Climate Change Drives Fish Into New Waters, Remaking an Industry

The catch is shifting northward as water temperatures rise, forcing crews to retool their boats and rework their businesses

By Robert Lee Hotz
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The fish are moving, and so is an entire industry.

Aboard the Stanley K and the Oracle, two 58-foot vessels, Buck Laukitis and his crews chase halibut across the Bering Sea worth $5 a pound at the docks. As sea temperatures rise, and Arctic ice retreats the fish appear to be avoiding warming waters, migrating northward where they cost more to reach, federal fisheries biologists say.

Twice this past fall, the Oracle sailed 800 miles north from the seaport of Dutch Harbor in the Aleutian Islands, before finding the halibut that a decade ago lived several hundred miles closer to home. Each voyage took twice as long and yielded half as many fish.

“It keeps me up at night,” he says. “I woke up at three in the morning. I couldn’t sleep thinking about where the fish are going.”

Commercial fishing in the Bering Sea waters of Alaska. PHOTO: COREY ARNOLD

Across the continent from Mr. Laukitis in Rhode Island, black sea bass have moved in with the warming waters. The bulk once lived roughly 700 miles south off North Carolina. Now they are a staple catch in Point Judith, R.I., along with the summer flounder that also have begun appearing.

“Not everybody is a loser in global warming,” says Aaron Gewirtz, owner of a 45-foot trawler in Point Judith, who says his bottom line has been shored up by the newcomers. “Some species really dig it. And black sea bass is one of them.”

Mr. Gewirtz, a “gill netter” who uses gear designed to catch fish by the gills or fins, has capitalized on shifts in fisheries by getting federal permits to catch almost anything with fins: cod, haddock, winter flounder, monkfish, scup, skate, black sea bass. A few decades ago, he says, a gill netter would concentrate on one fish. Today, “we try to be as diversified as possible in what we catch.”

The impact of climate change has a price, and for fishing-boat owners in sea ports, that means following the catch. The northward movement of fish around the world is disrupting some fishing grounds and revitalizing others—and fishing businesses are trying to adapt their operations.

The impact of temperature on oceans is varied. As the atmosphere warmed in recent decades, oceans absorbed heat unevenly, causing marine hot spots that can last months, scientists say. Spikes of warmer water affect fisheries differently depending on ocean currents, ocean depth and seafloor topography.

Higher temperatures mean less dissolved oxygen in the water while increasing a fish’s demand for oxygen by speeding up its metabolism. Warming water may also favor predators or drive off

species on which commercial fish feed. All told, warming ocean temperatures are pushing hundreds of marine species outside of their traditional ranges, ocean scientists say.

Off Portugal's coast, fishermen harvest fish that a decade or so ago lived only in waters off Africa, according to a study published in 2016 in the journal Fisheries Research. In 2011, mackerel for the first time appeared off Greenland's coast, according to marine biologists in Iceland and Norway.

"We have seen mackerel extending its feeding area into Icelandic waters," says Birkir Bardarson, who oversees a research fleet at Iceland's Marine and Freshwater Research Institute. "It has become important for the fisheries of Iceland."

A Pacific cod caught in the Bering Sea last year. PHOTO: COREY ARNOLD

Climate change has created an especially stark contrast of fortunes between fishers in Alaska and Rhode Island. In the Bering Sea, halibut, pollock and cod are moving away. Off Rhode Island, newly booming fisheries include not just black sea bass but also squid and Jonah crab, an edible species with big, dark-brown claws.

In Alaska's multibillion-dollar commercial fishing industry, representing America's largest wild-caught seafood harvest, federal fishery experts worry most about the impact of rising temperatures on pollock, considered the single-most-valuable fish by volume in the U.S.

