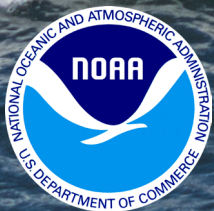
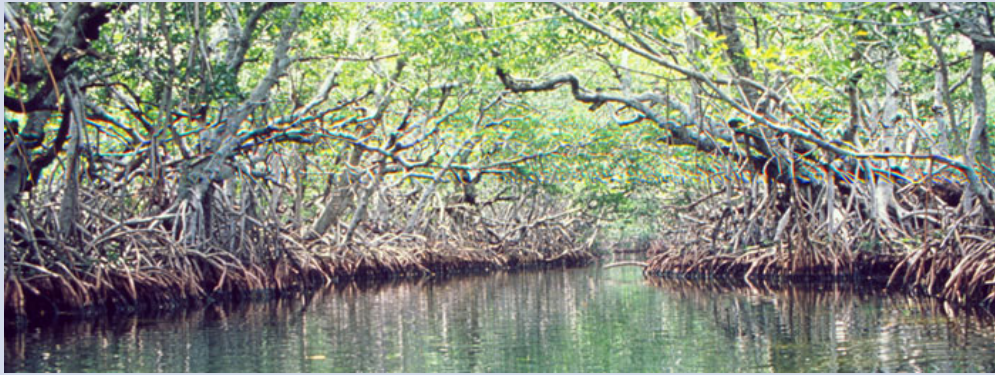


The Social and Economic Footprint of Marine Ecosystems



Executive Summary



Florida Keys Mangrove CREDIT: NOAA

Marine ecosystems are among the largest of Earth's aquatic ecosystems. They include oceans, estuaries and lagoons, mangroves and coral reefs, the deep sea and the sea floor. Marine waters cover two-thirds of the surface of the Earth, and they are very important for the overall health of both marine and terrestrial environments. According to the World Resource Center, coastal habitats alone account for approximately one third of all marine biological productivity, and estuarine ecosystems (i.e., salt marshes, seagrasses, mangrove forests) are among the most productive regions on the planet. In addition, other marine ecosystems such as coral reefs, provide food and shelter to the highest levels of marine diversity in the world.

In addition to their biological importance, marine ecosystems provide multiple services to humans including **provisioning, regulating, cultural, and supporting services**. **Provisioning** services from marine ecosystems include food sources from fisheries and pharmaceutical compounds derived from marine algae and invertebrates; **regulating** services include natural hazards protection, such as hurricanes and floods, from coastal wetlands; **cultural** services include quality of life, a sense of place, and traditions and ceremonies surrounding important species; and **supporting** services include estuaries acting as nursery areas for fish and invertebrates that support coastal communities and commercial and recreational fisheries.



US Coral Reef CREDIT: NOAA

A disproportionate percentage of the US population lives in coastal areas that are adjacent to marine ecosystems. Primarily, coastal residents study, photograph, and work to protect, conserve and wisely use marine ecosystems; but some of their activities have created environmental pressures on marine ecosystems. Such pressures can include overfishing, coastal pollution, land-use change, and invasion of non-native species. Due to these continuing threats, the Administration adopted the National Ocean Policy, which includes a set of overarching guiding principles for management decisions and actions toward achieving the vision of "an America whose stewardship ensures that the ocean, our coasts, and the Great Lakes are healthy and resilient, safe and productive, and understood and treasured so as to promote the well-being, prosperity, and security of present and future generations." This report was developed in response to the National Ocean Policy and it tries to highlight indicators that

characterize the human interactions with marine ecosystems, and identifies cutting-edge issues, with the intent to analyze long-term trends.

The report divides the US into six geographical regions: Alaska, West Coast, Pacific Islands, Northeast, Southeast, and Gulf of Mexico. For each Region, data are shown for coastal demographics and economy, commercial and recreational fisheries, fishing communities, marine protected species, aquaculture, and habitat. Specific indicators within these categories were chosen to portray temporal trends, and spatial comparisons between coastal and non-coastal areas. In addition, a spotlight article was developed for each Region to highlight a unique topic area of interest or concern for that Region. Furthermore, the spotlight articles provide specific examples of the multiple services that marine ecosystems provide.



Alaska Salt Marsh CREDIT: NOAA

Executive Summary

These results, and many others outlined throughout the report, show the significance of the interactions between humans and marine ecosystems, and provide a better understanding of how these interactions have been evolving through time. Humans and the economy are intrinsically tied to marine ecosystems and the wellness of these systems directly contribute to the well-being and productivity of coastal areas.

the
NORTHEAST
REGION
has the **largest**
coastal population

55% of EMPLOYMENT
in the US Regions
occurred in
coastal counties

GDP
gross domestic product
of coastal counties
equals approximately
70% of the
Regional
GDP

59%
of US beaches
are monitored
for pollutants

The Alaska Region
is the *only* region that
EXPORTS
more than it imports

45% of energy
production
occurs in the
Gulf of Mexico Region

commercial fisheries harvested
8.2 billion
pounds
of finfish and shellfish
generating **\$4.5 billion**
in revenue

Fiscal Risk =
\$1.3
TRILLION
of federally
insured assets in
COASTAL
FLOODPLAINS

Recreational saltwater fishermen took
MORE THAN
70,000,000
fishing trips
nationwide in **2011**

In 2011, recreational fishing activities
generated MORE THAN **454,000 jobs**
across the entire US

\$1.1 billion the total value of
AQUACULTURE products
SOLD in the US in 2005

The number of marine species identified as *threatened* or ENDANGERED has
INCREASED more than **FIVEFOLD** since 1970

30% of the US COASTLINE is
vulnerable to climate change

The Social and Economic Footprint of Marine Ecosystems

December 2013



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Each Region contains the following:

Coastal Demographics
Coastal Economy
Commercial Fisheries
Recreational Fisheries
Fishing Communities
Marine Protected Species
Aquaculture
Habitat

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A glacier is a large persistent body of ice that forms where the accumulation of snow exceeds its melting over many years, often centuries. Glaciers form on land, often elevated, and are distinct from the much thinner sea ice and lake ice that form on the surface of bodies of water. Because glacial mass is affected by long-term climate changes, it is considered among the most sensitive indicators of climate change and a major source of variations in sea level rise.

SPOTLIGHT: Climate Change

Evidence to date suggests that climate change will likely result in substantial socio-economic impacts to communities and economies worldwide that depend on marine resources. Polar regions are expected to be affected by climate-related changes earlier and more extremely than other regions.

In Alaska, the communities and local economies depend on and are engaged in subsistence harvesting of marine resources more than any other region in the United States. Regional changes in the climate and environment are already having a notable effect on subsistence activities in the ocean environment, through changes in hydrology, seasonality and phenology, as well as abundance and distribution of fish and wildlife. Residents of rural Alaska are already reporting unprecedented changes in the frequency and intensity of storm surges in the Bering Sea, changes in the distribution and thickness of sea ice, and increases in coastal erosion.

In the Chukchi Sea, for example, the loss of summer sea ice has reduced haul-out habitats for walrus, resulting in tens of thousands of walrus hauling out on land. As sea ice thins and retreats farther north, walrus and polar bears will either be displaced from essential feeding areas or forced to expend additional energy swimming to land-based haul-outs or remaining in the feeding areas.

In addition to the stress on marine mammal and polar bear populations, Native Alaskans, who have retained legal rights to hunt for marine mammals, will have to travel farther and longer to reach haul-outs and travel in open water for greater distances. This will increase their risk while hunting. Fuel and vessel maintenance costs associated with subsistence hunting will also increase as Native Alaskans have to travel greater distances. As interactions between them and the ocean environment changes, so will the discussions occurring and solutions arising.

Climate shifts in the Arctic (especially sea ice coverage) are also provoking discussion on the future of ocean governance, including marine resource and ecosystem-based management. Perhaps the most noteworthy issue in this arena is the increase in shipping accessibility in the Arctic. A seasonal, if not permanent, oceanic trade route across the Arctic would cut existing oceanic transport between western Europe and eastern Asia by an estimated 5,000 nautical miles (one week).

Walrus calf. Photo Credit: USFWS



The vast size (596,412 sq. miles) and location of Alaska make it a unique location with interesting phenomena. For example, Alaska has the longest salmon run in the world of up to 2,000 miles up the Yukon River, and some coastal areas experience 40 foot tides. Alaska is also unique in the sense that most communities are small, with over 99% of Alaska's communities having fewer than 12,000 residents.

OVERVIEW

-  Coastal Demographics
-  Coastal Economy
-  Commercial Fisheries
-  Recreational Fisheries
-  Fishing Communities
-  Marine Protected Species
-  Aquaculture
-  Habitat

The Alaska Region includes only the state of Alaska. The state's coastline is 6,640 miles; its tidal shoreline is enormous at 33,904 miles, more than 2.8 times longer than the next longest regional tidal shoreline.

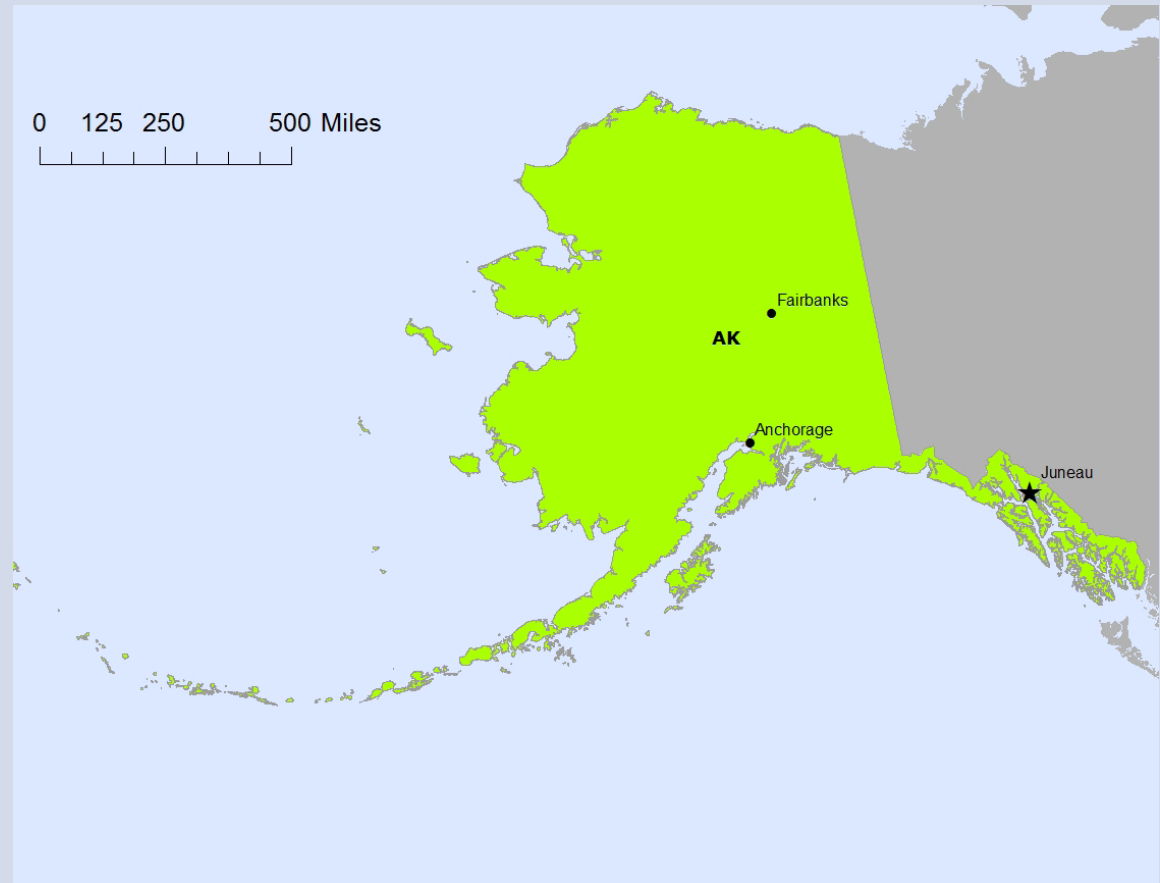


Figure 1. Map of the Alaska Region.

The Alaskan coastal county population has increased by 147% since 1970.

Coastal Watershed Counties Population Change from 1970 to 2010

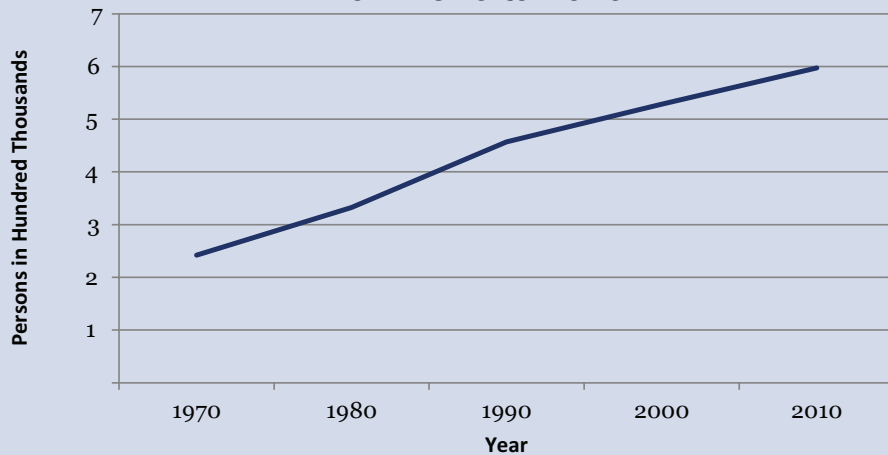


Figure 2. Total population of the Alaskan Region coastal watershed counties from 1970 to 2010. Source: US Census Bureau (25,27,28,29,30); Woods and Poole Economics, Inc. (42)

American Indians and Alaska Natives are the second most populous race in Alaska, approximately 15% of the population. People have inhabited Alaska for at least 14,000 years, and these indigenous communities are closely tied to the marine environment. Even communities in the interior of Alaska are tied to the marine environment by dependence on anadromous fish (for example, salmon) that spend part of their lives in the ocean and return to inland watershed systems.

Racial Distribution

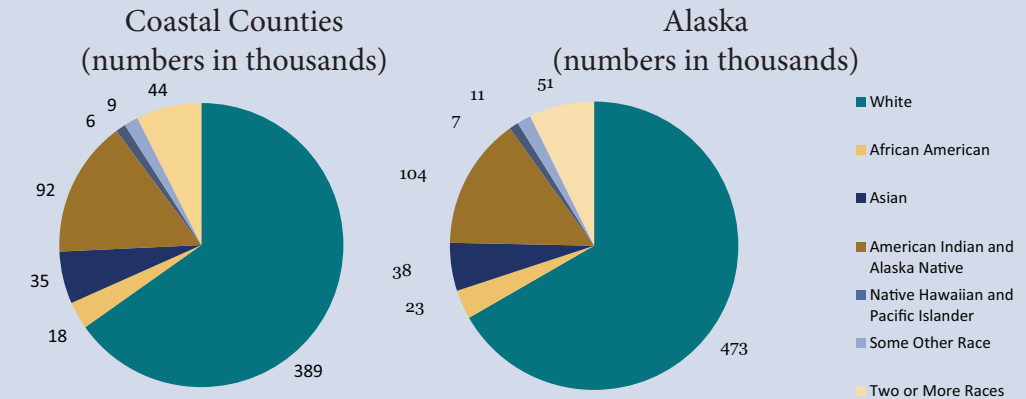


Figure 3. 2010 racial structure in Alaskan coastal counties and the Alaska Region. Source: US Census Bureau (30)

Males represent about 52% of the population, while 26% of the population is under 18 years of age. In general, the demographics of the Alaskan coastal counties are representative of the demographics for the entire state of Alaska.

Gender Distribution

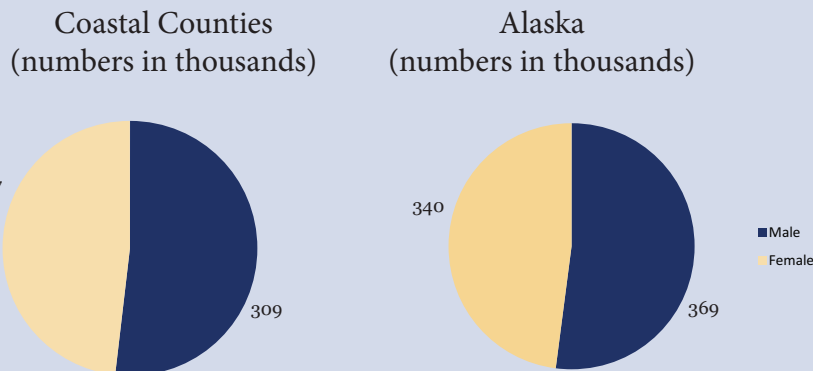


Figure 4. 2010 Gender structure in coastal counties and the Alaska Region. Source: US Census Bureau (30)

Age Distribution

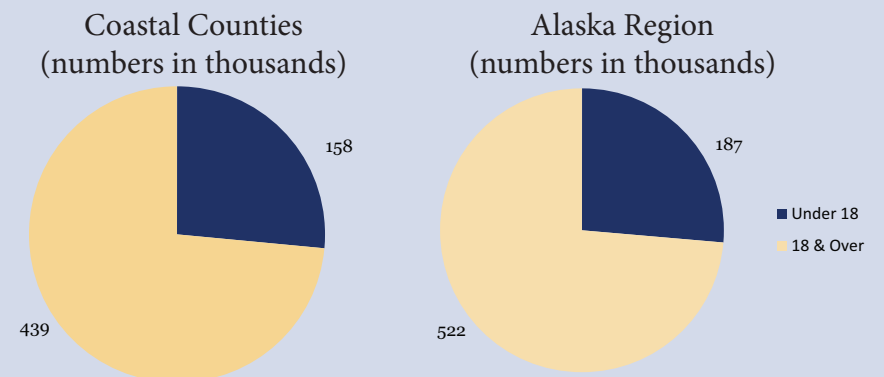


Figure 5. 2010 Age distribution in coastal counties and the Alaska Region. Source: US Census Bureau (30)

From 1984 through 2010, median household income decreased by 10%. Still, Alaska is ranked as the state with the ninth highest median household income in 2010.

Median Household Income

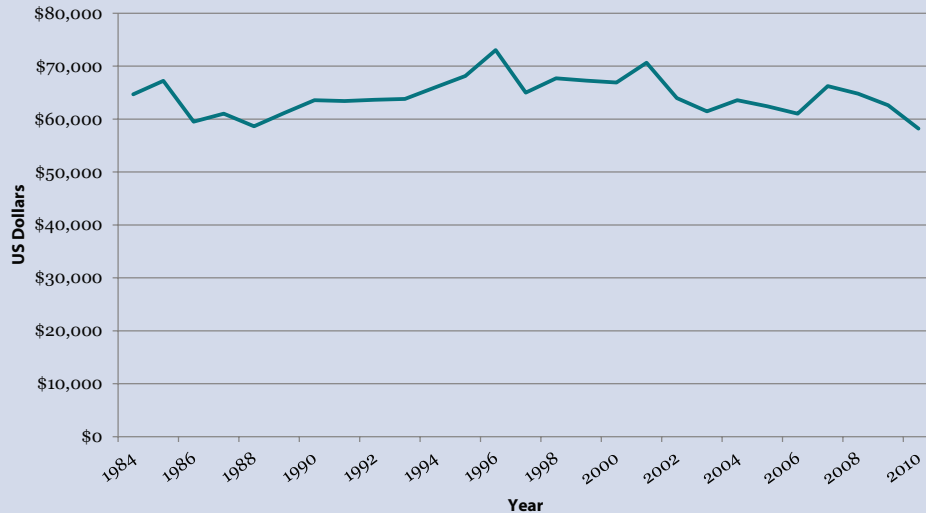


Figure 6. Alaska median household income (adjusted to 2010 US Dollars) from 1984 - 2010. Source: US Census Bureau (31)

Wages in Coastal Counties and State

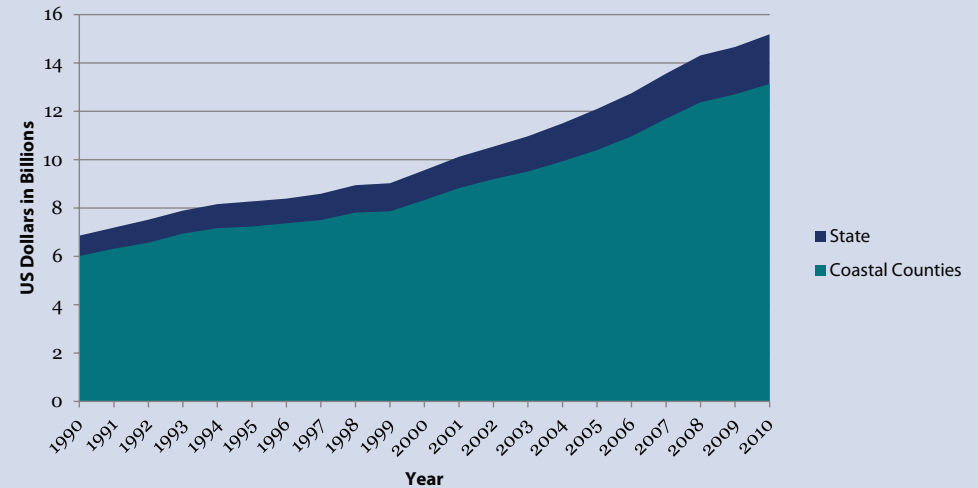


Figure 7. Wages of the Alaskan coastal counties and state from 1990 to 2010. Source: Bureau of Labor Statistics (5)

In 2010, 86% of the employment in the Alaska Region occurred in coastal counties generating \$13 billion in wages.

Employment in Coastal Counties and State

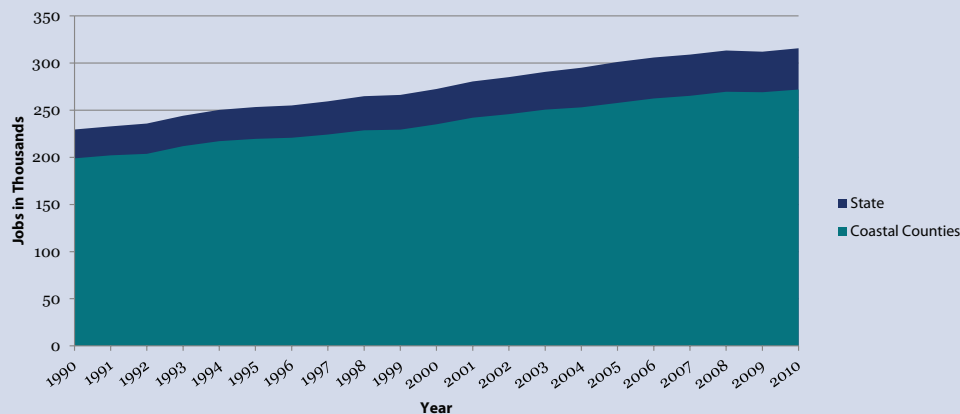


Figure 8. Employment of the Alaskan coastal counties and Alaska from 1990 to 2010. Source: Bureau of Labor Statistics (5)

Alaskan County Health Rankings

1. Southeast Fairbanks
- 2. Juneau**
3. Fairbanks North Star
- 4. Sitka**
- 5. Kodiak Island**

Table 1. Top five counties in Alaska in 2012 for population health. Health rankings are determined using measures of mortality (premature death) and morbidity (poor or fair health, poor physical health days, poor mental health days, and low birth weight). Coastal counties are in bold. Source: County Health Rankings and Roadmaps (6)

In 2010, the coastal counties GDP for Alaska was ranked 28th at over \$42 billion.

Oil and mining represented 25% of Alaska's GDP in 2010. The public sector was the second largest contributor making up 19% of the GDP.

Coastal Counties and State GDP

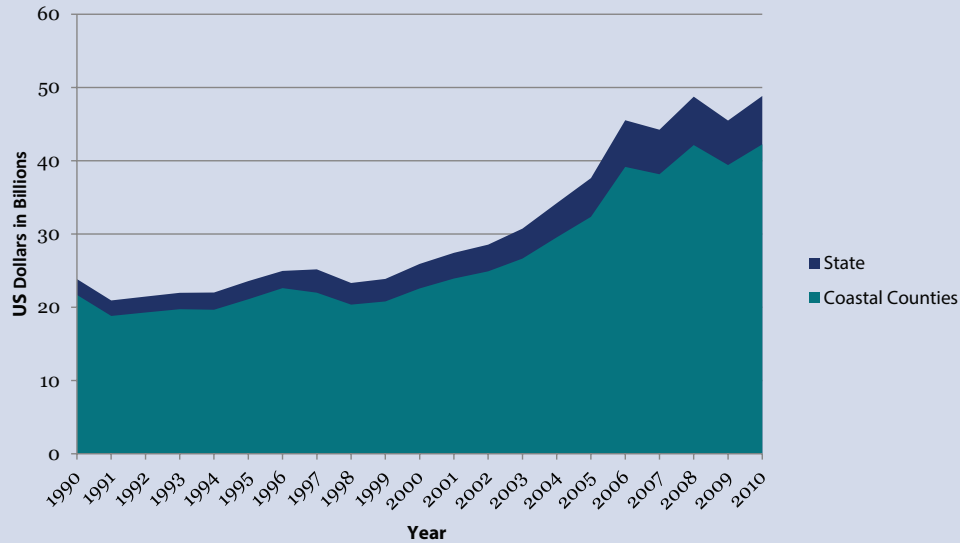


Figure 9. Gross Domestic Product (GDP) of the Alaska coastal counties and Alaska from 1990 to 2010. Source: Bureau of Economic Analysis (3)

The Alaska energy production increased by 84% between 1960 and 2009, with crude oil showing the greatest increase.

Energy Production

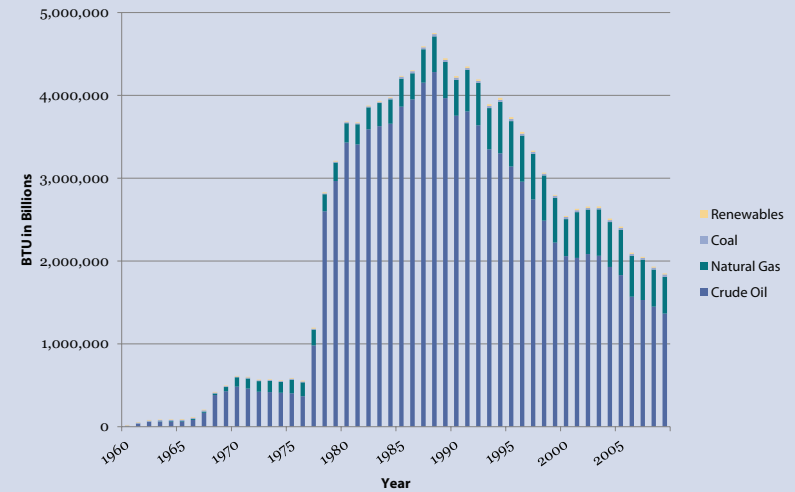


Figure 10. Energy production estimates for the Alaska Region from 1960 to 2009. British Thermal Unit (BTU) is a traditional unit of energy equal to about 1.055 KJoules. Source: US Energy Information Administration (33,34,35,36,37,38)

Ports Imports and Exports

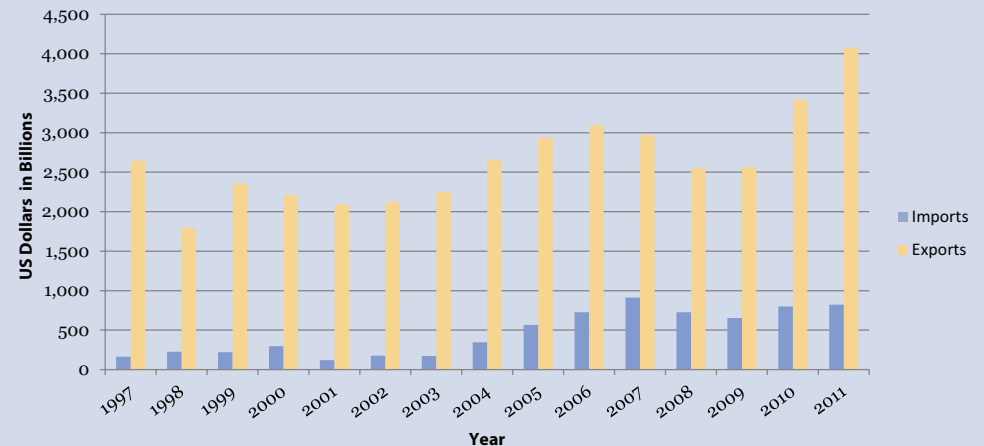


Figure 11. Value of imports and exports from Alaska ports from 1997 to 2011. Source: US Army Corps of Engineers, Navigation Data Center (24)

The Alaskan fishermen earned over \$1.9 billion from their commercial harvest of 5.3 billion pounds in 2011. Landings revenue was dominated by salmon (\$565 million), walleye pollock (\$363 million), crab (\$249 million) and Pacific cod (\$210 million).

Commercial Fishing Revenue

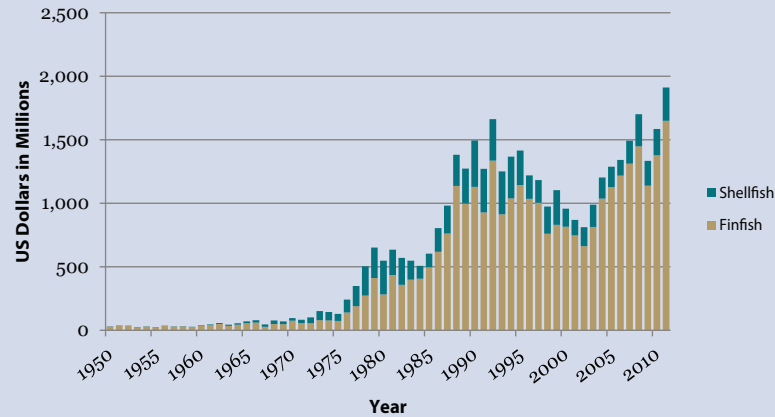


Figure 12. Commercial fishing landings revenue in Alaska from 1950 to 2011. *Source: National Marine Fisheries Service (14)*

In Alaska, a total of 64 stocks or complexes are managed by the National Marine Fisheries Service and the North Pacific Fishery Management Council. In 2011, no stocks were subject to overfishing, and two stocks (blue king crab and southern tanner crab) were overfished.

Commercial Fishing Landings

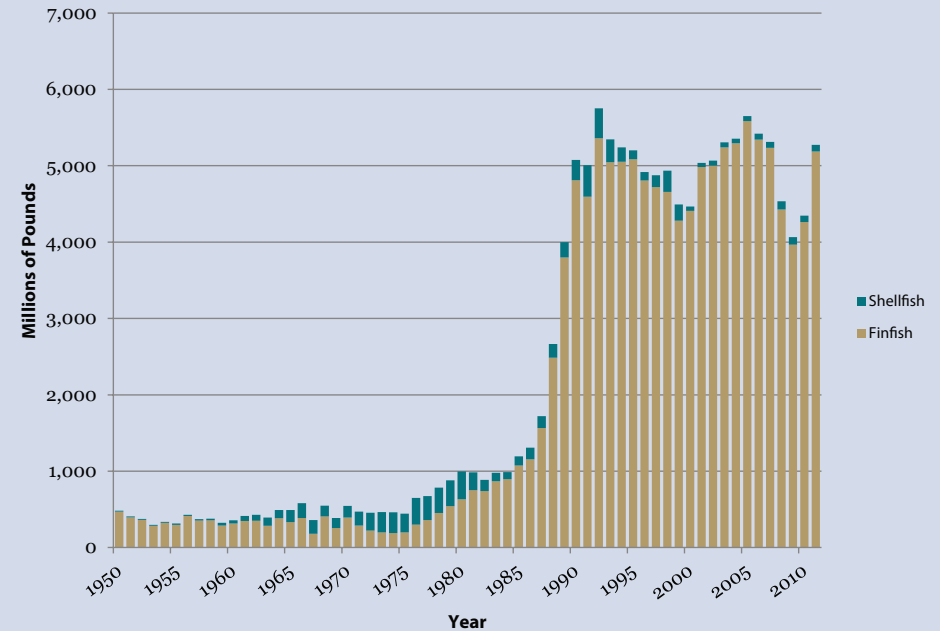


Figure 13. Commercial fishing landings in Alaska from 1950 to 2011. *Source: National Marine Fisheries Service (14)*

Average Price of Top 5 Commercial Fishing Species

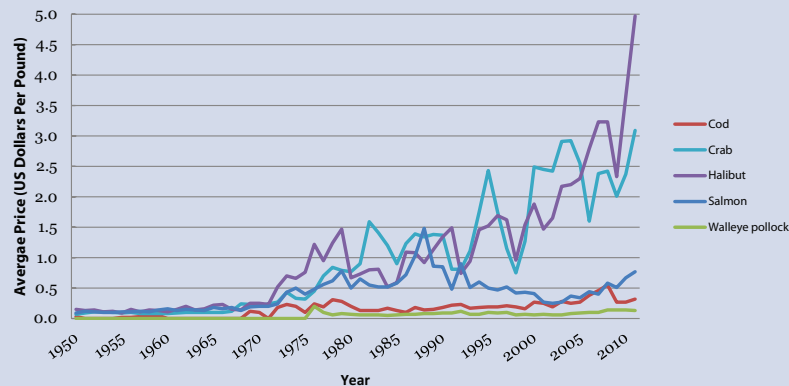


Figure 14. Average price of top five commercial fishing species in Alaska from 1950 to 2011. *Source: National Marine Fisheries Service (14)*

Walleye pollock contributed the most to commercial fishing landings in 2011, accounting for 53% of total landings with an average annual price of \$0.13 per pound.

2011 Economic Impacts of the Seafood Industry (thousands of dollars)

	Landings Revenue	Jobs	Value Added
Alaska	\$1,911,540	63,295	\$2,493,124

Table 2. Seafood industry economic impacts for 2011. The US seafood industry includes the commercial harvest sector, seafood processors and dealers, seafood wholesalers and distributors, importers, and seafood retailers. Value added refers to the increased value of fish at each stage of production, exclusive of initial costs. *Source: National Marine Fisheries Service (14)*

In 2011, the Alaska seafood industry generated \$4.7 billion in sales impacts, \$2 billion in income impacts, and over 63,000 jobs in fishing and across the broader economy.

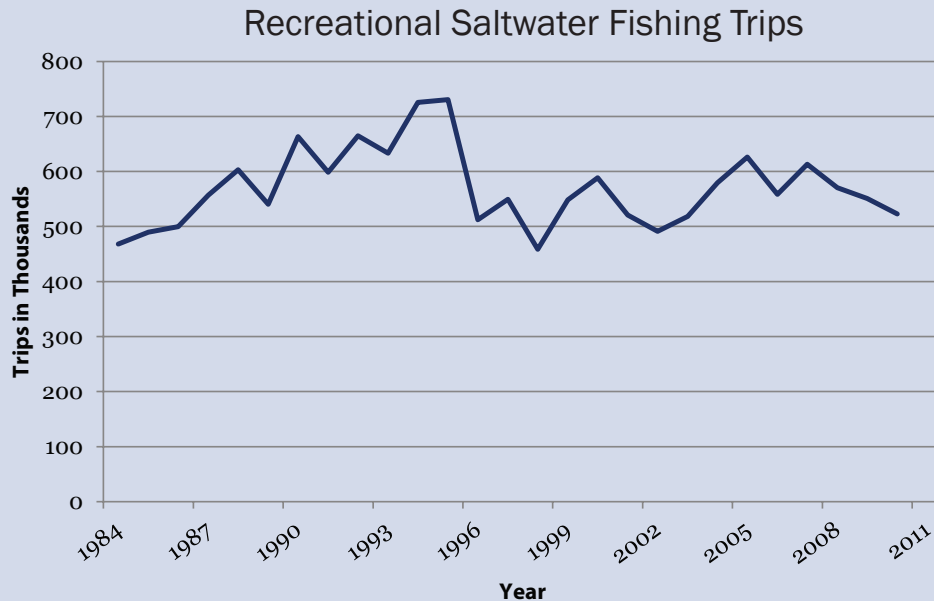


Figure 15. Total number of recreational saltwater fishing trips in Alaska from 1984 to 2011. *Source: National Marine Fisheries Service (15)*

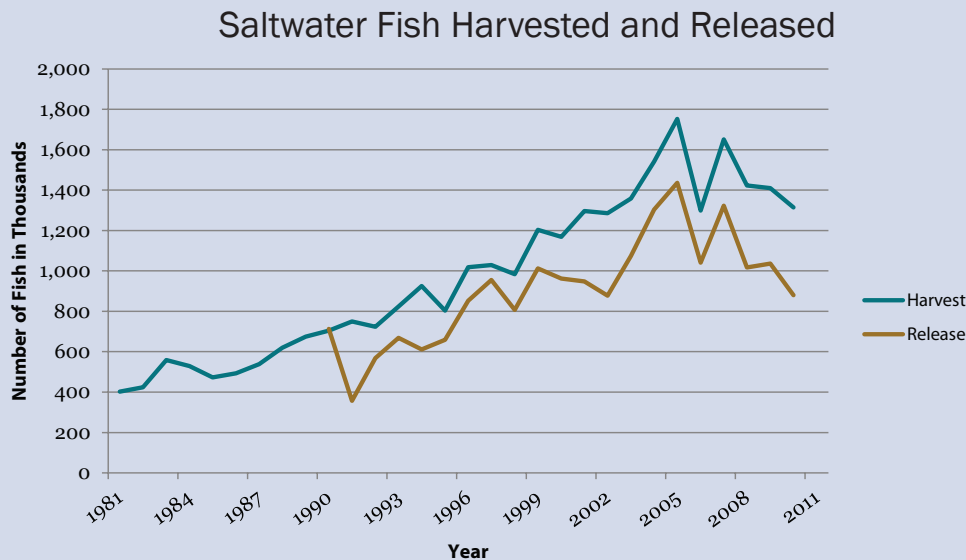


Figure 16. Total number of saltwater fish harvested and released during recreational fishing activities in Alaska from 1981 to 2011. *Source: National Marine Fisheries Service (15)*

There were 286,000 recreational saltwater fishermen in Alaska in 2011 who spent approximately 811,000 days fishing. Of these anglers, 56% of them were non-residents.

Pacific halibut was the most caught saltwater species or species group, with approximately 705,000 harvested or released in 2011. Coho salmon and razor clam were also caught and released in large numbers, 474,000 and 436,000, respectively.

2011 Economic Impacts of the Recreational Saltwater Fishing Expenditures (thousands of dollars)

State	Jobs	Total Sales	Value Added
Alaska	6,291	\$557,958	\$317,852

Table 3. Economic impacts from recreational saltwater fishing activities in Alaska for 2011. *Source: National Marine Fisheries Service (14)*

In 2011, approximately 6,291 jobs were generated by recreational saltwater fishing activities and over \$446 million was spent by anglers who fished in Alaska. Most of the employment impacts were generated by industries that provided services to anglers who fished from a for-hire boat (2,600 jobs) or a private boat (2,400 jobs). For-hire fishing trips generated \$138 million in sales, and private boat trips generated \$165 million in sales.

