# Climate Change & Commercial Fisheries in Cape May, NJ

Gulf of Maine Research Institute

## INTRODUCTION

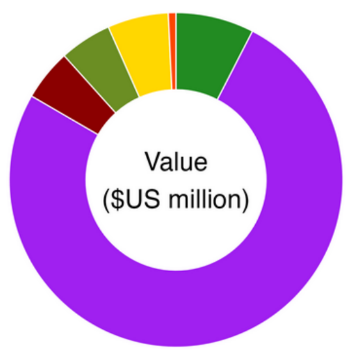
Climate change is altering the physical and chemical characteristics of our ocean and affecting marine ecosystems and fisheries. As environmental conditions continue to change, fishing communities may be affected by changes in the distribution and availability of species. This report summarizes the current status of fisheries in Cape May and shares information on changes in harvested species that may occur in the future. Used alongside the Climate Adaptation Resource Hub for Fishing Communities, this report provides information for understanding potential impacts on a fishing community, which can be used to consider ways to adapt to a changing climate.

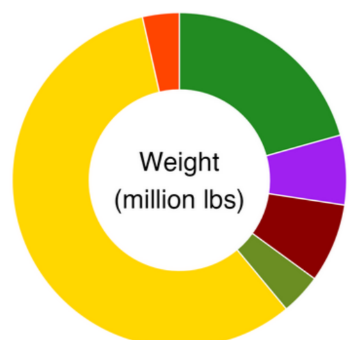
## WHAT IS LANDED HERE?

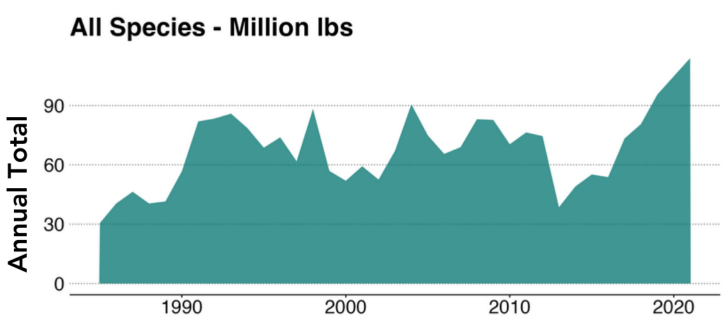
Commercial fishing vessels in Cape May landed an average of 74.2 million pounds of shellfish and finfish per year spanning 2012-2021, valued at $69 million per year on average.* Sea scallop was the highest value species landed, contributing an average $52.1 million per year. Atlantic menhaden was the highest volume species landed, with 42.5 million pounds coming into port each year. Shortfin squid also made substantial contributions, with an annual average of 15.3 million pounds valued at an average of $5.2 million per year being landed in Cape May. The overall volume of landings has fluctuated between 40 and 100 million pounds per year since 2000, surpassing 104 million pounds in 2020. The total value of landings in Cape May generally increased from 1990-2010, spiked in 2011 at $105 million, and has fluctuated around $75 million in recent years.

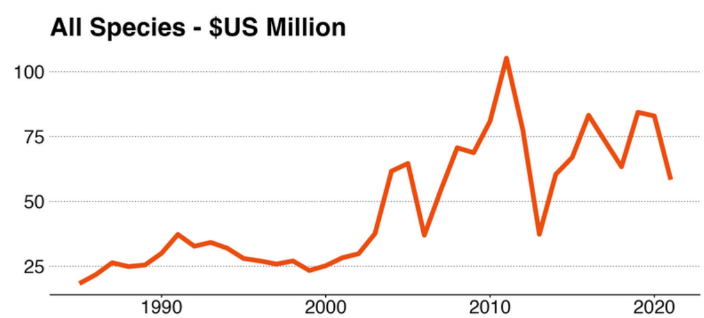
| Species | Annual Average Value | Annual Average Volume |
|---|---|---|
| Sea scallop | $52,111,588 | 4,967,558 lbs |
| Shortfin squid | $5,205,098 | 15,270,614 lbs |
| Atlantic menhaden | $4,059,184 | 42,493,632 lbs |
| Longfin squid | $3,463,061 | 2,918,535 lbs |
| Atlantic mackerel | $510,060 | 2,630,534 lbs |
| Other | $3,411,156 | 5,640,491 lbs |

Above are the annual average value and volume for the top species landed at this port in each year from 2012-2021.