Ships scoop Alaska pollock from shimmering schools in the Bering Sea in 1,200-foot-long nets, 100 tons or more at a time, then clean, process and freeze them aboard. The meat is trimmed, battered and breaded by processors into millions of fish sticks and fast-food filets a day. It is minced into paste called surimi for imitation crab, ground for animal feed and pressed into oil. Franz Mueter, who studies climate change and fisheries at the University of Alaska in Fairbanks, says: "It is the billion-dollar fish."

Fishermen and marine scientists who study Alaska fisheries are used to natural variations in ocean circulation patterns. But starting in 2000, warm and cool spells lasted longer, federal weather records show. Temperatures rose to records and plunged to bitter lows.

In 2016, St. Paul Island in the Bering Sea registered its warmest year on record, 4.9 degrees Fahrenheit above average. Last year, spring and summer temperatures across the Arctic generally were cooler, but the annual average surface temperature was the second highest on record, according to National Oceanic and Atmospheric Administration's annual Arctic Report and the Alaska Climate Research Center at the University of Alaska.

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"That was highly unusual and was not something we had ever seen in the Bering Sea before," says Janet Duffy-Anderson, who helps monitor the commercial fishery for the NOAA Alaska Fisheries Science Center in Seattle. She is part of a federal catch-management system that uses annual fish sampling, ocean surveys, ecosystem studies and computer models.

This year, the winter ice that normally covers the northern Bering Sea never formed and, for the first time since the surveys started 34 years ago, a vast pool of cold bottom water that normally kept many fish at the southeastern end of the Bering Sea was gone.

A trawl net bulging with pollock is hauled over a boat's stern in the Bering Sea. **PHOTO:** COREY ARNOLD

Marine scientists once thought Alaska pollock would thrive in warmer waters. Across the Arctic Circle in the Barents Sea, a pollock relative, Atlantic cod, doubled its

numbers recently as water temperatures soared.

Instead, federal ocean scientists in a Bering Sea survey earlier this year found pollock and cod were concentrating farther north than ever, likely out of easy reach of all but the best-equipped trawlers.

Fisherman Darius Kasprzak in Kodiak, Alaska, has been fishing commercially since 1983. "I have gone from averaging 100,000 pounds of cod every year at 40 cents a pound, and this year I caught two cod," he says. From his small boat he now catches rockfish, a whitefish that can fetch 6 cents to $1.25 a pound depending on the variety. "It's been five years since my last good cod season and I had to travel 400 miles to get that."

Managers at Aleutian Spray Fisheries Inc. in Seattle, which typically harvests 40,000 to 50,000 tons of pollock from the Bering Sea annually, decided in 2015 to build in more flexibility to meet shifting market demand and fishery conditions. They hauled their 1,000-ton 240-foot factory trawler, the Starbound, into dry dock and cut it in half. They welded it back together after inserting a 60-foot-long addition to accommodate more processing equipment, designed to expand the range of products they can make at sea.

"We wanted to make our vessel as versatile as possible," says company executive Craig Cross. "It's a response to different markets and different fish conditions, which includes climate."

A crew of 130 working 16-hour days can now process around 450 metric tons of fish daily aboard the renovated Starbound, about 100 metric tons more a day than before renovating the ship. The three computer-driven production lines can each clean, debone and trim filets at about 180 fish a minute. They can now also produce fish meal, surimi and fish oil while still at sea.

"We are able to mix and match our product to demand right onboard," says Starbound captain Karl Bratvold.

On its most recent fishing trip on the Bering Sea, it brought back 160 tons of frozen fish filets, 24 tons of fish meal and 6,000 gallons of fish oil, with an average trip now worth $3.8 million, compared with $3 million per trip before the conversion, he says. This past year, they made 16 fishing trips of 10 days each at a cost of about $60,000 a day, compared with $55,000 a day before. So far, the value of the additional fish products offsets the higher operating cost.

"We are definitely seeing changes in what's happening out on the ocean," says Doug L. Christensen, president of Arctic Storm Management Group in Seattle, a company that harvests about 90,000 tons of fish yearly from the Bering Sea. In pursuit of pollock this year, his ships have been traveling 60 or 70 hours out of Dutch Harbor, he says, instead of 20 hours or so as in years past, adding an extra 5,000 gallons or so of fuel to each voyage.

