Cod

Connections with other Communities

As they grow, the developing stages of cod become part of a whole series of different communities

Cod have been a major fishery in New England since colonial times. Over the years, fishermen and scientists have tracked the movements of cod, located their major spawning grounds and developed methods to estimate their abundance. Our understanding about how cod fit into the natural world, though incomplete, shows that cod are part of a complex and fascinating biological community.

Adult cod are opportunistic feeders and consume a variety of species ranging from tunicates, sea anemones and hydroids, various mollusks and crustaceans, to herring, redfish and even young cod. Mollusks are the major source of food for cod, with any other species encountered small enough to swallow making up the rest. Cod are notorious for feeding on schools of squid and small fish of any kind.

Most cod reproduce for the first time in the spring of their fourth year when they are about two feet long and five pounds in weight. Cod can grow to impressive size. There are numerous reports of fish being caught that weighed over 100 pounds.

When they were abundant in the Gulf of Maine, large cod could frequently be found feeding close to shore in the fall. As winter approached, they would move into the basins and channels to await the onset of spawning season.

In contrast, smaller, younger adults, while still remaining in the general area, often travel much farther along fairly definite routes to and from their spawning ground. During this nomadic period, some tagged cod have traveled great distances prior to returning.

Cod have synchronized their spawnin to coincide with seasonal plankto blooms. They are "broadcast" spawner releasing their eggs into the water colum where they drift until hatching. Copepod and other minute crustacea become th first prey. Successful reproducing depend on the eggs hatching when the plankto are still small enough to eat. If the larva arrive too early, they starve; too late, an they are eaten.

Rather than releasing their eggs all a once, cod release small quantities over a extended period of time. The surviva advantages are clear: by releasing egg over an extended period of time, some of spring will be more likely to find the righ size of plankton to eat and survive. Mos will not.

By early spring, cod begin to arrive a their spawning grounds. These are area with sandy, gravely bottom and often ar located near gyres or eddies. A few week later, spawning begins — and marks th start of the cod's greatest adventure. A they grow, the developing stages of co are to become part of a whole series o different communities, for the habita needs of larvae, juveniles and adults diffe greatly.

Tides and currents disperse cod egg throughout the Gulf of Maine. Dependin on temperature, the eggs hatch in a fe weeks (about two weeks at 43 degree Fahrenheit) with an attached yolk sac After one or two weeks, during which th yolk sac is absorbed, the mouth has full developed. The larvae commence feedin on copepods and other small crustaceans.

During this period, schools of migratin mackerel and herring, clams and othe mollusks, various zooplankton and eve larger cod larvae are feeding on the devel oping cod. Survivors of this stage gro rapidly and soon metamorphose to tin juveniles and settle to the bottom, where the cod must quickly find shelter. Grave of a size that allows them to hide i required. If the particles are too large predators quickly eat them. If too small they will have no shelter and again the will be eaten. Gravel such as that found beneath gyres and eddies provides high survival rates.

Unlikely as it seems that larvae carried on currents for so long would remain on the same "ground" in significant numbers those cod that survive to adulthood do return each year to the same spawnin area.

Coinciding with metamorphosis and set tlement are the appearance of larval stage of barnacles and various mollusks amphipods and tiny worms, all of which the cod add to their previous diet. At the same time, the cod shares its new habita

Peter Ralston

with many additional predators. Lobsters, crabs and a multitude of young fish not only compete with cod for shelter and food; those that are large enough also eat them.

Shelter continues to be critical for the juvenile cod. After growing too large for the gravely shelters of the settling area, they move to bordering benthic communities to feed and hide. As they continue to grow, they simultaneously leave one community as they become part of another.

If the necessary critical habitat is located too far away to reach safely, or is too damaged to support them, the young cod will soon starve or be eaten, creating a bottleneck that makes it difficult if not impossible for cod to survive.

Soon the juveniles are big enough to begin foraging over larger areas. With their varied diet, cod are able to find food in most of the habitats surrounding them. But now they must compete for food and space with other young groundfish such as pollock and haddock. Each species spends much of the time over certain bottom types, cod tending to rockier bottom than the others. (Little is known about the relationships with competitors during juvenile stages, but a single pollock of the same size reportedly will send a school of young cod into hiding.)

At this time in their lives, young cod are exposed to larger predators. Year-old pollock devour them in great numbers. Mackerel, sculpin, hakes, flounders, dogfish and even larger cod take their toll during the first year.

By the time the water begins to cool in the fall, the cod have grown to six inches or more and gradually move to deeper water, along with young herring and other groundfish. Having greater tolerance for temperature differences than adults, the juveniles aggregate around the safety of the edges and tops of deeper reefs, with larger fish predictably occupying the deeper soundings.

By winter, the cycle has begun again. Cod, according to their ages, have abandoned their summer haunts for deeper, more comfortable places and now await the beginning of the next year.

— Ted Ames
Stonington, Maine