*Landings data were provided by NOAA Fisheries' Greater Atlantic Regional Fisheries Office. Due to confidentiality restrictions, some data may not be fully representative of the historical landings at a given location.

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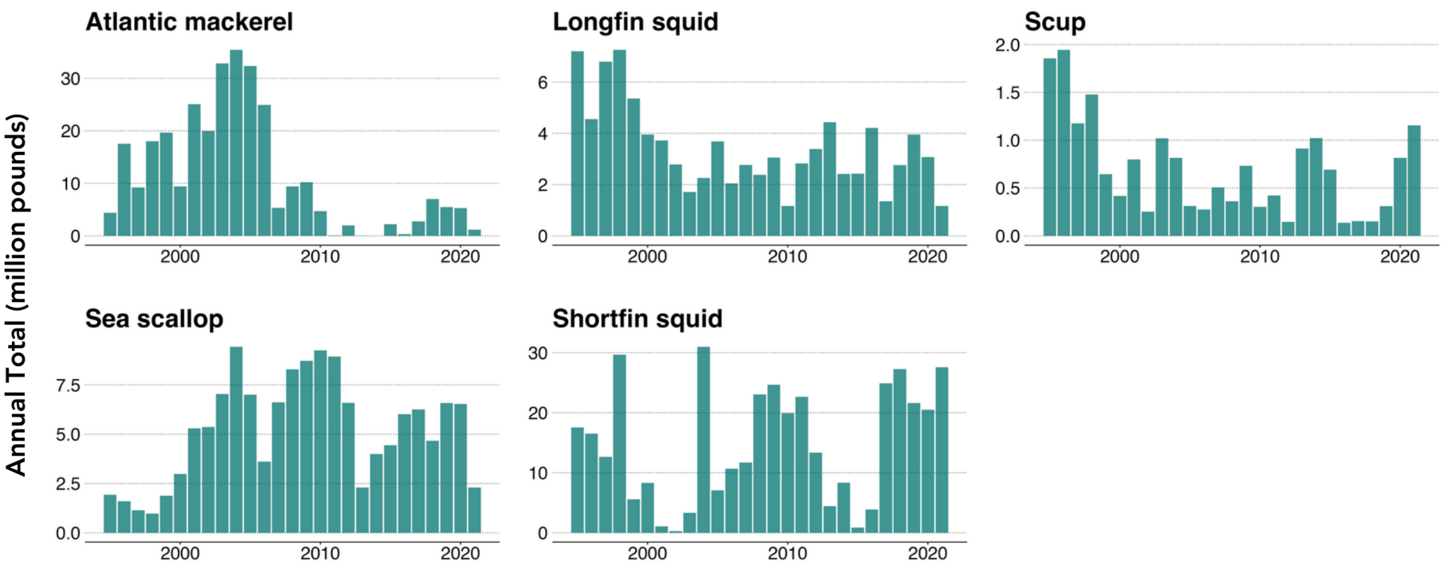
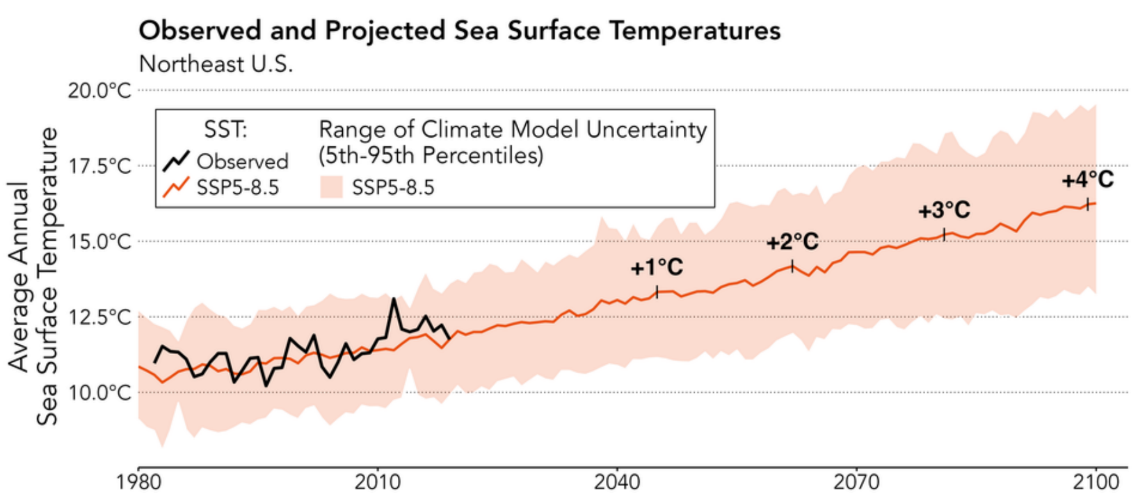
## LANDINGS OVER TIME