Dutch Harbor, Alaska, is America's most productive fishing port by volume. PHOTO: COREY ARNOLD

To control his operating costs, he moved from two trawlers to a single highly automated vessel he expects to cost more than $150 million. The new ship will have eight filleting production lines and freezer capacity for 2,500 tons of fish—twice the capacity of one of his current vessels. Labor and fuel costs will be lower, he says. "There's no reason for me to send two boats to do a job that one boat can do."

So far, there are no real climate-change winners in Alaska's fisheries from the northward migration of the catch. The Bering Sea is the end of the line for traditional U.S. commercial fisheries.

In Rhode Island, fishers are there to benefit as species move in. Not so long ago, the lobstermen of Point Judith threw away Jonah crabs that got tangled in traps. Now, lobsters have shifted into deeper, cooler waters off shore and the crab have become a commercial mainstay, says Thomas Heimann, a research associate at the Commercial Fisheries Research Foundation in Saunderstown, R.I.

"It wasn't even a fishery 10 years ago," he says. "It is pretty huge now."

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U.S. landings of Jonah crab are about 17 times what they were 20 years ago, according to the NOAA Report on U.S. Fisheries. Rhode Island lobstermen are buying wider boats to take advantage, building bigger deck tanks to hold the catch and investing in federal permits to gain access to the fishery.

To take advantage of growing Jonah crab supplies, Bonnie Hardy is converting a warehouse in East Providence into a crab-processing plant she hopes to open in January for her seafood startup. “How am I adapting to warming currents? Right now my adaptation is that I am setting up a food processing facility,” she says. “There is opportunity there.”

Meanwhile, squid have become so important to the Rhode Island economy that the legislature recently voted calamari the state’s official appetizer. The U.S. catch of Illex squid, usually used in calamari, tripled between 2016 and 2017, according to the NOAA Report. Richard Fuka, who builds boats and repairs commercial fishing vessels in Point Judith, says he has seen business thrive as a result.

“The huge winner in warming waters,” he says, “is the squid fisherman of Rhode Island.”

Then there’s the black sea bass. The local commercial sea-bass fishery tripled in value during the past nine years, largely due to the influx of new fish, according to state environmental officials. Federal fishery restrictions, which don’t account for recent shifts in species due to warming waters, block local fishermen in Rhode Island and other Northeastern states from taking full advantage of the record numbers. There have been challenges to the existing quotas but it may take years to reallocate them.

A vessel returns to Dutch Harbor after days at sea fishing for Pacific cod. PHOTO: COREY ARNOLD

Now it is fishermen from farther south who must sail farther to catch them. Jimmy Ruhle, owner of a 95-foot trawler, has been fishing from North Carolina to New England for 54 years.

Over the last 25 years, he says, he has seen summer flounder and black sea bass shift their range 600 to 700 miles or so north from where he once caught them as a young man, in response to warming water temperatures and shifts in the Gulf Stream.

To stay profitable, Mr. Ruhle has shifted northward too, and that means higher fuel costs. As a result, Mr. Ruhle has branched out into harvesting squid off the coast of Rhode Island, which he can unload locally.

Federal fishing quotas let commercial fishermen from the south such as Mr. Ruhle catch more black sea bass in northern waters than local fishers are allowed, because Mr. Ruhle and others like him are registered in southern ports where the black sea bass fishery was concentrated decades ago when the federal quotas were set. Even so, they must unload their haul in their legal home ports.

Mr. Ruhle steams south to unload in Virginia and North Carolina.

“We had to travel 1,300 miles in 11 days to get the catch we were allocated,” he said Sunday, after docking in Hampton at the end of his most recent fishing trip. “All of the fish we caught this year could easily have been taken off Virginia 25 years ago,” he said. “It has been that significant a shift in those species.”

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