Climate Change & Commercial Fisheries in Newport News, VA

Gulf of Maine Research Institute

INTRODUCTION

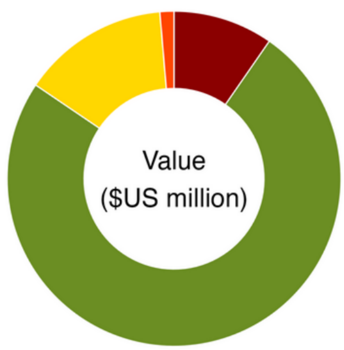
Climate change is altering the physical and chemical characteristics of our ocean and affecting marine ecosystems and fisheries. As environmental conditions continue to change, fishing communities may be affected by changes in the distribution and availability of species. This report summarizes the current status of fisheries in Newport News 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.

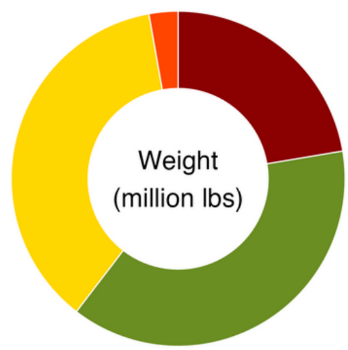
WHAT IS LANDED HERE?

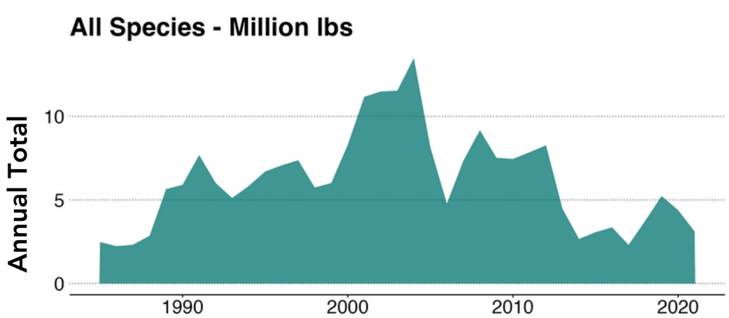
Commercial fisheries in Newport News landed an average 4.1 million pounds of finfish and shellfish, valued at an average $21.7 million per year from 2012-2021.* Landings of sea scallops represented a large portion of this total, with 1.5 million pounds and $16.2 million on average per year coming into Newport News. The total volume of species landed increased through the 1990s and early 2000s, peaking in 2003 at 13.5 million pounds; however, it has been decreasing since. The overall value of species landed in Newport News followed a similar pattern, spiking in 2004 and 2011, and declining in the years since.

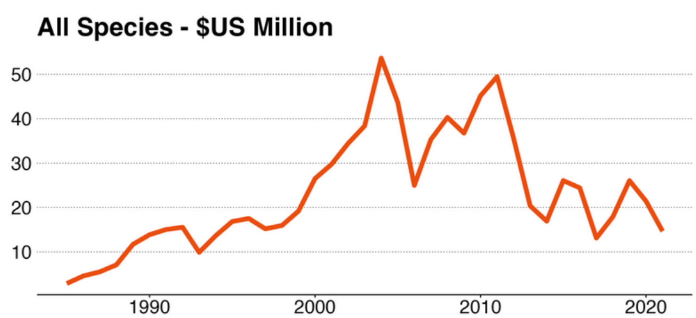
Species	Annual Average Value	Annual Average Volume
Sea scallop	$16,195,722	1,546,556 lbs
Summer flounder	$2,093,883	907,947 lbs
Black sea bass	$294,455	113,899 lbs
Other	$3,073,235	1,493,508 lbs