Atlantic mackerel landings in Cape May peaked in the mid 2000s, surpassing 30 million pounds in 2004, and have substantially declined in the years since. The landed volume of longfin squid has generally decreased since the late 1990s; while the volume is lower, landings have remained relatively stable since then, punctuated by a few small peaks. Scup landings followed a similar pattern of relatively lower landings during the 2000s, punctuated by distinct peaks since that time. The volume of scallop landings increased from 1998-2004 then remained relatively high, with several punctuated declines. The recent volume of shortfin squid landings have been high, but several cycles of landings increases and substantial declines have been noticed.




## OUR CHANGING CLIMATE AND WARMING WATERS

Greenhouse gas emissions around the world are a primary contributor to the warming the planet has been experiencing over the past century. This warming affects the health and distribution of species that support fisheries in coastal communities. Scientists around the world use a common set of scenarios to project climate impacts into the future. These scenarios represent multiple global social and economic development patterns paired with different levels of greenhouse gases in Earth's atmosphere. The scenario representing the largest build-up of greenhouse gases, labeled SSP5-8.5, indicates global average temperatures will warm by approximately 4°C (7°F) above pre-industrial levels by the end of this century. We use this scenario to understand how species may respond to changes in ocean temperatures in the Northeast U.S. relative to those experienced during 2010-2019. These species projections allow us to explore different potential futures of fisheries and support decisions now that can buffer the severity of future climate change impacts on fishing communities.



