

On the NOAA side, John Manderson, a senior fisheries research biologist with specialties in field ecology, habitat ecology, fisheries ecosystem science and collaborative research working out of the organization's Northeast Fisheries Science Center in New Jersey, served as the chief scientist on the project. Chris Roebuck, operator of the Karen Elizabeth, was representing the fishing industry. The crew onboard the vessel totaled 10 members – five researchers and five fishing professionals.

The goal of the study was to develop a quantitative understanding of two different modes of ocean-floor species surveying – one approved by the federal government and one designed by the fishing community for maximum efficacy. For this experiment, the third leg of the overall project, researchers were examining the catch rates of summer flounder, winter flounder and red hake. Previous and similar research conducted in 2015 was examining yellow-tail flounder and grey sole.

“My specialty has become collaborative research with the fishing industry,” said Manderson. “The reason for that is that at the scale of the ecosystem, experts in the fishing industry have much greater access to the ecosystem and as a result they have much better intuitions about what is going on in the ecosystem in real time, including changes in habitat occurring as a result of changes in climate, than we do. ”

The fishing vessel Karen Elizabeth is a twin trawler equipped with two nets as close together as possible which can then be towed simultaneously at approximately the same speeds and for the same duration. These assets lend the boat well to research-based projects that involve comparing different survey methods literally side-by-side.

“The unique thing about the boat that I have is that it's a twin trawler, so it tows two nets at the same time,” said Roebuck. “It lends itself well to towing for a controlled experiment. That's kind of been the key to testing a lot of the bycatch

reduction methods and the efficacy of different gears and the selectivity of different sweeps.”

The two survey methods were then attached to each net aboard the boat – the chain sweep developed by the fishing industry on one and the rockhopper sweep used by the federal government on the other. The nets used on each side were federally approved. Over the 10-day endeavor, between 107 and 117 trawling locations served as the sites of the experiment. Each tow produced a ratio of the number of fish caught in the chain sweep and the number caught in the rockhopper sweep.

“Our goal was to collect as many ratios as possible for the target species and sizes over the broadest area so we could develop estimates of maximum net efficiency with high certainty,” said Manderson.

2018 marks a federal assessment year for summer flounder. According to Roebuck, research like the work being conducted by the Karen Elizabeth crew serves to assist the government in more accurately determining fish populations in certain areas, thus leading to proper catch limits for fishermen.

“The question that’s guided us lately has been, ‘where can we influence the assessments?’” said Roebuck. “Summer flounder was the obvious choice.”

“[Net efficiency estimates] can be used as a reality check for catchability estimates developed from analytical fish population assessment models,” added Manderson. “Model based estimates should be reasonable similar to the field measurements. Net efficiency estimates can also be used to develop empirical estimates of population size developed just from the surveys when a specific analytical model does not appear to be producing accurate estimates which can sometimes occur.”

Roebuck said there may sometimes be a disparity between fish populations and catch limits.

"There's a lot of criticism of the [federal] survey," he said. "What people see is mismatches in the ocean between what they see on the water and what we're allowed to harvest. In between those two areas, there's a whole array of things that happen. We have a survey, which catches a certain number of species and then from there we go to an assessment, which says how many of the species we have. And then it goes to the Scientific and Statistical Committee, which dictates how much we can harvest for a given species."

"My opinion is that [the federal method] is a long-standing survey, the survey covers a lot of ground, it's done typically in the same time and space, they do a lot of great science," he continued. "It's just that the information taken from that survey isn't completely understood. If we caught 29 fish in the rockhopper, then we caught 100 fish in the chain sweep, it's not saying that the survey is bad. The information is useful, as long as we understand that when the rockhopper towed in a particular area and caught 29 fish, really there were 100 [fish] there."

NOAA developed software that allowed researchers to get data in real-time as trawls were producing catches. The work took the team all along the eastern coast.

"We did approximately 45 stations in southern New England focused on summer flounder and winter flounder, we then moved to the gulf of Maine to do 30-35 stations focused on red hake with winter flounder mixed in," said Manderson. "We then returned to southern New England, south of Nantucket, for the last 36 hours to do 25-30 stations focused on producing a great dataset on summer founder including large sizes of fish."

Manderson further reported that preliminary analysis of the data collected resulted in the finding that the rockhopper was sweep was approximately 16

percent to 60 percent as efficient as the fishing industry-developed chain sweep, with results varying by species, size and time of day.

“For some species, efficiency of the rockhopper increased as fish increased in size,” said Manderson. “This seemed to occur most often during the daytime. In some species, rockhopper efficiency seemed to be higher at night than in the day perhaps because the animals move off the seabed during the night. There were some counterintuitive results we need to pour over.”

From here, the data will be peer-reviewed and documented, to be used later to inform population studies and catchability estimates. The data from the survey has since been shared with Roebuck and his crew, and, according to Manderson, NOAA will heavily rely on Roebuck and others in the industry in the interpretation of the results.