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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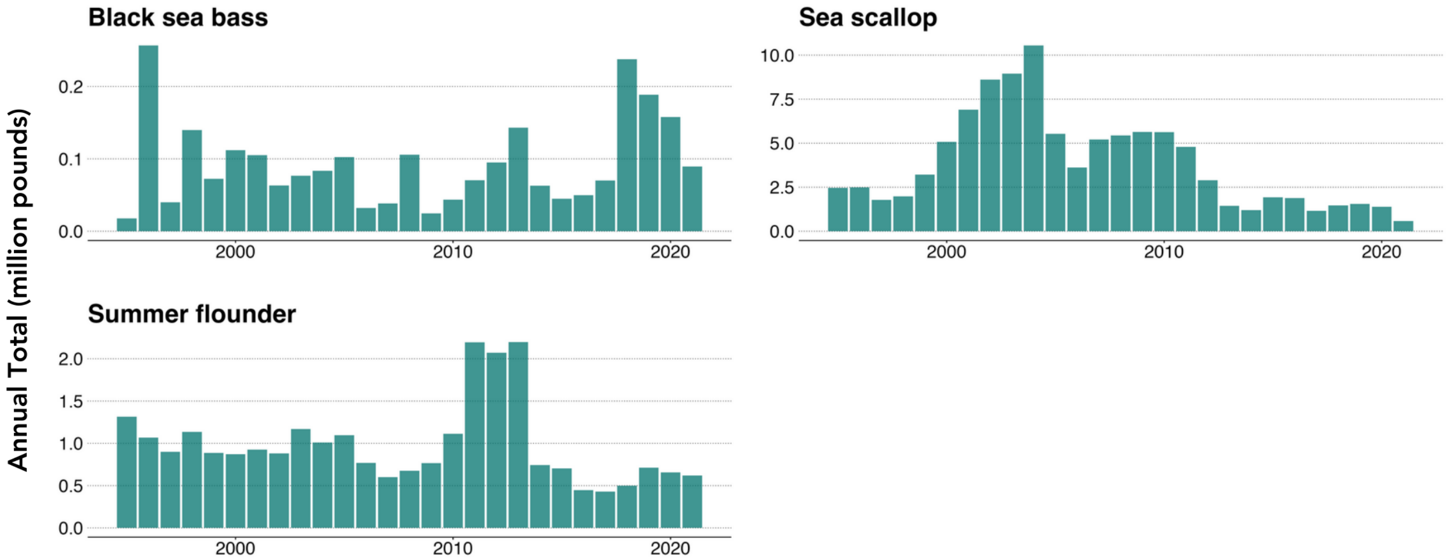
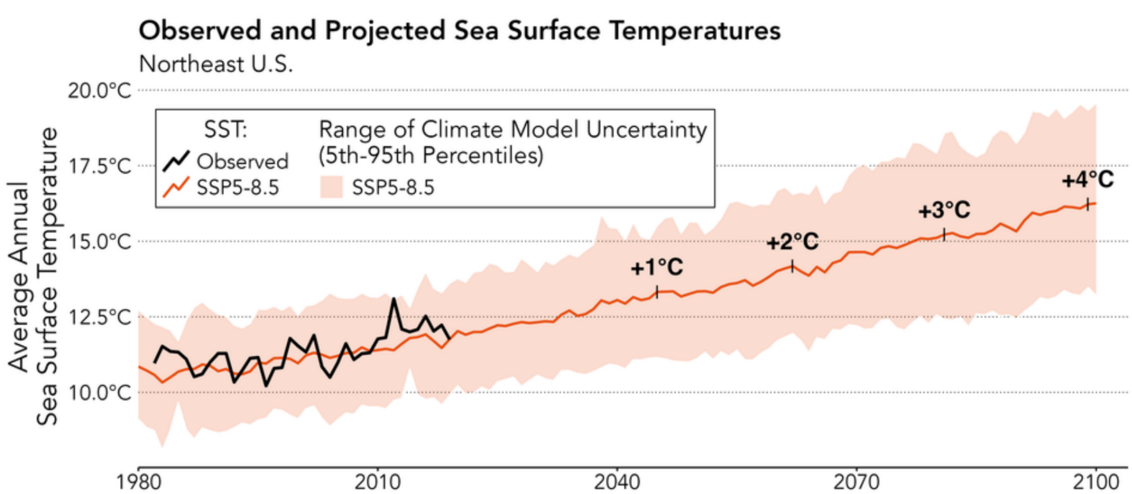
LANDINGS OVER TIME

Summer flounder, sea scallop and black sea bass landings have varied since the 1990s. Landings of black sea bass fluctuated between 50,000 and 100,000 pounds in most years, aside from spikes to near or over 200,000 pounds in a few years. Scallop landings peaked in 2004, surpassing 10 million pounds before decreasing to less than 2 million pounds per year since the early 2010s. Landings of summer flounder were generally between 0.5 and 1.0 million pounds per year, but they surpassed 2 million pounds from 2011-2013.



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.



