COD, DAVID FORD

INTRODUCTION

Butterfish. Scup. John Dory. Dogfish. Periwinkles. Sea robin. Skate. Razor clams. Each of these species thrives in the wild waters off New England's shores. But how often do we see these species for sale in the local marketplace?

The answer, of course, is "not often." But this isn't purely a rhetorical question; it can be answered empirically. That is exactly what 86 intrepid seafood lovers set out to do when they embarked on a six-month data quest called the Eat Like a Fish citizen science project.

This one-of-a-kind research project included weekly shopping expeditions, cooking experiments, and adventurous dinner table taste tests. Journeying to seafood markets, supermarkets, farmers' markets, and seaside fishing piers, participants hunted for 52 New England seafood species in their local marketplace, making note of where they found them and where they didn't. Their goal: to understand how well New England's retail marketplace reflects the diversity of wild seafood available in nearby ocean ecosystems.

The answers they found told a surprising tale about New England's local seafood system. Some of the most plentiful species in the ocean turned out to be among the rarest species in the marketplace. And yet, some of those same species received rave reviews when citizen scientists took them home and ate them.

Above all, this project highlighted a mismatch between New England's retail marketplace and its ocean ecosystems. The data leaves no room for doubt: the rich diversity produced by the region's underwater food webs is poorly reflected in the meager local choices available at area seafood counters.

A greater degree of alignment between the species composition of local ecosystems and markets can produce benefits for local fishing economies, for the resilience of marine food webs, and for the dinnertime enjoyment of local seafood lovers. But bringing about this alignment will require a broad-based campaign of supply chain facilitation and consumer education, supported by an "all hands on deck" approach.

Although the data collected by this project provides a stark picture of what is wrong with New England's seafood system, it also helps plot a course for how to fix it. By highlighting species whose availability in the ecosystem exceeds availability in the marketplace, citizen science data pinpoints the greatest needs and opportunities with regard to local seafood market expansion. By providing reflections on culinary practicality and gastronomic likability, citizen scientist data helps enrich our understanding of each species' unmet marketing potential. Together, these findings provide a first step toward aligning markets, palates, and purchasing habits with the rich and diverse ecosystems off our shores.

WHAT IS "EATING LIKE A FISH"?

Fish tend to be generalist predators, rather than specialists. Their diets are influenced more by the availability and size of their prey than by their prey's species identity. Rarely will a fish pass up a good meal. If something is small enough to swallow yet big enough to sink one's teeth into, then it'll do for dinner! As a result, fish diets closely mirror what's available in a given locale at a particular time of year.

Humans, in contrast, are selective eaters. We have a habit of cherry-picking certain species from the ocean—perhaps because they suit our fishing patterns, our processing and preservation technology, or our cultural expectations about seafood. We will often pass up a good meal from the sea—for instance, if a species is too small, too unusual-looking, too flavorful, or too unfamiliar.

Eating "like a fish" means replacing our highly selective seafood eating habits with a flexible acceptance of whatever the ocean provides. It means opening our minds and our mouths to the rich diversity of ocean life. Eating "like a fish" is a supply-based (rather than a demand-based) philosophy that requires consumers to stop asking our fishermen to go out and catch specific species for our tables, and asks us instead to discover the delights of whatever they happen to catch. Ultimately, eating "like a fish" means bringing our consumption patterns into harmony with the ocean's changing rhythms and seeing ourselves as part and parcel of the ocean food web. Eat like a fish!

THE PROBLEM WITH SELECTIVITY

Ocean ecosystems teem with diversity. Nearly 1,100 species of fish swim in the coastal waters between the Canadian Arctic and the Gulf of Mexico, and that does not include the many varieties of crustaceans and shellfish that inhabit the seafloor. Although not all of these species are edible to humans or catchable in fishermen's nets, traps, and lines, an astounding variety of them are both catchable and delicious. Yet we rarely see many of these organisms on our dinner plates.

To understand why this is, it helps to envision the decisions that take place on the decks of fishing boats. When an organism is caught at sea, its fate depends primarily on what it is. If it represents a species that is highly sought after by the marketplace (and if its harvest is permitted by fisheries management rules), then a fisherman may bring it to shore, where it will begin its journey through the seafood supply chain. On the other hand, if the organism in question represents a species for which there is little or no market demand, a fisherman may throw it back into the sea, where it will either die (and be eaten as carrion) or survive (and contribute to the next generation, if it can avoid predators long enough to reproduce). Species with a low rate of discard mortality (i.e., those that tend to survive when thrown back) can prosper in the face of fishing. These species are not harmed by being caught and released, and their lack of market appeal can benefit their populations.

DOGFISH, SARAH SCHUMANN

In fact, when fishermen remove and sell fish of certain species from the ocean ecosystem, they do some of the remaining species' populations a favor, by cutting down on competition. This can free up more food for the remaining organisms and help their populations grow, leading to greater dominance by "unwanted" species. Fishermen can also inadvertently help their quarry's prey species or hurt their quarry's predators by removing would-be predators or prey. This can result in ripple effects that propagate up and down the food chain, indirectly affecting populations of linked species. By selectively removing certain species at higher rates than others, humans can unintentionally skew the balance of marine ecosystems and disrupt natural predator-prey cycles.

One does not have to look too far afield for evidence of these impacts in New England waters. In the 1980s, heavy and selective fishing of cod, haddock, and flounder on Georges Bank (a large underwater plateau east of Cape Cod) led their competitors to proliferate, leading to a food web dominated by species low in economic value and gastronomic appeal to American consumers, such as dogfish and skate. It was not until export markets were developed in Europe for these species that harvesting patterns began to converge more closely with the make-up of the Georges Bank ecosystem. The ecological changes that took place on Georges Bank as a result of selective fishing were so significant that they have been called a "species replacement" or a "regime shift."

