# Ecosystem-Based Angling: Tips for Recreational Fishermen

Recently, there has been a realization that the current way we manage our marine fisheries is only partially successful because it concentrates on single-species rather than considering the entire system in which the fish are found. To address this, a new approach in fisheries management called Ecosystem-Based Management (EBM) has emerged that places special emphasis on how variables within the ecosystem, including human activity and habitat, influence fish populations. The goal of EBM is to maintain ecosystem health, integrity and sustainability by managing aspects of fisheries beyond simply estimating the effect of fishing pressure on a single population.

Many recreational anglers are very concerned with the current state of our marine fisheries. Recreational anglers are in a good position to monitor ecosystem health because after all, they are the ones out there on the water day to day. Inspired by the "10 Commandments for Ecosystem-Based Fisheries Scientists," (Francis et al. 2007 *Fisheries* magazine), which provides recommendations to fishery biologists and managers about ways they can better incorporate the theory of EBM into practice, this short educational document aims to provide recreational anglers with some tips to achieve similar goals. These recommendations emerged from interviewing and surveying hundreds of recreational anglers along the mid-Atlantic coast to see how they felt about how their practices might affect the ecosystem, what topics they wanted to know more about, and the threats to marine fisheries from their perspective. Nearly 90% of recreational fishermen said they would like to receive new information about how they could better take care of the ecosystems in which they fish. These tips are by no means exhaustive--and some may even be intuitive to many--however, they can at least serve as a reminder to how marine ecosystems operate and what recreational anglers can do to help ensure that we all have fish for the future.

## 1. Keep a Perspective that is Holistic

This is the first of the original '10 Commandments' for fisheries scientists and managers to support the notion of EBM, and we think this one holds true to fishermen too. Humans are not good at estimating long-term changes over space and time, especially in complex systems like fisheries. However, it is very important to keep a perspective that acknowledges that human activity (such as fishing, land and marine use, etc.) affects biological productivity. Even though your goal may be to catch one specific type of fish, the factors that affect whether that fish is available to catch relies on many other factors (abundance of forage fish, predators, nutrient cycling, etc.). In short, everything that goes into and comes out of the water affects how the ecosystem functions and it is important to keep that truth in mind and let it guide your actions when you are on the water.

## 2. Reduce Boating Impact

You may not realize it, but boats may have considerable negative impacts on the areas in which you fish. Boats produce noise, leak oil and gasoline, and may spread invasive species (so called hull borne invasives) that can all disrupt ecosystems. No one is suggesting sticking strictly to pier and shore fishing, however, there are some good things that you can do to reduce your boat's impact.

### *A. Clean your boat*

It is important to clean your hull regularly, especially when moving from one fishing spot to another that is a great distance away, when visiting major ports, or if you have been around a high concentration of boats from other areas. Moving your boat long distances would be considered relatively high risk for transmitting hull borne invasive species (like the Atlantic ship worm and quagga mussels). In these cases, boat owners should use antifoulants to rid their hull of potential unwanted creatures. However, antifoulants should be used sparingly and far from runoff areas into marine areas since they often times contain copper (and biocides) that can harm water quality and living organisms. In short, if you don't travel very far very often, then do not use antifoulants; if you do travel long distances, use them sparingly.

***B. Be careful when refueling and check your motor often***
Gasoline and oil from motors often leak directly into or runoff into ocean waters while performing routine boat care and maintenance in marina areas. Make sure to fill and check your motor at a controlled site, like at home or on the way to the launch site to reduce the risk of introducing chemicals into the water.

***C. Do research about nesting birds and other animals in the area***
How and where you drive your boat, too, can disrupt the normal process of coastal areas. From stirring up sediment to noise pollution disrupting nesting birds, the way you drive your boat may cause problems for local animals. Be aware of what is around, above, and underneath you while you drive to your favorite fishing spot.

## 3. Maintain Old Fish within the Population
For a long time, scientists thought that removing larger older fish within the population only left more resources for fast growing younger fish in the population. Scientists now think, however, that larger and older fish are much more important for sustaining the population because fecundity (how many eggs a fish can lay) is proportional to body weight and age. Everyone wants to catch the biggest fish possible, but remember that taking larger females out of the population may have negative impacts on future generations of fish. To give you an idea of how this might vary, a 12lb female striped bass may produce about 850,000 eggs where as a 55lb female produces almost 5 times that amount!

## 4. Be Aware of Spawning Seasons
Different fish species spawn at different times of the year, usually triggered by water temperature (which of course is affected by the season and air temperature). In the mid-Atlantic, most of the recreational fishermen that we spoke with fish for summer flounder, bluefish, and striped bass. Summer flounder reproduction happens in the fall, as soon as the fish begin migrating to their winter grounds (off the coast of New York and New Jersey when the water temp is about 53 – 66 degrees F). Bluefish spawn sometime in the summer, between the months of June and August offshore (when water temp is about 64 – 72 degrees F), while striped bass spawn in rivers and brackish waters somewhat earlier in the late spring and early summer (when water temp is about 65 degrees F). You should plan your fishing trips accordingly as not to disrupt the spawning behaviors of the fish you are looking for. We acknowledge that it is not easy to turn down a fishing trip on a warm spring or summer day on the off-chance that the fish are spawning, but be knowledgeable about when and where it is taking place so that you can interfere as little as possible.