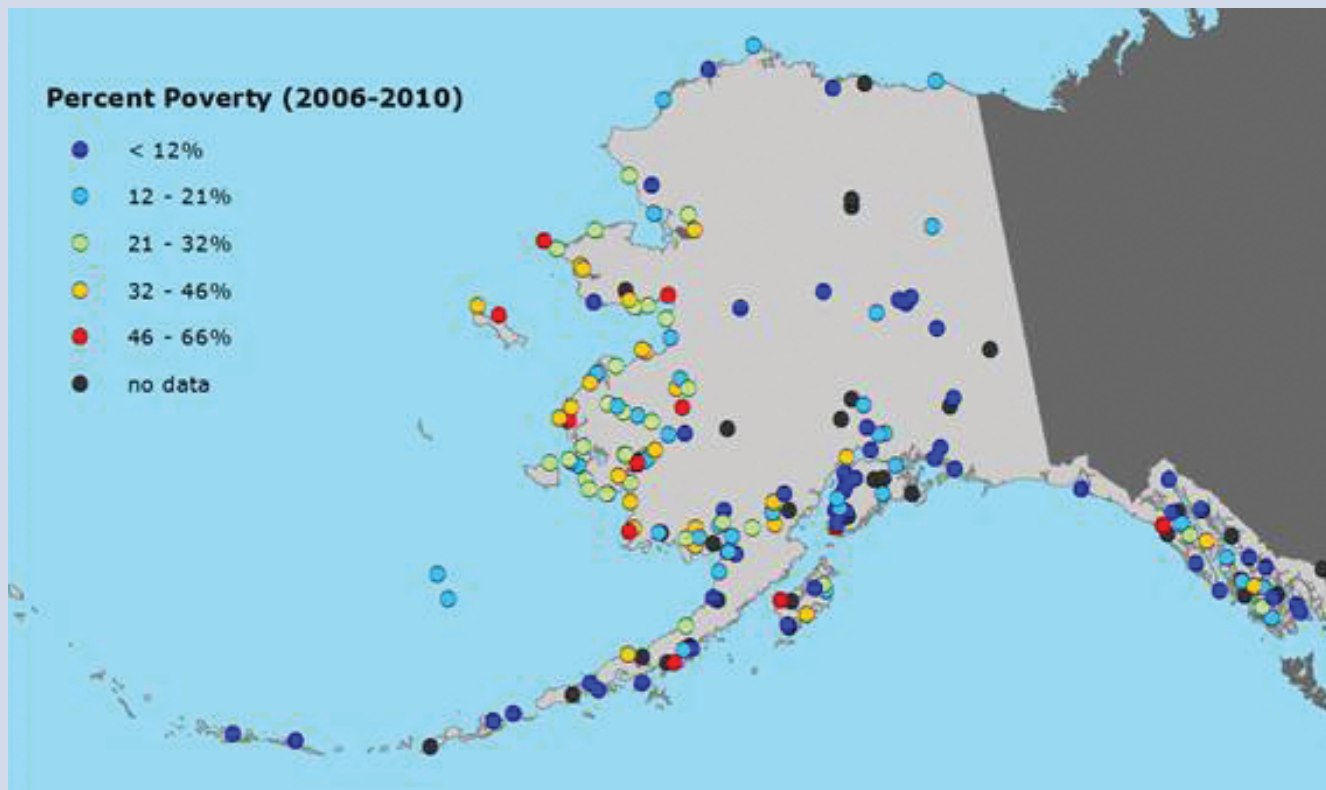


Figure 17. Poverty levels in profiled Alaskan fishing communities, averaged from 2006 to 2010. Source: National Marine Fisheries Service (10)

The breadth of commercial, recreational and subsistence fishing involvement in Alaskan communities is significant to the overall economy and social organization of Alaska. In 2010, 11 of the top 50 ports by commercial landings revenue were located in the Alaska and recreational fishing is important in 217 of Alaska's 361 communities.

In addition, Alaskans harvest a significant amount of their food from the marine environment for subsistence. For example, between 2006 and 2010:

- 92 communities reported residents harvesting halibut for subsistence
- 263 reported residents harvesting salmon for subsistence
- 111 had residents harvesting marine mammals for subsistence.

Top 5 Commercial Fishing Communities (2010)

Rank	Community Name	Landings Revenue (million \$)
1	Dutch Harbor - Unalaska, AK	\$163.1
2	Kodiak, AK	\$128.1
3	Naknek-King Salmon, AK	\$100.9
4	Cordova, AK	\$84.3
5	Seward, AK	\$69.2

Table 4. Top five commercial fishing communities in Alaska by landings revenue in 2010. Source: National Marine Fisheries Service (14)

Top 5 Recreational Fishing Communities (2010)

Rank	Community Name	For-Hire Permits (number)
1	Anchorage, AK	224
2	Soldotna, AK	172
3	Sitka, AK	131
4	Ketchikan, AK	104
5	Kodiak, AK	91

Table 5. Top five recreational fishing communities in Alaska by number of for-hire permits in 2010. Source: National Marine Fisheries Service (17)

Top 5 Salmon Subsistence Harvest Fishing Communities (2006-2010)

Rank	Community Name	Number of Salmon Caught
1	Bethel, AK	88,757
2	Fairbanks, AK	42,113
3	Anchorage, AK	39,595
4	Kwethluk, AK	26,777
5	Nome, AK	26,239

Table 6. Top five salmon subsistence harvest fishing communities in Alaska by number of salmon landed between 2006 and 2010. Source: Alaska Department of Fish and Game (1)

Coastal Species Protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)	
ESA Species	MMPA Species
Beluga whale (1)*	Baird's beaked whale
Blue whale	Bearded seal
Bowhead whale	Cuvier beaked whale
Fin whale	Dall's porpoise
Humpback whale	False killer whale
North Pacific right whale	Gray whale
Sei whale	Harbor porpoise
Sperm whale	Harbor seal
Steller sea lion (2)*	Minke whale
Spotted seal	Northern elephant seal
Ringed seal (4)*	Northern fur seal
Bearded seal (2)*	Pacific white-sided dolphin
Green sea turtle (2)*	Ribbon seal
Leatherback sea turtle	Ringed seal
	Risso's dolphin
	Stejneger's beaked whale

* The term "species" under the ESA includes species, subspecies, and for vertebrates only, "distinct population segments (DPSs)". Beluga whale, steller sea lion, ringed seal, bearded seal, and green sea turtle are listed in DPSs. The parenthesis indicate the number of listed DPSs for each species.

Table 7. Marine and anadromous species protected by the Endangered Species Act, and marine mammals protected by the Marine Mammal Protection Act in Alaska. Source: National Marine Fisheries Service (16)

There are four species of ice seals (ribbon, spotted, ringed, and bearded), whose habitat is being affected by climate change, specifically the loss of sea ice. NOAA listed the southern distinct population segment (DPS) of spotted seals as threatened in October 2010. In December 2010, NOAA *proposed* to list four subspecies of ringed seals found in the Arctic Basin and the North Atlantic, and two DPSs of bearded seals in the Pacific Ocean, as threatened. In December 2012, NOAA *listed* the four subspecies of ringed seals and two DPSs of bearded seals as threatened or endangered.

Number of Species Listed Under the ESA

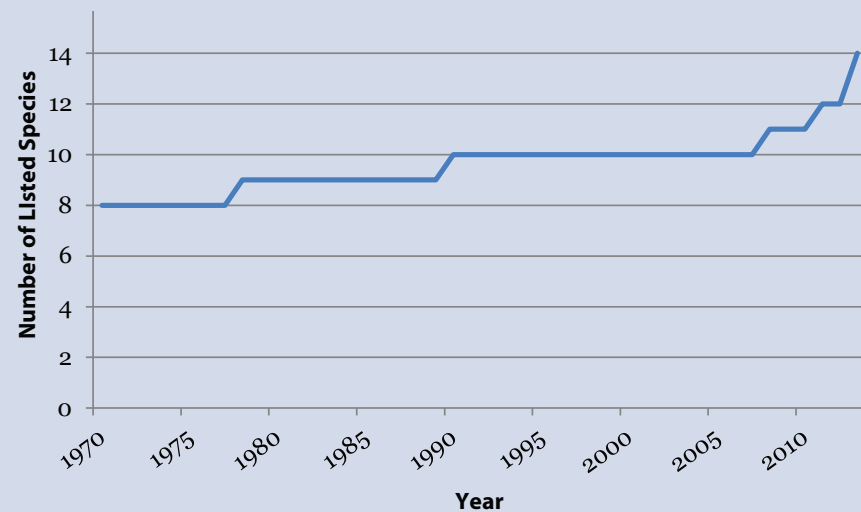


Figure 18. Number of species protected by the Endangered Species Act in Alaska from 1970 to 2012. Source: National Marine Fisheries Service (16)

The Cook Inlet beluga whale has been severely reduced in numbers over the last several decades. NOAA estimates this population once numbered as many as 1,300 whales, and the most current estimate is 375 whales. These whales were designated as "depleted" under the MMPA in June 2000 and as "endangered" under ESA in October 2008. The recovery of Cook Inlet beluga whales is hindered by the continued development within and along upper Cook Inlet and the cumulative effects on important beluga habitat. Threats include: oil and gas exploration and production; industrial activities that discharge or accidentally spill pollutants; disease; and predation by killer whales.

Whale Watching Economic Data

1998					
	Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
Alaska	76,700	N/A	\$89,100,000	\$33,500,000	\$122,650,000
2008					
	Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
Alaska	519,000	0	\$410,000,000	\$55,000,000	\$465,000,000

Table 8. Whale watching economic data for Alaska for 1998 and 2008. *Source: International Fund for Animal Welfare (8)*

Protected Species Valuation

Species	Household Willingness to Pay	National Value (\$ billions)
<i>North Pacific right whale</i>	\$73.16	\$4.49
<i>Leatherback sea turtle</i>	\$67.97	\$4.16

Table 9. Valuation data for some of the Alaska Region marine protected species. Household willingness-to-pay values are expressed as a US household's average willingness-to-pay for recovering a species. Payment is in the form of an increase to the household federal tax bill every year for ten years. The national values reported here represent the present value of aggregated household values across the Nation. The household aggregation strategy accounted for survey and panel non-response. All values are reported in 2011 US Dollars. *Source: Conservation Biology (41)*

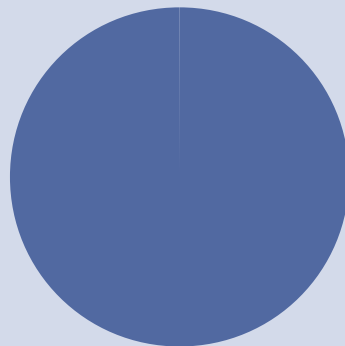
Alaska is one of the premier locations for whale watching in the United States, with humpback whale and orca populations drawing the greatest tourist interest. Southeast Alaska is both the state's most visited area and its whale watching hub, centered around the northernmost limits of the famous Inside Passage – a series of protected waterways that stretch south into Canada and connect right down to Washington. Humpback whales feed in the northern part of the Passage from May to September, and are often seen breaching. As these whales remain in the same area for 15 weeks or more, whale watching operators in this area are able to offer tours from May to September.

Aquaculture has been used to replenish or enhance fisheries through purposeful release of juvenile or adult fish. In Alaska, approximately 40% of the state's salmon harvest is dependent upon hatchery-based fisheries.

However, although aquaculture-based capture fisheries may result in increased harvest, some believe that it may facilitate inefficient harvest practices and create problems with genetic diversity and the integrity of truly wild stocks.

Alaska has incredibly diverse coastal habitats including rocky fjords, mudflats, coastal tundra, eelgrass lagoons, and sprawling river valleys. Much of Alaska's human population resides along the coast and coastally-connected river systems; globally significant populations of fish, migratory birds, and mammals depend on intact coastal habitats for food, migration corridors, reproduction, rearing of young, and overwintering. Intact coastal habitats and the fish and wildlife they support contribute hundreds of millions of dollars annually to Alaska's economy, enable Alaskan residents to retain a subsistence way of life, and attracts many tourists.

Value of Aquaculture Products Sold
(thousands of dollars)



Food fish, \$16,340

Figure 19. Value of aquaculture products sold by type in Alaska in 1998. Source: US Department of Agriculture (32)

Saltwater Aquaculture Farms

	Number of Farms	
	1998	2005
Alaska	27	25

Table 10. Total number of saltwater aquaculture farms in Alaska in 1998 and 2005. Source: US Department of Agriculture (32)

Shoreline Habitat

More than 85% of the Alaska shoreline is classified as rocky, beaches, or flat; which equals more than 28,818 miles of shoreline.

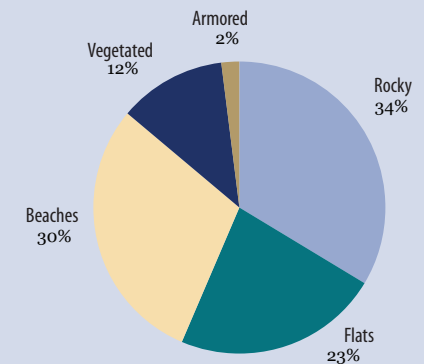


Figure 20. Percent of shoreline habitat in Alaska. Source: NOAA Environmental Sensitivity Index Maps (22)

Federally Insured Assets Along the Coast
(thousands of dollars)

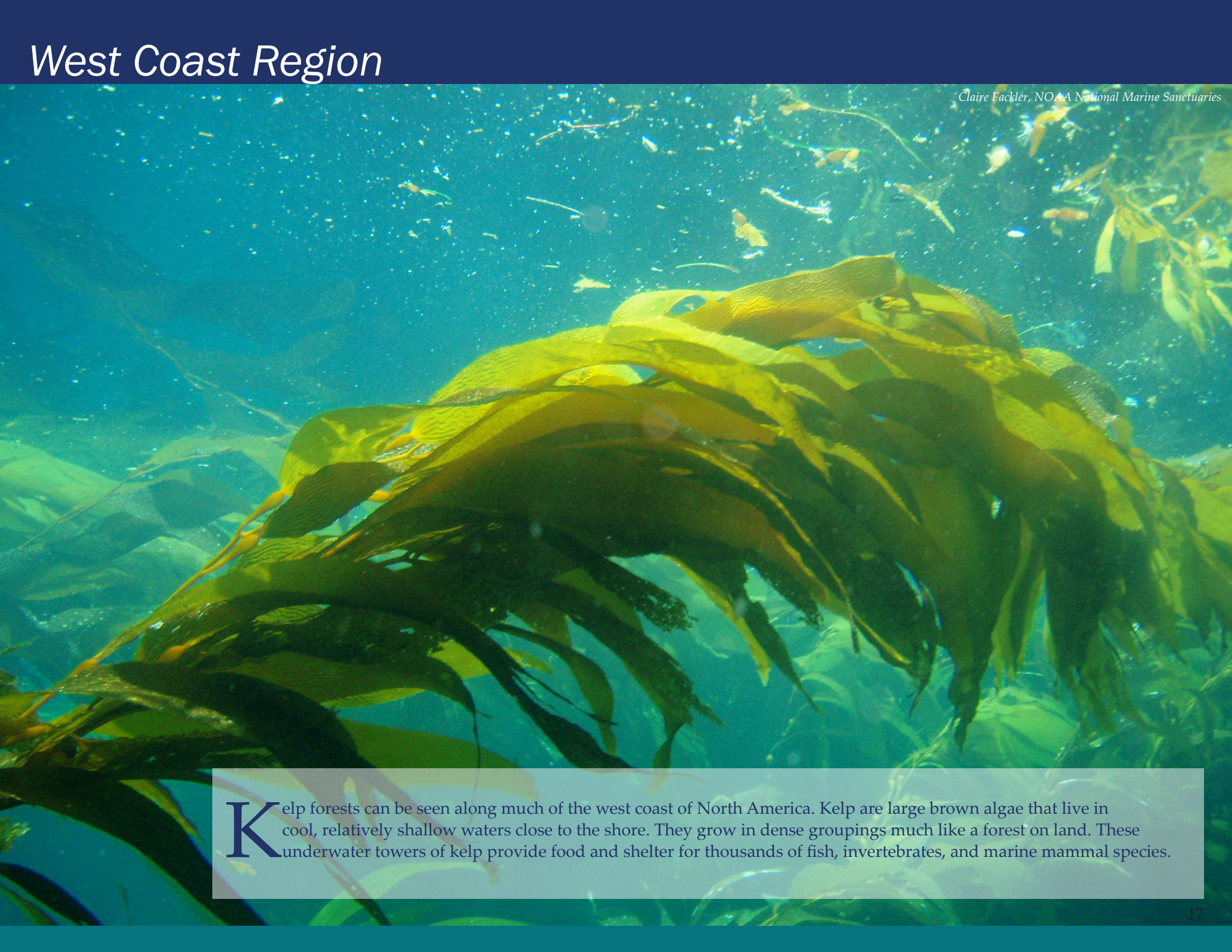
	Policies	Premiums	Coverage	Claims Payout
Alaska	1,154 (31)	\$1,307 (31)	\$264,777 (30)	\$1,058 (31)

Table 11. National Flood Insurance Program policies, premiums, coverage, and claim payouts for 2011 for federally insured assets along the coast of Alaska. The numbers in parenthesis indicate the state ranking for a specific variable. Source: Federal Emergency Management Agency (7)

In 2011, the Alaska federally insured assets along the coast, were covered by more than 1,154 policies totaling more than \$264 million of insured assets in the coastal floodplain.

West Coast Region

Claire Fackler, NOAA National Marine Sanctuaries



Kelp forests can be seen along much of the west coast of North America. Kelp are large brown algae that live in cool, relatively shallow waters close to the shore. They grow in dense groupings much like a forest on land. These underwater towers of kelp provide food and shelter for thousands of fish, invertebrates, and marine mammal species.

Spotlight: Pacific Salmon

photo credit: istockphoto.com

Salmon are an important commercial, recreational, and cultural resource of the Pacific West Coast. Commercial salmon fisheries occur along the West Coast, within the inland waters of Puget Sound, and in the mainstem of the Columbia River. In 2011, these fisheries generated over \$33 million in ex-vessel revenue. This amount represents a significant increase over the past five years but is well below historical levels. West Coast recreational fisheries show similar trends, with over 211,000 ocean fishing trips taken in 2011. In that year, these commercial and recreational fisheries generated \$67 million in income impacts.

The depressed state of the salmon fisheries relative to historical levels is reflected in their status under the Endangered Species Act (ESA). Fifty-two populations of West Coast salmon and steelhead (formally known as “evolutionarily significant units”) have been identified. Of these, 28 are listed under the ESA as endangered (5) or threatened (23). Salmon populations along the Washington State coast, Puget Sound, and the Columbia and Klamath River systems are also covered by treaties with Northwest and Klamath Indian tribes. The management of these fisheries is, therefore, a joint effort of federal, state, and tribal managers. A major challenge is accounting for the mixed stock nature of these fisheries, in which ESA-listed populations are harvested along with other, healthy populations. For example, low returns of salmon to the Klamath River in 2006 and to the Sacramento River in 2008 and 2009 resulted in unprecedented closures of ocean and in-river fisheries.

Salmon generate significant cultural values. For thousands of years, Northwest and Klamath Indian tribes have annually performed the First Salmon Ceremony, a rite that celebrates the continued return of salmon to their natal rivers. For coastal residents from Washington to Central California, in general, salmon are an iconic species. This status expresses itself in the public’s willingness to support salmon recovery. In a recent study, economists from NOAA estimated the willingness to pay for recovering species listed under the ESA, bringing their populations back to levels that would enable them to be removed from the list. They found that households were willing to pay around \$40 per year to support the recovery of the Chinook salmon population in Puget Sound, and about the same amount for the recovery of Chinook in the Upper Willamette River in Oregon.

Finally, the value of salmon to the West Coast Region is not limited to their harvest or mere existence. Salmon also play an important supporting role in the West Coast Region marine and freshwater ecosystems. For example, bald eagles derive much of their diet from the carcasses of salmon after spawning. Because bald eagles are a top predator that feeds on a variety of other groups, including many seabirds, fluctuations in salmon populations can have indirect feedbacks to the bird community. In addition, salmon carcasses represent marine-derived food and nutrient subsidies for a wide array of other freshwater and terrestrial organisms.

The West Coast Region states are linked in many ways: through the California Current large marine ecosystem, through the ships that travel between ports, and through the economic dependence on fisheries and other resources that migrate along the West Coast.

OVERVIEW

-  Coastal Demographics
-  Coastal Economy
-  Commercial Fisheries
-  Recreational Fisheries
-  Fishing Communities
-  Marine Protected Species
-  Aquaculture
-  Habitat

The West Coast Region includes the states of California, Oregon, and Washington, which share 1,293 miles of coastline extending from the Canadian border in the north to the Mexican border in the south. California has 840 miles (65%) of this coastline, followed by Oregon (296 miles) and Washington (157 miles). These states also share 7,863 miles of tidal shoreline: California has 3,427 miles; Washington, 3,026 miles; and Oregon, 1,410 miles.

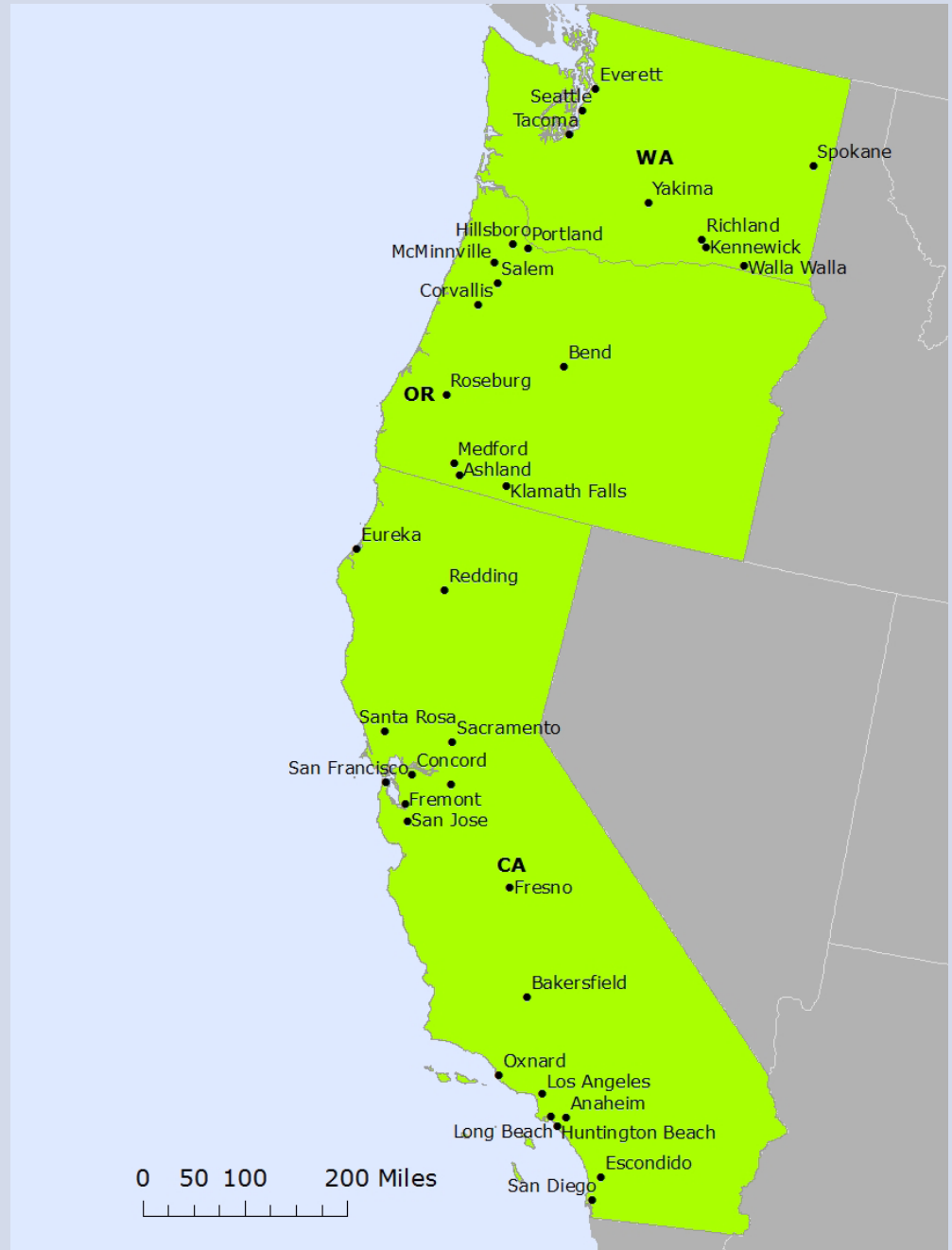


Figure 21. Map of the West Coast Region.

The West Coast Region coastal county population has increased by 80% since 1970, increasing the human pressure on coastal resources.

Coastal Watershed Counties Population Change from 1970 to 2010

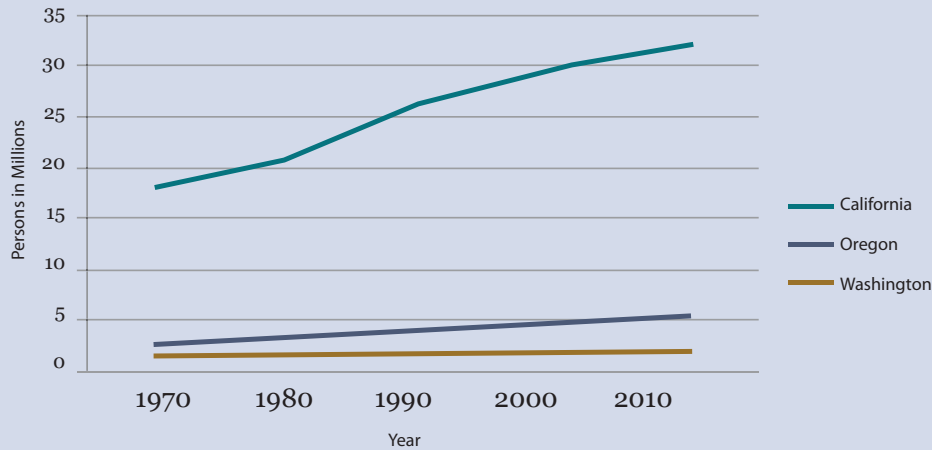


Figure 22. Total population of the West Coast Region coastal watershed counties from 1970 to 2010. Source: US Census Bureau (25,27,28,29,30); Woods and Poole Economics, Inc.(42)

The West Coast Region coastal county demographics are representative of the demographics for the entire West Coast Region states.

Racial Distribution

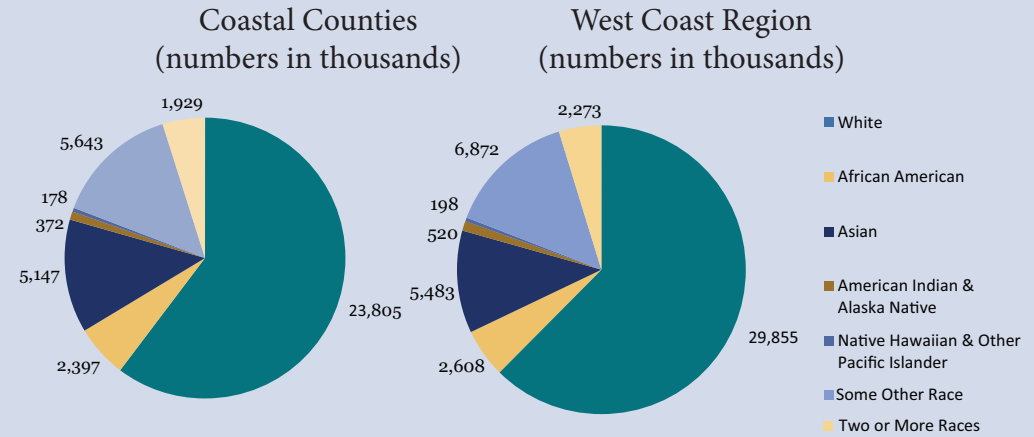


Figure 23. 2010 racial structure in West Coast Region coastal counties and the West Coast Region. Source: US Census Bureau (30)

The coastal county population is evenly split between males and females, while 24% of the population is under 18 years of age and 76% of the population is 18 years of age and older.

Gender Distribution

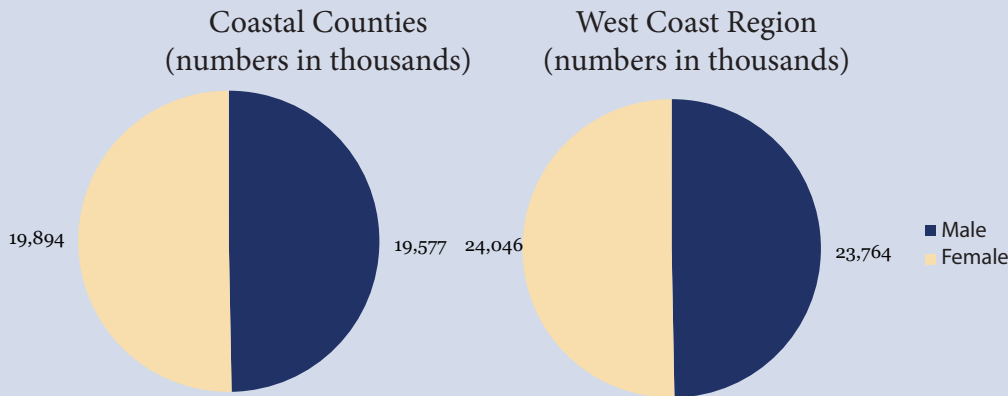


Figure 24. 2010 Gender structure in West Coast Region coastal counties and the West Coast Region. Source: US Census Bureau (30)

Age Distribution

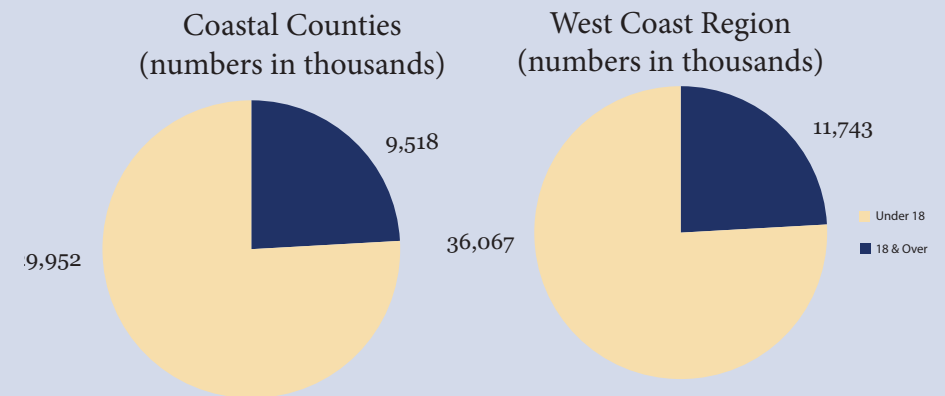


Figure 25. 2010 Age distribution in coastal counties and the West Coast Region. Source: US Census Bureau (30)

From 1984 through 2010, median household income increased 8%, 12% and 18% in California, Washington and Oregon, respectively.

Median Household Income

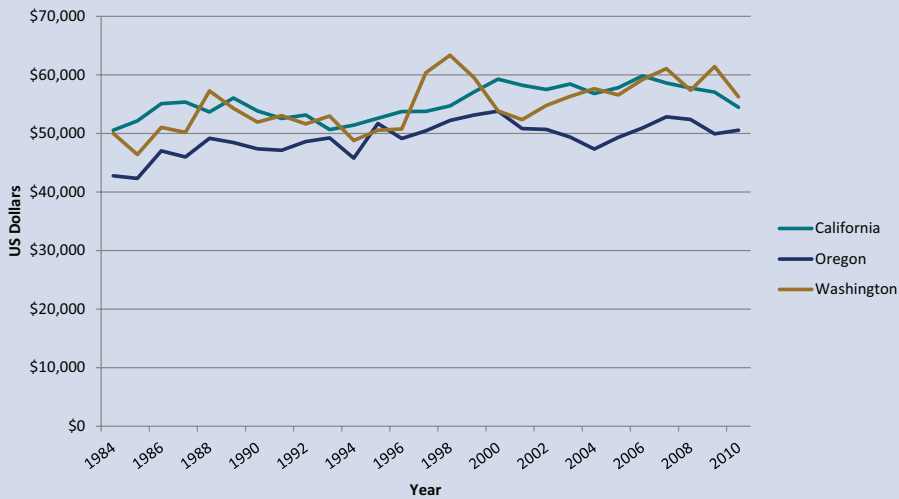


Figure 26. West Coast Region median household income (adjusted to 2010 US Dollars) from 1984 - 2010. Source: US Census Bureau (31)

Wages in Coastal Counties and States

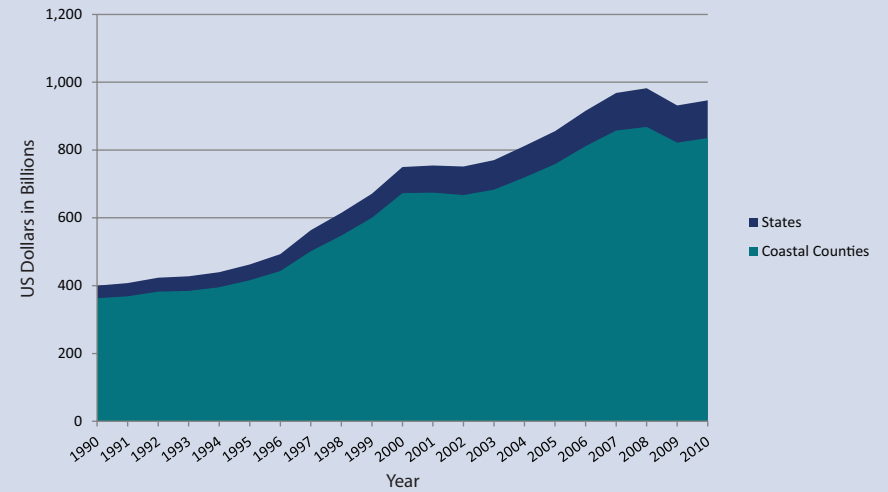


Figure 27. Wages of the West Coast Region coastal counties and states from 1990 to 2010. Source: Bureau of Labor Statistics (5)

In 2010, 84% of employment in the West Coast Region occurred in coastal counties generating \$835 billion in wages.

Employment in Coastal Counties and States

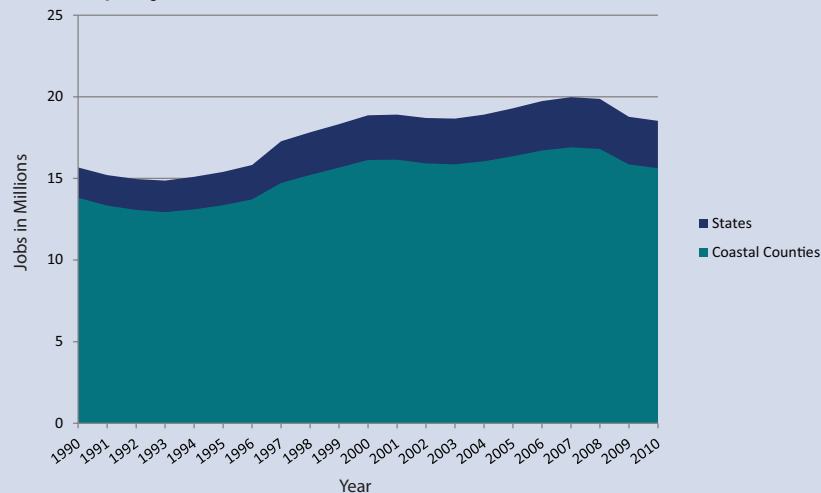


Figure 28. Employment of the West Coast Region coastal counties and states from 1990 to 2010. Source: Bureau of Labor Statistics (5)

West Coast Region County Health Rankings

CALIFORNIA	OREGON	WASHINGTON
1. Marin	1. Benton	1. San Juan
2. Santa Clara	2. Washington	2. Kittitas
3. San Benito	3. Hood River	3. Island
4. Placer	4. Clackamas	4. Whitman
5. San Mateo	5. Deschutes	5. Whatcom

Table 12. Top five counties in California, Oregon, and Washington in 2012 for population health. Health rankings are determined using measures of mortality (premature death) and morbidity (poor or fair health, poor physical health days, poor mental health days, and low birth weight). Coastal counties are in bold. Source: Country Health Rankings and Roadmaps (6)

GDP, wages, earnings, and other key economic data provide information about coastal economies. Commercial activities linked to the marine economy include commercial fisheries, marine transportation, coastal tourism and recreation, marine science and technology, and marine-related construction and infrastructure.

In 2010, the coastal counties GDP for California, Washington and Oregon ranked 1st, 11th and 19th in the US, respectively.

Coastal Counties and States GDP

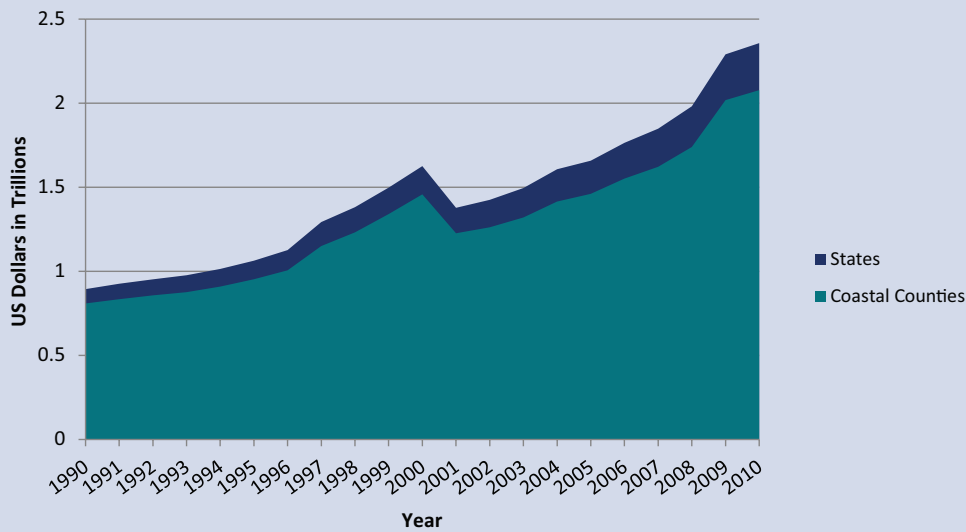


Figure 29. Gross Domestic Product (GDP) of the West Coast Region coastal counties and states from 1990 to 2010. *Source: Bureau of Economic Analysis (3)*

West Coast energy production increased by 16% between 1960 and 2009, with nuclear energy showing the greatest increases.

Energy Production

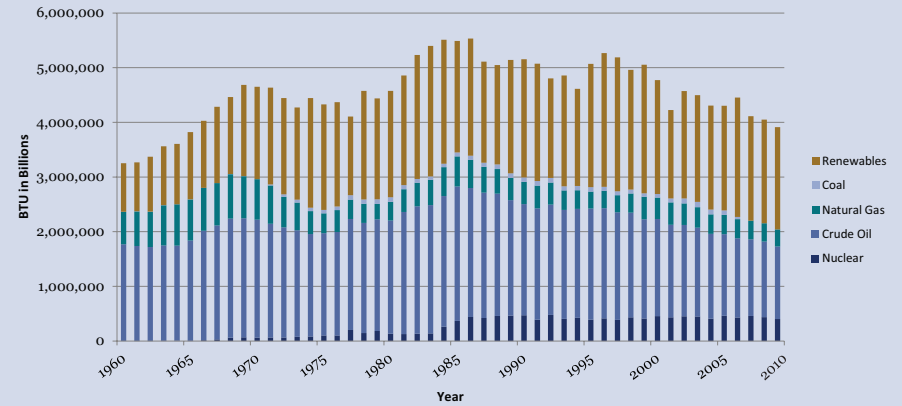


Figure 30. Energy production estimates for the West Coast Region from 1960 to 2009. British Thermal Unit (BTU) is a traditional unit of energy equal to about 1.055 KJoules. *Source: US Energy Information Administration (33,34,35,36,37,38)*

Ports Imports and Exports

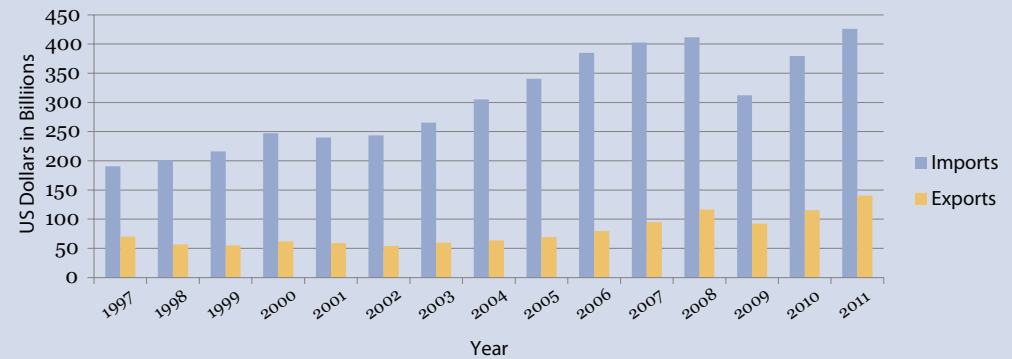


Figure 31. Value of imports and exports from West Coast Region ports from 1997 to 2011. *Source: US Army Corps of Engineers, Navigation Data Center (24)*

In 2011, commercial fisherman in the West Coast Region landed roughly 1.2 billion pounds of finfish and shellfish, earning \$710 million in landings revenue. Landings revenue was dominated by crab (\$182 million) and other shellfish (\$162 million).

