 and 2000 are the only two years for which data on the ocean economy is currently available.

¹² Wage and salary jobs. Source: Bureau of Economic Analysis.

¹³ Government employment is measured as total employment in government agencies and does not differentiate by type of function. Thus it is not possible to distinguish ocean related from non-ocean related government activities. Marine science organizations are, for the most part, separately reported from other science and research organizations and universities.

¹⁴ Measured as farm proprietors. Source: BEA.

¹⁵ Defined as two-digit SIC classifications.

¹⁶ The cruise ship industry is also poorly measured in the economic statistics. The cruise ships themselves are foreign owned and foreign crewed thus do not show up in the U.S. gross state product figures. The principal measure of the cruise ship industry is thus the shore-side employment of support organizations who provide food, fuel, and other services. Consumer expenditures on cruise ships are measured in the gross domestic product within overall consumption, but cannot be separated out in this analysis of production.

¹⁷ Employment in the harvesting sector of the commercial fishing industry is not included in any government statistics programs because this industry is excluded from the unemployment insurance laws. Occasional estimates of harvesting employment have been made for various fisheries and regions, but there is no regular measurement of employment in this sector.

¹⁸ Tour boats should more properly be counted under tourism and recreation, and some are. But the SIC system does not separate ferry services from tour boats if the establishment is classified as waterborne passenger transportation.

¹⁹ Metro and nonmetro are based on the 1990 designation of counties. The distribution by the size of the Urban Influence Codes of the U.S. Department of Agriculture Economic Research Service. See <http://www.ers.usda.gov/briefing/rurality/UrbanInf/>.

²⁰ A number of federal laws, including the Clean Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act, and the National Marine Sanctuaries Act require that economic damages from events such as oil spills be assessed.

²¹ The economic term is consumer surplus, the value represented by what one would be willing to pay to use a beach less what someone actually pays to use the beach.