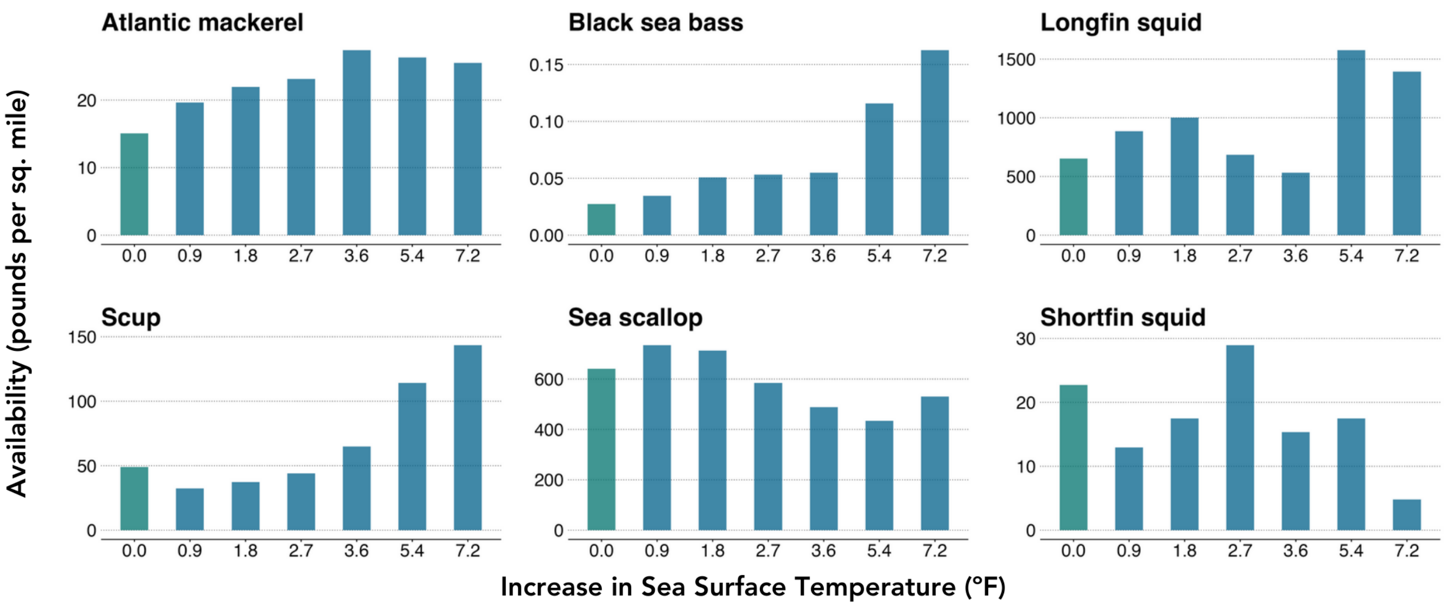

**Temperature Crossing Points**

*Based on SSP5-8.5 Climate Projections*

| Celsius | Fahrenheit | As soon as |
|---|---|---|
| 0.5°C | 0.9°F | 2034 |
| 1.0°C | 1.8°F | 2045 |
| 1.5°C | 2.7°F | 2056 |
| 2.0°C | 3.6°F | 2062 |
| 3.0°C | 5.4°F | 2081 |
| 4.0°C | 7.2°F | 2099 |

## FUTURE CHANGES IN AVAILABILITY

As the abundance and distribution of certain species changes with warming waters, communities may need to respond to ensure the continuity of the fishing industry. By combining historical species observations with future climate information, we can estimate how the availability of certain species may change, and what new opportunities may emerge. Availability is given here as the total estimated weight of a particular species of fish in a given area, as modeled from bottom trawl survey data. Warming ocean temperatures may affect the availability of some commercial species in the waters near Cape May. The biomass of Atlantic mackerel and black sea bass may increase with increasing ocean temperatures. Longfin and shortfin squid biomass may vary with different levels of warming. The availability of sea scallop may increase initially but experience declines at high levels of warming, while scup is projected to decline at low levels of warming but increase as warming progresses.




## EMERGING OPPORTUNITIES AND ADAPTATION OPTIONS

Harvesting emerging species and diversifying catch are some ways individual harvesters can adapt to changing fisheries. In the table below, we outline other potential adaptation options spanning the different scales of the fishery system. As the climate continues to change, new impacts will take shape, requiring re-evaluation and revision of goals in order to respond to climate change. For more information on adaptation options in fishing communities, please visit the Climate Adaptation Resource Hub for Fishing Communities.

### Individual Harvester Actions

- Shifting fishing locations
- Shifting harvested species
- Diversifying livelihood (alternative fisheries, aquaculture, non-fishing jobs)

### Industry Actions

- Improving product handling
- Developing supply chain capacity
- Diversifying markets and building consumer demand

### Management Measures

- Reassessing quota allocations
- Altering permit access and availability
- Developing adaptive reference points
- Applying dynamic and ecosystem-based management

### Community Initiatives

- Maintaining and securing shoreside infrastructure
- Improving transportation networks
- Developing local seafood initiatives
- Conducting vulnerability and resilience assessments
- Using early warning monitoring
- Community adaptation and resilience planning

## Projected Changes in Species Availability in Cape May

Values represent percent change in modeled species availability at potential levels of warming relative to *2010-2019* baseline conditions.
Species in gray had low availability *(<5 lbs/sq. mile)* during the baseline period.