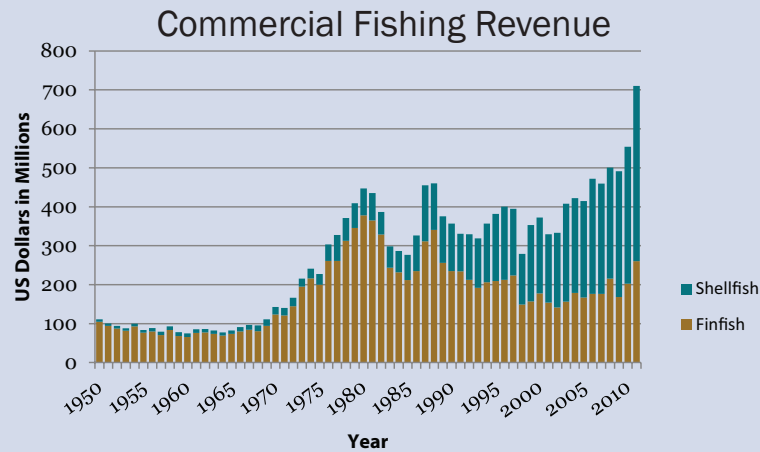


Figure 32. Commercial fishing landings revenue in the West Coast Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

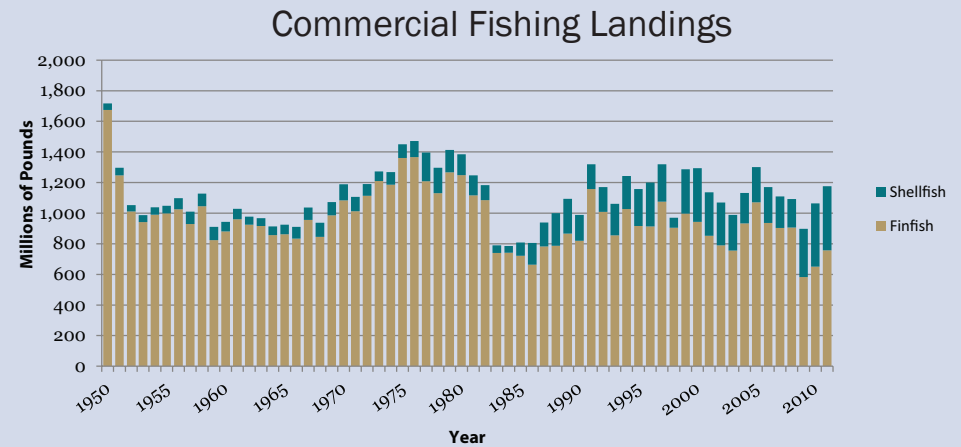


Figure 33. Commercial fishing landings in the West Coast Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

Along the West Coast Region, a total of 173 stocks or complexes are managed by the National Marine Fisheries Service and the Pacific Fishery Management Council. In 2011, two stocks experienced overfishing (bigeye tuna and Pacific bluefin tuna), and six stocks were overfished (canary rockfish, cowcod, Pacific ocean perch, yelloweye rockfish, chinook salmon in California Central Valley, Sacramento (fall); and coho salmon in Washington coast: western Strait of Juan de Fuca).

Average Price of Top 5 Commercial Fishing Species

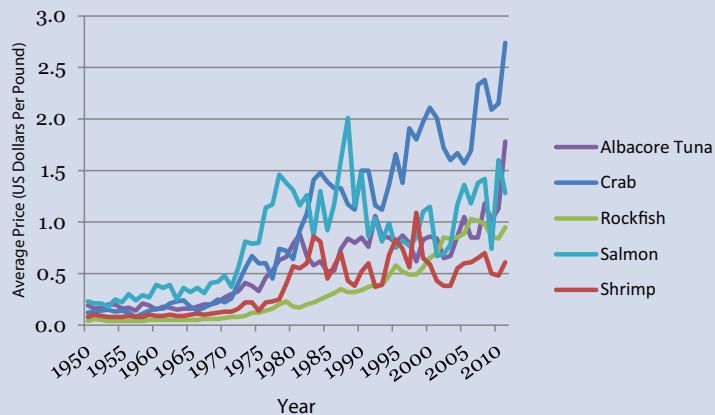


Figure 34. Average price of top five commercial fishing species in the West Coast Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

2011 Economic Impacts of the Seafood Industry (thousands of dollars)

	Landings Revenue	Jobs	Value Added
California	\$201,269	122,074	\$7,168,389
Oregon	\$148,337	18,562	\$633,483
Washington	\$331,404	67,007	\$3,297,368

Table 13. Seafood industry economic impacts for 2011. The US seafood industry includes the commercial harvest sector, seafood processors and dealers, seafood wholesalers and distributors, importers, and seafood retailers. Value added refers to the increased value of fish at each stage of production, exclusive of initial costs. Source: National Marine Fisheries Service (14)

Washington had the highest landing revenue in the Region with \$331 million in 2011, followed by California (\$201 million) and Oregon (\$148 million).

In 2011, the West Coast Region seafood industry generated \$20.1 billion, \$1.3 billion, and \$8.0 billion in sales impacts in California, Oregon and Washington, respectively.

Recreational Saltwater Fishing Trips

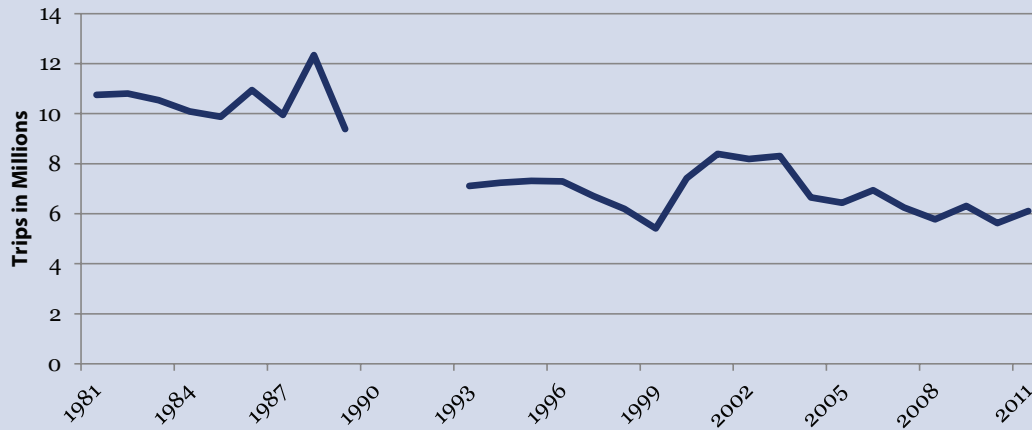


Figure 35. Total number of recreational saltwater fishing trips in the West Coast Region from 1981 to 2011. Data not available for California, Oregon, and Washington from 1990-1992. *Source: National Marine Fisheries Service (14)*

Recreational fishing is an important part of the West Coast Region recreational culture and contributes to the tourism economy in many locations. This is evident by the fact that in 2011 anglers took 6.1 million trips and caught approximately nine million fish. Almost 70% of the trips took place in California.

Between 2002 and 2011, albacore and other tunas were the most commonly caught key saltwater species or species group, averaging 99,000 over this time period.

Saltwater Fish Harvested and Released

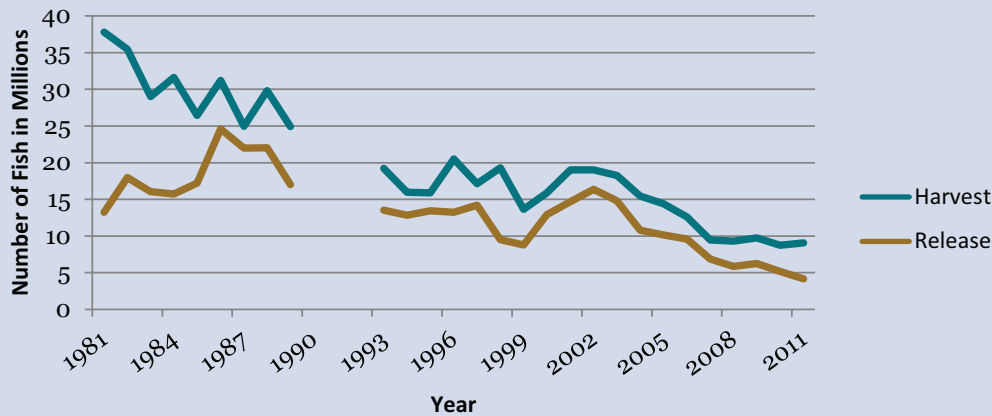


Figure 36. Total number of fish harvested and released during recreational saltwater fishing activities in the West Coast Region from 1981 to 2011. Data not available for California, Oregon, and Washington from 1990-1992.

Source: National Marine Fisheries Service (15)

2011 Economic Impacts of the Recreational Saltwater Fishing Expenditures (thousands of dollars)

State	Jobs	Total Sales	Value Added
California	7,703	\$1,031,068	\$551,328
Oregon	3,147	\$370,032	\$200,835
Washington	4,939	\$514,088	\$275,425

Table 14. Economic impacts from recreational saltwater fishing activities in the West Coast Region for 2011. *Source: National Marine Fisheries Service (15)*

The West Coast Region employment impacts were generated by expenditures on recreational saltwater fishing trips taken by anglers (private or rental boat, for-hire boats, shore-based trips) or expenditures on durable equipment. Throughout the West Coast Region, most of the employment impacts in 2011 were generated by expenditures in durable equipment: 73% in Oregon, 72% in Washington, and 35% in California.

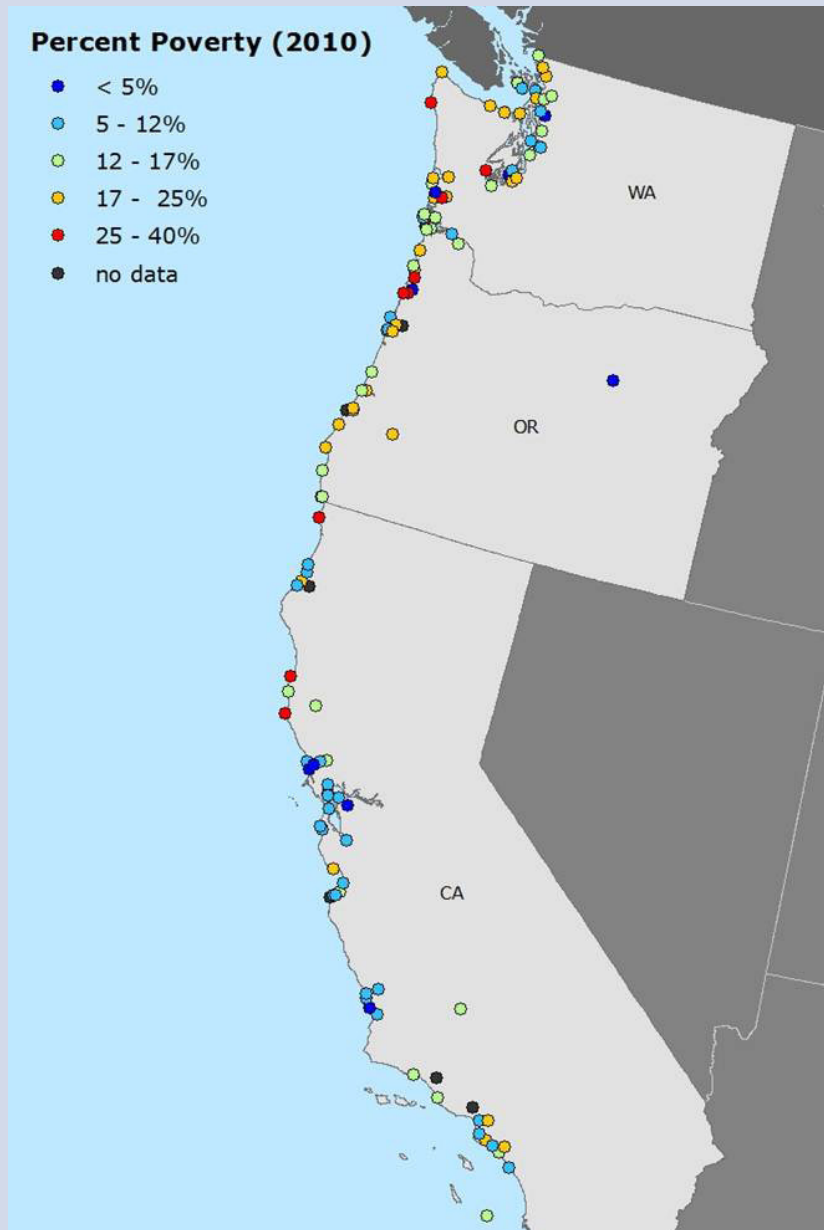


Figure 37. Poverty levels in profiled West Coast Region fishing communities, averaged from 2006 to 2010. *Source: National Marine Fisheries Service (12)*

Overall, NOAA Fisheries scientists have obtained information of the social and economic characteristics of 120 fishing communities in the West Coast Region because of the nature of their links with commercial and/or recreational fishing: 50 in California, 30 in Oregon, and 40 in Washington. In 2010, 12 of the top 50 ports by landings revenue were located in the West Coast Region.

Fishing communities in the West Coast Region are alive and thriving. For example, many West Coast communities begin their fishing seasons with “Blessing of the Fleet” springtime festivals and celebrations.

Additionally, the community of Astoria, Oregon hosts a Fisher Poets Annual Gathering that features original poetry and songs written by participants in the fishing industry.

Top 5 Commercial Fishing Communities (2010)

Rank	Community Name	Landings Revenue (million \$)
1	Westport, WA	\$38.5
2	Los Angeles, CA	\$37.8
3	Port Huneme-Oxnard Ventura, CA	\$37.4
4	Newport, OR	\$30.6
5	Astoria, OR	\$30.5

Table 15. Top five commercial fishing communities in the West Coast Region by landings revenue in 2010. *Source: National Marine Fisheries Service (21)*

Top 5 Recreational Fishing Communities (2010)

Rank	Community Name	For-Hire Permits (number)
1	San Diego, CA	57
2	Westport, WA	22
3	Depoe Bay, OR	15
4	Portland, OR	15
5	Ilwaco, WA	13

Table 16. Top five recreational fishing communities in the West Coast Region by number of for-hire permits in 2010. *Source: National Marine Fisheries Service (21)*

Coastal Species Protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)	
ESA Species	MMPA Species
Blue whale	Baird's beaked whale
Fin whale	Blainville's beaked whale
Humpback whale	Bottlenose dolphin
Killer whale	California sea lion
North Pacific right whale	Cuvier beaked whale
Sei whale	Dall's porpoise
Sperm whale	Dwarf sperm whale
Green sea turtle (2)*	False killer whale
Leatherback sea turtle	Gray whale
Loggerhead sea turtle (9)*	Harbor porpoise
Olive ridley sea turtle (2)*	Harbor seal
Bocaccio	Long-beaked common dolphin
Chinook salmon (9)*	Minke whale
Chum salmon (2)*	Northern elephant seal
Coho salmon (4)*	Northern fur seal
Green sturgeon	Northern right whale dolphin
Pacific eulachon/smelt	Pacific white-sided dolphin
Sockeye salmon	Pygmy sperm whale
Steelhead trout (11)*	Risso's dolphin
Yelloweye rockfish	Rough-toothed dolphin
Black abalone	Short-beaked common dolphin
White abalone	Short-finned pilot whale
Steller sea lion	Stejneger's beaked whale
Guadalupe fur seal	Striped dolphin
Canary rockfish	

* The term "species" under the ESA includes species, subspecies, and for vertebrates only, "distinct population segments (DPSs)". Pacific salmon (e.g., Chinook, Chum, Coho, and Sockeye salmon) are listed as "evolutionary significant units (ESUs), which are essentially equivalent to DPSs for the purpose of the ESA; and Green Sea turtle, Loggerhead Sea turtle, Olive Ridely Sea turtle, and Steelhead Trout are listed in DPSs. The parenthesis indicate the number of listed ESUs or DPSs for each species.

Table 17. Marine and anadromous species protected by the Endangered Species Act, and marine mammals protected by the Marine Mammal Protection Act in the West Coast Region. Source: National Marine Fisheries Service (16)

Twenty-eight evolutionarily significant units of West Coast salmon and steelhead species have been listed under the ESA. All of these are of traditional, recreational, and/or commercial value to communities of the Region.

Number of Species Listed Under the ESA

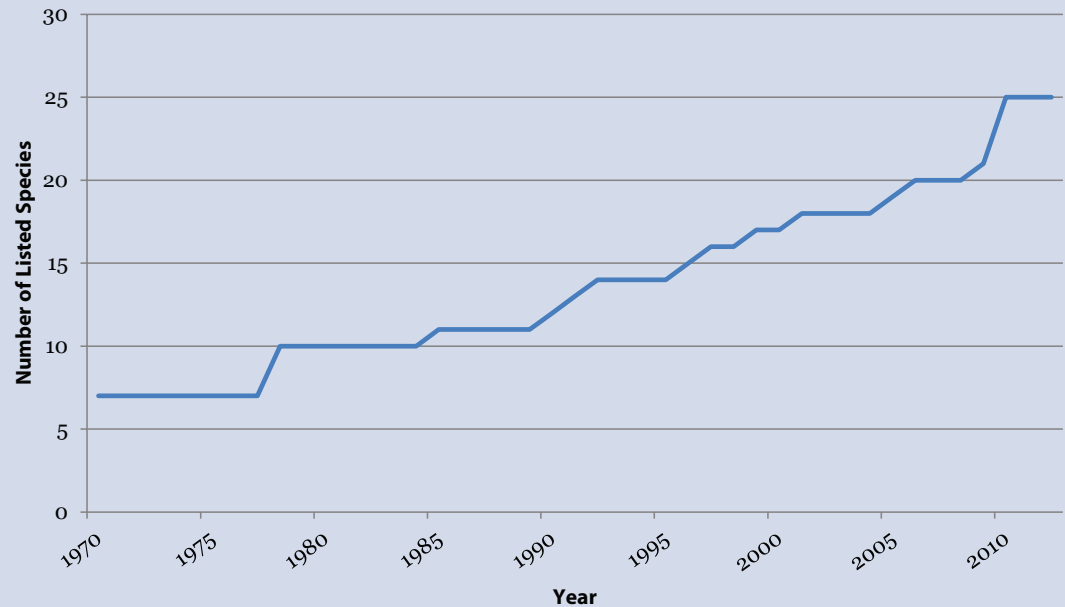


Figure 38. Number of species protected by the Endangered Species Act in the West Coast Region from 1970 to 2012. Source: National Marine Fisheries Service (16)

On October 2013, NOAA removed the eastern Steller sea lion species from the ESA after a status review found that the species recovered. Listed as "threatened" under the ESA in 1990, Steller sea lion status was modified in 1997 to identify two species (distinct population segments) under the ESA, one of which (western) was listed as endangered, and the other (eastern) remained threatened. According to the status review, the eastern population appears to have grown from about 18,000 in 1979 to over 70,000 in 2010. This works out to an estimated annual growth rate of 4.18%, exceeding the 3% target specified in the population's 2008 recovery plan. The eastern population of Steller Sea Lions will still be safeguarded by the Marine Mammal Protection Act, which applies to all marine mammals whether endangered or not.

Whale Watching Economic Data

1998					
	Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
Washington	317,000	26	3,312,000	10,355,000	13,567,000
Oregon	190,137	10	818,000	5,577,000	6,395,000
California	1,774,700	65	14,110,000	50,171,000	64,281,000

2008					
	Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
Washington	425,000	42	10,845,500	50,590,500	61,436,000
Oregon	376,618	11	1,587,205	28,246,343	29,833,548
California	1,371,467	73	14,308,814	68,573,343	82,882,157

Table 18. Whale watching economic data for the West Coast Region states for 1998 and 2008. *Source: International Fund for Animal Welfare (8)*

Protected Species Valuation

Species	Household Willingness to Pay	National Value (\$ billions)
<i>North Pacific right whale</i>	\$73.16	\$4.49
<i>Upper Willamette River chinook salmon</i>	\$40.65	\$2.49
<i>Puget Sound chinook salmon</i>	\$40.49	\$2.48
<i>Leatherback sea turtle</i>	\$67.97	\$4.16
<i>Loggerhead sea turtle</i>	\$44.72	\$2.74

Table 19. Valuation data for some of the West Coast Region marine protected species. Household willingness-to-pay values are expressed as a US household's average willingness-to-pay for recovering a species. Payment is in the form of an increase to the household federal tax bill every year for ten years. The national values reported here represent the present value of aggregated household values across the Nation. The household aggregation strategy accounted for survey and panel non-response. All values are reported in 2011 US Dollars. *Source: Conservation Biology (41)*

Protected species valuation studies enable the assessment of the national benefits derived from threatened and endangered species. Values can also be used to assess the benefits obtained from conservation and recovery efforts, thus providing a useful benchmark for valuing state and federal protected species research and recovery efforts. For West Coast Region species, average US households are willing to pay the highest amount to recover the southern resident killer whale, which also have the largest national value.

About 80-90% of the salmon caught in the West Coast Region start their lives in a hatchery, which is a form of aquaculture. In recent years, aquaculture activities have increased, along with value of aquaculture products sold.

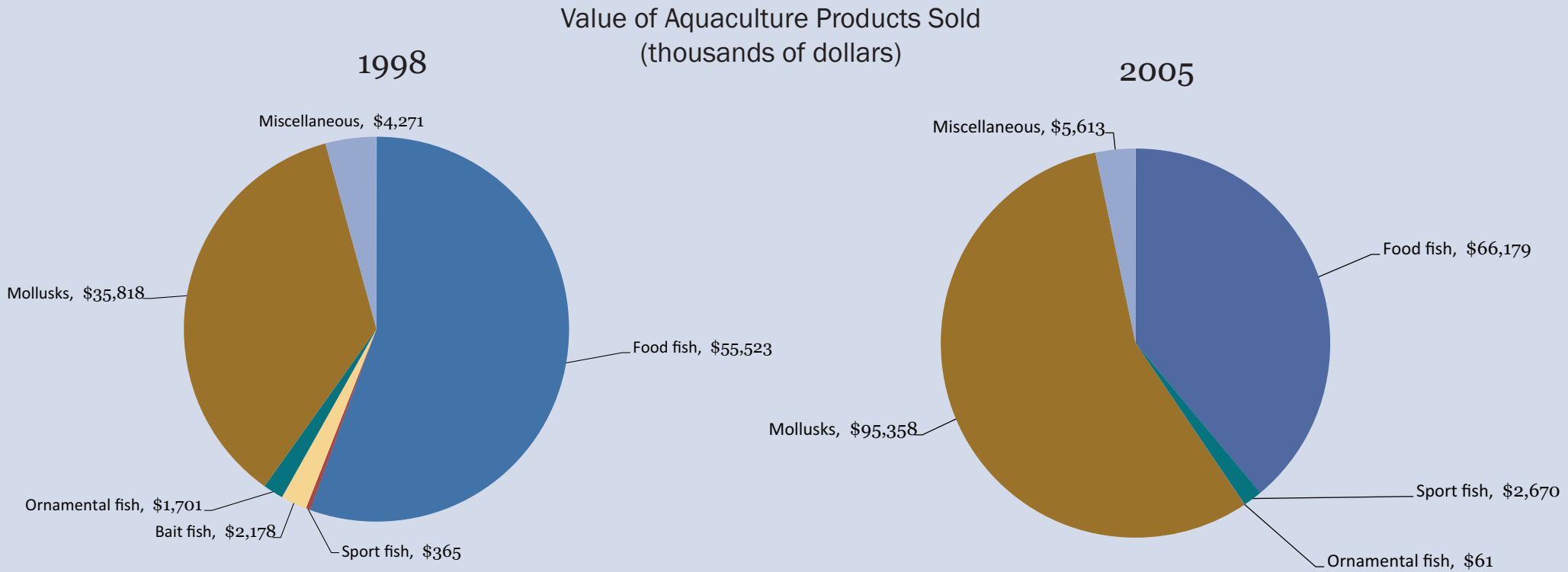


Figure 39. Value of aquaculture products sold by type in the West Coast Region in 1998 and 2005. Source: US Department of Agriculture (32)

Saltwater Aquaculture Farms

	Number of Farms	
	1998	2005
California	16	22
Oregon	9	21
Washington	66	175
TOTAL	91	218

Table 20. Total number of saltwater aquaculture farms in West Coast Region states in 1998 and 2005. Source: US Department of Agriculture (32)

The expansive shoreline of the West Coast Region allows for a variety of diverse habitat types that provide critical habitat to many species as well as provide recreational opportunities for coastal residents and tourists.

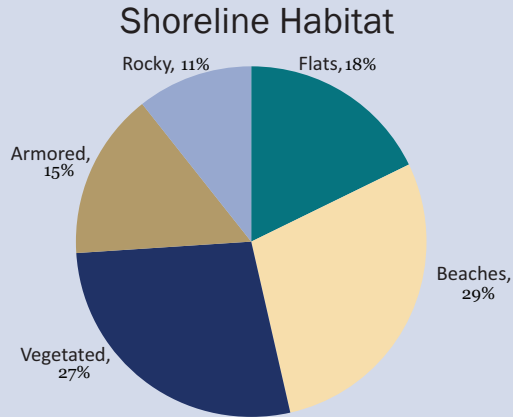


Figure 40. Percent of shoreline habitat in the West Coast Region. *Source: NOAA Environmental Sensitivity Index Maps (22)*

More than half of the West Coast Region coastline is considered to be very high or high in their vulnerability to sea level rise.

Coastal Vulnerability to Sea Level Rise

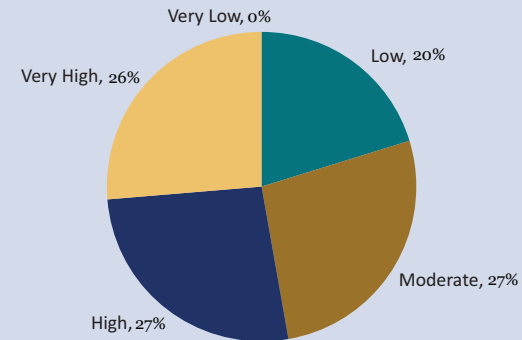


Figure 41 : Percent of coastline in the West Coast Region that is vulnerable to sea level rise. *Source: US Geological Survey (40)*

A total of 548 beaches are monitored in the West Coast Region. As of 2011, 100% of the California beaches were monitored, while 28% and 6% of the Oregon and Washington beaches were monitored, respectively.

In 2011, the West Coast Region federally insured assets along the coast, were covered by more than 110,000 policies totaling more than \$24 billion of insured assets in the coastal floodplain.

Percent of Monitored Beaches Affected by Notification Actions

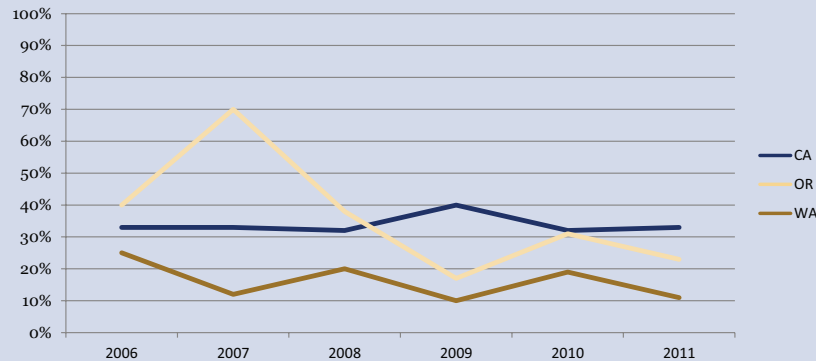


Figure 42. Percent of monitored beaches affected by notification actions in West Coast Region states from 2006 to 2011. Notification actions are issued by states or local agencies when monitoring of water at swimming beaches show that levels of certain bacteria exceed standards which might pose health risks. The notification may be either a beach advisory, warning people of possible risks or swimming, or closing a beach to the public. *Source: Environmental Protection Agency (39)*


Federally Insured Assets Along the Coast (thousands of dollars)

	Policies	Premiums	Coverage	Claims Payout
California	83,351 (6)	\$100,758 (5)	\$19,071,863 (6)	\$247,716 (11)
Oregon	8,641 (22)	\$7,585 (22)	\$1,647,929 (22)	\$22,056 (24)
Washington	19,825 (16)	\$18,893 (15)	\$4,107,471 (16)	\$102,057 (15)

Table 21. National Flood Insurance Program policies, premiums, coverage, and claim payouts for 2011 for federally insured assets along the coast of West Coast Region states. The numbers in parenthesis indicate the state ranking for a specific variable. *Source: Federal Emergency Management Agency (7)*

Pacific Islands Region

photo credit: istockphoto.com



There are over 800 known species of reef-building coral worldwide and hundreds of species of soft corals and deep-sea corals. Coral reefs are essential spawning, nursery, breeding, and feeding grounds for numerous organisms. In terms of biodiversity, the variety of species living on a coral reef is greater than in any other shallow-water marine ecosystem, and is one of the most diverse on the planet, yet coral reefs cover less than one tenth of one percent of the ocean floor.

SPOTLIGHT: Pacific Island Monuments

On January 16, 2009, Presidential Proclamations established three new Marine National Monuments in the Pacific: **the Pacific Remote Island Area (PRIA); Rose Atoll; and the Marianas Trench.** Together, these areas encompass over 125 million acres of small islands, atolls, coral reefs, submerged lands, underwater volcanic features, and deep blue waters. These join the Papahānaumokuākea Marine National Monument, established in 2006, which included about 90 million acres in the Northwestern Hawaiian Islands. Although quite remote, all Monuments have some history of human use and some have continued use today.

The **PRIA Marine National Monument**, comprises the most widespread collection of coral reef, seabird, and shorebird protected areas on the planet under a single nation's jurisdiction. One of the islands, Palmyra, is home to The Nature Conservancy's Palmyra Atoll Research Consortium, which hosts researchers from around the world who come

to study climate change, coral reefs, and invasive species at this natural laboratory. The island, like other PRIAs, is visited by yachters traveling in the Pacific, and although commercial fishing is prohibited, a limited amount of recreational bonefishing and some pelagic fishing is allowed.

The **Rose Atoll Marine National Monument** is centered on one of the smallest atolls in the world. This atoll features a pink-colored fringing reef caused by the dominance of crustose coralline algae. Residents of the sparsely-populated Manu`a Islands in American Samoa remember their parents and grandparents talking about fishing trips there. Manu`a residents maintain strong cultural connections to Muliava or Motu o Manu, both traditional names for Rose Atoll. Public access to Rose Atoll, also designated as a National Wildlife Refuge, is prohibited, and commercial fishing is prohibited in the Monument. However, access can be provided to Monument waters for noncommercial and sustenance fishing, traditional indigenous fishing, and recreational fishing.

The **Marianas Trench Marine National Monument** includes three units: the Trench itself; an arc of 21 undersea mud volcanoes and thermal vents; and the waters around the northernmost three islands of the Mariana Archipelago (Islands Unit). Commercial fishing is prohibited in the Islands Unit, but access for sustenance, recreational, and traditional indigenous fishing can be permitted. Many residents of Guam and the Commonwealth of the Northern Mariana Islands (CNMI) were not aware of the designation, but tended to support it once they learned more. A number of commercial and non-commercial fishing trips have taken place to the three northernmost islands over the past decades and before, although selling fish, if it happened at all, was frequently a way to recoup costs for the long, expensive voyage. Fish from the northernmost islands are highly prized by CNMI residents.

photo credit: NOAA Submarine Ring of Fire 2004 (Volcanoes Unit MTMNM)

Pacific Islands Region

Bound by the Hawaiian Archipelago in the north, American Samoa and Pacific remote island areas in the south, and the Mariana's Archipelago, including Guam in the west, the Pacific Islands Region encompasses an expansive geographical area. The total area of the US Exclusive Economic Zone (EEZ) waters included in the Region is more than 1.5 million square nautical miles, roughly equal to all the remaining US EEZ waters surrounding the continental US, including Alaska.

OVERVIEW

-  Coastal Demographics
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-  Habitat

The diverse marine environment of the Pacific Islands Region complements its terrestrial richness. The aquatic environment ranges from rich coastal ecosystems of wetlands, shorelines and coral reefs, to the unexplored depths of the deep ocean trenches. As rich as the tropical environment is in animal and plant species, the Pacific Islands Region retains a culture unique to themselves. The island life revolves around the ocean – for pleasure, transportation and physical and spiritual sustenance.



Figure 43. Map of the Pacific Islands Region.

The Pacific Islands Region coastal county population increased by 83% since 1970. From the locations within the Region, the Northern Marina Islands coastal county population quadrupled since 1970, while Hawaii's coastal county population increased the slowest by 77% since 1970.

Coastal Watershed Counties Population Change from 1970 to 2010

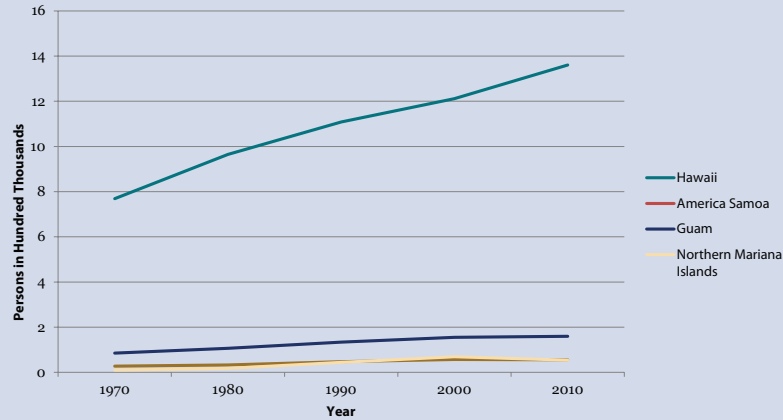


Figure 44. Total population of the Pacific Islands region from 1970 to 2010. Source: US Census Bureau (25,27,28,29,30); Woods and Poole Economics, Inc. (42)

Racial Distribution

Hawaii

(numbers in thousands)

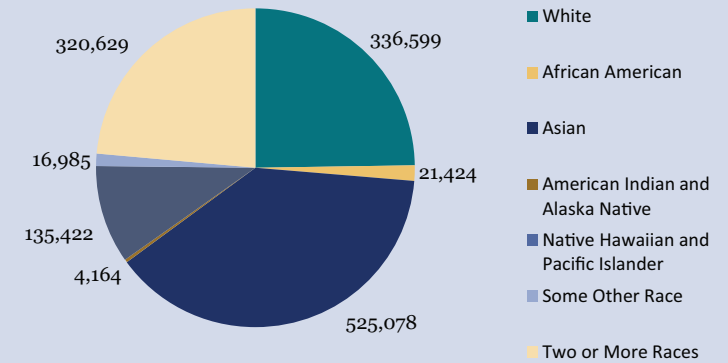


Figure 45. 2010 racial structure in Hawaii. Source: US Census Bureau (26)

In Hawaii, approximately 39% of the population is Asian, gender distribution is equal, and 22% of the population is under 18 years of age.

Gender Distribution

Hawaii

(numbers in thousands)

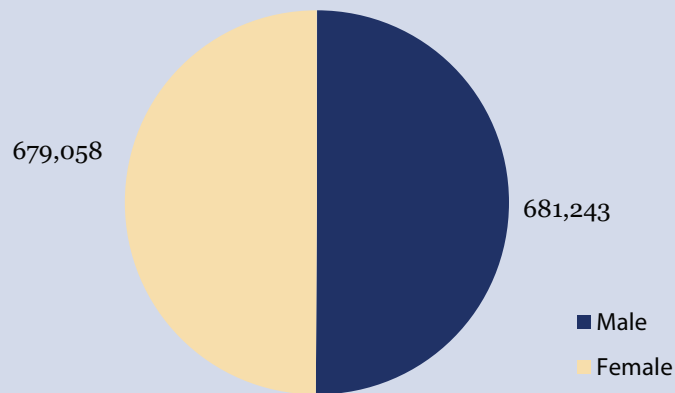


Figure 46. 2010 Gender structure in Hawaii. Source: US Census Bureau (26)

Age Distribution

Hawaii

(numbers in thousands)

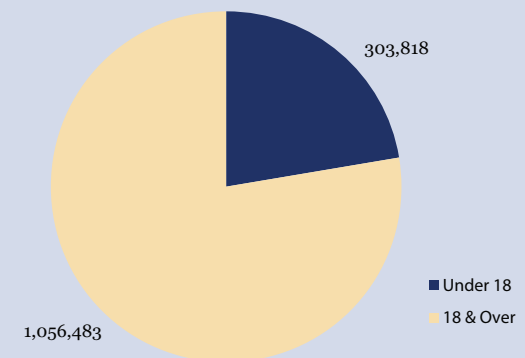


Figure 47. 2010 Age distribution in Hawaii. Source: US Census Bureau (26)

In 2010, Hawaii's median household income was the eighth highest in the US at \$58,507 but it was only slightly higher than its 1984 median household income of \$57,718.

Median Household Income

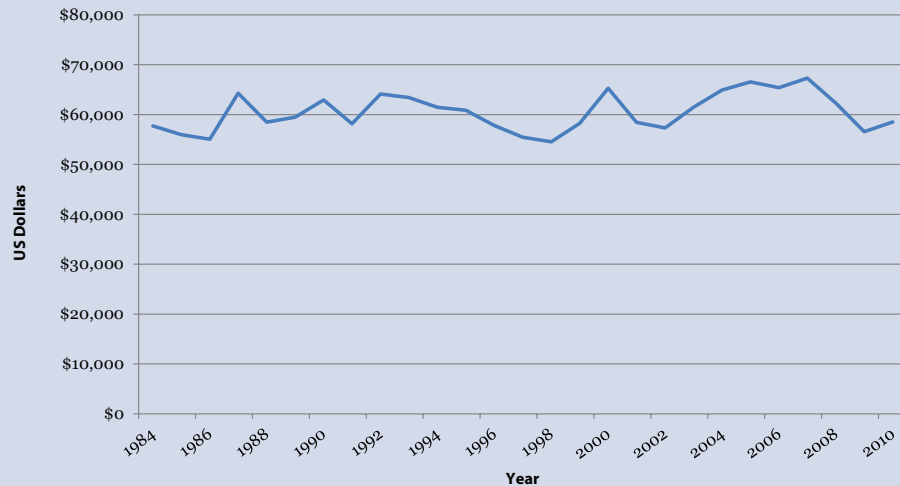


Figure 48. Hawaii median household income (adjusted to 2010 US Dollars) from 1984 - 2010. *Source: US Census Bureau (31)*

Wages in Hawaii

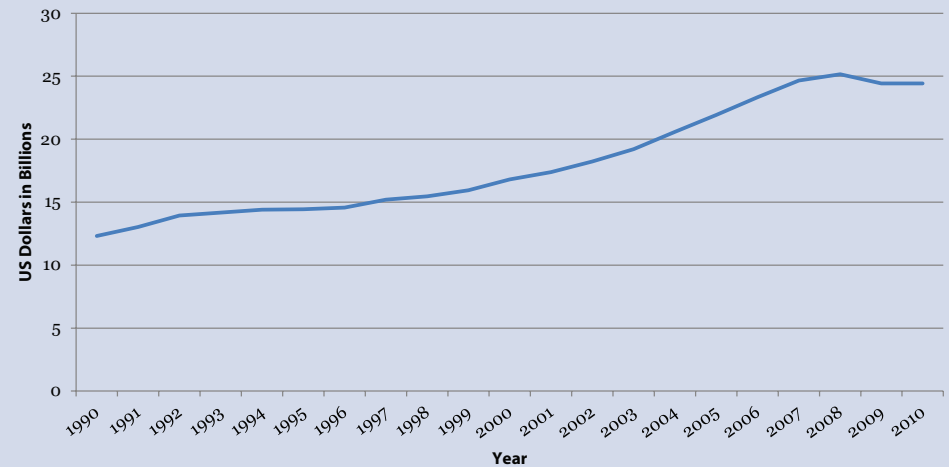


Figure 49. Wages in Hawaii from 1990 to 2010. *Source: Bureau of Labor Statistics (5)*

In 2010, there were more than 580,000 jobs in Hawaii, a 10% increase when compared to 1990. These jobs generated more than \$24 billion in wages.

