



Angler Nick Sandone has landed a tautog, also known as blackfish. Photo: Sean Outlaw



# Throw the big ones back!

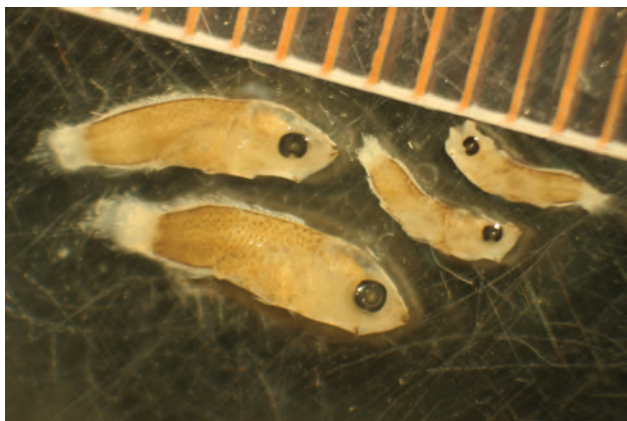
by Eric Schultz, Jason Vokoun, Jason McNamee, and Jacob Kasper

Tautog (*Tautoga onitis*), also known as blackfish, have a lifestyle that promotes a long life: they eat crabs and shellfish, sleep all winter, and in the summer they rest every night and have sex every day. But not all is well with blackfish. Long Island Sound (LIS) anglers with long memories know that our waters now have fewer of these wonderful fish. What do we know about the biology of this fish species, the anglers that seek it, and the way the resource is managed? What can be done to restore the population in our area? The answers may lie in protecting the bigger older fish that make an especially large contribution to the next generation.

## Biology

Tautog is an expatriot species. It is a wrasse, one in a family of thousands of species mostly living in tropical habitats such as coral reefs. But tautog and the related cunner (*Tautoglabrus adspersus*) live entirely in the coastal waters of eastern North America, mostly between Cape Cod and Chesapeake Bay. Like their tropical relatives, they remain close to the seafloor in shallow water, and are active during the day, while at night they take shelter and remain quite still. Unlike the tropical wrasses, they also rest all winter, perhaps having inherited a dislike for cold from their coral reef-dwelling ancestors.

Tautog take most things slowly. Their growth is gradual and they need a few years to become sexually mature. If they are lucky they live a long time: their lifespan can extend beyond 30 years. One aspect of life they are not so chill about is making babies. Former



Blackfish larvae collected in a plankton sample at the Millstone Nuclear Power Station. The largest larva is about 8 mm long. Photo: Shannon Nardi

UConn graduate student Lori Laplante, now a professor at St. Anselm College in New Hampshire, found that most mature females expel a fresh batch of eggs every day during the summer, from May into September. Their output adds up to an amazingly large number. A big female weighing six pounds can produce about 50 million eggs in a season! The eggs are tiny and planktonic, drifting away from the spawning pair with water currents and eventually hatching into planktonic larvae.

With such prodigious output of eggs, why aren't we up to our necks in blackfish? We could ask this question about almost any coastal fish species, because they all broadcast numerous eggs. The price for making many tiny eggs is shockingly high offspring mortality. Here's the math: if a female and male make an average of 20 million fertilized eggs each year, reproduce for an average of ten years, and just replace themselves, then 99.99999% of the offspring die before spawning. Nearly all mortality occurs in the first few weeks of life. But predators continue to be interested in our little fish. Indeed, when they get big enough, humans like to catch and eat them.

## Fishing for Tautog and how the fishery is managed

Large coastal fishes are often targeted by the fishing trade for sale in fish markets, as well as by those who fish for fun and their own dinner table. Most tautog are caught by recreational fishers: for every one fish that is commercially harvested, four are kept by recreational anglers who prize blackfish for their mild flavor, firm texture and their habit of living close to shore. Most are captured by rod and reel during spring and fall seasons. Some adventure-seeking fishers target blackfish by spearfishing.

Just as with people, where you live determines what laws you live by. Most adult blackfish live within state

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Jacob Kasper and Lazer Kasper with Lazer's first tautog, caught in RI. The fish was undersized and released. Photo: Roy Shakun

waters up to three miles from shore. Just how often and how far blackfish move have been measured in relatively few locations. We have enlisted enthusiastic anglers to help place tags on blackfish in Long Island Sound so that we can learn more about their movements in that environment. Of course, fish don't read maps and adhere to political boundaries. If different states share the same fish, they should coordinate

enough? Are enough fish evading capture each year? By these indicators, the ASMFC determined that tautog are, using fisheries terminology, 'overfished' (less abundant than is desirable) and in some places are subjected to 'overfishing' (fishery-based mortality is higher than is desirable).

The remedy for a situation like this is 'take fewer fish.' The ASMFC sets a general target for a sustainable fishery,



A tagged blackfish. Photo: John Swenarton

their management of those fish. This is the reason for the Atlantic State Marine Fisheries Commission (ASMFC), formed in an interstate compact approved by Congress in 1942. The ASMFC coordinates 26 management boards, each focusing on a coastal species of fish or crustacean. Management boards are informed by technical committees, advisory panels, and plan review teams, which in combination strive to provide boards with timely information on the fishery.