In similar fashion, the improvement of fishing technology in the mid-20th century, combined with selective demand for flaky white-fleshed fish, led to a sharp decrease in previously dominant bottom fish like cod, halibut, and haddock in the Gulf of Maine. This decline of finfish predators allowed sea urchins to multiply, and before long, urchins mowed down their favorite food source—the lush kelp fronds that had formerly blanketed the Gulf of Maine's rocky sea floor. Lobsters and crabs, which had previously utilized kelp beds as protective habitat, soon found themselves without shelter from predation. It wasn't until a fishery for sea urchins developed in the 1980s that kelp beds recovered and lobsters and crabs experienced a resurgence. With finfish predators still low in abundance, crustaceans continue to dominate Gulf of Maine food webs and seafood catches. The sequential selectivity of fishing patterns in the Gulf of Maine has been associated with a series of booms and busts and a reduction in ecological and economic diversity in the region.

CHRISTOPHER ANDREW, TYLER MURGO

THE BENEFITS OF DIVERSITY

In theory, seafood harvests could be maximized and ecological impacts minimized if seafood lovers matched their diets proportionately to an ecosystem's outputs. For example, if ten percent of the energy in a given ecosystem takes the form of monkfish, then ten percent of fishermen's catch should consist of monkfish. If five percent of the energy in an ecosystem is expressed in the form of black sea bass, then five percent of fishermen's catch should consist of black sea bass. As these proportions vary with natural cycles and man-made climate change, consumers should vary their diets, so that fishermen's catches remain synchronized with the mix of species in the area.

Unfortunately, we humans have not yet developed the technological and scientific capabilities to achieve a perfect, real-time alignment between ecosystems and markets. Put simply, we do not know exactly how much of the ecosystem is made up of which species of fish at any given time. While we wait for those answers, we must advance along more practical lines. A more pragmatic solution, therefore, is for human seafood lovers to simply diversify their intake of seafood from a given ecosystem as much as possible. By counteracting the pressures of market-induced fishery selectivity, market diversification is a risk reduction strategy that can decrease the likelihood that fishing practices will skew ocean food webs, while increasing the likelihood of achieving closer ecosystem-human coupling.

Catch diversification has other benefits as well. For instance, diversity can be an insurance strategy that provides a buffer against unexpected events. Ecosystems, which are naturally variable, are now becoming more so as a result of climate change. Every year, the ocean produces surprises: once-familiar species of fish moving elsewhere, new species of fish moving in, and migratory behavior taking place earlier or later than ever before. Meanwhile, macroeconomic trends, natural disasters, and many other social, economic, and geopolitical factors can influence availability and demand for seafood products on both the local and global scales and make the seafood system vulnerable to external shocks.

In the face of surprises and setbacks, diversified consumer demand can provide a bedrock of resilience for fishing fleets and seafood supply chains. The greater the number of options available to local fishermen, the higher the likelihood that fishermen will have alternative species to fall back on when something changes. Moreover, diverse markets are indicative of adaptable customers, whose flexibility may permit them to seamlessly substitute one fish with another as ecological outputs vary.

FISHERMAN AL EAGLES, KATE MASURY

WHITING, KATE MASURY

THE BENEFITS OF LOCAL SUPPLY CHAINS

This report is not the first to extol the value of local seafood supply chains for their contribution to seafood system resilience. Previous publications by many authors have praised short, local seafood supply chains for their association with local food security, improvement of income opportunities for small-scale fishermen, and contributions to community social fabric and identity. In addition to recognizing these potential benefits, this report adds to a growing recognition of the promise that local seafood supply chains offer for diversifying both the spectrum of market channels through which local seafood may flow and the range of local species that contribute to the prosperity of fishing communities.

In New England, seafood is a celebrated component of the regional economy and culture. However, little is known about what happens to New England seafood once it is landed at the dock. Although fishermen and seafood dealers are required to report the quantities and prices of seafood when it is transferred from a fishing vessel to a primary dealer, all transactions taking place past the point of initial offload are confidential. As a result, people and institutions interested in understanding and investing in local seafood supply chains have found themselves hampered by inadequate baseline knowledge regarding the current distribution channels of New England-landed seafood. This knowledge deficit includes significant data gaps related to where New England seafood goes before it is consumed, and conversely, how much of the seafood consumed in New England is locally landed.

While the Eat Like a Fish citizen science project does not fill these data gaps directly, it contributes to a mounting set of efforts by researchers around New England to quantify the flow of New England seafood after it reaches the dock. This report is the first comprehensive effort to assess the relative availability of 52 local seafood species in the New England retail marketplace and the first to quantify the diversity of locally landed seafood in the marketplace. It complements previous research efforts by enriching understandings of the market potential of local and "under-appreciated" species, but it stands apart from previous controlled consumer experiments in its unique, "real-life" approach to capturing consumers' perceptions. This report is an initial step, but a significant one, towards characterizing the alignment of ecosystems and markets, and it provides a creative, interactive template for advancing regional commitments to local seafood.

TAKEAWAY

A seafood counter that brims with local species diversity is reflective of a robust customer demand for local seafood, an adaptable customer knowledge base, and a fishing fleet with many options to fall back on in the face of change. The Eat Like a Fish citizen science project was the first large-scale effort to quantify the availability and diversity of local seafood in the New England retail marketplace.

EAT LIKE A FISH
BY THE NUMBERS

86
CITIZEN SCIENTISTS

52
LOCAL SPECIES

26
WEEKS

4
SPECIES/PERSON/WEEK

2,946
MARKET VISITS

394
DIFFERENT MARKETS SAMPLED

1,048
MEALS EATEN

885
QUALITATIVE "FISH STORIES"