Employment in Hawaii

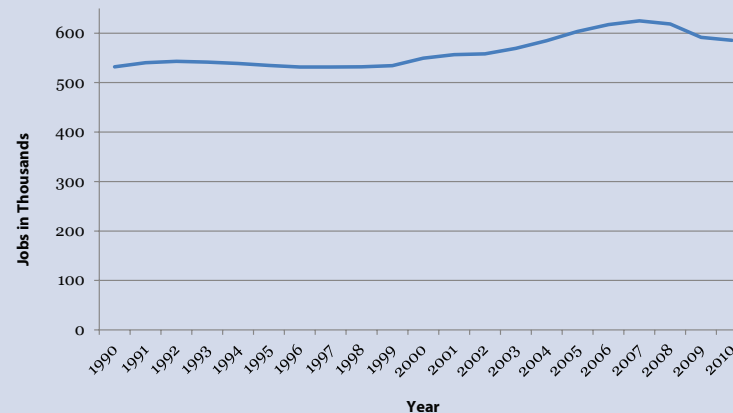


Figure 50. Employment in Hawaii from 1990 to 2010. *Source: Bureau of Labor Statistics (5)*

In 2009, Hawaii had the highest GDP in the Pacific Island Region at approximately \$65.3 billion, while American Samoa had the lowest GDP in the Region at \$703 million. In 2010, the Hawaii GDP ranked twenty first in the US at approximately \$66.6 billion.

Hawaii GDP

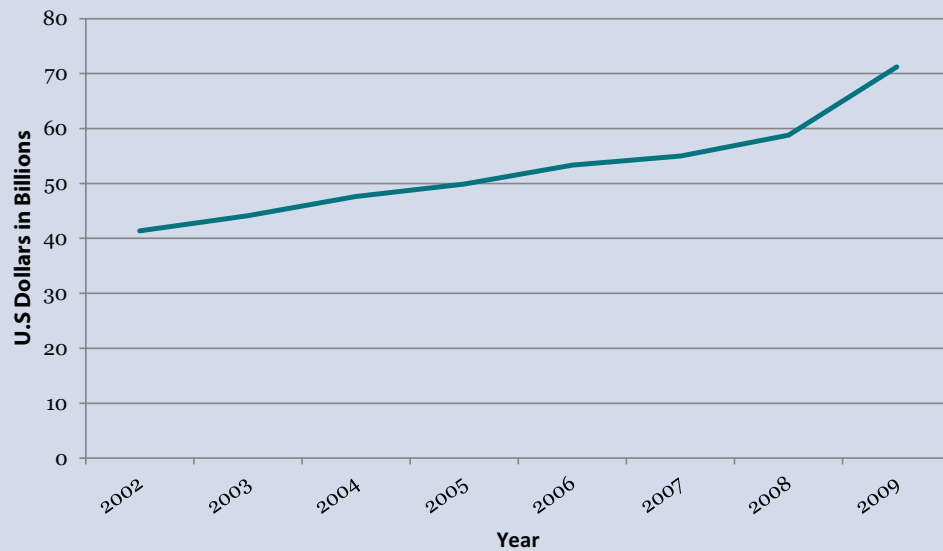


Figure 51. Gross Domestic Product (GDP) of Hawaii from 2002-2009. *Source: Bureau of Economic Analysis (3)*

Hawaii's energy production consists primarily of renewable resources such as geothermal, hydroelectric, solar, wind, and wood and waste. In 2009, the total renewable energy production in Hawaii ranked 27th in the US.

Renewable Energy Production

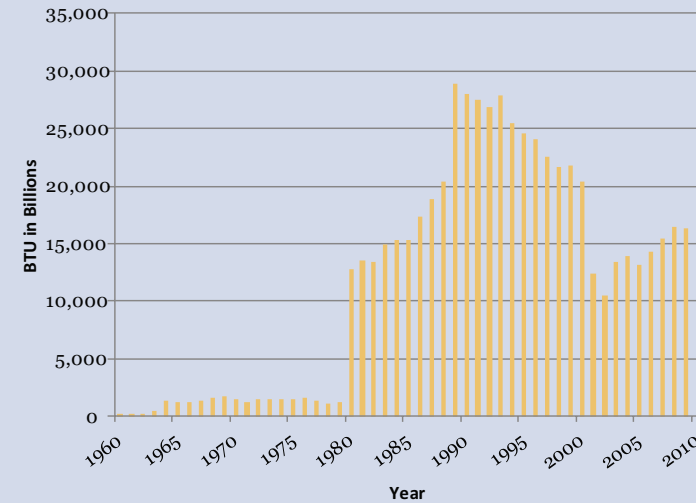


Figure 52. Energy production estimates for Hawaii from 1960 to 2009. British Thermal Unit (BTU) is a traditional unit of energy equal to about 1.055 KJoules. *Source: US Energy Information Administration (33,34,35,36,37,38)*

Ports Imports and Exports

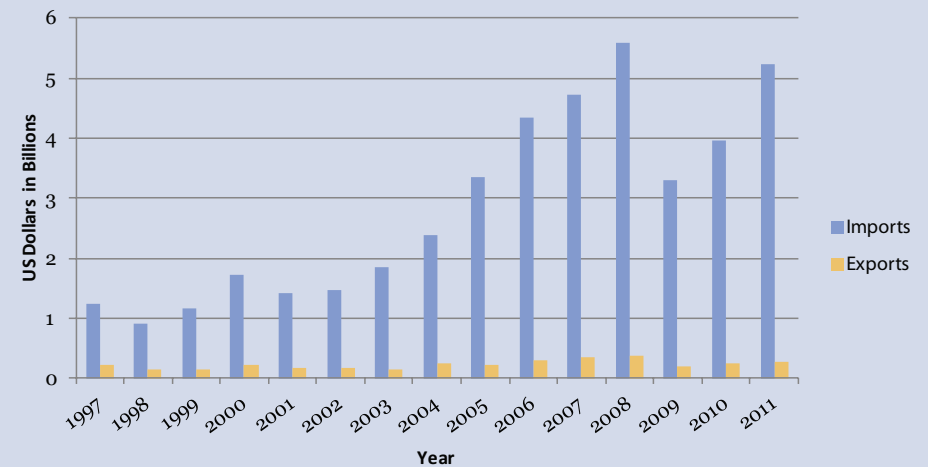


Figure 53. Value of imports and exports from Hawaii from 1997 to 2011. *Source: US Army Corps of Engineers, Navigation Data Center (24)*

Fishermen in Hawaii earned \$92 million from their commercial harvest in 2011, landing over 29 million pounds of finfish and shellfish. Tunas comprised 73% of this landings revenue (\$67 million) as well as 63% of total landings (19 million pounds).

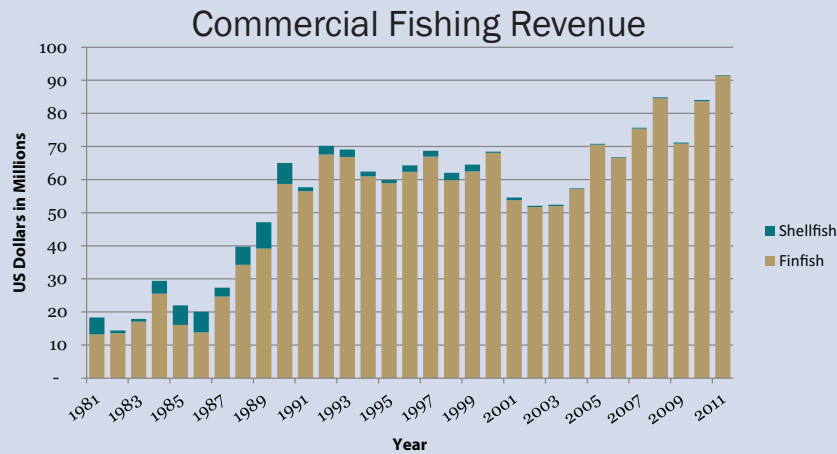


Figure 54. Commercial fishing landings revenue in Hawaii in 1981 to 2011. *Source: National Marine Fisheries Service (14)*

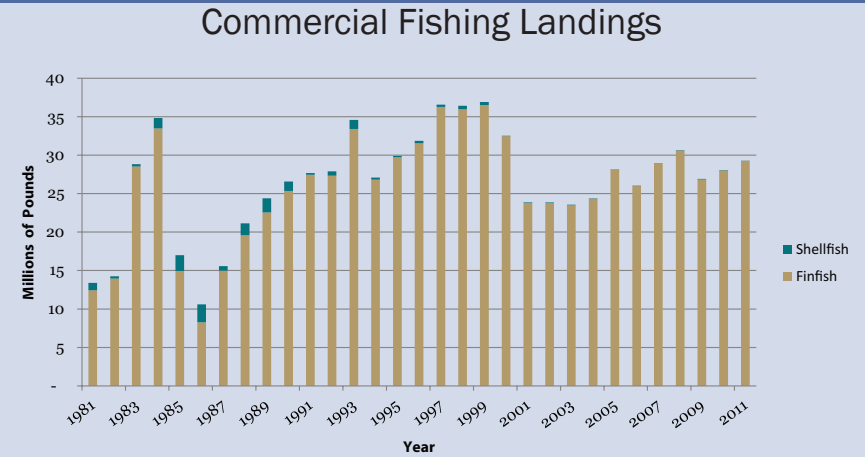


Figure 55. Commercial fishing landings in Hawaii from 1981 to 2011. *Source: National Marine Fisheries Service (14)*

Along the Pacific Islands Region, a total of 66 stocks of complexes are managed by NMFS and the Western Pacific Fishery Management Council. In 2011, two stocks experienced overfishing (bigeye tuna and Pacific bluefin tuna), and one stock was overfished (seamount groundfish complex – hancock seamount).

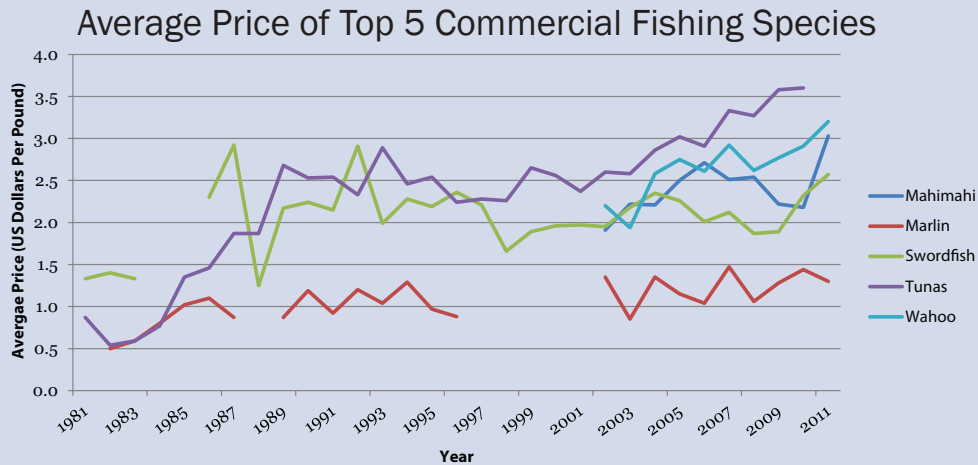


Figure 56. Average price of top five commercial fishing species in Hawaii from 1981 to 2011. *Source: National Marine Fisheries Service (14)*

2011 Economic Impacts of the Seafood Industry (thousands of dollars)

	Landings Revenue	Jobs	Value Added
Hawaii	\$91,513	8,627	\$311,097

Table 22. Seafood industry economic impacts for 2011. The US seafood industry includes the commercial harvest sector, seafood processors and dealers, seafood wholesalers and distributors, importers, and seafood retailers. *Source: National Marine Fisheries Service (14)*

Lobsters commanded the highest ex-vessel price in 2011, with an average annual price of \$10.39 per pound.

In 2011, the Hawaii seafood industry generated \$694 million in sales impacts, \$213 million in income impacts, and approximately 8,600 full and part-time jobs. Importers contributed the most to sales, while the retail sector contributed the most to employment impacts, income impacts, and value added impacts.



Figure 57. Total number of recreational saltwater fishing trips in Hawaii from, 2003 to 2011. *Source: National Marine Fisheries Service (14)*

In 2011, there were 87,000 recreational saltwater anglers who fished in the state of Hawaii, and these anglers took 1.38 million fishing trips.

Of Hawaii's key saltwater species and species groups, bigeye and mackerel scad, goatfishes, and trevallys and other jacks were most frequently caught by recreational fisherman. In 2011, 662,000 bigeye and mackerel scad, 185,000 goatfishes, and 159,000 trevallys and other jacks were caught by anglers in Hawaii.

Saltwater Fish Harvested and Released

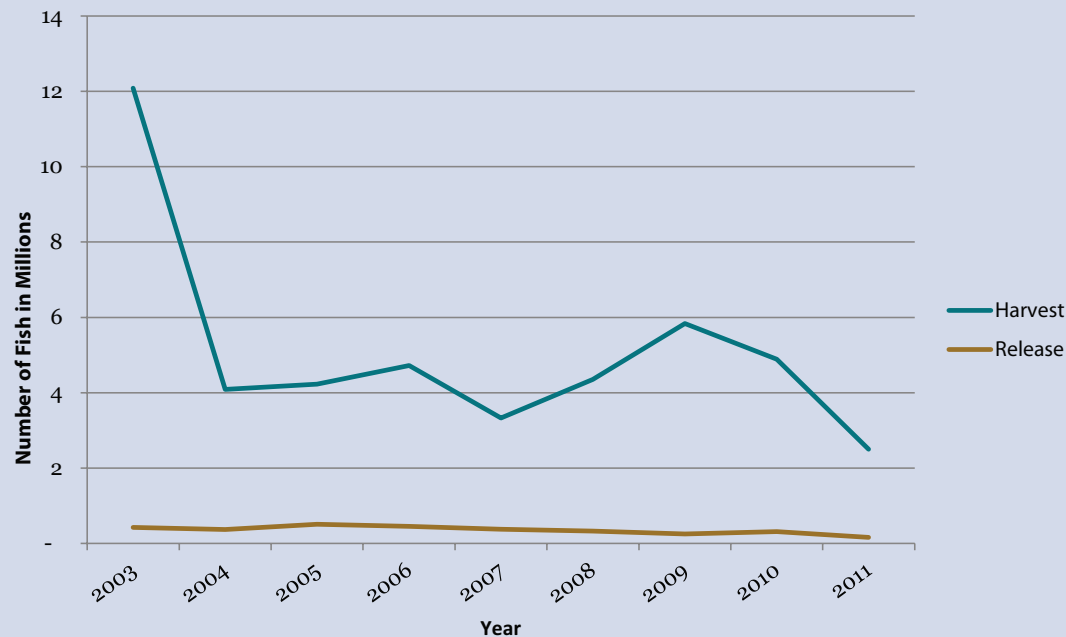


Figure 58. Total number of saltwater fish harvested and released during recreational fishing activities in Hawaii from 2003 to 2011. *Source: National Marine Fisheries Service (14)*

2011 Economic Impacts of the Recreational Saltwater Fishing Expenditures (thousands of dollars)

State	Jobs	Total Sales	Value Added
Hawaii	2,948	\$309,923	\$156,595

Table 23. Economic impacts from recreational saltwater fishing activities in Hawaii for 2011. Value added refers to the increased value of fish at each stage of production, exclusive of initial costs. *Source: National Marine Fisheries Service (15)*

In 2011, approximately 2,900 jobs in Hawaii were generated by recreational saltwater fishing activities and over \$285 million was spent by anglers. Most of these employment impacts were generated by industries that provided services to anglers who fished from shore or a private boat. In addition to employment impacts generated by recreational fishing activities, other economic impacts included sales impacts and the contribution of recreational fishing activities to the gross domestic product (value added impacts).

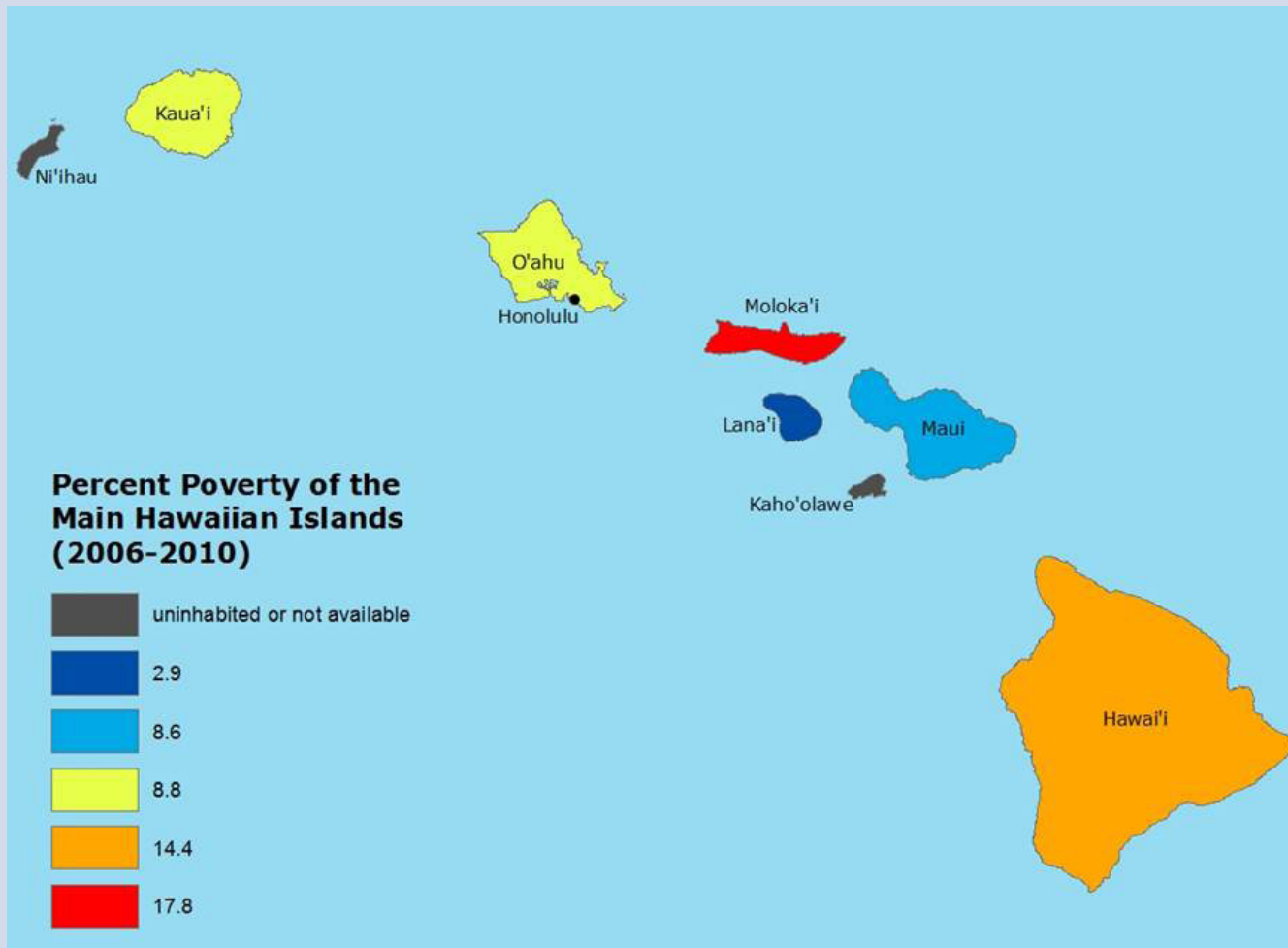


Figure 59. Poverty levels in profiled Hawaii fishing communities, averaged from 2006 to 2010. Source: US Census Bureau (31)

Since 1992, Honolulu has frequently been among the top ten US ports in economic value of commercial fisheries landings. In 2006, Honolulu ranked only 30th in quantity of fish landed (23.5 million pounds) but 8th in value (\$71.6 million), reflecting strong market demand for fresh fish.

Top 5 Recreational Fishing Communities (2010)

Rank	Island Name	Active-For-Hire Vessels (number)
1	Hawaii	106
2	Oahu	39
3	Maui	29
4	Kauai	18
5	Molokai	3

Table 24. Top five recreational fishing communities in Hawaii by the number of active for-hire vessels in 2010. Source: National Marine Fisheries Service (20)

Hawaiian monk seals are critically endangered, with a downward population trajectory expected to fall below 1,000 individuals within 10 years. The species may become extinct within 50 years without human intervention. NOAA Fisheries is implementing methods to increase survival of female monk seals because current survival rates are insufficient to promote survival or recovery of the species. Despite the establishment of the Papahānaumokuākea Marine National Monument, the primary breeding population of Hawaiian monk seals, pups and yearlings in these remote, and well protected areas are starving to death at increasing rates. Conversely, monk seal numbers are increasing in the highly populated main Hawaiian Islands, which bring additional management challenges.

Coastal Species Protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)	
ESA Species	MMPA Species
Blue whale	Blainville's beaked whale
False killer whale	Cuvier beaked whale
Fin whale	Dwarf sperm whale
Humpback whale	False killer whale
Sei whale	Longman's beaked whale
Sperm whale	Melon-headed whale
Hawaiian monk seal	Minke whale
Green sea turtle (2)*	Pygmy killer whale
Hawksbill sea turtle	Pygmy sperm whale
Leatherback sea turtle	Short-finned pilot whale
Loggerhead sea turtle (9)*	Bottlenose dolphin
Olive Ridley sea turtle (2)*	Risso's dolphin
	Rough-toothed dolphin
	Short-beaked common dolphin
	Striped dolphin

* The term "species" under the ESA includes species, subspecies, and for vertebrates only, "distinct population segments (DPSs)". Green, Loggerhead, and Olive Ridley sea turtle are listed in the DPSs. The parenthesis indicate the number of listed DPSs for each species.

Table 25. Marine and anadromous species protected by the Endangered Species Act, and marine mammals protected by the Marine Mammal Protection Act in the Pacific Islands Region. *Source: National Marine Fisheries Service (16)*

Number of Species Listed Under the ESA

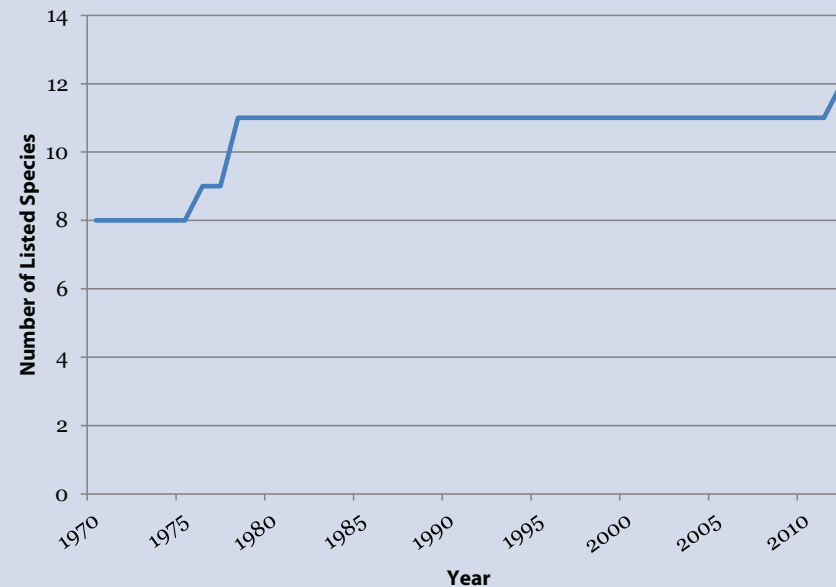


Figure 60. Number of species protected by the Endangered Species Act in the Pacific Islands Region from 1970 to 2012. *Source: National Marine Fisheries Service (16)*

On November 30, 2012, NOAA proposed the listing of 66 reef-building coral species under the ESA. Fifty nine of these species occur in the Pacific Island Region, and seven would be listed as endangered and 52 would be listed as threatened. A final listing decision will be made in late 2013.

Whale Watching Economic Data

1998					
	Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
American Samoa	None	None	None	None	None
Guam	4,000	N/A	N/A	N/A	N/A
Hawaii	448,000	N/A	16,030,000	N/A	27-54 million

2008					
	Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
American Samoa	Minimal	Minimal	Minimal	Minimal	Minimal
Guam	221,155	15	13,048,145	19,627,506	32,675,651
Hawaii	450,000	67	16,900,000	114,500,000	131,400,000

Table 26. Whale watching economic data for the Pacific Islands Region for 1998 and 2008. Whale watch locations in Hawaii were Maui, Oahu, and Kauai; the whale watch location in Guam was Agat Marina; and the whale watch location in American Samoa was Fagatele Bay. *Source: International Fund for Animal Welfare (8)*

Protected Species Valuation

Species	Household Willingness to Pay	National Value (\$ billions)
<i>Leatherback sea turtle</i>	\$67.97	\$4.16
<i>Loggerhead sea turtle</i>	\$44.72	\$2.74
<i>Hawaiian monk seal</i>	\$66.31	\$4.06

Table 27. Valuation data for some of the Pacific Islands Region marine protected species. Household willingness-to-pay values are expressed as a US household's average willingness-to-pay for recovering a species. Payment is in the form of an increase to the household federal tax bill every year for ten years. The national values reported here represent the present value of aggregated household values across the Nation. The household aggregation strategy accounted for survey and panel non-response. All values are reported in 2011 US Dollars. *Source: Conservation Biology (41)*

During the months of December through April, many of the North Pacific humpback whales that spend the northern summer feeding in Alaska and the Bering Sea — estimated at 10,000 whales — migrate to the Hawaiian Islands to mate and raise their calves in warm, shallow waters. In 1992, the US Congress created the Hawaiian Islands Humpback Whale National Marine Sanctuary in the waters around the main Hawaiian Islands. The four month duration of the humpback whales' presence in Hawaiian waters enables a substantial whale watching season. Each year more than 50 vessels take approximately 330,000 patrons on dedicated whale watching tours, providing more than 270 jobs during the season and generating approximately \$9.5 million in direct expenditure.

The Hawaii aquaculture industry is comprised of two major sectors: Commercial Production and Research and Technology Transfer. Over 30 different species of plants and animals are raised in the Hawaii aquaculture industry, and they are grouped into four categories: algae, shellfish, finfish, and other (e.g., aquarium animals and pearl oysters). Many farms are small-scale, family-operated and medium-sized, owner-operated farms. A number of cooperative community-based development groups made up of backyard family farms, are also in operation. In Hawaii, farm-gate and retail prices for aquaculture products are uniformly high, as demand exceeds the supply for most species. Algae continues to be Hawaii's most valuable aquaculture crop which is consumed locally and exported.

Value of Aquaculture Products Sold
(thousands of dollars)

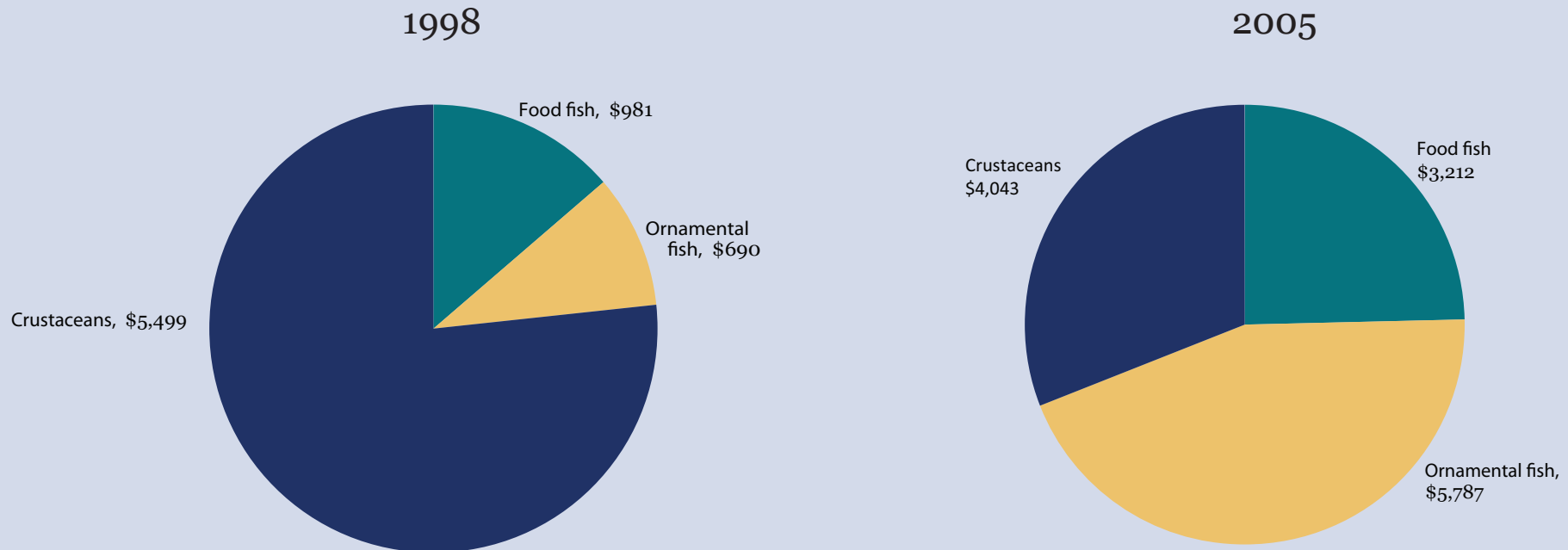


Figure 61. Value of aquaculture products sold by type in Hawaii in 1998 and 2005. Source: US Department of Agriculture (32)

Saltwater Aquaculture Farms

	Number of Farms	
	1998	2005
Hawaii	30	30

Table 28. Total number of saltwater aquaculture farms in Hawaii in 1998 and 2005. Source: US Department of Agriculture (32)

The Pacific Islands Region habitat is unique in that it encompasses a large percentage of the US coral reefs. The islands within this Region depend on healthy coral reef ecosystems for food and a tourist-based economy. Federal, State and local partners work cooperatively in this Region to protect and restore coral reef ecosystems so that they continue to be a valuable resource to current and future generations.

There are 539 beaches in the Pacific Islands Region and 52% were monitored in 2011 for pollutants. In 2011, the swimming season averaged 190 days per monitored beach, however, beaches were closed an average of 25 days per season. This means that beaches were open and safe for swimming about 87% of the time.

Percent of Monitored Beaches Affected by Notification Actions



Figure 62. Percent of monitored beaches affected by notification actions in Pacific Islands Region from 2006 to 2011. Notification actions are issued by states or local agencies when monitoring of water at swimming beaches show that levels of certain bacteria exceed standards which might pose health risks. The notification may be either a beach advisory, warning people of possible risks or swimming, or closing a beach to the public. *Source: Environmental Protection Agency (39)*

Shoreline Habitat

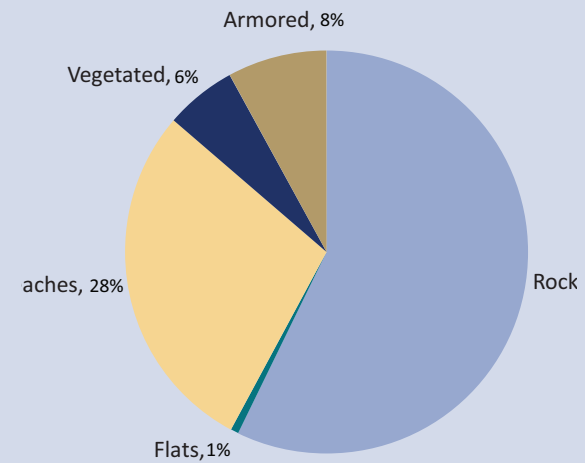


Figure 63. Percent of shoreline habitat in the Pacific Islands Region. *Source: NOAA Environmental Sensitivity Index Maps (22)*

In 2011, the Guam and Hawaii federally insured assets along the coast, were covered by more than 32,000 policies totaling more than \$6.5 billion of insured assets in the coastal floodplain.


Federally Insured Assets Along the Coast (thousands of dollars)

	Policies	Premiums	Coverage	Claims Payout
Guam	218 (34)	\$376 (33)	\$44,396 (33)	\$1,058 (32)
Hawaii	31,971 (13)	\$24,420 (14)	\$6,492,363 (13)	\$42,120 (21)

Table 29: National Flood Insurance Program policies, premiums, coverage, and claim payouts for 2011 for federally insured assets along the coast of Guam and Hawaii. The numbers in parenthesis indicate the state ranking for a specific variable. *Source: Federal Emergency Management Agency (7)*

Northeast Region

photo credit: Ben Kimball



Intertidal zones are transitional coastal regions located between high and low tide marks. They can be found along rocky shores or sandy beaches. Rocky intertidal regions are characterized by sturdy boulders, rocks, crevices, and ledges that are home to a variety of organisms. The rocky intertidal region can be divided into four vertical zones based on height and tidal influence. These four zones include, from highest to lowest, the splash zone, the high intertidal zone, the mid-intertidal zone, and the low intertidal zone. Easy access to rocky intertidal regions provides a tremendous opportunity for people to experience nature and learn about the diverse species that live in this unique and challenging environment.

SPOTLIGHT: Northeastern Offshore Wind Resources

photo credit: istockphoto.com

In an effort to spur economic growth, combat climate change, and reduce pollution, the United States has pursued the development of a variety of renewable energy sources. Of these, wind energy has grown the fastest in the last five years and is poised to continue leading other renewable energy technologies. Offshore wind, where wind speeds are higher and more sustained, represents some of the most promising new wind developments, and nearly one third of all US offshore wind potential is located in the Mid-Atlantic and New England Region.

(Musial, Ram, and NREL, 2011)

Estimates of offshore wind potential in the Northeastern states from Virginia to Maine total 801.8 gigawatts over more than 160,000 square kilometers. If every resource were harnessed, this would be an amount sufficient to power every home in the United States. With improving technology, this potential could grow further.

Physical constraints, infrastructure needs, and environmental concerns drive a gap between potential and feasible generation. Water depth is a significant constraint because most wind turbines require a permanent tower and footing installed on the seafloor for support. In “shallow” areas up to 30m, current monopile towers are sufficient for conditions in the Northeast. In “transitional” areas (30m-60m depth), more complex foundations are required. In “deep” water (>60m), floating structures will likely be necessary, but are expensive and still in development. In the Northeast, around one third of all offshore wind potential is located in depths of less than 30m, around 30% is in depths between 30m and 60m, and around 37% is in depths greater than 60m.

(Schwartz et al., 2010)

Transmission infrastructure is required to transport electricity to populated areas. A significant investment is required to build the needed distribution system and a number of “collector” connections have been proposed along the Northeast. The expense of building infrastructure to collect and distribute offshore wind is compounded by the corrosive sea environment where extreme temperatures, fouling, and salinity shorten the life of man-made installations.

Finally, environmental and socio-economic concerns must be addressed before development begins. Environmental concerns include (but are not limited to) the effects on wildlife (rotor strikes with birds; vibration effects on aquatic life; electromagnetic effects from undersea cables) and on habitat (disruption of the seafloor during construction of footings; changes in sediment due to “scouring” behind footings). Socio-economic concerns include the visual impacts of offshore wind farms on tourism, the limitation of access to fishing grounds, and changes in local cultures and economies.

As environmental and socio-economic impacts are addressed, deeper-water technologies are demonstrated, and new transmission infrastructure is completed, it is likely that Northeastern offshore wind energy will contribute a larger percentage of the United States energy portfolio in the coming years.

Northeast Region

The Northeast Region has many sounds, bays, inlets, islands, and related features that characterize its coastal area. Some examples are: Nantucket Sound and Long Island Sound; Cape Cod, Casco, Chesapeake, and Penobscot Bays; and Deer Isle, Martha's Vineyard, Mt. Desert, Nantucket, and Vinalhaven are some of the larger islands in the Region.

OVERVIEW

- Coastal Demographics
- Coastal Economy
- Commercial Fisheries
- Recreational Fisheries
- Fishing Communities
- Marine Protected Species
- Aquaculture
- Habitat

The Northeast Region includes the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland and Virginia. These states combined share 901 miles of coastline: 28 miles in Delaware; 228 miles in Maine; 31 miles in Maryland; 192 miles in Massachusetts; 13 miles in New Hampshire; 130 miles in New Jersey; 127 miles in New York; 40 miles in Rhode Island; and 112 miles in Virginia. Connecticut has no ocean coastline but does have 618 miles of the Region's tidal shoreline on Long Island Sound and its inlet.

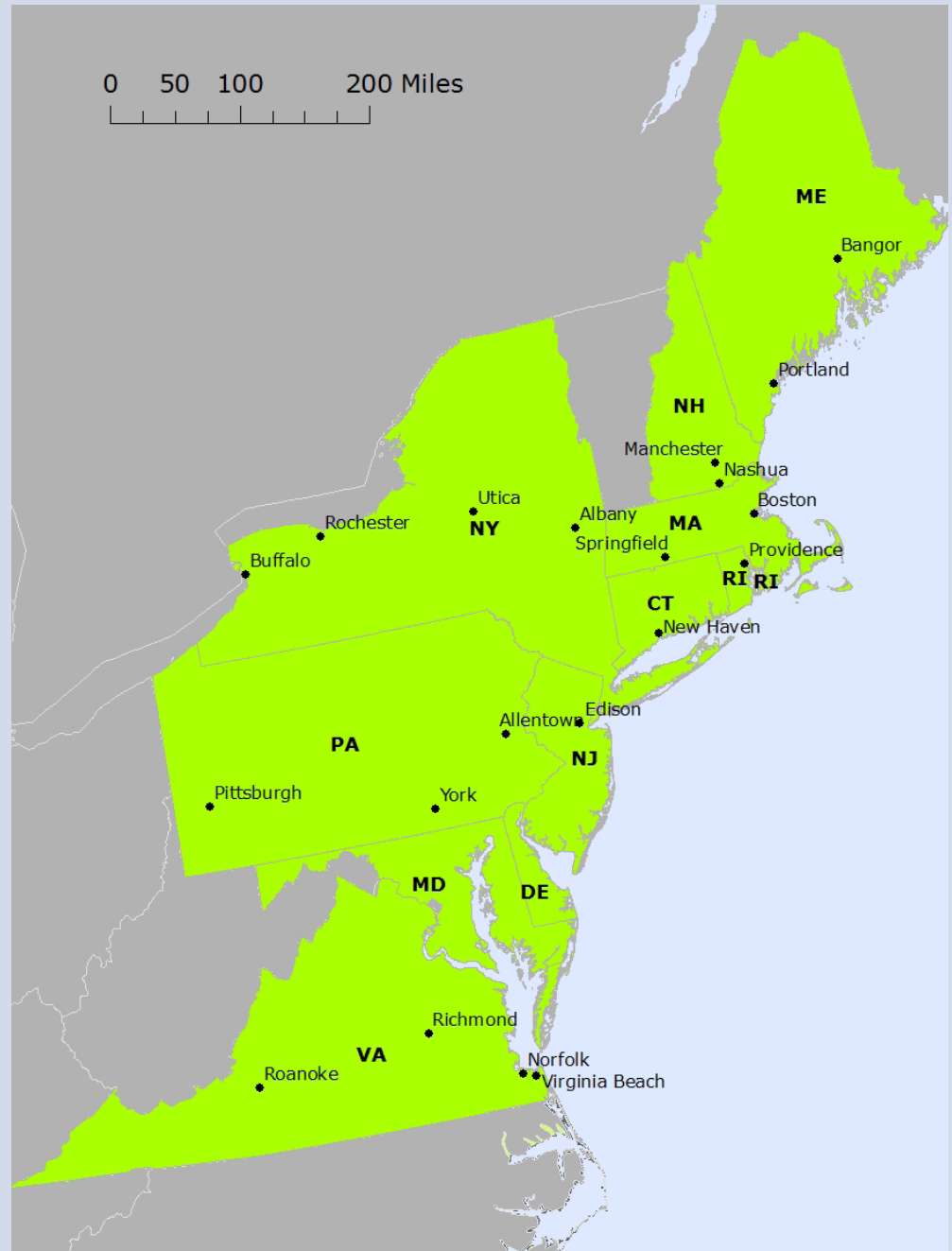


Figure 64. Map of the Northeast Region.

The Northeast Region coastal county population increased by 20% since 1970. From the states within the region, Virginia's coastal county population increased most rapidly (57%) since 1970 while New York's coastal county population increased the slowest (5%) since 1970.

Coastal Watershed Counties Population Change from 1970 to 2010

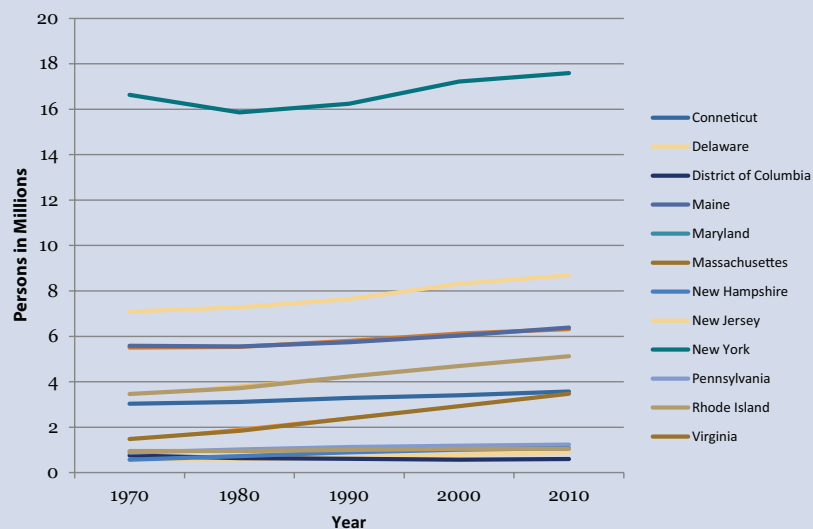


Figure 65. Total population of the Northeast Region coastal watershed counties from 1970 to 2010. Source: US Census Bureau (25,27,28,29,30); Woods and Poole Economics, Inc.(42)

In the Northeast Region coastal counties, approximately 69% of the population is White.