The ASMFC is worried about tautog. There have been numerous management efforts since the mid-1990s, but the stock has fallen to low levels and is not rebuilding. The situation is laid out in an analysis called a stock assessment. A stock assessment is like a medical chart: the stock (meaning a managed population) is the patient, and the assessment is a report on the stock's condition: it might include data on changes in abundance and vital signs such as birth rate, growth rate, and mortality rate. The patient's condition is judged in comparing these data to sustainable values: is it abundant

such as a level of mortality or abundance of fish. The states then propose ways to restrict the catch. For a primarily recreational fishery such as that for tautog, this is mostly done by increasing the minimum legal size, capping the legal number of fish allowed per fishing trip, and restricting the fishing season. Over the years, fishing for tautog in Connecticut has become more restrictive, from a minimum size of 12" and no restriction on the season or number of fish that can be kept, to current regulations with a minimum size of 16", seven months in which fishing is prohibited, and a limit of two or four fish depending on the month.

The ASMFC is also improving management by regionally tailoring its tautog stock assessments, and we have assisted in that effort. The stock has historically been assessed as a single coastwide management unit despite evidence that aspects of the species' biology such as growth rate vary along its range. Improvements to data collection and modeling methods permitted ASMFC to develop region-specific stock assessments. Last year, the Tautog Technical Committee presented a stock assessment to the management board that divided the

fishery into three regions: a Southern New England region combining Massachusetts and Rhode Island, a middle region with Connecticut, New York, and New Jersey, and a southernmost region with Delaware, Maryland and Virginia. An alternate scenario under consideration was to put Connecticut together with Massachusetts and Rhode Island, and New York together with New Jersey, thus awkwardly splitting LIS between two management regions. Both regional divisions were problematic for those concerned with managing tautog in Long Island Sound, because there are clear differences in fish growth patterns and fishing practices between LIS and waters off New Jersey. Dave Simpson, who is an ASMFC Commissioner and a now-retired biologist with the Connecticut Department of Energy and Environmental Protection (CT DEEP) characterized this situation as "trying to fill a bucket full of holes... We're going to keep losing fish to a southern region that won't be reflected in their stock assessments; and we'll be perpetually cutting our catch to no avail." Fortunately, we had just received a research grant from Connecticut Sea Grant to prepare a Long Island Sound-specific assessment. With this news, the management board deferred consideration of regional stock assessments until this year.

Our team, including fisheries biologists from CT DEEP, New York and New Jersey, prepared a new set of separate assessments for LIS and the New York Bight (the waters off the south shore of Long Island and off the New Jersey coast). In August 2016, the management board approved this new regional division for management use. This was an exciting development for us, because we saw how our research could be useful to managers who are responsible for conserving the fish population.

Our next step is to use our assessment of the LIS blackfish population to evaluate alternative management approaches. We will project from the LIS stock



assessment how many fish should be harvested each year over the next five years in order to maintain the stock at a sustainable level. With these projections, we can test for the effect of changes in the legal size, the legal limit of fish allowed per fishing trip, and the fishing season. We are particularly interested in alternative management approaches because of our high regard for the big old blackfish, for reasons we will now explain.

## Respecting the elders in fisheries management

We should always respect elders (says the 'senior author'), but we should especially do this for fishes. In contrast to humans and other mammals, in which reproduction declines after a certain age and may cease altogether, fishes keep breeding as they keep growing. We have recently learned from studies of tautog and other species that the continued reproduction of older individuals is especially valuable for the population, for two reasons. One reason is that larger females of many species make more eggs.

We found that a large (six pounds) female tautog will make 20 to 80 times as many eggs per unit of body weight than a small (one pound) mature female. Surprisingly, they do not necessarily sacrifice quality for quantity: large females of many species make larger eggs as well. So, a second reason that large females are especially valuable is that their offspring are especially likely to survive because of this head start on the young that hatch from smaller eggs.

Unfortunately, fisheries do not show elder fishes much respect. Larger and older fish are scarcer in populations that are fished, mostly because they have been 'at risk' for longer: an old fish has been tempted by baited hooks or has seen more nets go by than a younger fish. This decline in the abundance of elders could impair our efforts to rescue overfished stocks.

With the help of Connecticut Sea Grant, we are working to restore the Tautog stock in Long Island Sound to its former abundance.

Short of stopping fishing altogether, what can be done to bring the elders back? We suggest that we can better respect the elders by throwing them back in the water! In recreational fisheries, we could use a slot limit that sets not only a minimum size that a fish must reach to be legally kept for the oven, grill or frying pan, but also a maximum size above which a fish must be released. In this way, the lucky fish that avoided the hook for several years will continue to enjoy an active sex life for years to come. We are scientifically testing this idea via stock assessment projections that compare the effectiveness of managing by a slot limit relative to other management approaches. We hypothesize that an especially effective way to help the population recover will be for anglers to throw the big ones back. Whether this is an approach that the anglers will accept will be the subject of a future study.

## Bringing back the blackfish

Harvesting wild organisms in a sustainable way is no easy matter. We humans are quite clever at getting to our quarry, are well-equipped to catch them, and there are many of us to feed. These impacts are especially evident in a populous region such as ours. Fortunately, we have also learned how to maintain a close watch on the population health of the quarry and how to enable fishery managers to restrict the harvest. Prospects are improving for some stocks in the northeast. With the help of Connecticut Sea Grant, we are working to restore the tautog stock in Long Island Sound to its former abundance.

### ABOUT THE AUTHORS:

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