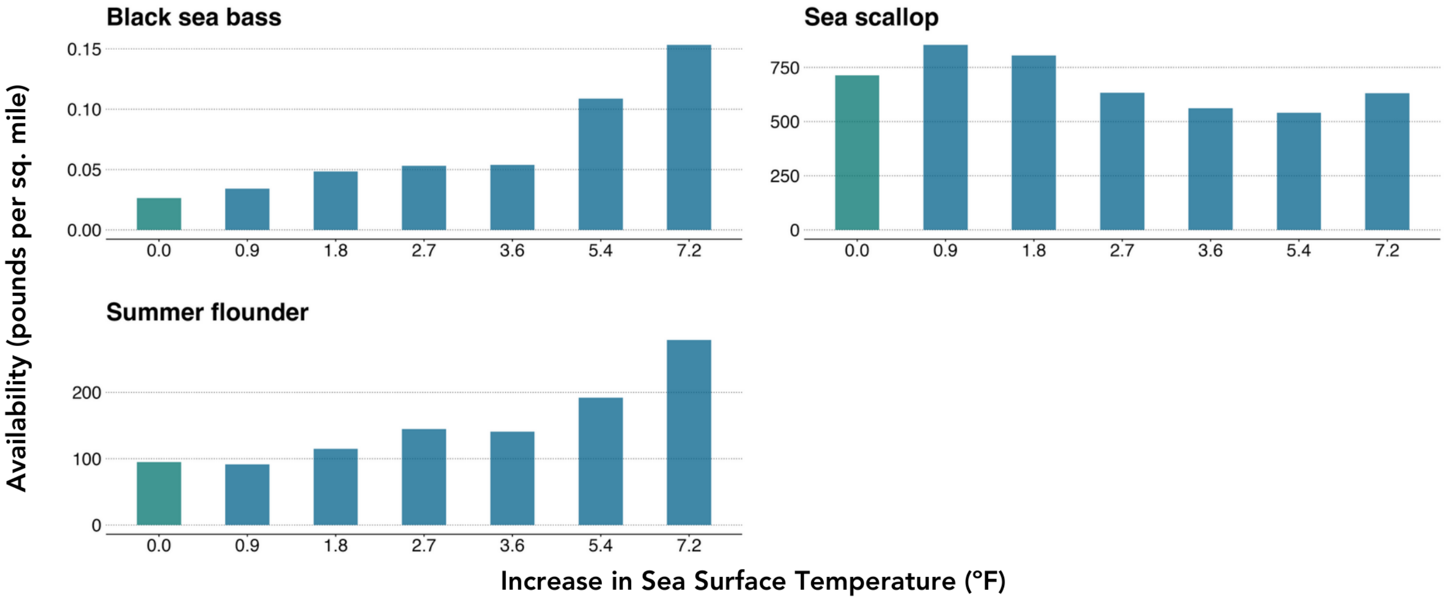
Temperature Crossing Points

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 Newport News. Black sea bass and summer flounder may increase over nearly all levels of warming. Scallop availability may increase with low levels of warming but decline at high levels of warming.



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 Newport News

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	−2.8%	−5.3%	−29.6%	−45.0%
American lobster	17.3%	28.2%	20.3%	−1.1%
American plaice	−4.7%	−6.1%	−12.9%	−17.2%
Atlantic cod	3.8%	22.8%	41.7%	32.3%
Atlantic halibut	6.5%	2.3%	2.3%	−0.9%
Atlantic herring	20.1%	12.8%	−16.2%	16.2%
Atlantic mackerel	29.8%	45.7%	77.1%	66.2%
Black sea bass	30.0%	84.5%	105.4%	313.5%
Butterfish	−30.4%	−31.7%	−14.6%	−30.2%
Deep sea red crab	−22.9%	−17.9%	−35.3%	−20.7%
Haddock	−14.8%	8.6%	−7.7%	−37.4%
Hagfish	43.5%	106.8%	98.8%	45.2%
Jonah crab	22.8%	−1.3%	3.8%	−21.9%
Little skate	−39.2%	−40.5%	−37.3%	−30.8%
Longfin squid	36.8%	56.6%	−17.8%	151.0%
Monkfish	−11.8%	−20.6%	−39.4%	−45.5%
Ocean quahog clam	−42.3%	−9.2%	9.0%	−51.8%
Pollock	−18.6%	13.6%	9.4%	−1.9%
Red hake	29.0%	19.7%	7.7%	−6.5%
Rock crab	62.0%	44.1%	77.1%	132.0%
Sand lance	−45.7%	−41.7%	−64.0%	−59.3%
Scup	−49.5%	−45.7%	−6.6%	78.5%
Sea scallop	19.7%	12.8%	−21.3%	−24.3%
Shortfin squid	−43.0%	−21.1%	−25.8%	−24.4%
Silver hake	8.4%	5.9%	0.8%	−13.5%
Smooth skate	−8.0%	−17.5%	−11.2%	−6.5%
Spiny dogfish	−70.3%	−71.3%	−69.1%	−69.1%
Summer flounder	−3.5%	21.2%	48.6%	102.5%
Thorny skate	−15.4%	−14.5%	−21.4%	−29.2%
White hake	−21.0%	−5.4%	2.8%	11.2%
Windowpane	−16.9%	3.7%	8.3%	17.0%
Winter flounder	23.3%	25.8%	31.3%	15.9%
Winter skate	−38.9%	−38.9%	−32.4%	−30.7%
Witch flounder	−4.1%	−20.4%	−23.7%	−17.5%
Yellowtail flounder	−31.7%	−36.7%	−46.1%	−42.9%

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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