Racial Distribution

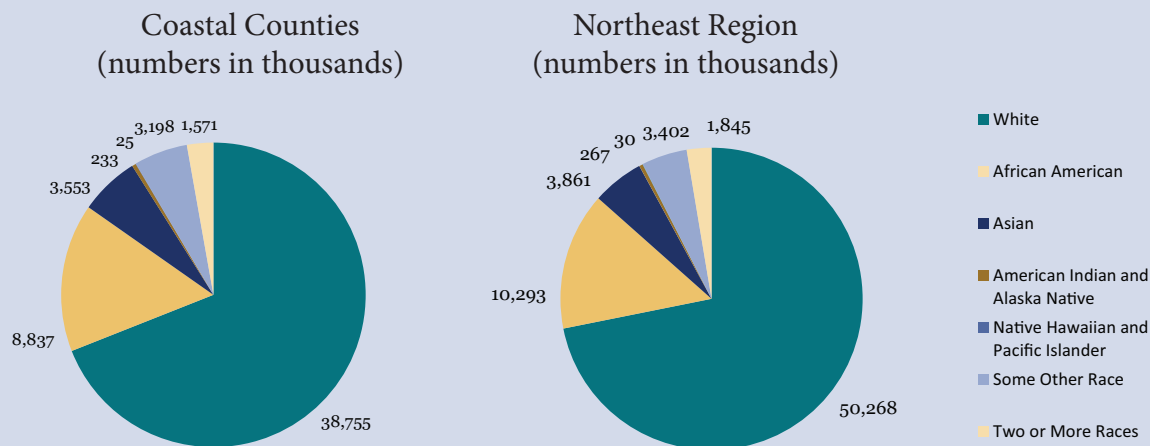


Figure 66. 2010 racial structure in Northeast Region coastal counties and the Northeast Region. Source: US Census Bureau (30)

Females represent 52% of the coastal county population, while 23% of the population is under 18 years of age. In general, the demographics of the Northeast Region coastal counties are representative of the demographics for the entire Northeast Region states.

Gender Distribution

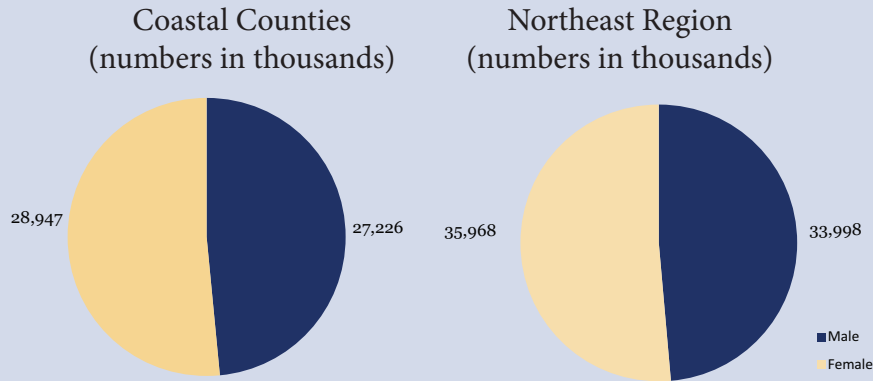


Figure 67. 2010 Gender structure in Northeast Region coastal counties and the Northeast Region. *Source: US Census Bureau (30)*

Age Distribution

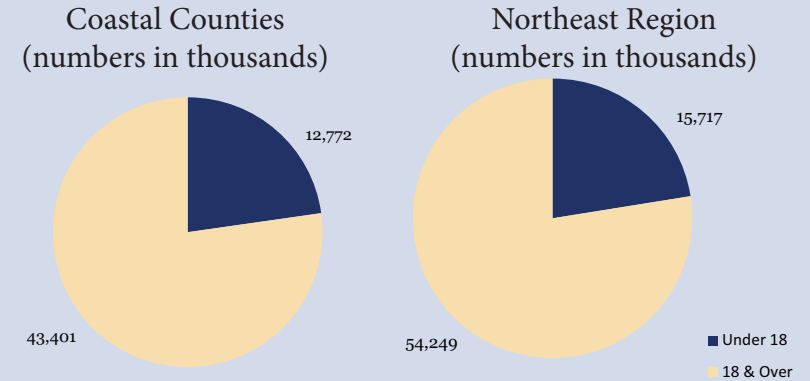


Figure 68. 2010 Age distribution in Northeast Region coastal counties and the Northeast Region. *Source: US Census Bureau (30)*

In 2010, New Hampshire had the highest median household income at \$66,707, and Maine had the lowest median household income at \$48,133. Also, from 1984 through 2010, New Hampshire experienced the greatest increase in median household income by 29%, while Delaware experienced the lowest increase in median household income by 7%.

Median Household Income

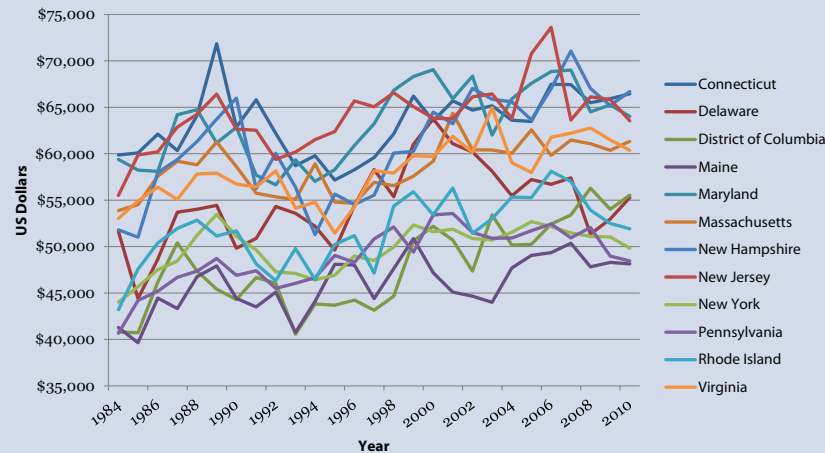


Figure 69. Northeast Region median household income (adjusted to 2010 US Dollars) from 1984 - 2010. *Source: US Census Bureau (31)*

In 2010, 84% of employment in the Northeast Region occurred in coastal counties generating \$1.46 trillion in wages.

Wages in Coastal Counties and States

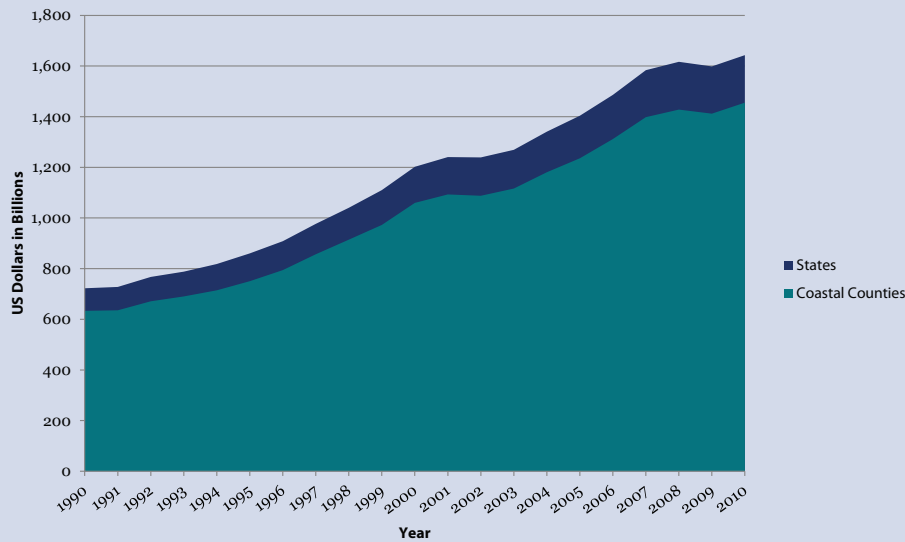


Figure 70. Wages of the Northeast Region coastal counties and state from 1990 to 2010.
Source: Bureau of Labor Statistics (5)

Employment in Coastal Counties and States

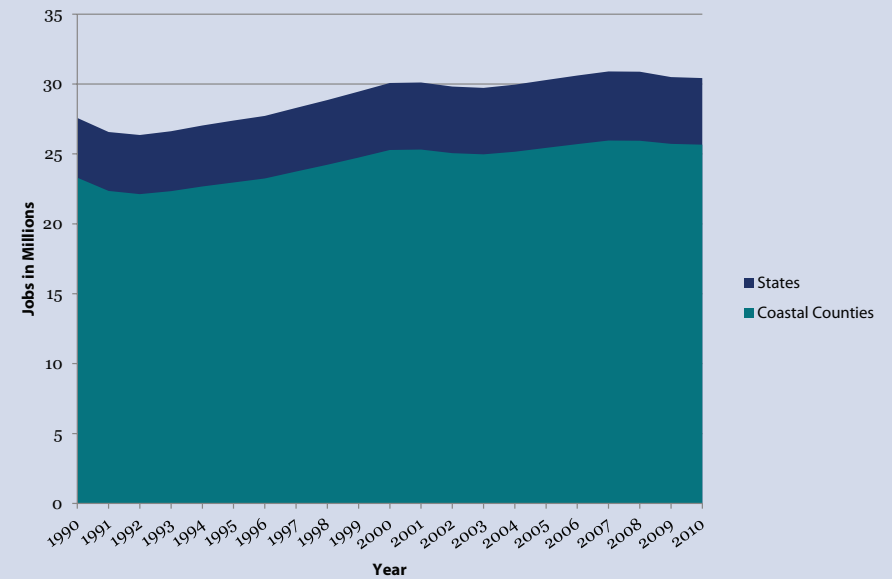


Figure 71. Employment of the Northeast Region coastal counties and state from 1990 to 2010.
Source: Bureau of Labor Statistics (5)

Northeast Region County Health Rankings

CONNECTICUT	DELAWARE	MAINE	MARYLAND	MASSACHUSETTS	NEW HAMPSHIRE	NEW JERSEY	NEW YORK	PENNSYLVANIA	RHODE ISLAND	VIRGINIA
1. Tolland	1. New Castle	1. Sagadahoc	1. Howard	1. Dukes	1. Merrimack	1. Hunterdon	1. Putnam	1. Union	1. Bristol	1. Fairfax
2. Middlesex	2. Sussex	2. Hancock	2. Montgomery	2. Nantucket	2. Rockingham	2. Morris	2. Tompkins	2. Chester	2. Newport	2. Arlington
3. Fairfield	3. Kent	3. Cumberland	3. Queen Anne's	3. Middlesex	3. Grafton	3. Somerset	3. Saratoga	3. Juniata	3. Washington	3. Loudon
4. Litchfield		4. York	4. Frederick	4. Norfolk	4. Cheshire	4. Bergen	4. Rockland	4. Centre	4. Kent	4. Albemarle
5. New London		5. Knox	5. Carroll	5. Hampshire	5. Hillsborough	5. Sussex	5. Livingston	5. Montgomery	5. Providence	5. York

Table 30. Top five counties in the Northeast Region in 2012 for population health. Health rankings are determined using measures of mortality (premature death) and morbidity (poor or fair health, poor physical health days, poor mental health days, and low birth weight). Coastal counties are in bold. Source: County Health Rankings and Roadmaps (6)

In 2010, the coastal county GDP of New York was the highest of the Northeast Region and rank 2nd in the US, while the coastal county GDP of New Hampshire was the lowest of the Northeast Region and ranked 27th in the US.

Coastal Counties and States GDP

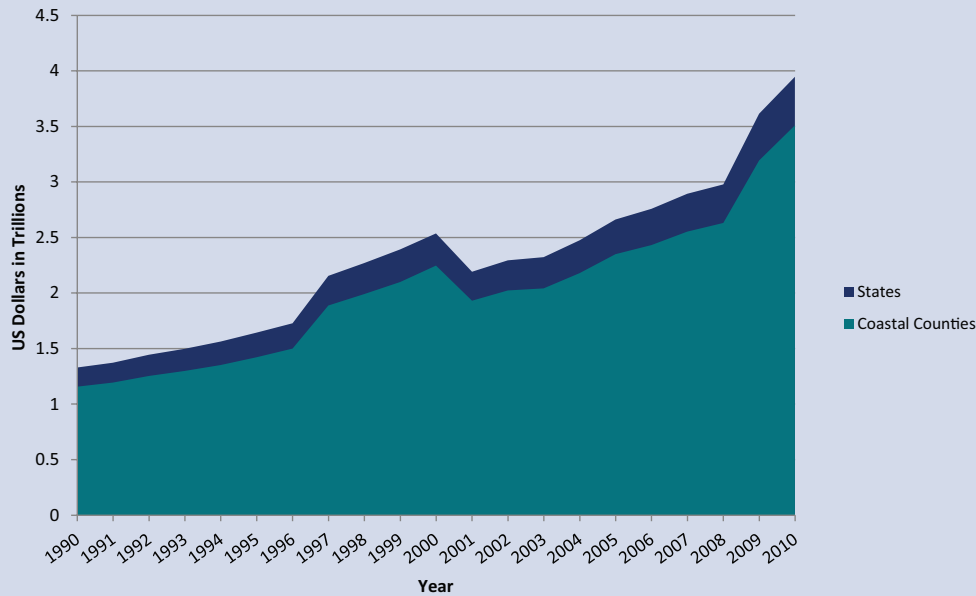


Figure 72. Gross Domestic Product (GDP) of the Northeast Region coastal counties and states from 1990 to 2010. Source: Bureau of Economic Analysis (3)

Coal and nuclear energy account for 80% of the Northeast Region energy production from 1960 through 2009, but during this time period coal energy production decreased by 31% while nuclear energy production increased by 7,000%.

Energy Production

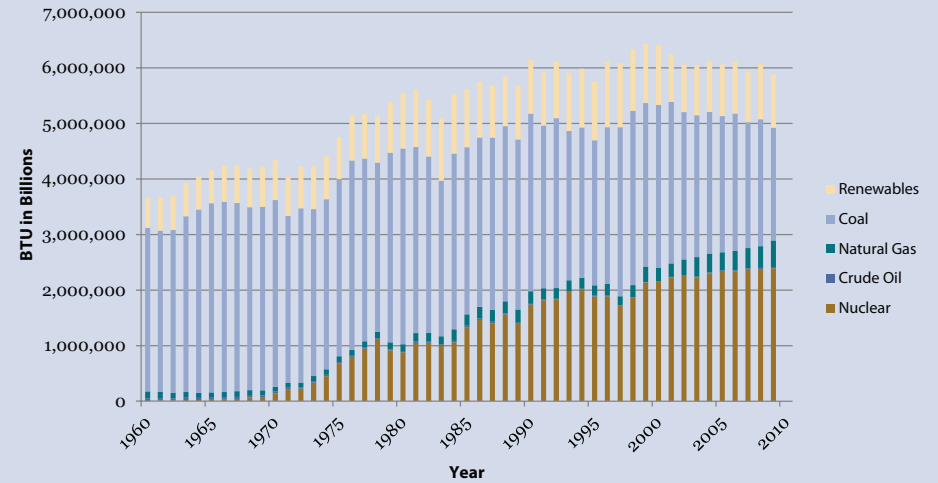


Figure 73. Energy production estimates for the Northeast Region from 1960 to 2009. British Thermal Unit (BTU) is a traditional unit of energy equal to about 1.055 KJoules. Source: US Energy Information Administration (33,34,35,36,37,38)

Ports Imports and Exports

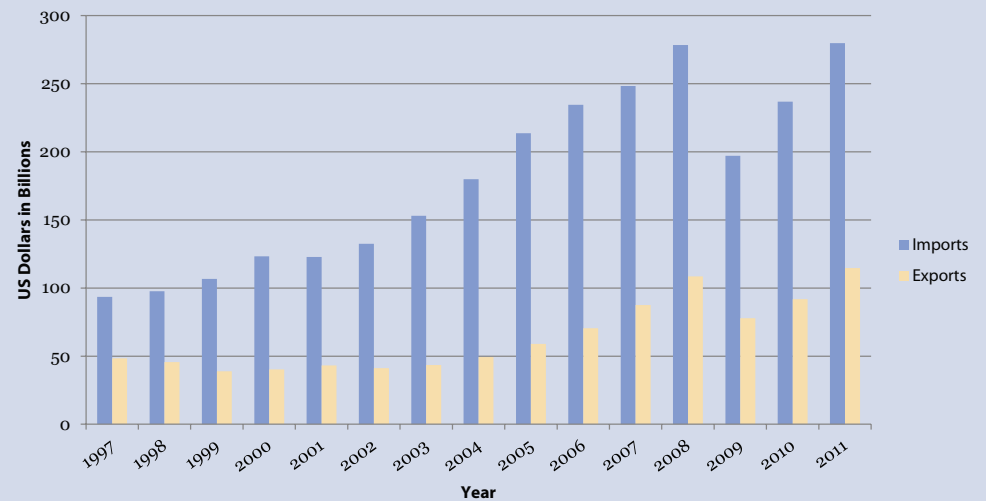


Figure 74. Value of imports and exports from Northeast Region ports from 1997 to 2011. Source: US Army Corps of Engineers, Navigation Data Center (24)

In 2011, commercial fisherman in the Northeast Region landed roughly 1.4 billion pounds of finfish and shellfish, earning \$1.64 billion in landings revenue. Landings revenue was dominated by sea scallop (\$580 million) and American lobster (\$423 million).

Commercial Fishing Revenue

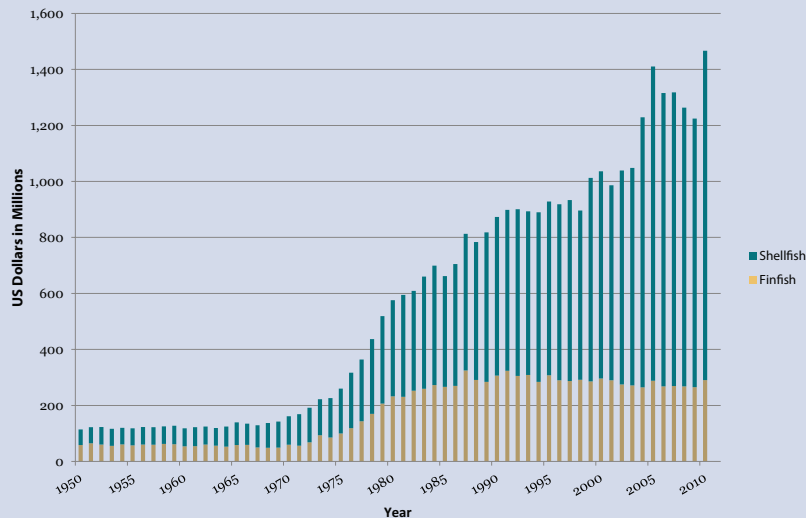


Figure 75. Commercial fishing landings revenue in the Northeast Region from 1950 to 2011.
Source: National Marine Fisheries Service (14)

Commercial Fishing Landings

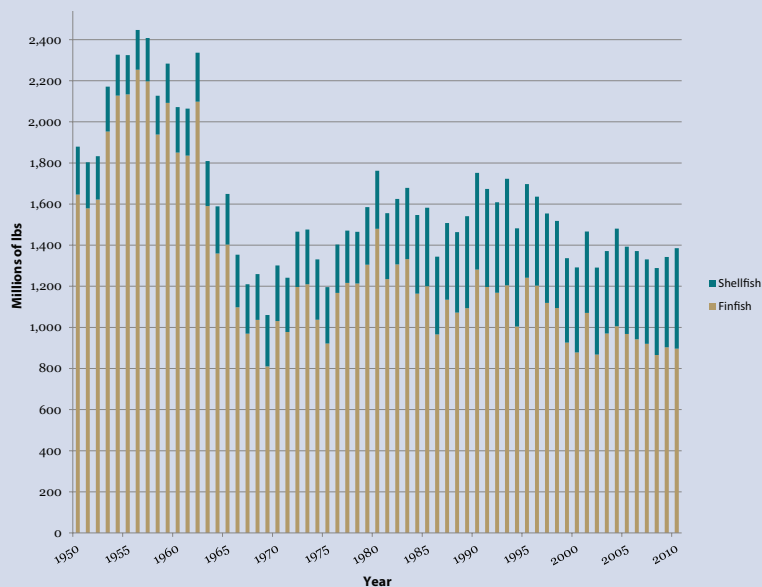


Figure 76. Commercial fishing landings in the Northeast Region from 1950 to 2011.
Source: National Marine Fisheries Service (14)

Along the Northeast Region, a total of 50 stocks or complexes are managed by the National Marine Fisheries Service and the New England and Mid-Atlantic Fishery Management Councils. In 2011, eight stocks experienced overfishing, and fourteen stocks were overfished (Table 30).

2011 Stocks That Experienced Overfishing and Overfished Stocks

Overfishing Stocks	Overfished Stocks
Cod – Georges Bank (GB)	Atlantic salmon
Cod – Gulf of Maine (GOM)	Cod GB
White hake	Atlantic halibut
Windowpane – GOM/GB	Atlantic wolfish
Windowpane – Southern New England (SNE)/ Mid-Atlantic (MA)	Ocean pout
Witch flounder	White hake
Yellowtail flounder – Cape Cod/GOM	Windowpane – GOM/GB
Yellowtail flounder – SNE/MA	Winter flounder – SNE/MA
	Witch flounder
	Yellowtail flounder – Cape Cod/GOM
	Yellowtail flounder – GB
	Yellowtail flounder – SNE/MA
	Thorny skate – GOM
	Butterfish

Table 31. Northeast Region stocks in 2011 that experienced overfishing and were overfished.

Average Price of Top 5 Commercial Fishing Species

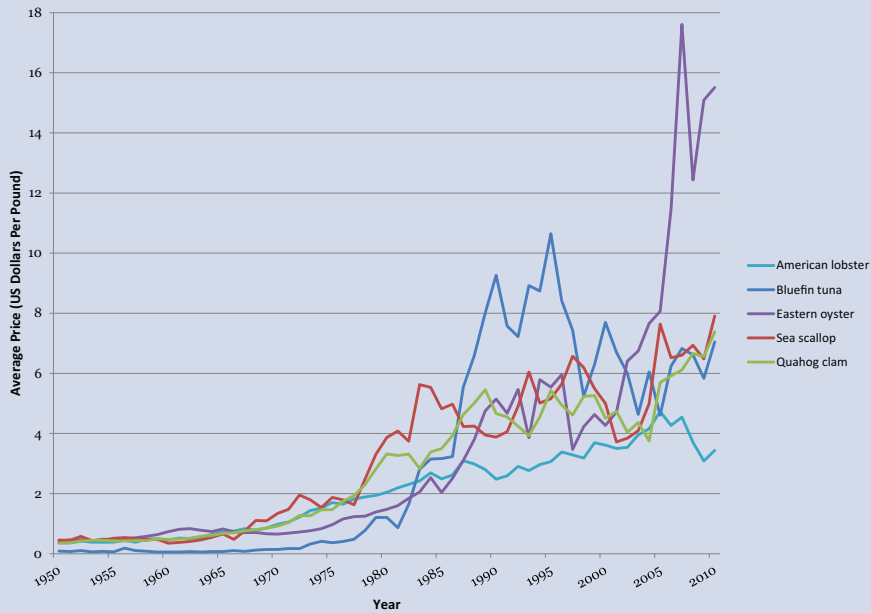


Figure 77. Average price of top five commercial fishing species in the Northeast Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

2011 Economic Impacts of the Seafood Industry (thousands of dollars)

	Landings Revenue	Jobs	Value Added
Connecticut	\$19,668	4,514	\$257,905
Delaware	\$7,091	339	\$14,661
Maryland	\$76,722	15,274	\$665,883
Massachusetts	\$565,238	98,358	\$3,090,449
Maine	\$424,712	31,127	\$829,833
New Hampshire	\$23,483	5,968	\$287,785
New Jersey	\$214,191	43,638	\$2,407,754
New York	\$37,625	41,847	\$1,801,303
Rhode Island	\$75,956	9,157	\$397,018
Virginia	\$191,665	22,082	\$800,243

Table 32. Seafood industry economic impacts for 2011. The US seafood industry includes the commercial harvest sector, seafood processors and dealers, seafood wholesalers and distributors, importers, and seafood retailers. Value added refers to the increased value of fish at each stage of production, exclusive of initial costs. Source: National Marine Fisheries Service (14)

In 2011, Massachusetts had the highest landings revenue in the region with \$565 million, followed by Maine (\$424 million), and New Jersey (\$214 million).

In 2011, Massachusetts had the largest seafood industry sales impacts, generating \$7.8 billion, followed by New Jersey (\$6.6 billion), and New York (\$5.1 billion).

In 2011, over 3.7 million recreational saltwater anglers took 22.1 million fishing trips in the Northeast Region. Over 92% of these anglers were residents of a regional coastal county.

Saltwater Recreational Fishing Trips



Figure 78. Total number of saltwater recreational fishing trips in the Northeast Region from 1981 to 2011. Source: National Marine Fisheries Service (14)

Summer flounder was the most caught saltwater species or species group, with approximately 21.5 million harvested or released in 2011. Atlantic croaker and porgies (scup) were also caught and released in large numbers, 9.3 million and 6.5 million, respectively.

Saltwater Fish Harvested and Released

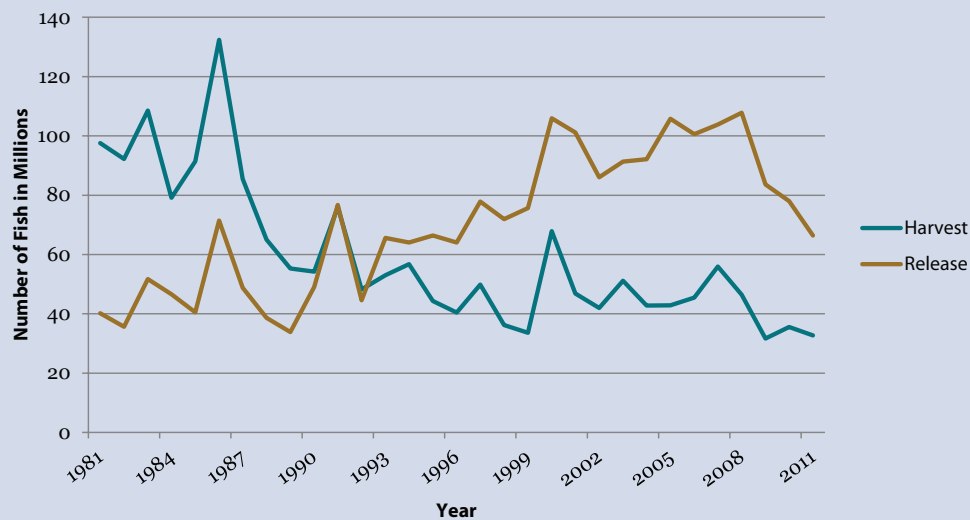


Figure 79. Total number of saltwater fish harvested and released during recreational fishing activities in the Northeast Region from 1981 to 2011. Source: National Marine Fisheries Service (14)

2011 Economic Impacts of the Recreational Saltwater Fishing Expenditures (thousands of dollars)

State	Jobs	Total Sales	Value Added
Connecticut	909	\$128,921	\$75,685
Delaware	795	\$120,877	\$55,535
Maryland	5,745	\$783,833	\$396,620
Massachusetts	5,322	\$726,164	\$390,731
Maine	843	\$77,071	\$39,313
New Hampshire	376	\$41,005	\$22,614
New Jersey	9,965	\$1,697,115	\$870,983
New York	2,972	\$369,382	\$212,169
Rhode Island	1,273	\$157,111	\$73,650
Virginia	7,237	\$833,508	\$433,725

Table 33. Economic impacts from recreational saltwater fishing activities in the Northeast Region for 2011. Source: National Marine Fisheries Service (15)

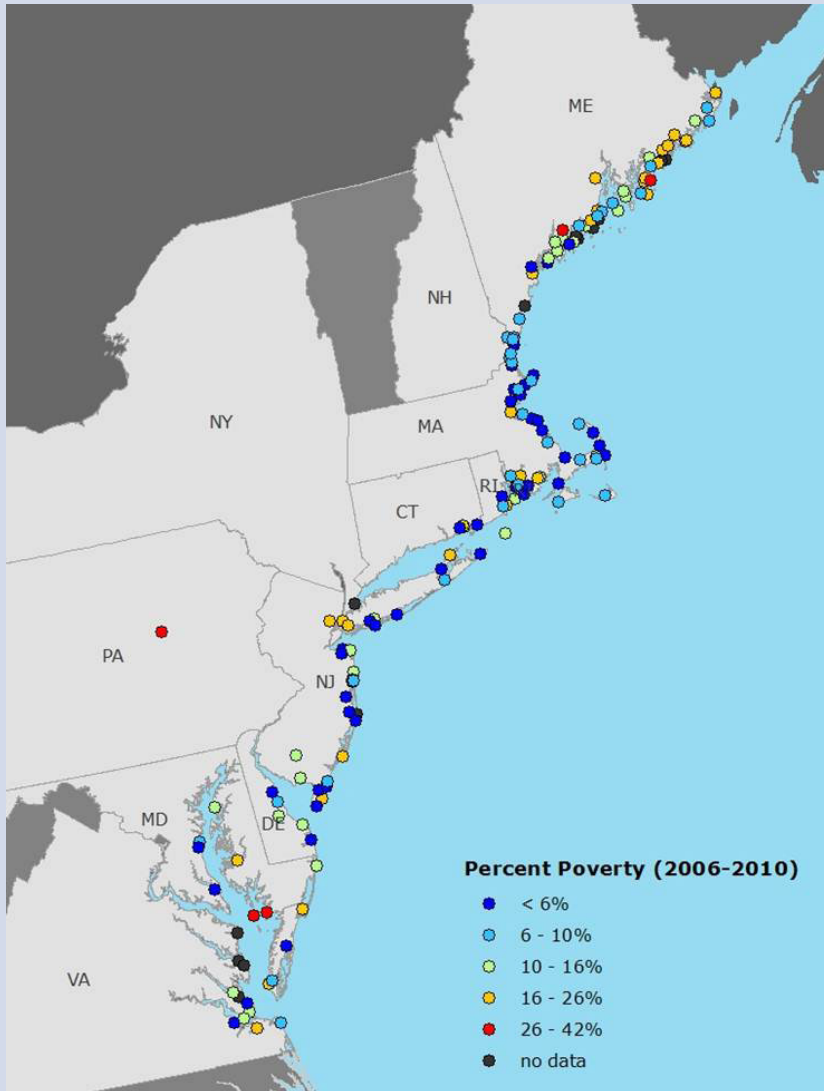


Figure 80. Poverty levels in profiled Northeast Region fishing communities, averaged from 2006 to 2010. *Source: National Marine Fisheries Service (11)*

Overall, NOAA Fisheries scientists have obtained information of the social and economic characteristics of 142 fishing communities in the Northeast Region because of the nature of their links with commercial and/or recreational fishing: 4 in Connecticut, 5 in Delaware, 40 in Maine, 8 in Maryland, 30 in Massachusetts, 5 in New Hampshire, 19 in New Jersey, 10 in New York, 1 in Pennsylvania, 9 in Rhode Island, and 11 in Virginia. In 2010, 14 of the top 50 ports by landings revenue were located in the Northeast Region. New Bedford, Massachusetts has had the highest commercial fishing landings value among all US ports since 2000.

Top 5 Commercial Fishing Communities (2010)

Rank	Community Name	Landings Revenue (million \$)
1	New Bedford, MA	\$306.0
2	Cape May - Wildwood, NJ	\$81.0
3	Hampton Roads Area, VA	\$75.4
4	Gloucester, MA	\$56.6
5	Stonington, ME	\$45.3

Table 34. Top five commercial fishing communities in the Northeast Region by landings revenue in 2010. *Source: National Marine Fisheries Service (14)*

Top 5 Recreational Fishing Communities (2010)

Rank	Community Name	For-Hire Permits (number)
1	Virginia Beach, VA	62
2	Montauk, NY	54
3	Brick, NJ	44
4	Gloucester, MA	33
5	Marshfield, MA	31

Table 35. Top five recreational fishing communities in the Northeast Region by number of for-hire permits in 2010. *Source: National Marine Fisheries Service (18)*

Coastal Species Protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)	
ESA Species	MMPA Species
Blue whale	Atlantic spotted dolphin
Fin whale	Atlantic white-sided dolphin
Humpback whale	Blainville's beaked whale
North Atlantic right whale	Bottlenose dolphin
Sei whale	Clymene dolphin
Sperm whale	Cuvier beaked whale
Green sea turtle (2)*	Dwarf sperm whale
Hawksbill sea turtle	Gervia's beaked whale
Kemp's ridely sea turtle	Gray seal
Leatherback sea turtle	Harbor porpoise
Loggerhead sea turtle (9)*	Harbor seal
Atlantic salmon (1)*	Long-finned pilot whale
Atlantic sturgeon (5)*	Melon-headed whale
Shortnose sturgeon	Minke whale
	Northern bottlenose whale
	Pan ropical spotted dolphin
	Pygmy killer whale
	Pygmy sperm whale
	Risso's dolphin
	Rough-toothed dolphin
	Short-beaked common dolphin
	Short-finned pilot whale
	Sowerby's beaked whale
	Spinner dolphin
	Striped dolphin
	True's beaked whale

* The term "species" under the ESA includes species, subspecies, and for vertebrates only, "distinct population segments (DPSs)". Loggerhead and green sea turtles, Atlantic salmon, and Atlantic sturgeon are listed in DPSs. The parenthesis indicate the number of listed DPSs for each species.

Table 36. Marine and anadromous species protected by the Endangered Species Act, and marine mammals protected by the Marine Mammal Protection Act in the Northeast Region. Source: National Marine Fisheries Service (16)

Wild Atlantic salmon population levels are very low, due to a number of factors including habitat destruction, dams, and historic overfishing. Atlantic salmon once returned by the hundreds of thousands to most major rivers along the northeastern US but now only return in small numbers to rivers in Maine. Commercial fishing for the species is currently prohibited by law, and the Gulf of Maine population is protected under the ESA. Substantial efforts are ongoing to restore wild Atlantic salmon and its habitat. They include improving fish passage by removing or modifying dams so salmon can reach the freshwater spawning and rearing areas critical to their survival, understanding and improving historically low salmon survival in the ocean, and supplementing wild populations with hatchery-raised Atlantic salmon.

Number of Species Listed Under the ESA

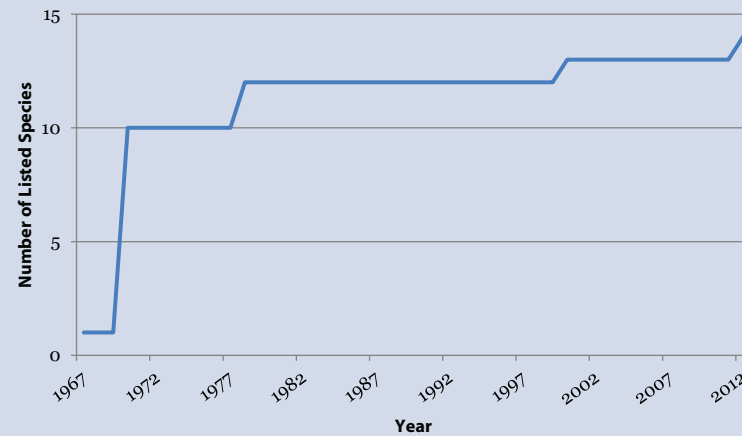


Figure 81. Number of species protected by the Endangered Species Act in the Northeast Region from 1967 to 2012. Source: National Marine Fisheries Service (16)

With only 300-400 in existence, North Atlantic right whales are among the most endangered whales in the world. Their slow movement, time spent at the surface, and time spent near the coast makes them highly vulnerable to human activities, especially being struck by ships. In October 2008, NOAA published a "Final Rule to Implement Speed Restrictions to Reduce the Threat of Ship Collisions with North Atlantic right whales" aimed at minimizing the threat of vessel strikes on the North Atlantic right whale population. The rule went into effect in December 2008. The Rule requires all vessels 65 ft. or greater in length to travel at 10 knots or less in certain locations along the east coast of the US Atlantic seaboard at certain times of the year to reduce the threat of ship collisions with critically endangered North Atlantic right whales. Since the ship speed restriction went into effect, no known fatal ship strikes of North Atlantic right whales have occurred in the management zones.

Whale Watching Economic Data

1998				
Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
1,240,000	36	\$30,600,000	\$76,650,000	\$107,250,000
2008				
Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
910,071	31	\$35,000,000	\$91,000,000	\$126,000,000

Table 37. Whale watching economic data for the Northeast Region for 1998 and 2008. Whale watching locations include Stellwagen Bank, Maine, and New Hampshire. Source: *International Fund for Animal Welfare* (8)

Protected Species Valuation

Species	Household Willingness to Pay	National Value (\$ billions)
North Atlantic right whale	\$71.62	\$4.38
Smalltooth sawfish	\$51.89	\$3.18
Leatherback sea turtle	\$67.97	\$4.16
Loggerhead sea turtle	\$44.72	\$2.74

Table 38. Valuation data for some of the Northeast Region marine protected species. Household willingness-to-pay values are expressed as a US household's average willingness-to-pay for recovering a species. Payment is in the form of an increase to the household federal tax bill every year for ten years. The national values reported here represent the present value of aggregated household values across the Nation. All values are reported in 2011 US Dollars. Source: *Conservation Biology* (41)

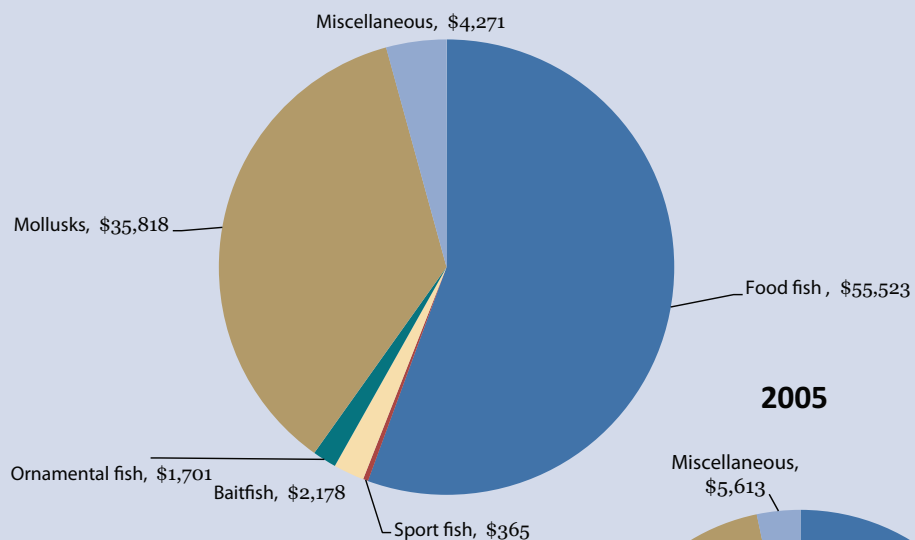
About 20 miles off the coast of Massachusetts, stretching from the tip of Cape Anne to the end of Cape Cod, lies Stellwagen Bank. It encompasses 842 square miles and it is one of 13 National Marine Sanctuaries. Within its boundaries, Stellwagen Bank rises hundreds of feet from the depths of the Atlantic Ocean, forming a massive plateau that lies approximately 100 feet below the surface. The deep ocean currents collide with the plateau, they flow up its side and toward the surface. This process, known as upwelling, bring nutrient-rich water to the ocean's surface, and fueled by sunlight, it sparks a food web that attracts a range of marine life. More than 575 species are found in Stellwagen Bank, including 22 marine mammals. More than 700,000 tourists ventured to Stellwagen Bank on commercial whale watching vessels in 2008. These tourists spent approximately \$126 million on tickets and associated expenses.