| | Increase in Sea Surface Temperature | | | |
|---|---|---|---|---|
| **Species** | 0.9°F | 1.8°F | 3.6°F | 5.4°F |
| Acadian redfish | −1.7% | −3.4% | −27.6% | −43.0% |
| American lobster | 14.2% | 28.2% | 20.8% | −1.2% |
| American plaice | −4.6% | −5.6% | −12.8% | −17.1% |
| Atlantic cod | −0.8% | 27.7% | 47.9% | 29.1% |
| Atlantic halibut | 6.8% | 4.1% | 4.5% | 0.4% |
| Atlantic herring | 16.5% | 10.0% | −20.6% | 7.7% |
| Atlantic mackerel | 30.5% | 45.8% | 81.9% | 74.6% |
| Black sea bass | 26.9% | 86.3% | 101.0% | 324.3% |
| Butterfish | −0.9% | −14.2% | 14.2% | −2.2% |
| Deep sea red crab | −18.9% | −17.9% | −30.9% | −19.4% |
| Haddock | −5.5% | 13.5% | 4.4% | −30.8% |
| Hagfish | 45.5% | 108.1% | 102.5% | 45.7% |
| Jonah crab | 17.2% | −2.2% | 1.5% | −28.3% |
| Little skate | −39.4% | −40.9% | −36.8% | −29.2% |
| Longfin squid | 35.7% | 53.7% | −18.5% | 141.5% |
| Monkfish | −11.1% | −18.8% | −36.0% | −42.3% |
| Ocean quahog clam | −40.7% | −13.3% | 16.5% | −52.9% |
| Pollock | −18.5% | 9.0% | 8.2% | −9.3% |
| Red hake | 31.7% | 26.0% | 10.1% | −2.0% |
| Rock crab | 63.7% | 48.0% | 78.9% | 138.3% |
| Sand lance | −35.8% | −37.3% | −60.7% | −56.0% |
| Scup | −34.0% | −23.9% | 32.3% | 133.1% |
| Sea scallop | 14.7% | 11.3% | −23.8% | −32.2% |
| Shortfin squid | −42.9% | −23.0% | −32.5% | −23.1% |
| Silver hake | 7.4% | 4.8% | −0.5% | −13.2% |
| Smooth skate | −11.0% | −18.0% | −12.2% | −10.5% |
| Spiny dogfish | −68.1% | −70.8% | −66.7% | −68.4% |
| Summer flounder | −0.9% | 18.2% | 43.9% | 94.6% |
| Thorny skate | −16.5% | −15.9% | −21.8% | −32.3% |
| White hake | −18.9% | −2.8% | 4.9% | 13.1% |
| Windowpane | −15.0% | 2.7% | 5.0% | 16.1% |
| Winter flounder | 17.6% | 18.6% | 23.3% | 11.4% |
| Winter skate | −38.8% | −41.3% | −33.2% | −31.5% |
| Witch flounder | −0.6% | −22.8% | −26.7% | −23.3% |
| Yellowtail flounder | −28.6% | −31.7% | −43.1% | −37.8% |

## MAKING SENSE OF CLIMATE PROJECTIONS AND SPECIES DISTRIBUTION MODELS

The species results shown here were developed using a spatio-temporal species distribution model, which can estimate the current and future distribution of marine species through time and space. The model uses projected regional sea surface and bottom temperature data from the globally coordinated Coupled Model Intercomparison Project (CMIP6) and species data from bottom trawl surveys conducted by the Northeast Fisheries Science Center and the Department of Fisheries and Oceans. Estimated species biomass densities are then averaged over an area fished by vessels from the port of interest. This enables us to interpret local changes in availability of a species at a specific time or temperature.

## LEARN MORE

For more information regarding climate change, species distribution change, fisheries adaptation options, and adaptation barriers and enablers, please visit:

**gmri.org/adaptationhub**

## ASK QUESTIONS

For specific questions regarding your community, contact Kathy Mills at:

**kmills@gmri.org**

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Science. Education. Community.