## 5. Maintain Juvenile Habitat
Many marine fish rely on healthy estuary and coastal areas for reproduction, and these areas need to be maintained to ensure the viability of future generations. Some rely on these resources more heavily than others. For example, striped bass rely on estuaries exclusively for spawning and protecting their young until they have matured. Fertilized striped bass eggs drift downstream with currents while developing and hatch into larvae. As they make their journey into the inland portions of coastal sounds and estuaries, they mature into juveniles for 2 to 4 years. During this risky time, their survival into adulthood relies on the health of these ecologically important areas. If these estuaries or delta habitats have been contaminated by run-off or in impaired by other activities around them, it can have an effect on the fishable and mature population. While fishing, if you see an area that looks suspiciously deprived of elements that you are accustomed to seeing--such as less vegetation on the banks or absence of other wildlife- it is important that you report it to your States Department of Fish and Wildlife or Environmental Protection.

## 6. Be Aware of Coastal Development and Runoff

Increased development in coastal areas means a change in ecosystem function because of an increase in impermeable surface (such as roofs and parking lots) and human activity. This means that more water travels from land to the ocean. As the water travels down the watershed, it picks up various types of chemicals (e.g. fertilizer and oil) and substances (litter) that it carries directly into marine environments. These contaminants, especially nitrogen from lawn and agricultural fertilizers, have harmful effects and can throw off the balance of ecosystems. Be informed about your watershed. If you live in coastal areas try to manage your property (like your lawn) with non-harmful chemicals and fertilizers.

## 7. Take Out What You Take In

Obviously, there is the hazard of leaving plastics and other debris out on the ocean while you are out fishing, but one thing you might not consider is releasing harmful unused bait or organic material into these areas. It is essential to take everything you brought into an ecosystem out of the ecosystem when you leave. This especially goes for live bait. Fishers use variety of different organisms, mixtures, and tackles to catch their favorite prey, but you can never quite be sure where these things originated. Many times, live bait is caught in generally the same areas where you are doing your fishing, but you don't always know. A good rule of thumb, since some of these things maybe potentially harmful to other fish (e.g., they may carry disease or contaminants or they may be non-native) is that it is just best just to take it with you and dispose of it when you return home.

## 8. Understand the Relationship between Size and Age

Knowing why many fishing restrictions are based on size and age may shed some light on why it is important to follow the size and catch limitations established by fisheries management. These restrictions are carefully calculated by fisheries scientists based on the information they have available to them about how many fish of a certain age are in the population. Sometimes local abundance of a fish may seem high, but the larger range of the population may need to be considered. It is important to know the demographics of the population to understand how many adults can be reasonably expected to have replaced themselves through reproduction (called recruitment). Many fish are not sexually mature until age class 2 or 3, and some species, like spiny dogfish, may not be mature until they are 11(males) or 20 (females). The best way to estimate the age of a fish without laboratory tests is by length. Even though yearly length restrictions may change, these limitations are carefully established based on biologists understanding of how many fish of what age need to remain in the water to make sure that the population remains stable.

## 9. Participate and Share Knowledge in Science and Management

If fishing is important to you, then it is important to share what you know with those involved in making decisions about it. Marine fisheries are managed by regional multi-state councils that hold public meetings where plans are formulated for how to manage fisheries (e.g., setting bag and size limits). It is also important to provide your expertise and skills to helping scientists understand more about how marine ecosystems work so that regulations can be fair and informed.

### *A. Fisheries Management Councils*

Recreational fishermen have a unique opportunity to share their experience and knowledge on the water with those that make decisions about how those resources are managed. Fisheries management in the US under Magnuson Stevens (federal legislation that guides the process of marine fisheries management) is built around the idea that marine resource stakeholders should be involved. Find out more about your regional management council, write letters, send emails, and make phone calls to see what and when decisions are being made about the fisheries in which you are involved.

***B. Volunteer Participation in Fish Science***

There are many programs that rely on citizen participants to collect data to help scientists monitor marine wildlife. On the Atlantic coast, one of the largest and oldest volunteer tagging projects is run by the American Littoral Society (ALS). For almost 40 years, this catch and release program has given scientists insight into essential habitat and the changing behaviors of recreational and commercially valuable species. Participating in programs like this allows managers and scientists to make decisions that are more informed, because they are based on larger and better datasets collected by fishermen.

## 10. Reduce Post-Release Mortality

Reducing the stress on a fish after capture could be the difference between returning a fish into the water that will live and one that will die. There are many studies that indicate that stress caused by harsh handling of fish can result in severe harm and death post-release (soft flesh tears; removal of protective skin coating; fatigue leading to easier predation). It is important to remember that fish are subject to a variety of injuries when caught.

***A. Chose fishing gear wisely***

It is no surprise to experienced anglers that fish swallow hooks and lures in many ways and removing a hook is not always easy. Have a net on board to reduce the pressure put on the fish in case the fish was gut or eye hooked. Also, use circle hooks when appropriate. Circle hooks have been shown to reduce post-release mortality and many fishermen find them easier to remove because they are designed to snag the jaw.

***B. Know how to handle a fish***

If you know that the fish is too small to be kept, avoid lifting into the air and try to leave it laterally in the water. This reduces the amount of stress placed on the fish after its capture. It is also important to handle the fish as little as possible. Most fish rely on “slime” on their skin to help them resist disease. Excessive handling removes this protective layer from their skin making the more vulnerable for infection.