The Northeast Region has a small but vibrant commercial marine aquaculture industry supported by a world class research and technology sector. Over 65 species are farmed in the Region. Farmed species in the Northeast Region include fish and shellfish farmed as food for human consumption as well as hatchery-raised species used either to support important commercial and recreational fisheries in the region or for habitat and endangered species restoration. The list of culture species is long and varies, including shellfish and other invertebrates, finfish and other vertebrates and aquatic plants.

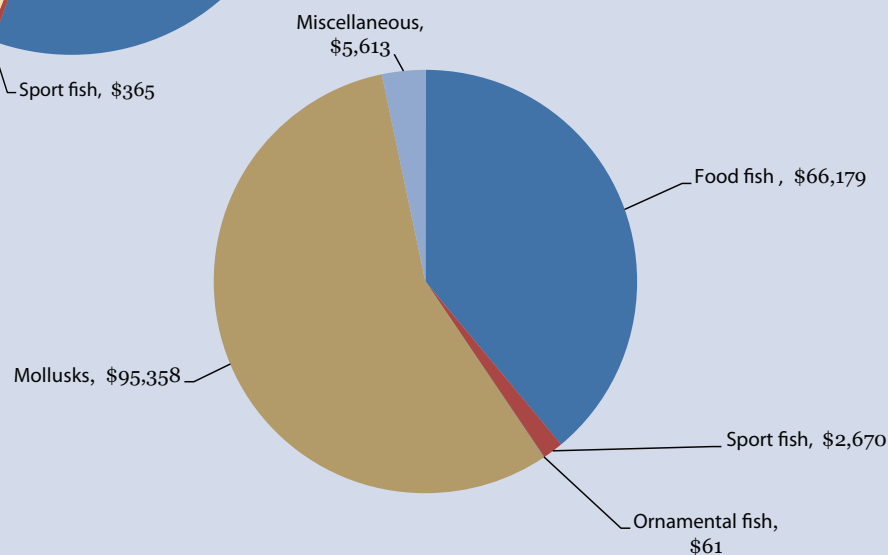
Examples include Atlantic salmon, blue crab, tilapia, sea scallops, and striped bass.

Value of Aquaculture Products Sold
(thousands of dollars)

1998



2005



Saltwater Aquaculture Farms

	Number of Farms	
	1998	2005
Connecticut	15	27
Maine	28	40
Maryland	9	75
Massachusetts	96	140
New Hampshire	0	6
New Jersey	14	70
New York	3	13
Rhode Island	2	11
Virginia	238	122
TOTAL	405	504

Table 39. Total number of saltwater aquaculture farms in the Northeast Region in 1998 and 2005. No data reported for New Hampshire in 1998. Source: US Department of Agriculture (32)

Figure 82. Value of aquaculture products sold by type in the Northeast Region in 1998 and 2005. Source: US Department of Agriculture (32)

The Northeast Region contains a diversity of habitat ranges from fine clay substances to cold-water corals. The hydrography within this Region is also complex with major influxes from the warm Gulf Stream from the south as well as cold, often fresher, waters from the Scotian Shelf to the north.

Approximately 40% of the Northeast Region coastline is considered to be highly or very highly vulnerable to sea level rise.

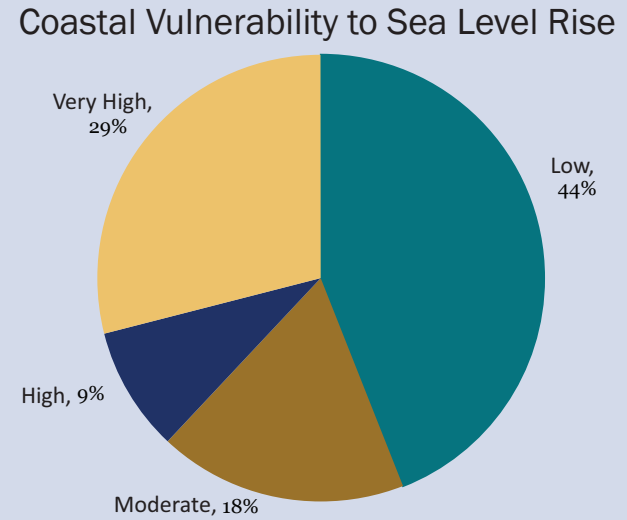
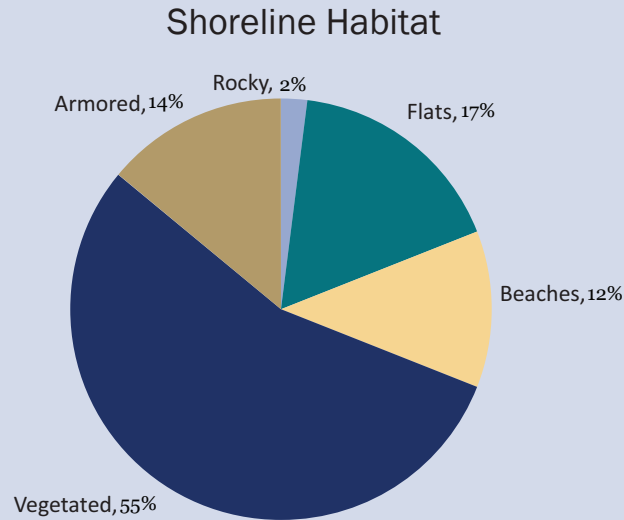


Figure 83. Percent of shoreline habitat in the Northeast Region. *Source: NOAA Environmental Sensitivity Index Maps (22)*

Figure 84. Percent of coastline in the Northeast Region that is vulnerable to sea level rise. *Source: US Geological Survey (40)*

There are 1,689 beaches in the Northeast Region and 90% were monitored in 2011 for pollutants. In 2011, the swimming season averaged 57 days per monitored beach, however, beaches were closed an average of 2 days per season. This means that beaches were open and safe for swimming about 97% of the time.

Percent of Monitored Beaches Affected by Notification Actions

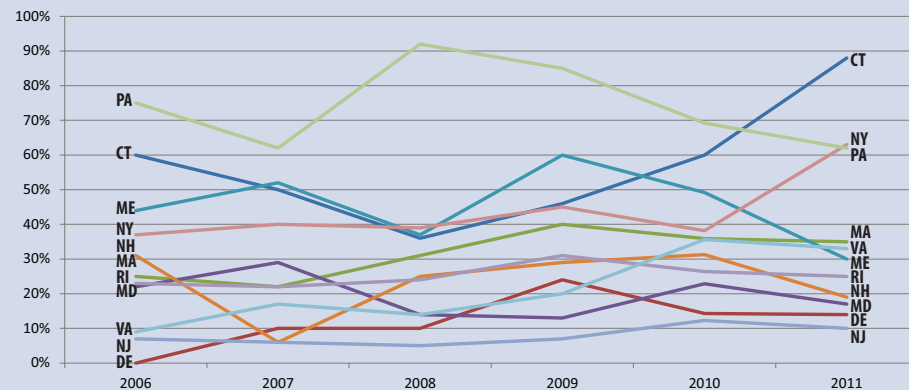


Figure 85. Percent of monitored beaches affected by notification actions in the Northeast Region from 2006 to 2011. Notification actions are issued by states or local agencies when monitoring of water at swimming beaches show that levels of certain bacteria exceed standards which might pose health risks. The notification may be either a beach advisory, warning people of possible risks or swimming, or closing a beach to the public. *Source: Environmental Protection Agency (39)*

Federally Insured Assets Along the Coast (thousands of dollars)

	Policies	Premiums	Coverage	Claims Payout
Connecticut	23,469 (14)	\$32,603 (12)	\$5,073,715 (14)	\$137,499 (14)
Delaware	17,913 (17)	\$13,861 (19)	\$4,087,740 (17)	\$44,870 (19)
Maryland	47,801 (10)	\$29,786 (13)	\$9,547,278 (11)	\$183,496 (13)
Maine	3,266 (27)	\$4,275 (25)	\$622,735 (25)	\$10,206 (29)
Massachusetts	34,367 (12)	\$46,737 (9)	\$7,125,258 (12)	\$203,506 (12)
New Hampshire	3,083 (29)	\$2,780 (28)	\$507,124 (27)	\$11,137 (28)
New Jersey	188,141 (3)	\$170,985 (3)	\$41,332,551 (3)	\$797,290 (5)
New York	69,743 (8)	\$96,689 (6)	\$15,945,978 (8)	\$476,535 (8)
Pennsylvania	4,159 (26)	\$3,742 (26)	\$834,796 (24)	\$34,501 (23)
Rhode Island	10,030 (21)	\$16,391 (17)	\$2,167,562 (20)	\$57,418 (17)
Virginia	51,847 (9)	\$43,778 (10)	\$11,423,605 (9)	\$390,093 (9)


Table 40. National Flood Insurance Program policies, premiums, coverage, and claim payouts for 2011 for federally insured assets along the coast of the Northeast Region. The numbers in parenthesis indicate the state ranking for a specific variable.

Source: Federal Emergency Management Agency (7)

In 2011, the Northeast Region federally insured assets along the coast, were covered by more than 450,00 policies totaling more than \$950 billion of insured assets in the coastal floodplain.

Southeast Region

photo credit: wcu.edu

An aerial photograph showing a long, narrow barrier island stretching from the top left towards the bottom right. The island is composed of light-colored sand and is bordered by a road. To the left of the island is a large body of water, likely a bay or lagoon, with several smaller inlets and channels. The water is a deep blue color. To the right of the island is the open ocean, with white waves breaking against the shore. The overall scene is a coastal landscape with a mix of land, water, and sand.

Barrier islands, a coastal landform and a type of barrier system, are relatively narrow strips of sand that are parallel to the mainland coast. They usually occur in chains, consisting of anything from a few islands to more than a dozen. Excepting the tidal inlets that separate the islands, a barrier chain may extend uninterrupted for over a hundred of miles. The length and width of barriers and overall morphology of barrier coasts are related to parameters including tidal range, wave energy, sediment supply, sea-level trends and basement controls.

SPOTLIGHT: The Lionfish Invasion

The Indo-Pacific lionfish (*Pterois volitans* and *P. miles*) invasion is a poster-child for the unintended consequences of the global aquarium trade. After persisting in low numbers along the southeast coast of the United States since the 1980s as a result of multiple accidental and intentional releases, lionfish have in the past 10 years spread rapidly throughout the Western North Atlantic, Gulf of Mexico, and Caribbean (Figure 1). The invasion consists of two morphologically similar species, however *P. miles* is less abundant and, unlike *P. volitans*, is limited to US waters. Lionfish have successfully colonized a diverse range of habitats, including coral reefs and important nursery areas like seagrass meadows and mangroves. Throughout their invaded range they are phenomenal generalist predators of native marine life. Studies attribute drastic reductions in recruitment and total biomass of lionfish prey species to the invasion. Lionfish are also hazardous to humans due to their venomous spines.

The ultimate extent and intensity of this invasion is not yet known. Biologists believe that lionfish pose a threat to native ecosystems, like coral reefs, and the ecosystem services they provide (e.g., fisheries, biodiversity). Their intense appetite is likely to worsen the effects of overfishing and ocean warming. They are known to consume members of the snapper-grouper complex, and there is concern that the invasion will impede stock rebuilding efforts now underway in

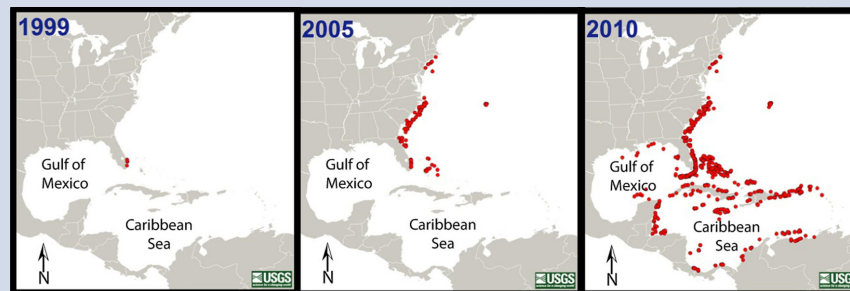


Figure 86. Progression of the lionfish invasion. Source: Adapted from Fig. 1 in Betancur-R et al (2011) (2)

the Southeast. Lionfish also consume herbivores on coral reefs, and this is expected to increase the likelihood of a shift from coral to algae or seaweed-dominated reefs. One study has already linked lionfish to a reduction in herbivore biomass and a subsequent shift to algal domination of a Bahamian reef.

Lionfish present resource managers with a daunting control problem. Lionfish spawn year-round, and females produce over two-million eggs annually. Larvae circulate throughout the Western North Atlantic and Caribbean through ocean currents. Lionfish are also difficult to monitor and can occupy depth refuges of several hundred meters. Since eradication is infeasible, options for local population suppression are now being explored. Some experts have called for a commercial lionfish fishery to be established, although the US Food and Drug Administration recommends against eating lionfish because of the presence of ciguatera toxin in lionfish flesh. Recent evidence shows that lionfish culling by divers in a reef habitat can yield short-term reductions in lionfish abundance. Targeted removal of lionfish in and around sensitive areas, particularly of larger fish, is likely to remain one of the few options available to resource managers, although bycatch and collateral damage to fragile habitat is a concern. Another option is to strengthen and accelerate efforts to improve the health of invaded and non-invaded ecosystems in order to increase their resilience to the invasion.

Southeast Region

The Southeast Region includes North Carolina, South Carolina, Georgia, the Atlantic coast of Florida, Puerto Rico, and the US Virgin Islands. These areas combined share 1,595 miles of coastline: 580 miles in Florida's Atlantic coast, 311 miles in Puerto Rico, 301 miles in North Carolina, 187 miles in South Carolina, 116 miles in the US Virgin Islands, and 100 miles in Georgia.

OVERVIEW

-  Coastal Demographics
-  Coastal Economy
-  Commercial Fisheries
-  Recreational Fisheries
-  Fishing Communities
-  Marine Protected Species
-  Aquaculture
-  Habitat

The Southeast Region has the second highest potential for annual hurricane seasons that can disrupt economic activity, and life in its towns and cities. Communities located along the Region's low-lying coastline are at risk from hurricanes' high winds, associated storm surge, and heavy rain. Since 1960, Florida has received more major disaster declarations for hurricanes and tropical storms combined than the Region's other states; followed in descending order by North Carolina, South Carolina, and Georgia. North Carolina's barrier island chain protrudes far out into the Atlantic, Cape Hatteras is only about 40 miles from the continental shelf and the Gulf Stream. This contributes to that state's increased vulnerability to this kind of natural disaster.

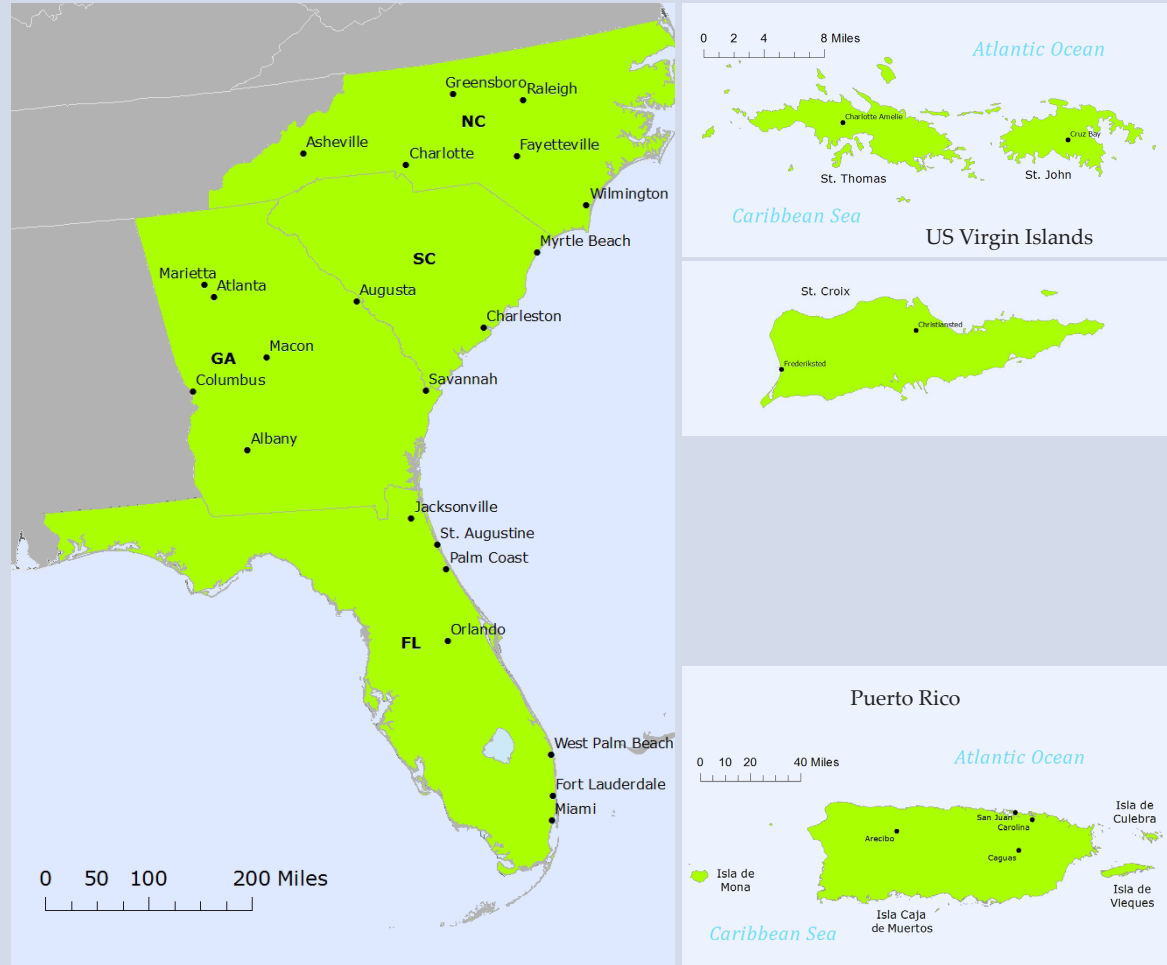


Figure 87. Map of the Southeast Region.

The Southeast Region coastal county population increased by 105% since 1970. From within the Region, the east coast of Florida's coastal county population increased more rapidly (almost 180%) since 1970, while Puerto Rico's coastal county population increased the slowest (37%) since 1970.

Coastal Watershed Counties Population Change from 1970 to 2010

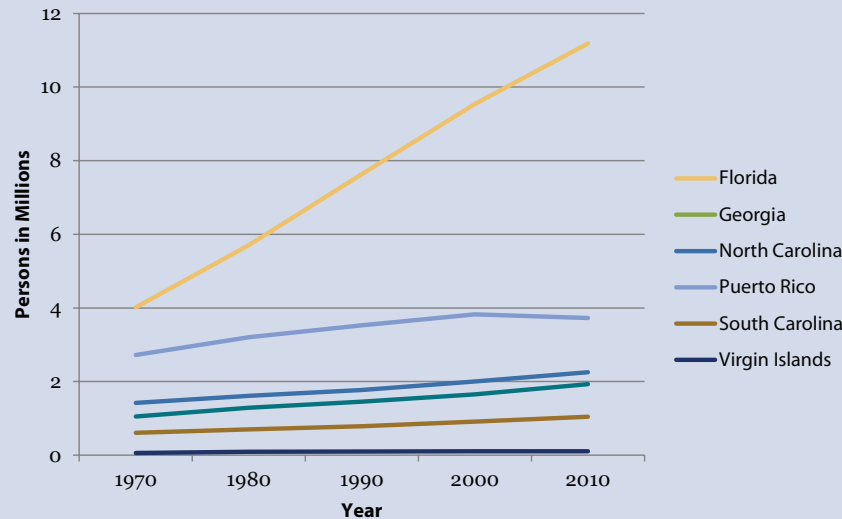


Figure 88. Total population of the Southeast Region coastal watershed counties from 1970 to 2010. Source: US Census Bureau (25,27,28,29,30); Woods and Poole Economics, Inc.(42)

In the Southeast Region coastal counties, 71% of the population are White while 20% of the population are African Americans. Combined, these races make up about 91% of the population in coastal counties.

Racial Distribution

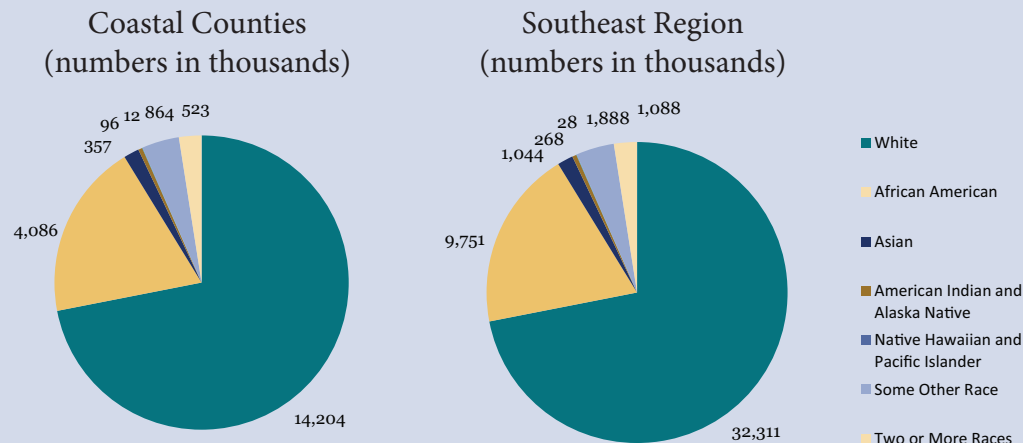


Figure 89. 2010 Racial structure in Southeast Region coastal counties and the Southeast Region. Figure does not include data from Puerto Rico and the US Virgin Islands. Source: US Census Bureau (30)

The coastal county population is evenly split between males and females, while 23% of the population is under 18 years of age and 77% of the population is 18 years of age and older.

Gender Distribution

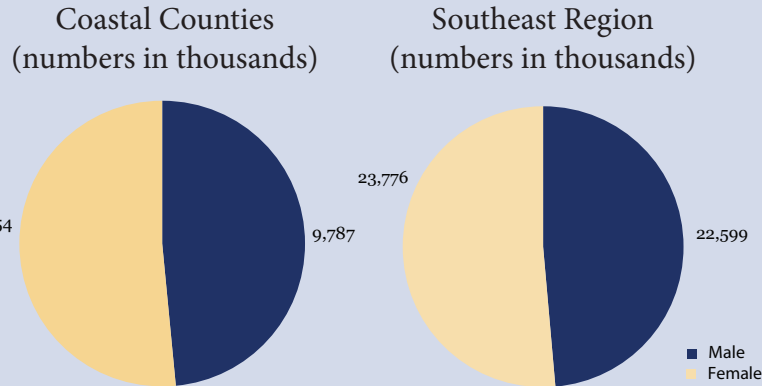


Figure 90. 2010 Gender structure in Southeast Region coastal counties and the Southeast Region. Figure does not include data from Puerto Rico and the US Virgin Islands. *Source: US Census Bureau (30)*

Age Distribution

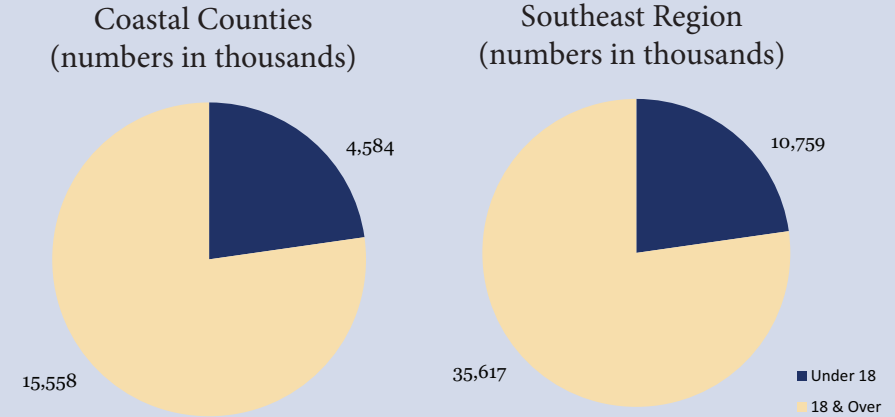


Figure 91. 2010 Age distribution in Southeast Region coastal counties and the Southeast Region. Figure does not include data from Puerto Rico and the US Virgin Islands. *Source: US Census Bureau (30)*

From 1984 through 2010, median household income increased by 3%, 6%, 10%, and 12% in South Carolina, North Carolina, Georgia, and Florida, respectively.

Median Household Income

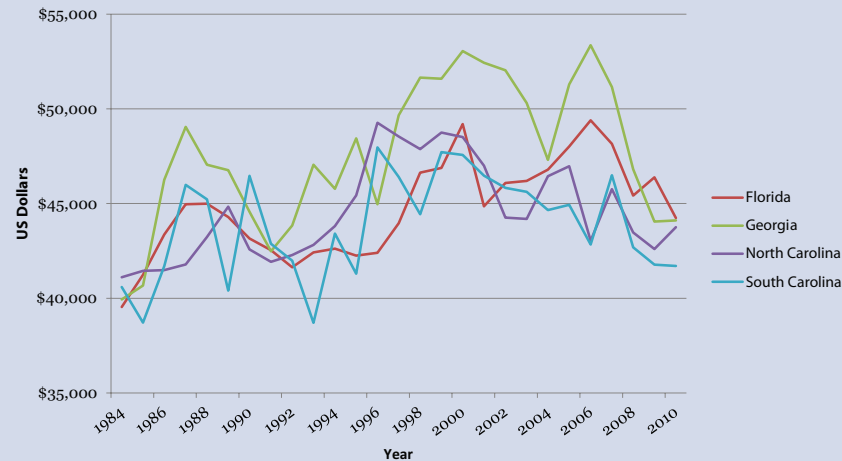


Figure 92. Southeast Region median household income (adjusted to 2010 US Dollars) from 1984 - 2010. Figure includes data from east and west Florida, but does not include data from Puerto Rico and the US Virgin Islands. *Source: US Census Bureau (31)*

In 2010, 40% of the employment in the Southeast Region occurred in coastal counties generating \$259 billion in wages.

Wages in Coastal Counties and States

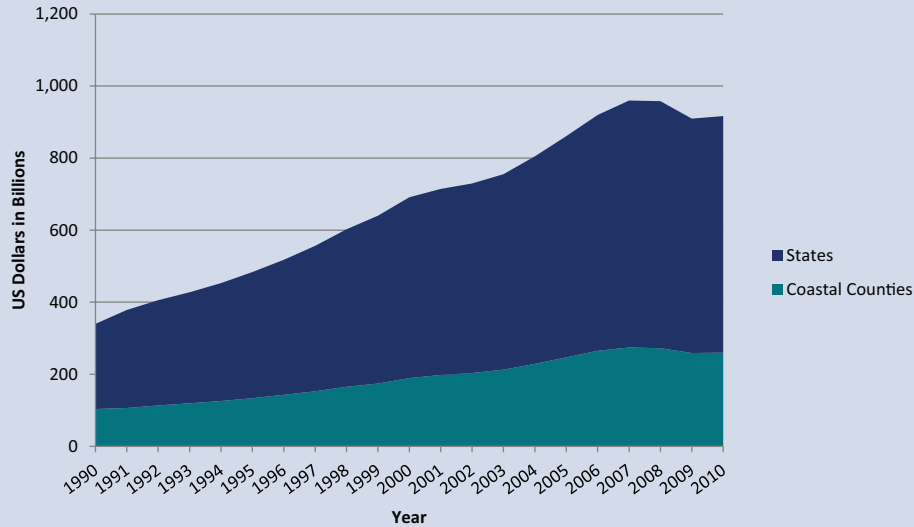


Figure 93. Wages of the Southeast Region coastal counties and states from 1990 to 2010. Figure includes data from east and west Florida but does not include data from Puerto Rico and the US Virgin Islands. *Source: Bureau of Labor Statistics (5)*

Employment in Coastal Counties and States

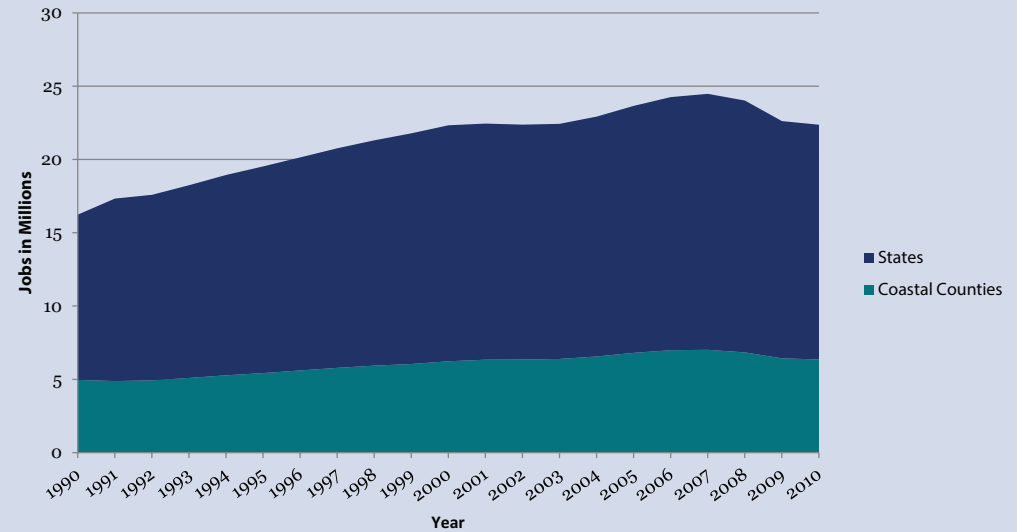


Figure 94. Employment of the Southeast Region coastal counties and states from 1990 to 2010. Figure includes data from east and west Florida but does not include data from Puerto Rico and the US Virgin Islands. *Source: Bureau of Labor Statistics (5)*

Southeast Region County Health Rankings

FLORIDA	GEORGIA	NORTH CAROLINA	SOUTH CAROLINA
1. St. Johns	1. Fayette	1. Wake	1. Beaufort
2. Seminole	2. Forsyth	2. Orange	2. York
3. Sarasota	3. Oconee	3. Union	3. Lexington
4. Collier	4. Cherokee	4. Mecklenburg	4. Greenville
5. Martin	5. Gwinnett	5. Dare	5. Dorchester

Table 41. Top five counties in the Southeast Region in 2012 for population health. Health rankings are determined using measures of mortality (premature death) and morbidity (poor or fair health, poor physical health days, poor mental health days, and low birth weight). Coastal counties are in bold. *Source: County Health Rankings and Roadmaps (6)*

In 2010, the coastal county GDP of Florida was the highest of the Southeast Region ranking 3rd in the US, while the coastal county GDP of Georgia was the lowest on the Southeast Region ranking 28th in the US.

Coastal Counties and States GDP

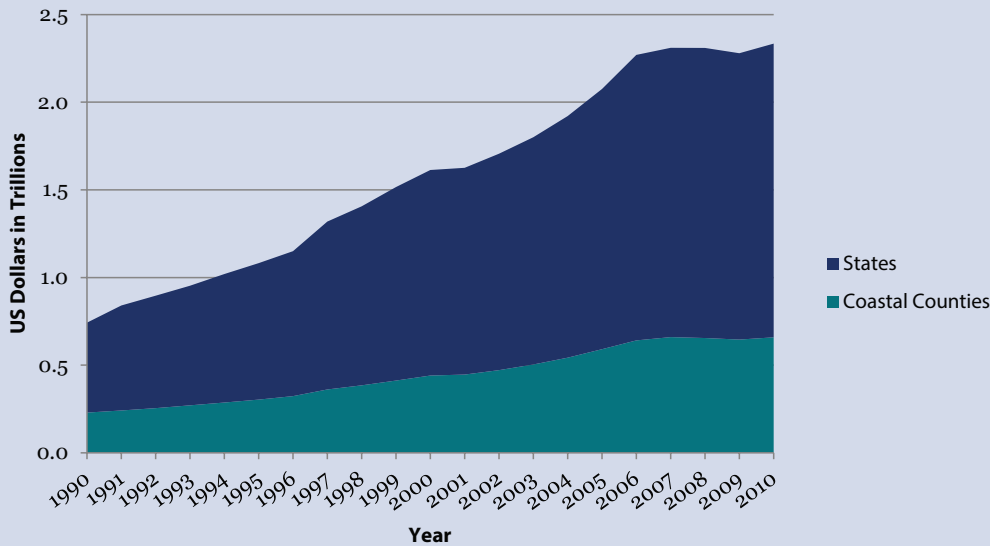


Figure 95. Gross Domestic Product (GDP) of the Southeast Region coastal counties and states from 1990 to 2010. Figure includes data of east and west Florida but does not include data from Puerto Rico and the US Virgin Islands. Source: Bureau of Economic Analysis (4)

The Southeast Region energy production increased by 471% between 1960 and 2009. This large increase was primarily due to increased production of nuclear energy. Also during this time period renewables energy production increased by 45%.

Energy Production

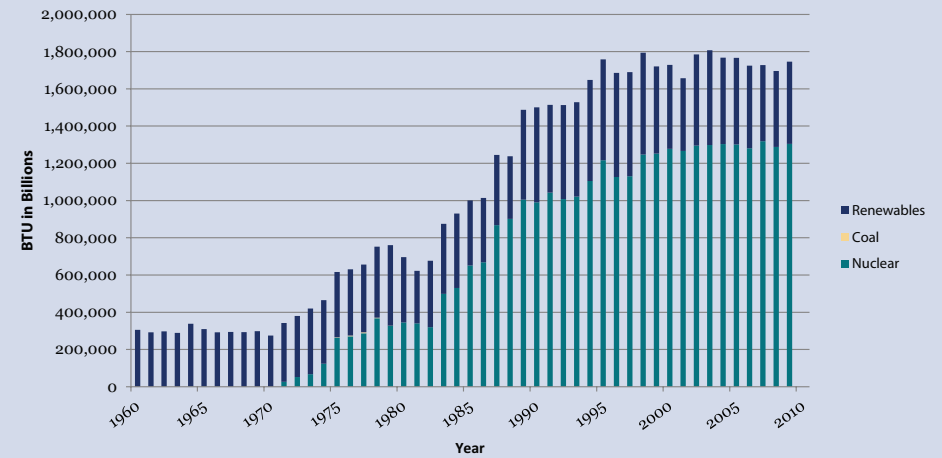


Figure 96. Energy production estimates for the Southeast Region from 1960 to 2009. British Thermal Unit (BTU) is a traditional unit of energy equal to about 1.055 KJoules. Figure includes data from east and west Florida but does not include data from Puerto Rico and the US Virgin Islands. Source: US Energy Information Administration (33,34,35,36,37,38)

Ports Imports and Exports



Figure 97. Value of imports and exports from Southeast Region ports from 1997 to 2011. Figure includes data from east and west Florida but does not include data from Puerto Rico and the US Virgin Islands. Source: US Army Corps of Engineers, Navigation Data Center (24)

In 2011, commercial fisherman in the Southeast Region landed 123 million pounds of finfish and shellfish, earning \$171 million in landings revenue. Landings revenue was dominated by shrimp (\$54 million) and blue crab (\$34 million).

Commercial Fishing Revenue

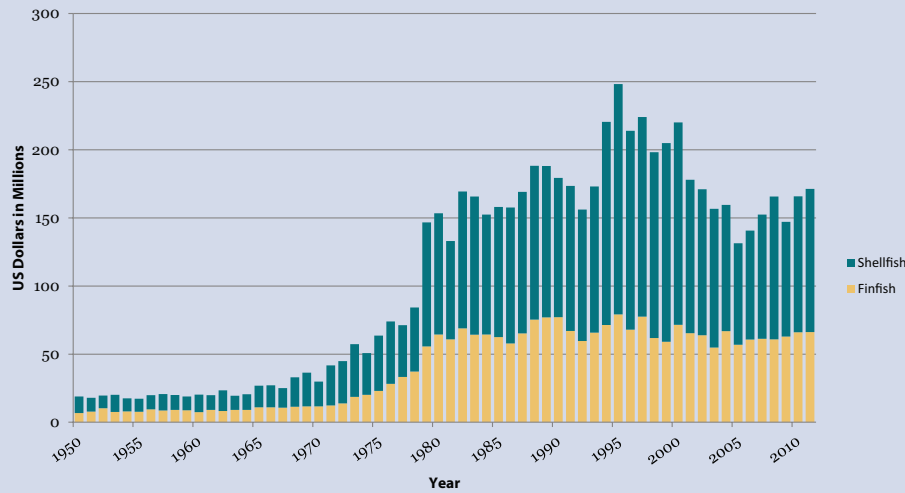


Figure 98. Commercial fishing landings revenue in the Southeast Region from 1950 to 2011. Figure does not include data from Puerto Rico and the US Virgin Islands. *Source: National Marine Fisheries Service (14)*

Commercial Fishing Landings

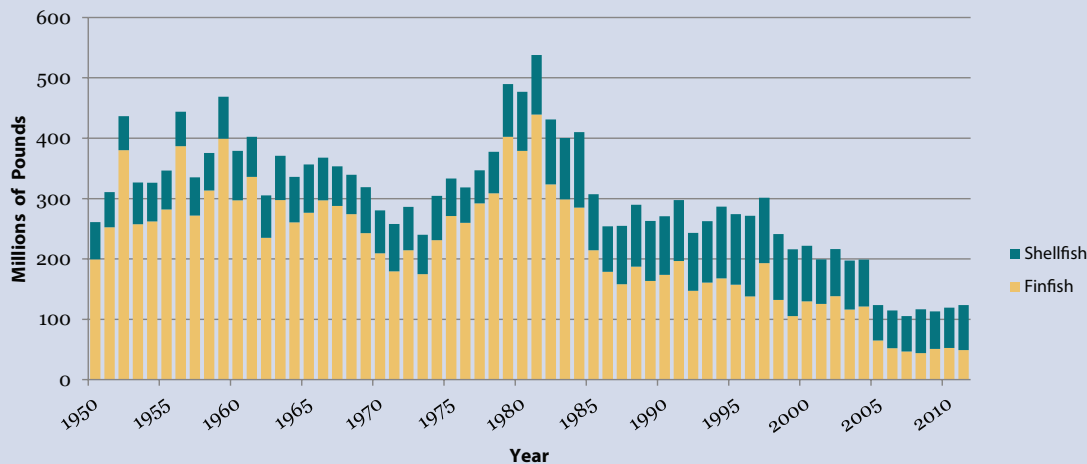


Figure 99. Commercial fishing landings in the Southeast Region from 1950 to 2011. Figure does not include data from Puerto Rico and the US Virgin Islands. *Source: National Marine Fisheries Service (14)*

The South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils manage fisheries resources in the Region through seventeen fishery management plans. In 2011, seventeen stocks experienced overfishing, and thirteen stocks were overfished (Table 41).

2011 Stocks That Experienced Overfishing and Overfished Stocks

Overfishing Stocks	Overfished Stocks
Black sea bass	Red grouper
Gag*	Red porgy
Red grouper	Red snapper*
Red snapper	Snowy grouper
Snowy grouper	Pink shrimp
Speckled hind	Gag
Vermillion snapper	Gray triggerfish
Warsaw grouper	Greater amberjack
Grey triggerfish	Reef Fish Fishery of Puerto Rico and the USVI grouper Unit 1
Greater amberjack	Reef Fish Fishery of Puerto Rico and the USVI grouper Unit 2
Red snapper	Reef Fish Fishery of Puerto Rico and the USVI grouper Unit 4
Reef Fish Fishery of Puerto Rico and the USVI grouper Unit 1	Queen conch
Reef Fish Fishery of Puerto Rico and the USVI grouper Unit 4	
Reef fish fishery of Puerto Rico and the USVI snapper Unit 1	
Reef fish fishery of Puerto Rico and the USVI Parrotfish complex	
Queen conch	

Table 42. Southeast Region stocks in 2011 that experienced overfishing and were overfished. * Denotes stocks managed by more than one fisheries management plan, and subject to overfishing or overfished in each plan.

Average Price of Top 5 Commercial Fishing Species

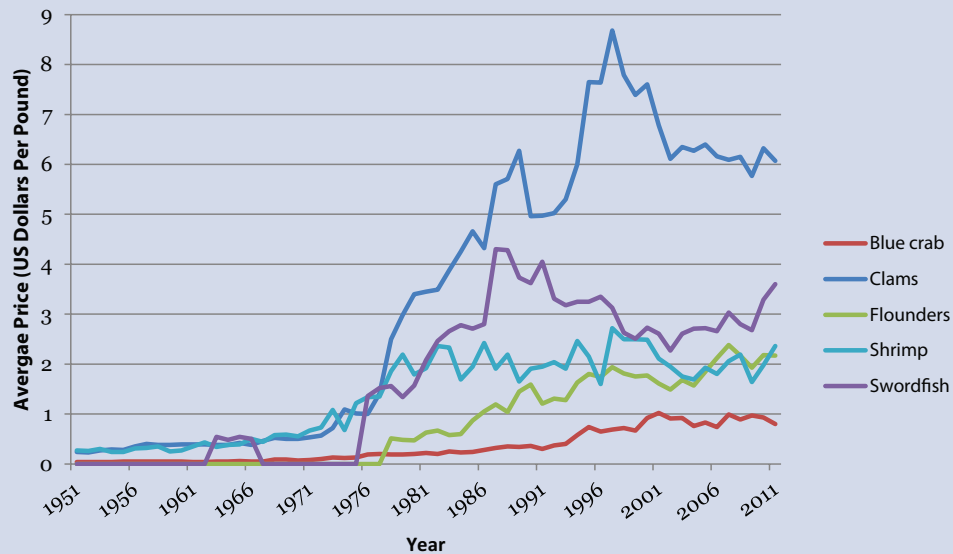


Figure 100. Average price of top five commercial fishing species in the Southeast Region from 1950 to 2011. Figure does not include data from Puerto Rico and the US Virgin Islands. *Source: National Marine Fisheries Service (14)*

In 2011, North Carolina had the highest landing revenue in the Region with \$71 million, followed by east coast Florida (\$60 million), and South Carolina (\$23 million).

2011 Economic Impacts of the Seafood Industry (thousands of dollars)

	Landings Revenue	Jobs	Value Added
Georgia	\$16,295	11,137	\$548,826
Florida	\$60,570	72,341	\$4,778,502
North Carolina	\$71,177	8,850	\$329,451
South Carolina	\$23,268	1,547	\$46,495

Table 43. Seafood industry economic impacts for 2011. The US seafood industry includes the commercial harvest sector, seafood processors and dealers, seafood wholesalers and distributors, importers, and seafood retailers. Value added refers to the increased value of fish at each stage of production, exclusive of initial costs. *Source: National Marine Fisheries Service (14)*

In 2011, the Southeast Region seafood industry generated \$88 million in sales impacts in South Carolina, \$796 million in sales impacts in North Carolina, \$1.5 billion in sales impacts in Georgia, and \$14 billion in sales impacts in Florida.

In 2011, almost 2.3 million recreational saltwater anglers took 18 million fishing trips in the Southeast Region. Over 81% of these anglers were residents of a regional coastal county.

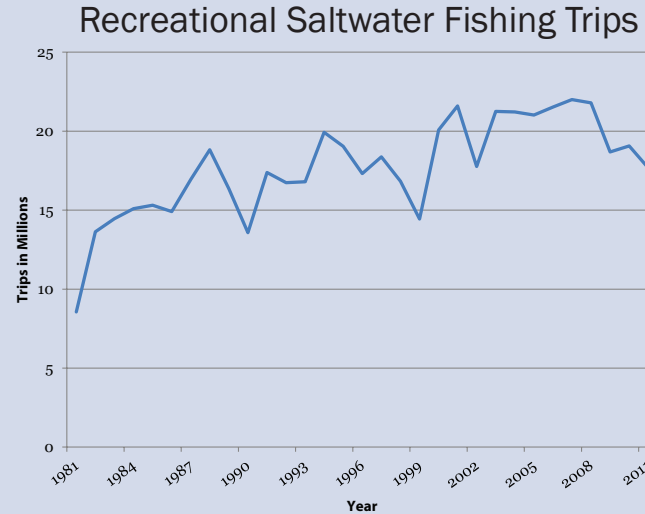


Figure 101. Total number of recreational saltwater fishing trips in the Southeast Region from 1981 to 2011. Data from Puerto Rico is only from 2000-2011. Figure does not include data from the US Virgin Islands. Source: National Marine Fisheries Service (14)

The Southeast Region's most frequently caught saltwater species or species groups in 2011 were Atlantic croaker and spot (7.3 million fish), spotted seatrout (5.7 million fish), bluefish (5.4 million fish), and black sea bass (3.4 million fish).

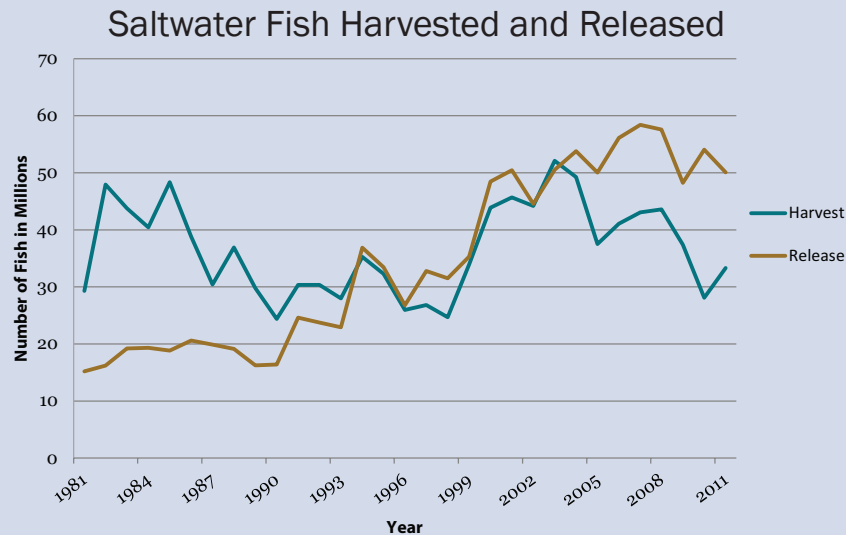


Figure 102. Total number of saltwater fish harvested and released during recreational fishing activities in the Southeast Region from 1981 to 2011. Data from Puerto Rico is only from 2000-2011. Figure does not include data from the US Virgin Islands. Source: National Marine Fisheries Service (14)

2011 Economic Impacts of the Recreational Saltwater Fishing Expenditures (thousands of dollars)

State	Jobs	Total Sales	Value Added
Georgia	2,880	\$348,742	\$182,586
Florida	28,701	\$3,255,774	\$1,708,369
North Carolina	17,737	\$1,961,144	\$948,461
South Carolina	3,254	\$282,049	\$154,999

Table 44. Economic impacts from recreational saltwater fishing activities in the Southeast Region for 2011. Source: National Marine Fisheries Service (15)

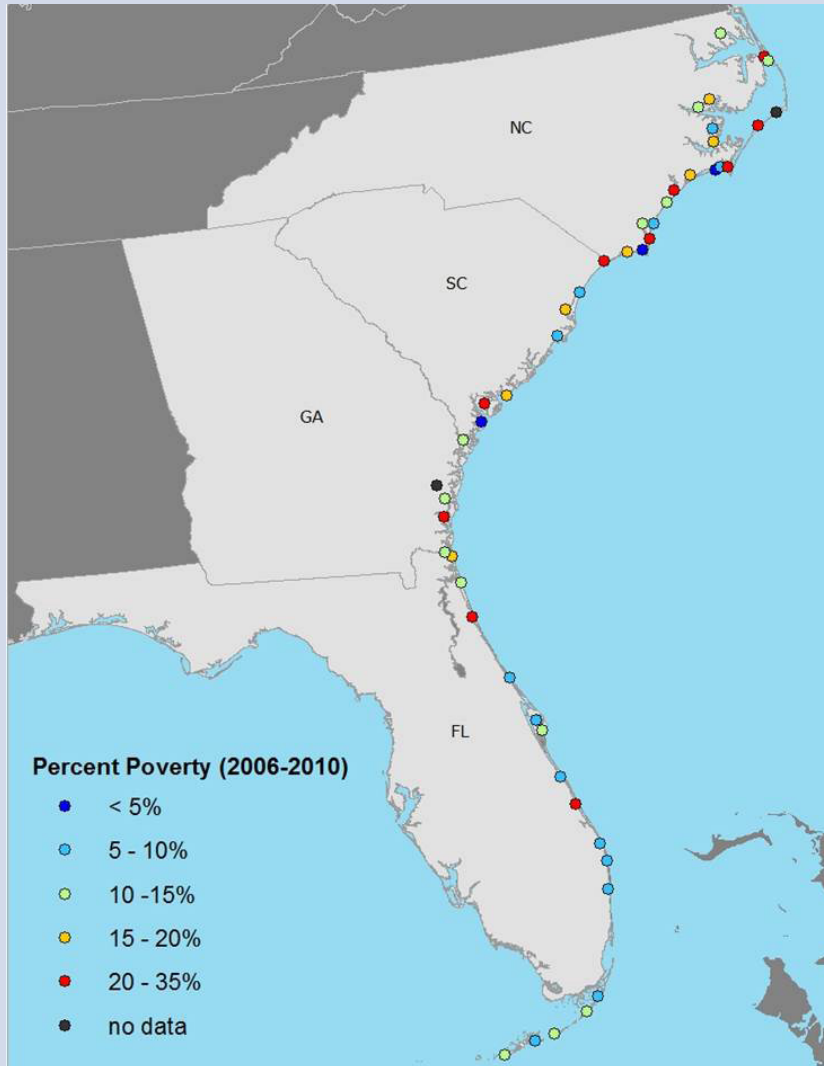


Figure 103. Poverty levels in profiled Southeast Region fishing communities, averaged from 2006 to 2010. *Source: National Marine Fisheries Service (13)*

Overall, NOAA Fisheries scientists have obtained information of the social and economic characteristics of 50 fishing communities in the Southeast Region because of the nature of their links with commercial and/or recreational fishing: 16 in Florida, 6 in Georgia, 21 in North Carolina, and 7 in South Carolina. In 2010, 2 of the top 50 ports by landings revenue were located in the Southeast Region.

Top 5 Commercial Fishing Communities (2010)

Rank	Community Name	Landings Revenue (million \$)
1	Key West, FL	\$50.0
2	Wanchese-Stumpy Point, NC	\$22.0
3	Mayport, FL	\$11.0
4	Englehard-Swanquarter, NC	\$10.6
5	Charleston-Mt. Pleasant, SC	\$9.9

Table 45. Top five commercial fishing communities in the Southeast Region by landings revenue in 2010. *Source: National Marine Fisheries Service (14)*

Top 5 Recreational Fishing Communities (2010)

Rank	Community Name	For-Hire Permits (number)
1	Key West, FL	118
2	Islamora, FL	90
3	Morehead City, NC	51
4	Tavernier, FL	47
5	Manteo, NC	47

Table 46. Top five recreational fishing communities in the Southeast Region by number of for-hire permits in 2010. *Source: National Marine Fisheries Service (18)*

Coastal Species Protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)	
ESA Species	MMPA Species
Blue whale	Atlantic spotted dolphin
Fin whale	Atlantic white-sided dolphin
Humpback whale	Blainville's beaked whale
North Atlantic right whale	Bottlenose dolphin
Sei whale	Bryde whale
Sperm whale	Clymene dolphin
Green sea turtle (2)*	Cuvier beaked whale
Hawksbill sea turtle	Dwarf sperm whale
Kemp's ridley sea turtle	False killer whale
Leatherback sea turtle	Fraser's dolphin
Loggerhead sea turtle (9)*	Gervia's beaked whale
Atlantic sturgeon (5)*	Harbor porpoise
Shortnose sturgeon	Harbor seal
Elkhorn coral	Long-finned pilot whale
Staghorn coral	Melon-headed whale
Smalltooth sawfish	Minke whale
Johnson's seagrass	Pan tropical spotted dolphin
	Pygmy killer whale
	Pygmy sperm whale
	Risso's dolphin
	Rough-toothed dolphin
	Short-beaked common dolphin
	Short-finned pilot whale
	Spinner dolphin
	Striped dolphin
	True's beaked whale (Florida East Coast)

* The term "species" under the ESA includes species, subspecies, and for vertebrates only, "distinct population segments (DPSs)". Loggerhead and green sea turtle and Atlantic sturgeon are listed in DPSs. The parenthesis indicate the number of listed DPSs for each species.

Table 47. Marine and anadromous species protected by the Endangered Species Act, and marine mammals protected by the Marine Mammal Protection Act in the Southeast Region. Source: National Marine Fisheries Service (16)

The Atlantic sturgeon is a long-lived, estuarine-dependent, anadromous fish. Atlantic sturgeon can grow to approximately 14 ft. long, weigh up to 800 lbs., and have been aged to 60 years. Atlantic sturgeon are benthic feeders and typically forage on benthic invertebrates such as crustaceans, worms, and mollusks. Historically, Atlantic sturgeon were present in approximately 38 rivers in the US from St. Croix Island, ME to the Saint Johns River, FL, where 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of these of rivers.

In 2009, the Natural Resources Defense Council petitioned NOAA Fisheries to list the Atlantic sturgeon under the ESA. NOAA Fisheries made a final decision in 2012 to list five distinct population segments of Atlantic sturgeon under the ESA in response to the petition. The Chesapeake Bay, New York Bight, Carolina, and South Atlantic populations of Atlantic sturgeon are listed as "Endangered", while the Gulf of Maine population is listed as "Threatened". The current conservation efforts include a moratorium to harvest Atlantic sturgeon; preservation of existing habitat; habitat restoration and improvement; and monitoring of bycatch and stock recovery.

Number of Species Listed Under the ESA

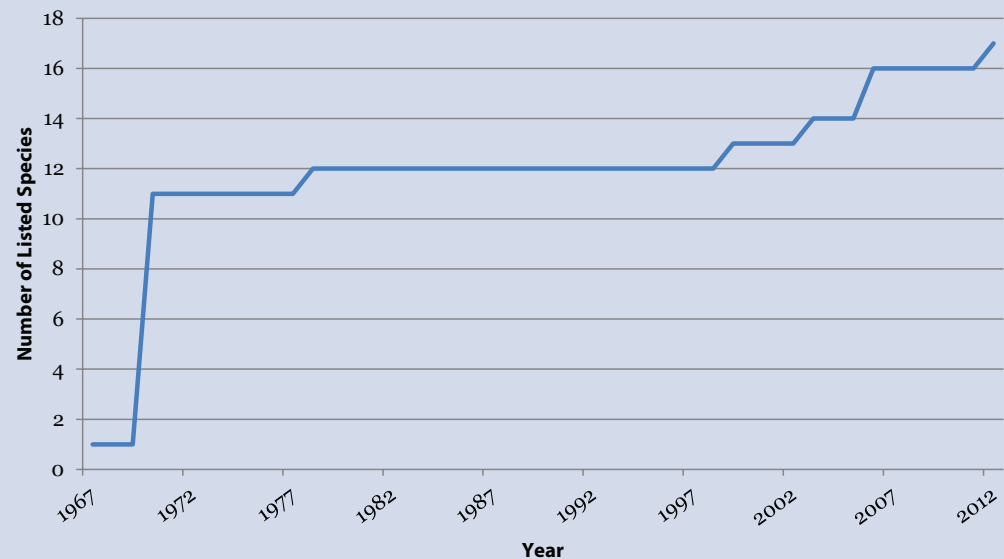


Figure 104. Number of species protected by the Endangered Species Act in the Southeast Region from 1967 to 2012. Source: National Marine Fisheries Service (16)

Whale Watching Economic Data

1998				
Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
204,000	N/A	N/A	N/A	N/A
2008				
Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
297,000	50	\$7,300,000	\$12,500,000	\$19,800,000

Table 48. Whale watching economic data for the Southeast Region for 1998 and 2008. Whale watching locations in the Southeast Region were Cape May, Lewes, Dewey Bay, Virginia Beach, Hilton Head and Cape Hatteras. *Source: International Fund for Animal Welfare (8)*

Protected Species Valuation

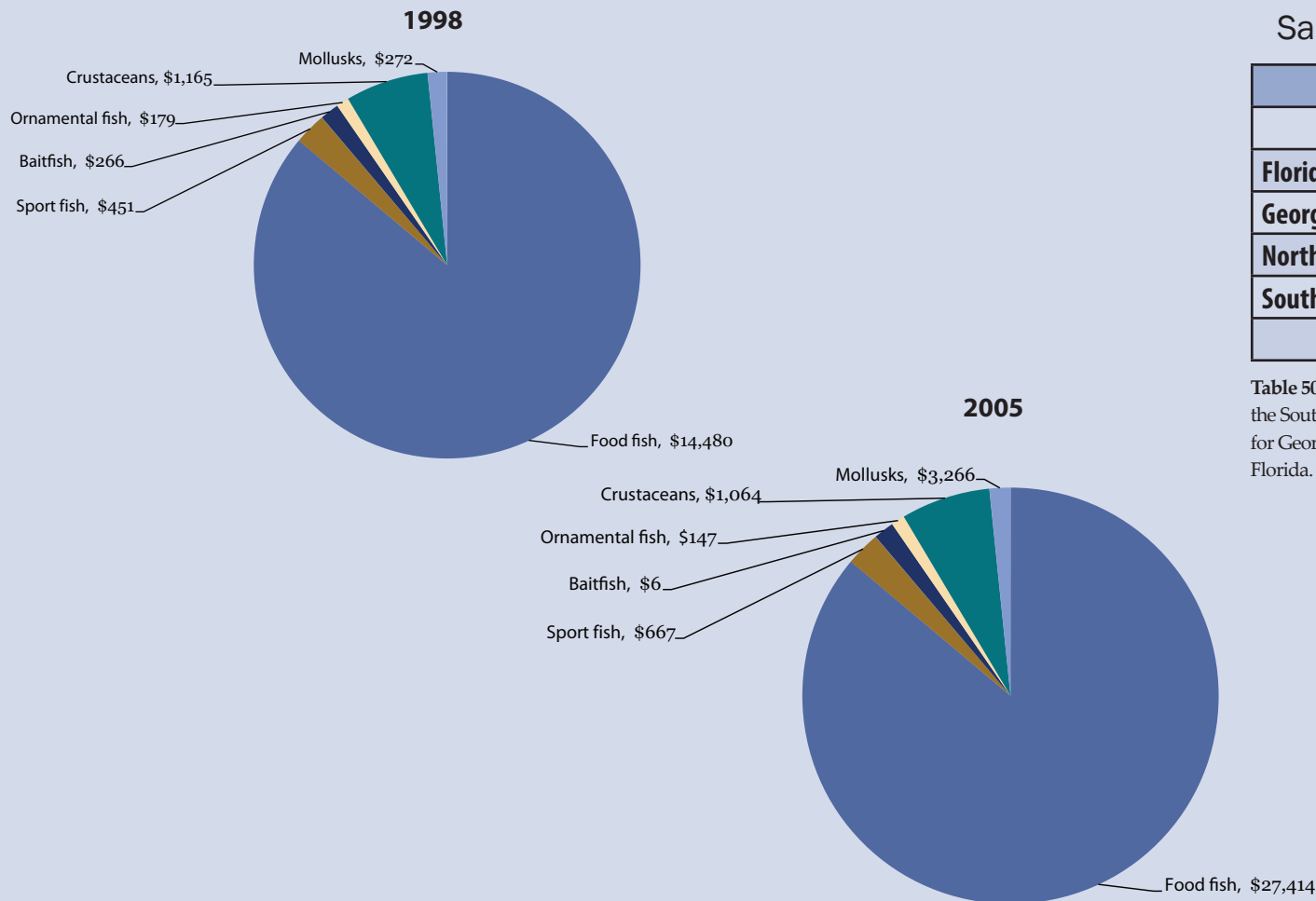
Species	Household Willingness to Pay	National Value (\$ billions)
North Atlantic right whale	\$71.62	\$4.38
Smalltooth sawfish	\$51.89	\$3.18
Leatherback sea turtle	\$67.97	\$4.16
Loggerhead sea turtle	\$44.72	\$2.74

Table 49. Valuation data for some of the XX Region marine protected species. Household willingness-to-pay values are expressed as a US household's average willingness-to-pay for recovering a species. Payment is in the form of an increase to the household federal tax bill every year for ten years. The national values reported here represent the present value of aggregated household values across the Nation. The household aggregation strategy accounted for survey and panel non-response. All values are reported in 2011 US Dollars. *Source: Conservation Biology (41)*

Cetacean watching from North Carolina to Georgia is characterized by small operators running short, boat-based dolphin watching trips. Most operators in the region are small, one-boat businesses. Many boats have a capacity of fewer than ten passengers, although there are some larger operators particularly in North Carolina and Hilton Head, South Carolina. The abundance of small operators is possible due to the sheltered waters, resident dolphin populations and proximity to tourist areas. Trips are short, at around two hours, cost \$20-\$30, and often guarantee dolphin sightings.

The primary species for commercial aquaculture purposes in the Southeast Region are oysters and clams, although there are some commercial aquaculture farms that culture red drum, shrimp and, to a lesser extent, cobia and sea bass. Red drum and spotted sea trout are species targeted for stock enhancement, while smaller scale enhancement programs exist for southern flounder, red snapper, snook, and cobia. There also is a federal aquaculture live rock permit program for corals and sponges in federal waters off of Florida. Research by NOAA labs in the Southeast Region is primarily focused on husbandry and rearing methods for marine species such as a red porgy. NOAA also has provided funding for projects related to culture of red snapper, blackfin tuna, cobia, and baitfish species as well as for research into alternative diets for marine finfish.

Value of Aquaculture Products Sold
(Thousands of dollars)



Saltwater Aquaculture Farms

	Number of Farms	
	1998	2005
Florida	226	163
Georgia	0	1
North Carolina	15	57
South Carolina	9	45
TOTAL	250	266

Table 50. Total number of saltwater aquaculture farms in the Southeast Region in 1998 and 2005. No data reported for Georgia in 1998. Table includes data from east and west Florida. Source: US Department of Agriculture (32)

Figure 105. Value of aquaculture products sold by type in the Southeast Region in 1998 and 2005. Figure includes data from east and west Florida but does not include data from Puerto Rico and US Virgin Islands. Source: US Department of Agriculture (32)

The coastal area of the Southeast Region is characterized by large sounds, strips of salt marsh, networks of tidal creeks and rivers, barrier islands, coral reefs ecosystems, and coastal plains. Some of the barrier islands include those that constitute the Outer Banks of North Carolina; Hilton Head and Kiawah Islands, South Carolina; and Tybee and St. Simon's Islands in Georgia. The numerous estuaries are nurseries for diverse marine species including finfish and shrimp.

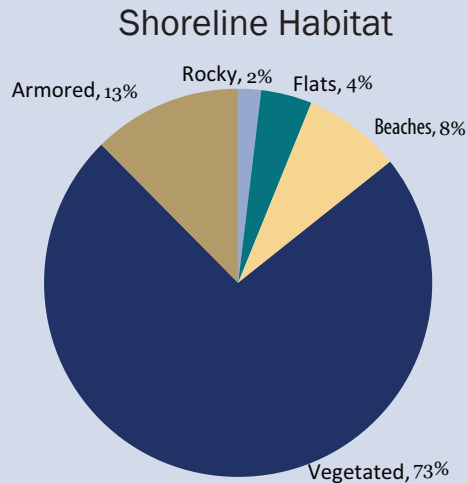


Figure 106. Percent of shoreline habitat in the Southeast Region. Figure includes data from east and west Florida. *Source: NOAA Environmental Sensitivity Index Maps (22)*

Coastal Vulnerability to Sea Level Rise

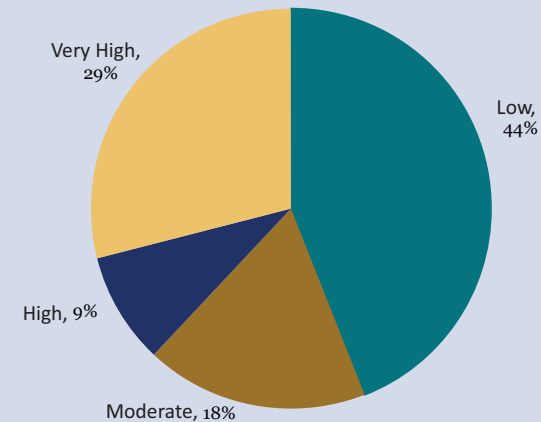


Figure 107. Percent of coastline in the Southeast Region that is vulnerable to sea level rise. Figure includes data from east and west Florida. *Source: US Geological Survey (40)*

There are 594 beaches in the Southeast Region and 78% were monitored in 2011 for pollutants. In 2011, the swimming season averaged 171 days per monitored beach, however, beaches were closed an average of 4 days per season. This means that beaches were open and safe for swimming about 98% of the time.

Percent of Monitored Beaches Affected by Notification Actions

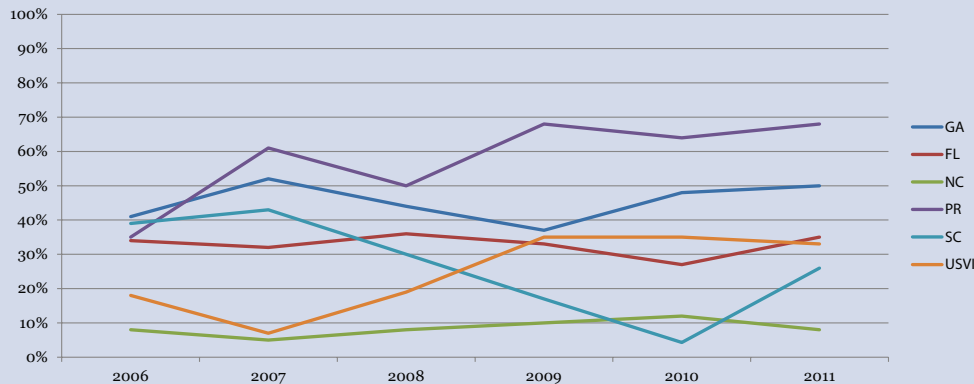


Figure 108. Percent of monitored beaches affected by notification actions in Southeast Region states from 2006 to 2011. Notification actions are issued by states or local agencies when monitoring of water at swimming beaches show that levels of certain bacteria exceed standards which might pose health risks. The notification may be either a beach advisory, warning people of possible risks or swimming, or closing a beach to the public. *Source: Environmental Protection Agency (39)*

Federally Insured Assets Along the Coast (thousands of dollars)

	Policies	Premiums	Coverage	Claims Payout
Georgia	39,939 (11)	\$34,514 (11)	\$9,606,594 (10)	\$19,883 (25)
Florida	1,115,215 (1)	\$649,450 (1)	\$250,941,908 (1)	\$2,412,824 (3)
North Carolina	73,699 (7)	\$60,894 (8)	\$16,210,433 (7)	\$609,486 (7)
Puerto Rico	4,286 (25)	\$2,510 (29)	\$428,560 (29)	\$220 (33)
South Carolina	134,489 (4)	\$93,335 (7)	\$31,125,529 (4)	\$381,572 (10)
US Virgin Islands	1,697 (30)	\$1,670 (30)	\$258,580 (31)	\$41,101 (22)

Table 51. National Flood Insurance Program policies, premiums, coverage, and claim payouts for 2011 for federally insured assets along the coast of the Southeast Region. The numbers in parenthesis indicate the state ranking for a specific variable. Table includes data from east and west Florida *Source: Federal Emergency Management Agency (7)*

Gulf of Mexico Region

Black skimmers, photo credit: Rex H. Caffey



Black skimmers hover over Chandeluer Island in the Northern Gulf of Mexico. The barrier shorelines of this region are a dynamic coastal landscape, shaped over time by geologic and climatic forces. This productive ecosystem provides food and shelter for resident and migratory shorebirds, nursery habitat for marine-dependent fisheries, and buffers the mainland from tropical storms and hurricanes.

SPOTLIGHT: Coastal Wetlands

photo credit: NOAA

The five states of the northern Gulf of Mexico comprise a 1,600 mile-long coastal bend that stretches from south Texas to the Florida Keys. Within this arc, 17,141 miles of intertidal shoreline support one of the most productive ecosystems in the world.

Wetlands along these shores host the highest concentration of resident shorebirds and migratory waterfowl in North America and provide an estuarine nursery ground that spawns the largest volume of fisheries landings in the coterminous U.S. The barrier shorelines and wetlands in this region also serve as a buffer against tropical storms and hurricanes that threaten Gulf coast communities.

During the past two centuries, wetland acreage in the northern Gulf states has been reduced by 52% (35.4 million acres), with the vast majority of recent losses occurring in the estuarine marshlands of coastal Louisiana.

Deterioration of this landscape is due to numerous factors, including: urban development, hydrologic modification, saltwater intrusion, subsidence, and sea level rise. Perhaps the most detrimental factor has been the loss of alluvial sedimentation resulting from levees constructed along major rivers for the purposes of flood control and navigation. For example, since the initiation of contiguous levees along the lower Mississippi River with the Flood Control Act of 1927, Louisiana alone has lost more than 1.1 million acres of coastal land.

As a result of these changes, northern Gulf communities have become increasingly vulnerable to high tide and storm surge. Communities once resilient to Category 1 or 2 hurricanes are now regularly flooded by a tropical storm.

State and federal authorities have responded by dedicating billions of dollars to coastal mitigation projects. Numerous methods of restoration have been used, ranging from small-scale revegetation efforts to large-scale dredge projects or marsh creation or beach renourishment.

With global climate models predicting an 8-44 inch increase in sea level rise over the next century, such projects may offer only stop-gap protection to coastal communities made vulnerable by their low elevation or extensive shoreline development.

Even at the lower end of this range, communities located in coastal Louisiana would be disproportionately impacted. The state has adopted an aggressive coastal master plan calling for a massive unleashing of the lower Mississippi River. The socioeconomic implications of this plan, however, have yet to be fully calculated. Most of the land slated for floodplain restoration is privately owned and supports the vital economic sectors of tourism, fisheries, and petroleum.

The Gulf of Mexico has an area of approximately 580,000 square miles, contains an approximate 584,000 cubic miles of water, and has an average depth of 5,299 feet. For this document, the Gulf of Mexico Region extends from the Florida Keys to the southern tip of Texas. The combined coastline along this area totals over 1,631 miles.

OVERVIEW

-  Coastal Demographics
-  Coastal Economy
-  Commercial Fisheries
-  Recreational Fisheries
-  Fishing Communities
-  Marine Protected Species
-  Aquaculture
-  Habitat

The Gulf of Mexico Region contains a wide range of ecosystems with unique features and habitats. Also, communities living within this Region show different assemblages of people, cultures, occupations, and living and settlement patterns. The various Gulf of Mexico ecosystems provide these communities with food, clean water, jobs, recreation, and protection from hurricanes.

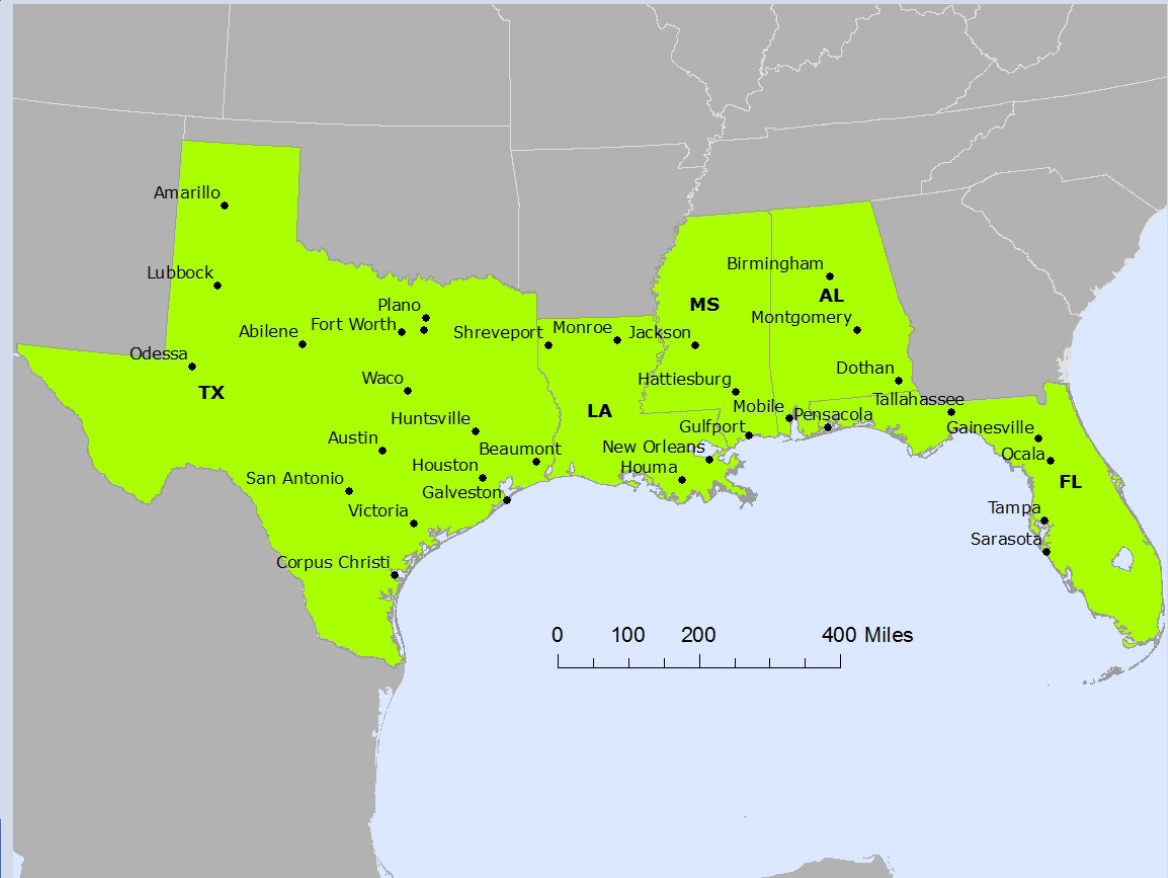


Figure 109. Map of the Gulf of Mexico Region.

The Gulf of Mexico Region coastal county population increased by 109% since 1970. From the states within the Region, the west coast of Florida's coastal county population increased more rapidly (almost 180%) since 1970, while Louisiana's coastal county population increased the slowest (27%) since 1970.

Coastal Watershed County Population Change from 1970 to 2010

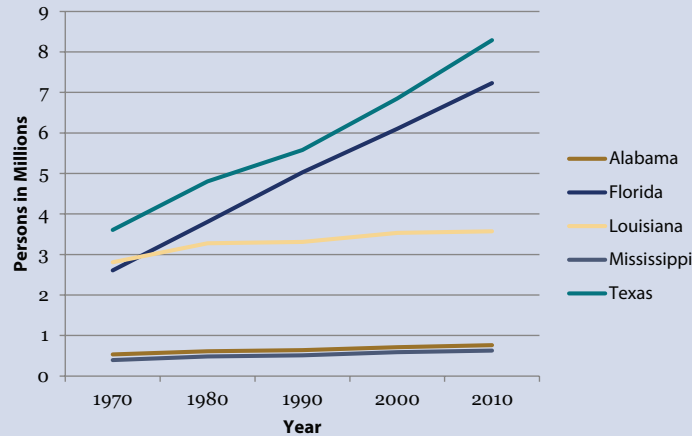


Figure 110. Total population of the Gulf of Mexico Region coastal watershed counties from 1970 to 2010. Source: US Census Bureau (25,27,28,29,30); Woods and Poole Economics, Inc.(42)

In the Gulf of Mexico Region coastal counties, 71% of the population are White while 14% of the population are African Americans. Combined, these races make up about 85% of the population in coastal counties.

Racial Distribution

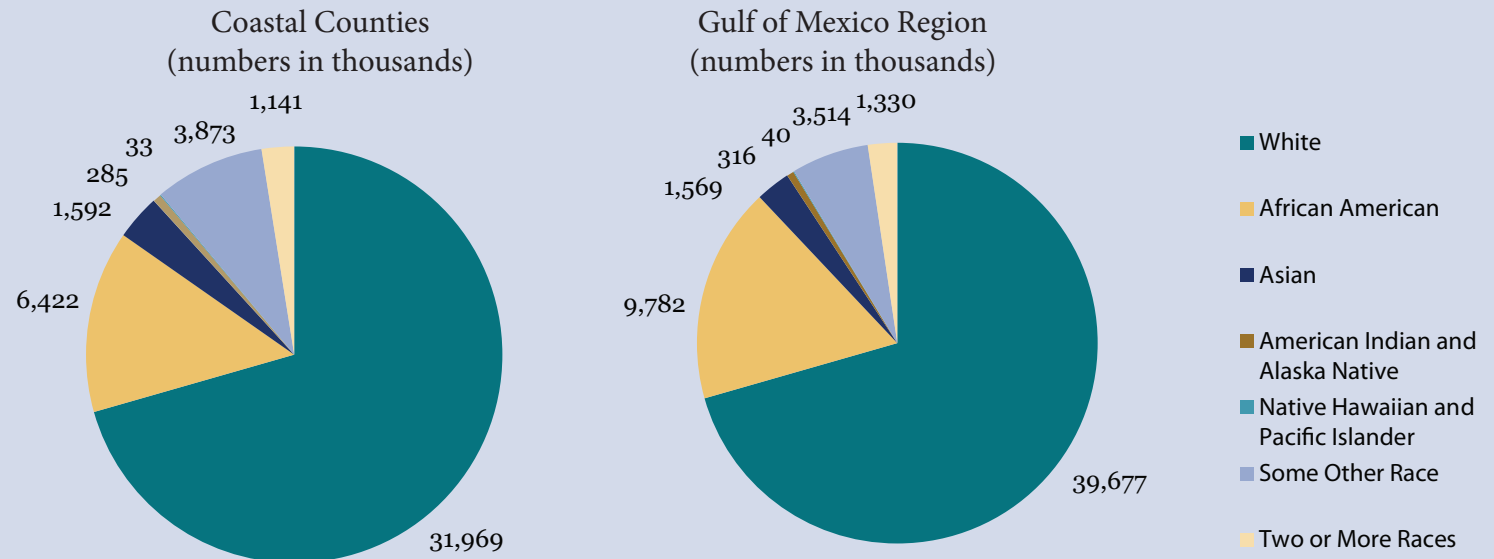


Figure 111. 2010 racial structure in the Gulf of Mexico coastal counties and the Gulf of Mexico Region.. Source: US Census Bureau (30)

The coastal county population is evenly split between males and females, while 25% of the population is under 18 years of age and 75% of the population is 18 years of age and older.

Gender Distribution

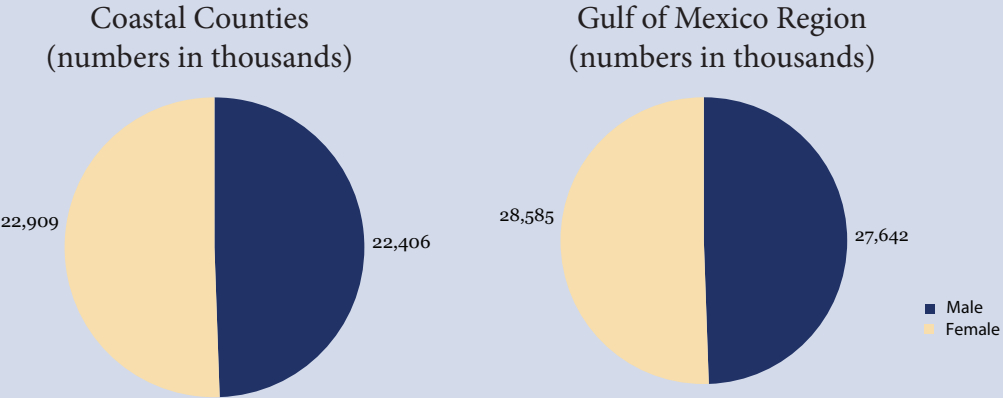


Figure 112. 2010 Gender structure in the Gulf of Mexico Region coastal counties and the Gulf of Mexico Region. Source: US Census Bureau (30)

Age Distribution

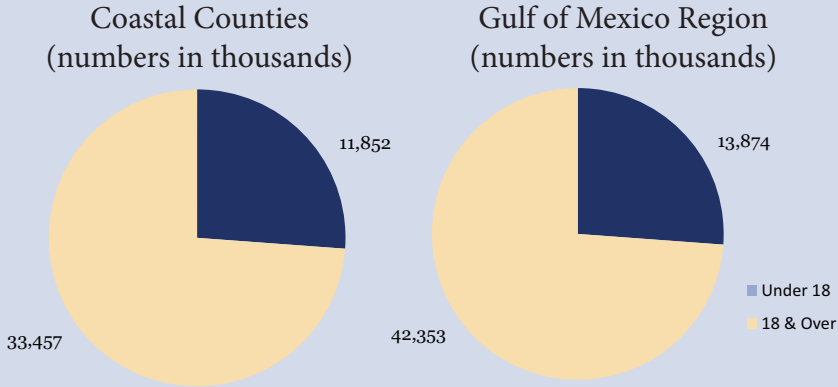


Figure 113. 2010 Age distribution in the Gulf of Mexico Region coastal counties and the Gulf of Mexico Region. Source: US Census Bureau (30)

From 1984 through 2010, median household income increased by 3%, 4%, 12%, 18% and 23% in Texas, Louisiana, Florida, Alabama and Mississippi, respectively.

Median Household Income

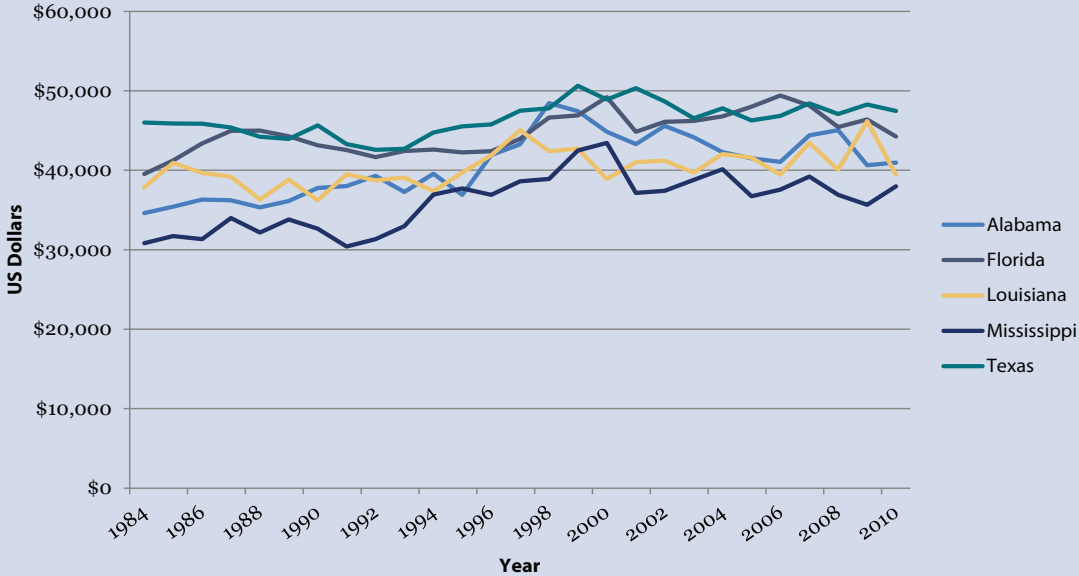


Figure 114. Gulf of Mexico Region median household income (adjusted to 2010 US Dollars) from 1984 - 2010. Figure includes data from east and west Florida Source: US Census Bureau (30)

In 2010, 43% of the employment in the Gulf of Mexico Region occurred in coastal counties generating \$419 billion in wages.

Wages in Coastal Counties and States

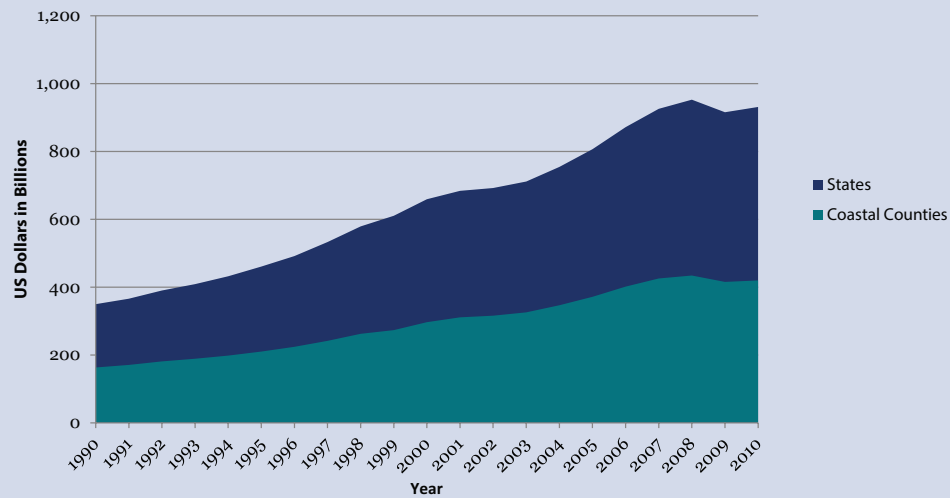


Figure 115. Wages in the Gulf of Mexico Region coastal counties and states from 1990 to 2010. Figure includes data from east and west Florida. *Source: Bureau of Labor Statistics (5)*

Employment in Coastal Counties and States

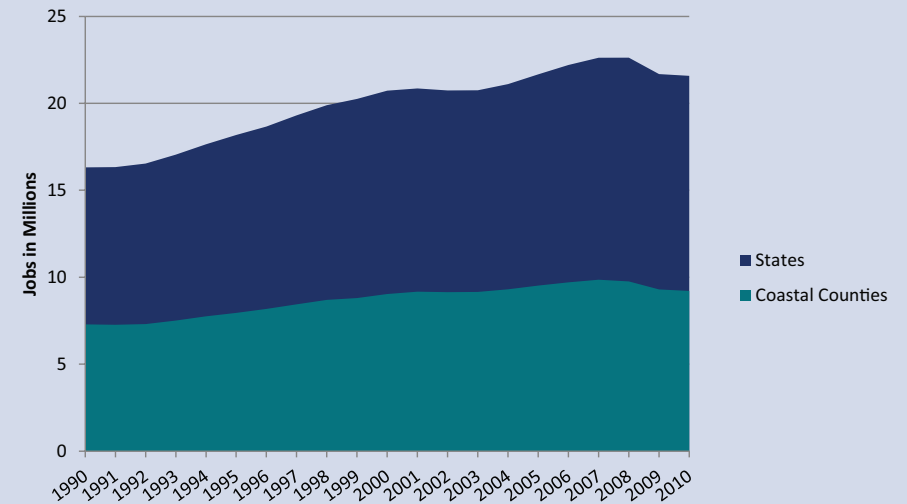


Figure 116. Employment in the Gulf of Mexico Region coastal counties and states from 1990 to 2010. Figure includes data from east and west Florida. *Source: Bureau of Labor Statistics (5)*

Gulf of Mexico County Health Rankings

ALABAMA	FLORIDA	LOUISIANA	MISSISSIPPI	TEXAS
1. <i>Shelby</i>	1. <i>St. Johns</i>	1. St. Tammany	1. <i>DeSoto</i>	1. <i>Collin</i>
2. <i>Lee</i>	2. <i>Seminole</i>	2. <i>La Salle</i>	2. <i>Lafayette</i>	2. <i>Williamson</i>
3. Baldwin	3. Sarasota	3. Ascension	3. Lamar	3. <i>Rockwall</i>
4. <i>Madison</i>	4. Collier	4. St. Charles	4. <i>Rankin</i>	4. <i>Denton</i>
5. <i>Limestone</i>	5. <i>Martin</i>	5. <i>Bossier</i>	5. <i>Oktibbeha</i>	5. <i>Gillespie</i>

Table 52. Top five counties in the Gulf of Mexico Region in 2012 for population health. Health rankings are determined using measures of mortality (premature death) and morbidity (poor or fair health, poor physical health days, poor mental health days, and low birth weight). Coastal counties are in bold. *Source: County Health Rankings and Roadmaps (6)*

In 2010, the coastal county GDP of Texas was the highest within the Gulf of Mexico Region, ranking 5th in the US, while the coastal county GDP of Mississippi was the lowest of the Gulf of Mexico Region, ranking 31st in the US.

Coastal Counties and States GDP

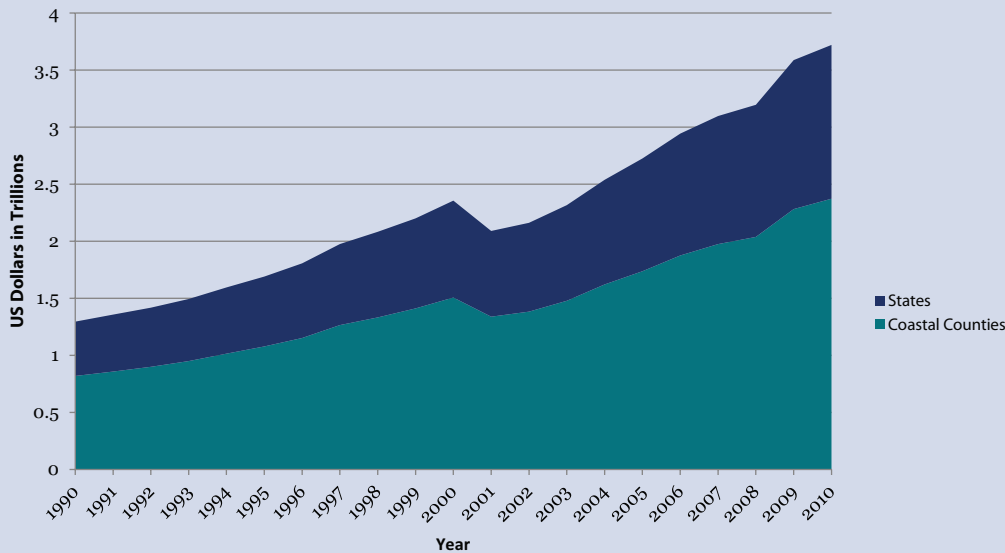


Figure 117. Gross Domestic Product (GDP) of the Gulf of Mexico Region coastal counties and states from 1990-2009. Graph includes data from east and west Florida. *Source: Bureau of Economic Analysis (3)*

The Gulf of Mexico Region energy production increased by 17% between 1960 and 2009. During this time period, the crude oil production decreased by 23% while production of renewable, coal, natural gas, and nuclear energy increased.

Energy Production

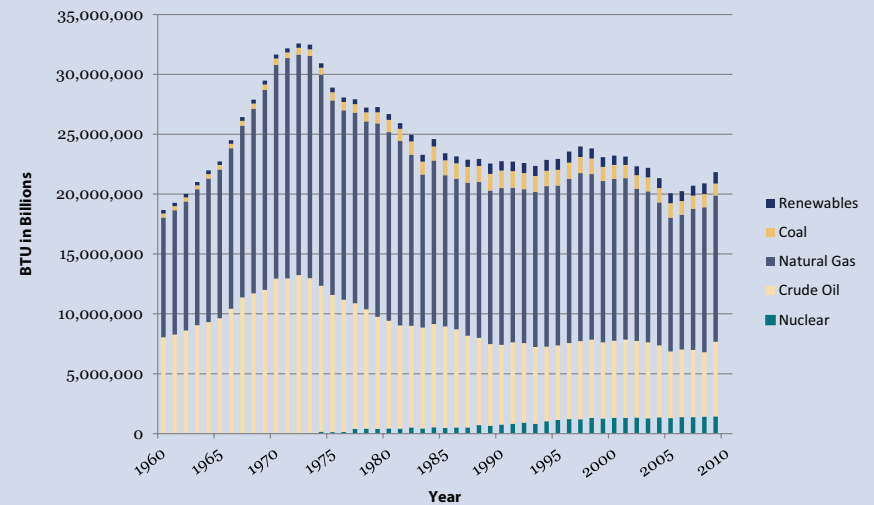


Figure 118. Energy production estimates for the Gulf of Mexico Region from 1960 to 2009. British Thermal Unit (BTU) is a traditional unit of energy equal to about 1.055 KJoules. Figure includes data from east and west Florida. *Source: US Energy Information Administration (33,34,35,36,37,38)*

Ports Imports and Exports



Figure 119. Value of imports and exports from the Gulf of Mexico Region from 1997 to 2011. Figure includes data from east and west Florida. *Source: US Army Corps of Engineers, Navigation Data Center (24)*

In 2011, commercial fisherman in the Gulf of Mexico Region landed 1.8 billion pounds of finfish and shellfish, earning \$818 million in landings revenue. Landings revenue was dominated by shrimp (\$438 million) and menhaden (\$104 million).

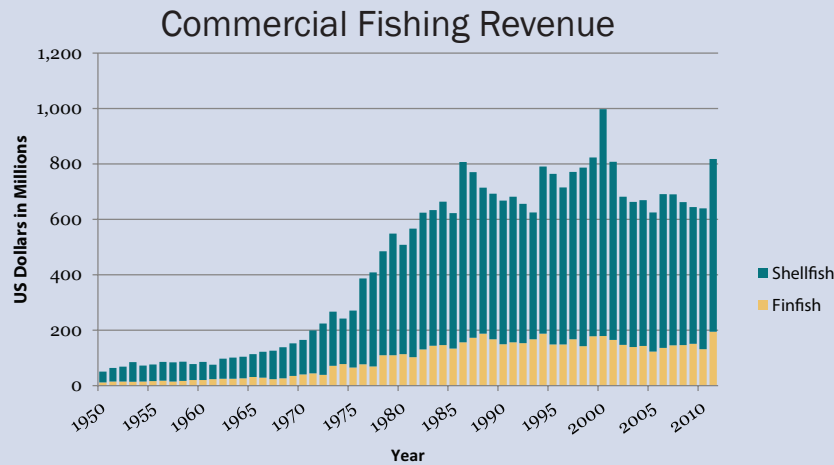


Figure 120. Commercial fishing landings revenue in the Gulf of Mexico Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

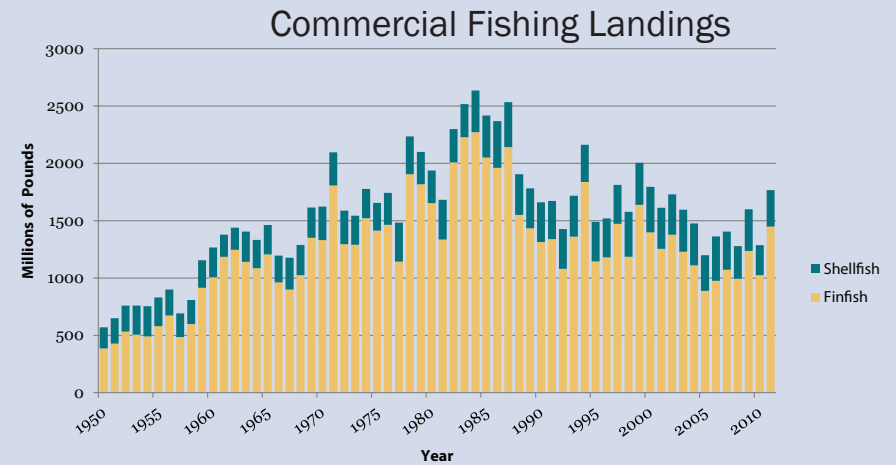


Figure 121. Commercial fishing landings in the Gulf of Mexico Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

The Gulf of Mexico Fishery Management Council manages fisheries resources in the Region through seven fishery management plans. In 2011, four stocks experienced overfishing (gag, gray triggerfish, greater amberjack, and red snapper), and those same four stocks were overfished.

Average Price of Top 5 Commercial Fishing Species

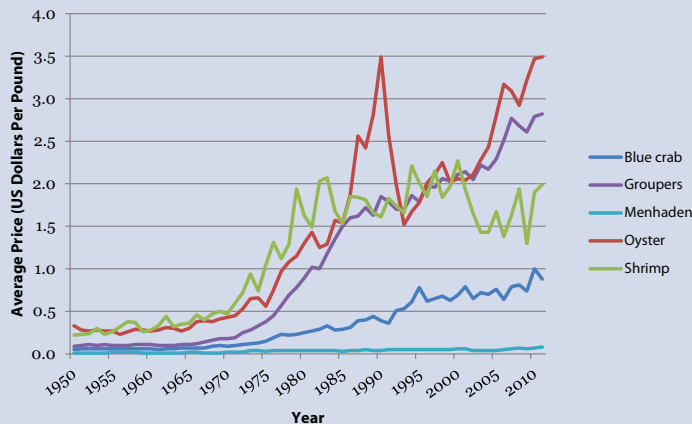


Figure 122. Average price of top five commercial fishing species in the Gulf of Mexico Region from 1950 to 2011. Source: National Marine Fisheries Service (14)

2011 Economic Impacts of the Seafood Industry (thousands of dollars)

	Landings Revenue	Jobs	Value Added
Alabama	\$50,941	11,011	\$250,171
Florida	\$164,074	72,341	\$4,778,502
Louisiana	\$333,619	32,818	\$877,911
Mississippi	\$30,300	5,550	\$125,430
Texas	\$239,082	27,717	\$1,002,928

Table 53. Seafood industry economic impacts for 2011. The US seafood industry includes the commercial harvest sector, seafood processors and dealers, seafood wholesalers and distributors, importers, and seafood retailers. Value added refers to the increased value of fish at each stage of production, exclusive of initial costs. Source: National Marine Fisheries Service (14)

In 2011, the Gulf of Mexico Region seafood industry generated \$247 million in sales impacts in Mississippi, \$500 million in sales impacts in Alabama, \$1.8 billion in sales impacts in Louisiana, \$2.3 billion in sales impacts in Texas, and \$14 billion in sales impacts in the west coast of Florida. The west coast of Florida also generated the largest employment (72,000 jobs), income (\$2.7 billion), and values added impacts (\$4.8 billion).

In 2011, over 3.0 million recreational saltwater anglers took 23 million fishing trips in the Gulf of Mexico Region.
Over 90% of these anglers were residents of a regional coastal county.

Recreational Saltwater Fishing Trips



Figure 123. Total number of recreational saltwater fishing trips in the Gulf of Mexico Region from 1981 to 2011. *Source: National Marine Fisheries Service (15)*

Saltwater Fish Harvested and Released

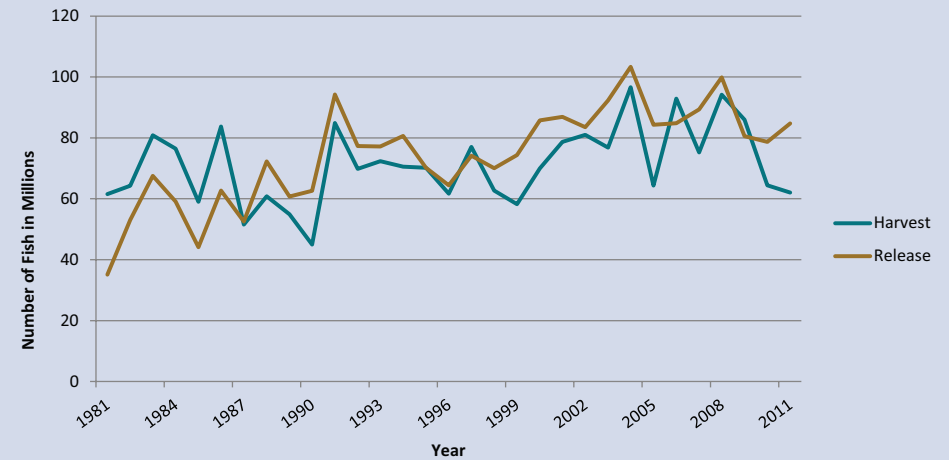


Figure 124. Total number of saltwater fish harvested and released during recreational fishing activities in the Gulf of Mexico Region from 1980 to 2011. *Source: National Marine Fisheries Service (15)*

The Gulf of Mexico Region's key saltwater species or species groups most frequently caught by anglers in 2011 were spotted seatrout (33 million fish), red drum (10 million fish), sand and silver seatrout (8.3 million fish), and Atlantic croaker (8 million fish).

2011 Economic Impacts of the Recreational Saltwater Fishing Expenditures (thousands of dollars)

State	Jobs	Total Sales	Value Added
Alabama	8,177	\$797,280	\$410,222
Florida	47,047	\$4,881,831	\$2,653,677
Louisiana	17,764	\$1,602,913	\$806,349
Mississippi	1,181	\$145,769	\$60,735
Texas	15,150	\$1,853,361	\$952,284

Table 54. Economic impacts from recreational saltwater fishing activities in the Gulf of Mexico Region for 2011. *Source: National Marine Fisheries Service (14)*

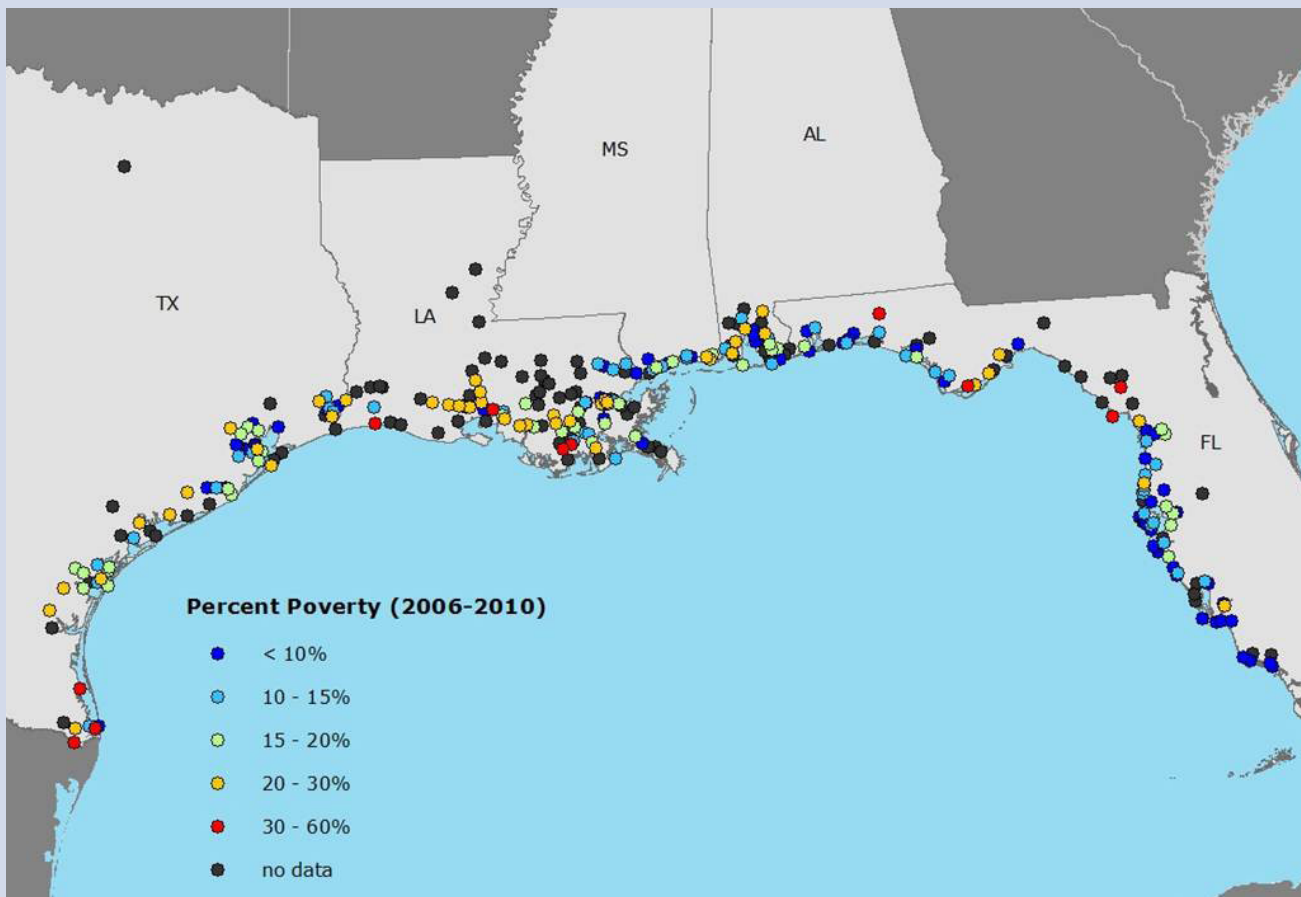


Figure 125. Poverty levels in profiled Gulf of Mexico Region fishing communities, averaged from 2006 to 2010. *Source: National Marine Fisheries Service (13)*

Overall, NOAA Fisheries scientists have obtained information of the social and economic characteristics 205 fishing communities in the Gulf of Mexico Region because of the nature of their links with commercial and/or recreational fishing: 18 in Alabama, 71 in Florida, 52 in Louisiana, 13 in Mississippi, and 51 in Texas. In 2010, 10 of the top 50 ports by landings revenue were located in the Gulf of Mexico Region.

In many coastal communities, fishermen can no longer afford to live near the water because increasing development and redevelopment of these areas has raised the cost of living beyond their means.

Top 5 Commercial Fishing Communities (2010)

Rank	Community Name	Landings Revenue (million \$)
1	Empire-Venice, LA	\$59.4
2	Brownville-Port Isabel, TX	\$52.5
3	Port Arthur, TX	\$47.4
4	Dulac-Chauvin, LA	\$45.1
5	Palacios, TX	\$31.9

Table 55. Top five commercial fishing communities in the Gulf of Mexico Region by landings revenue in 2010. *Source: National Marine Fisheries Service (14)*

Top 5 Recreational Fishing Communities (2010)

Rank	Community Name	For-Hire Permits (number)
1	Orange Beach, AL	93
2	Destin, FL	90
3	Naples, FL	79
4	Pensacola, FL	47
5	Tampa, FL	39

Table 56. Top five recreational fishing communities in the Gulf of Mexico Region by number of for-hire permits in 2010. *Source: National Marine Fisheries Service (18)*

The Deepwater Horizon oil spill in April 2010, endangered the Gulf of Mexico's sea turtles. Sea turtle experts at NOAA and among its federal, state, local and nongovernmental partners recognized they needed to work together to monitor for stranded sea turtles, rescue turtles from oiled waters, rehabilitate oiled turtles, and investigate turtle deaths. Another major part of the effort to protect sea turtles during the spill focused on turtle nests and hatchlings. Federal, state, local, nongovernmental, and private organizations led a massive relocation of 278 turtle nests from the northern Gulf of Mexico to the east coast of Florida. The goal was to prevent young sea turtles from entering the oiled waters of the northern Gulf of Mexico. By mid-November 2010 all but a few of the rescued turtles were returned to the wild proving that the multi-pronged approach of rescue, rehabilitation, and relocation mitigated some of the harmful effects of the oil spill on sea turtles.

Coastal Species Protected by the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA)	
ESA Species	MMPA Species
Blue whale	Atlantic spotted dolphin
Fin whale	Blainville's beaked whale
Humpback whale	Bottlenose dolphin
Sei whale	Bryde whale
Sperm whale	Clymene dolphin
Green sea turtle	Cuvier beaked whale
Hawksbill sea turtle	Dwarf sperm whale
Kemp's ridley sea turtle	False killer whale
Leatherback sea turtle	Fraser's dolphin
Loggerhead sea turtle (9)*	Gervia's beaked whale
Gulf sturgeon	Minke whale
Large-tooth sawfish	Pan tropical spotted dolphin
Smalltooth sawfish	Pygmy killer whale
Elkhorn coral	Pygmy sperm whale
Staghorn coral	Risso's dolphin
	Rough-toothed pilot whale
	Short-finned pilot whale
	Spinner dolphin
	Striped dolphin

* The term "species" under the ESA includes species, subspecies, and for vertebrates only, "distinct population segments (DPSs)". Loggerhead Sea turtle is listed in DPS. The parenthesis indicate the number of listed DPSs for each species.

Table 57. Marine and anadromous species protected by the Endangered Species Act, and marine mammals protected by the Marine Mammal Protection Act in the Gulf of Mexico Region. *Source: National Marine Fisheries Service (16)*

Number of Species Listed Under the ESA

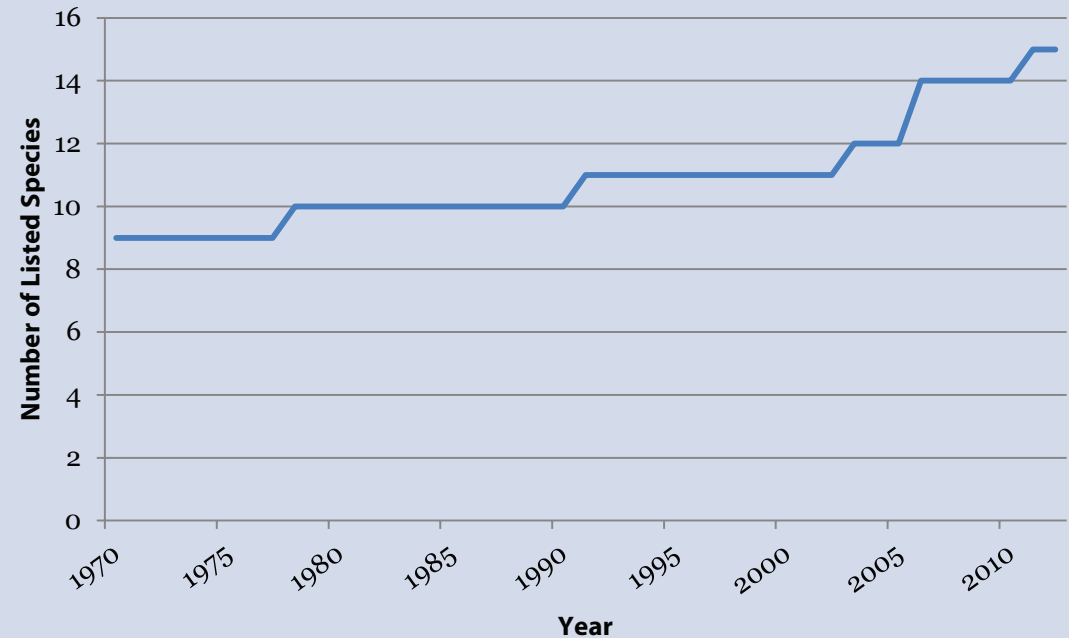


Figure 126. Number of species protected by the Endangered Species Act in the Gulf of Mexico Region from 1970 to 2012. *Source: National Marine Fisheries Service (16)*

Florida has the longest running and most established cetacean watching industry in the Gulf of Mexico Region, with Texas and Alabama only starting up in the late 1990's. Louisiana and Mississippi have minimal activities. Bottlenose dolphins are the main focus of cetacean tourism in the Gulf of Mexico Region. Because of the wide continental shelf in the Gulf of Mexico, larger cetaceans are rarely seen except in deeper water far from the coast.

Whale Watching Economic Data

1998				
Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
61,000	N/A	N/A	N/A	N/A
2008				
Number of Whale Watchers	Number of Operators	Direct Sales	Indirect Sales	Total Sales
550,653	125	\$12,730,956	\$27,532,643	\$40,263,599

Table 58. Whale watching economic data for the Gulf of Mexico Region for 1998 and 2008. Whale watch locations in the Gulf of Mexico Region were Key West, Clearwater/St. Petersburg, Sanibel, Panama City, Destin, Orange Beach, South Padre Island, Port Aransas, and Galveston. Source: *International Fund for Animal Welfare* (8)

Protected Species Valuation

Species	Household Willingness to Pay	National Value (\$ billions)
<i>Leatherback sea turtle</i>	\$67.97	\$4.16
<i>Loggerhead sea turtle</i>	\$44.72	\$2.74
<i>Smalltooth sawfish</i>	\$51.89	\$3.18

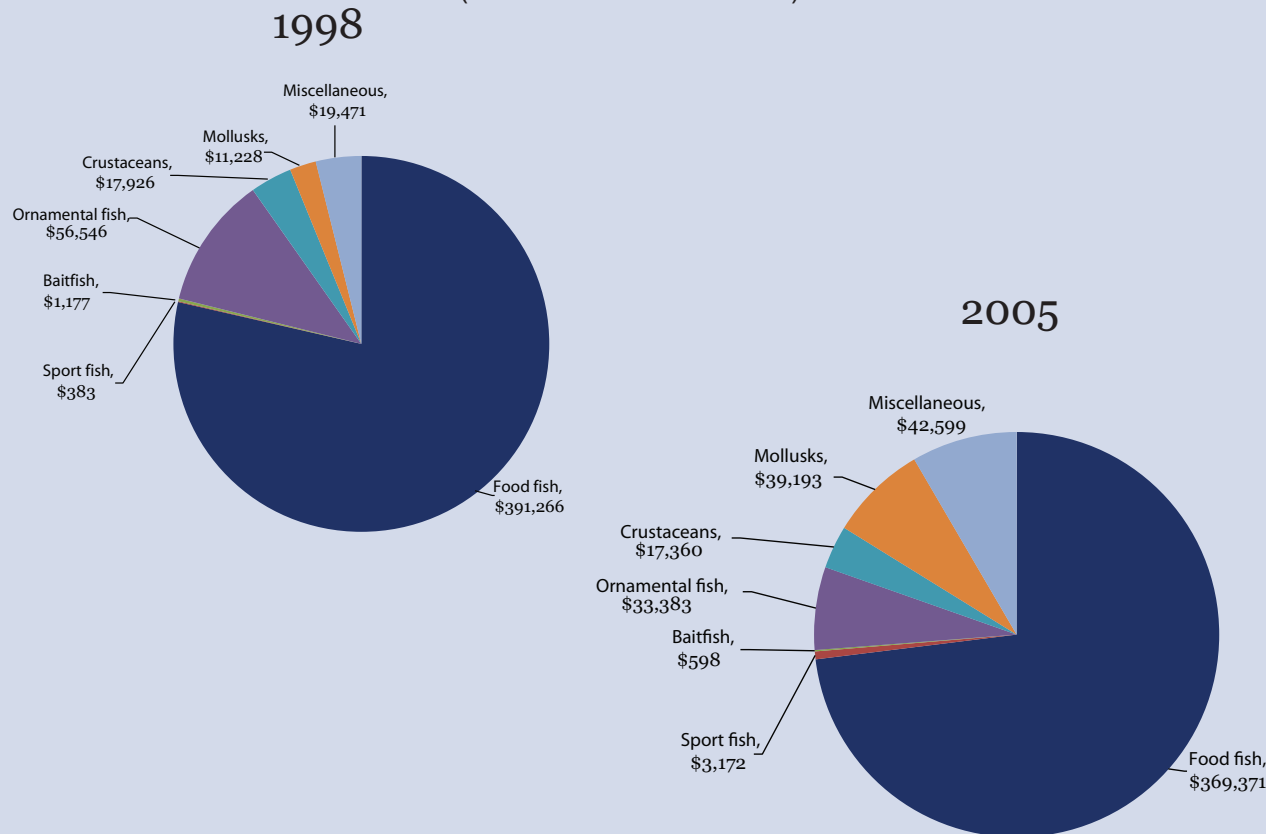
Table 59. Valuation data for some of the Gulf of Mexico Region marine protected species. Household willingness-to-pay values are expressed as a US household's average willingness-to-pay for recovering a species. Payment is in the form of an increase to the household federal tax bill every year for ten years. The national values reported here represent the present value of aggregated household values across the Nation. The household aggregation strategy accounted for survey and panel non-response. All values are reported in 2011 US Dollars. Source: *Conservation Biology* (41)

Dolphin SMART, a partnership between NOAA, the Whale and Dolphin Conservation Society, and the Dolphin Ecology Project, is an education program to promote responsible viewing and advertising of wild dolphins. Dolphin SMART businesses provide their customers detailed knowledge about the laws protecting wild bottlenose dolphins; information on how to responsibly view wild dolphins and recognize signs of harassment; and details about local dolphin populations and research.

The Gulf of Mexico Fishery Management Council developed an Aquaculture Fisheries Management Plan in September 2009 to establish a regionally-based regulatory framework for managing the development of an environmentally sound and economically sustainable offshore aquaculture industry in the federal waters of the Gulf of Mexico.

The primary goal of the Fishery Management Plan is to increase fishery production in the Gulf of Mexico by supplementing the supply of wild caught species with cultured fish. Key protections in the Fishery Management Plan include: limiting the species that may be cultured to native species of the Gulf of Mexico; prohibiting the culture of non-native, genetically modified, and transgenic species; prohibiting aquaculture operations from being sited in habitat areas of particular concern; creating restricted access zones for each permitted facility; capping the total amount of fish that may be cultured annually; and establishing a rigorous recordkeeping, reporting and operational requirements designed to minimize or mitigate potential environmental impacts.

Value of Aquaculture Products Sold
(thousands of dollars)



Saltwater Aquaculture Farms

	Number of Farms	
	1998	2005
Alabama	0	2
Florida	226	163
Louisiana	2	135
Mississippi	0	1
Texas	10	19
TOTAL	30	30

Table 60. Total number of saltwater aquaculture farms in the Gulf of Mexico Region in 1998 and 2005. Table includes data from east and west Florida. Source: US Department of Agriculture (32)

Figure 127. Value of aquaculture products sold by type in the Gulf of Mexico Region saltwater Aquaculture Farms in 1998 and 2005. Figure includes data from east and west Florida. Source: US Department of Agriculture (32)

Wetlands are among the Gulf of Mexico Region's most ecologically and economically important habitats, and provide a host of benefits for fish, wildlife, and coastal communities. Wetlands are valuable because they help remove pollutants from the water, provide flood and storm surge protection, prevent soil erosion, and provide valuable fish and wildlife habitat.

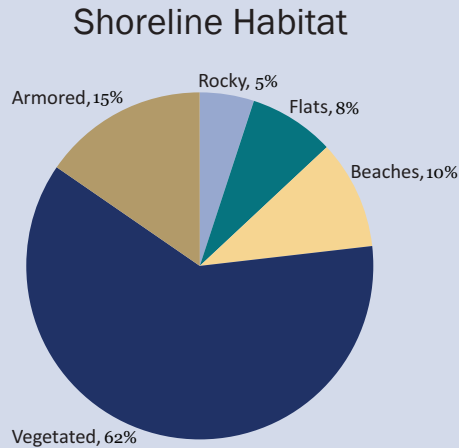


Figure 128. Percent of shoreline habitat in the Gulf of Mexico Region. Figure includes data from east and west Florida. Source: NOAA Environmental Sensitivity Index Maps (22)

Coastal Vulnerability to Sea Level Rise

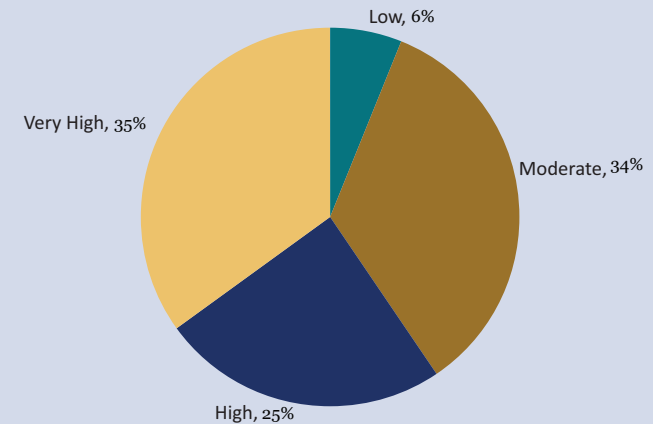


Figure 129. Percent of coastline in the Gulf of Mexico Region that is vulnerable to sea level rise. Figure includes data from east and west Florida. Source: US Geological Survey (40)

There are 590 beaches in the Gulf of Mexico Region and 51% were monitored in 2011 for pollutants. In 2011, the swimming season averaged 163 days per monitored beach, however, beaches were closed an average of 7 days per season. This means that beaches were open and safe for swimming about 96% of the time.

Percent of Monitored Beaches Affected by Notification Actions



Figure 130. Percent of monitored beaches affected by notification actions in the Gulf of Mexico Region from 2006 to 2011. Notification actions are issued by states or local agencies when monitoring of water at swimming beaches show that levels of certain bacteria exceed standards which might pose health risks. The notification may be either a beach advisory, warning people of possible risks or swimming, or closing a beach to the public. Source: Environmental Protection Agency (39)

Federally Insured Assets Along the Coast (thousands of dollars)

	Policies	Premiums	Coverage	Claims Payout
Alabama	22,599 (15)	\$16,715 (16)	\$4,449,965 (15)	\$660,380 (6)
Florida	1,115,215 (1)	\$649,450 (1)	\$250,941,908 (1)	\$2,412,824 (3)
Louisiana	232,504 (2)	\$212,978 (2)	\$48,258,172 (2)	\$12,333,504 (1)
Mississippi	12,663 (19)	\$8,312 (21)	\$2,718,924 (18)	\$1,812,759 (4)
Texas	133,301 (5)	\$116,769 (4)	\$26,688,164 (5)	\$2,797,800 (2)

Table 61. National Flood Insurance Program policies, premiums, coverage, and claim payouts for 2011 for federally insured assets along the Gulf of Mexico Region. The numbers in parenthesis indicate the state ranking for a specific variable. Table includes data from east and west Florida Source: Federal Emergency Management Agency (7)

In 2011, the Gulf of Mexico Region federally insured assets along the coast were covered by more than 1.5 million policies totaling more than \$333 billion of insured assets in the coastal floodplain.

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