

Private Reef Building in Alabama and Florida

Fishing communities around the world learned hundreds of years ago to fish around natural reefs and other large objects underwater. Before long, they began creating the first artificial reefs, often out of nothing more than a pile of rocks.

In Japan, the old fishing communities that first discovered the usefulness of artificial reefs gradually evolved into cooperatives that came to own the reefs outright, and today their reefs are well protected, productive resources. But elsewhere, very few ownership schemes developed. Thus, even though artificial reefs remain popular fishing sites, few of the people who fish them are directly involved in creating them.

The private ownership of marine resources can be a very effective conservation tool. In the United States, however, private rights to the seabed are virtually nonexistent. Some clandestine artificial reef creation went on as early as the 1920s, but never on a large scale. Then in 1984, Congress passed the National Fishing Enhancement Act, which encouraged the states to construct artificial reefs. And they did, using everything from old tires, coal ash blocks and automobiles to decommissioned ships and oil rigs.

Throughout much of the U.S., artificial reefs are created directly by state conservation departments. Alabama and Florida are two exceptions: They began to tap the connection between ownership and stewardship by creating limited areas where private groups and individuals could create their own reefs. Once the reefs are in the water they become public property, but the exclusive knowledge of where reefs are located allows their "owners" to benefit from the productivity of the reefs and discourages them from overfishing. Of course, this ownership only lasts as long as the reef location remains a secret, but even this fleeting property right has resulted in a tremendous private initiative to enhance the marine environment in these two states.

Artificial Reefs and the Gulf of Mexico

The Gulf of Mexico is particularly well suited to artificial reef creation because the seafloor is mostly mud and sand; the bottom is relatively bare. "Dropping one of these [artificial reefs] in the middle of this vast expanse of mud bottom is like putting an oasis in the desert," according to one state official.

Thus artificial reefs are popular with fishers, divers and many conservationists because they create habitat for marine species. When a hard substrate (surface) appears on the seafloor, small, encrusting animals attach themselves within days, creating more surface area for other organisms to either attach to or hide behind. These fish and invertebrates in turn attract and feed larger fish, some of which might not survive otherwise. Thus, populations on artificial reefs are both produced and attracted, and the exact contribution of each remains unclear (as does the extent to which attracted fish are intercepted from

other sites). No doubt these factors vary from reef to reef, but each certainly has some effect.

A six-year study at the University of Florida is currently working on these questions by testing the effects of different reef designs and spacing patterns on artificial reef populations. Researchers found that design and spacing are important (reefs too close together or too far apart are not as effective), but in each case there were significant increases in the abundance of species around the reefs. Furthermore, by tagging gag grouper (a popular recreational catch), they found that adults tended to stay at or return to a "home patch reef," suggesting production over attraction in this case.

In Texas and Louisiana, the most common artificial reefs are decommissioned oil rigs. Turning these rigs into reefs is often very lucrative for both the state and the oil companies, which share the cost savings from offshore disposal. Alabama and Florida have less oil production, and therefore less large material available. Luckily, large structures are not as crucial for reefs in these states because the seabed is sandier, so smaller reefs are less likely to settle and sink than they are in the mud.

Alabama

In 1987 the Alabama Department of Conservation and Natural Resources created the first of two large permit areas that allow people to sink "acceptable objects" (those passing a state inspection for toxic materials) over a broad area. Since then thousands of reefs have been created privately over the almost one thousand square nautical miles of permit area.

The measure was partially a response to illegal artificial reef creation. Recreational fishers had been sinking objects on their own for many years, often simply dumping old junk. Eventually the commercial fishing industry grew tired of stray toilets and shopping carts damaging their nets, so they helped convince the state to set basic guidelines and a limited permit area.

Once reef creation was officially permitted, the numbers of reefs skyrocketed. By 1992, with only a fraction of the Gulf Coast shoreline, the recreational catch of red snapper in Alabama was two to five times higher than in the other Gulf states. Alabama has only one and one half percent of the Gulf coastline, yet it produces 38 percent of the red snapper catch.

In 1992, a research survey off of the coasts of Louisiana, Mississippi, Alabama and Florida measured larval red snapper abundance (among other things). Although no definite conclusions could be drawn from the study, the largest concentrations of snapper larvae were found in the vicinity of large artificial reef congregations.

One of the most popular reef materials to date has been old car bodies. They are inexpensive and easy to deploy. They are thoroughly stripped before they are sunk, and according to one charter boat captain, catches around a single car can add up to 2,000

pounds of red snapper over the lifetime of the reef. Unfortunately, car bodies only last for about five years, and as they break apart or are moved by storms they can interfere with commercial fishing. As a result, Alabama will prohibit automobile reefs as of January 1997.

Florida

Artificial reef creation is widespread in Florida. Thirty-three out of thirty-four coastal counties have artificial reefs off their shores. In response to the success of the large permit areas in Alabama, three counties around the Panhandle have created five large permit areas for private artificial reef creation. The one off of Okaloosa county and two off of Scambia county cover 179 square nautical miles and are controlled by the state Department of Environmental Protection. The remaining two areas are controlled by Bay County and total about 170 square nautical miles.

The state permit areas are much more restrictive, allowing only structures made out of concrete or heavy gauge steel, while Bay county allows automobiles. This situation is much to the chagrin of some charter boat captains outside of Bay county; they would also like to be able to use automobiles to create reefs. They claim that concrete structures are difficult to manage, while a car can simply be rolled on and off a boat.

In the panhandle of Florida, the charter fishing industry targets three types of fish -- bottom fish like snapper and grouper, surface migratory fish like mackerel and cobia, and pelagic migratory fish like dolphin, marlin and sailfish. Mike Eller, the President of the charter boat association in Destin, Florida, believes that the abundance of all three of these types depends on artificial reefs, if not directly then from the increases in bait fish.

Public Reefs in Alabama and Florida

Both states are also directly involved in artificial reef creation. They tend to create larger reefs, utilizing old structures like old cargo ships or decommissioned M-60 tanks. The location of these reefs is public knowledge, and the difference is telling. These larger structures should support larger fish, but because they are popular fishing spots, they are full of small fish -- all the larger ones are fished out.

Nathan Cox, the president of the Orange Beach charter boat association, believes that as a charter boat operation, "if you depended on [the public reefs] to make a living, you wouldn't." In the off season, when there are not as many recreational fishers, charter boats do utilize public reefs, but once the tourists arrive, they fish elsewhere. In the summer there are sometimes as many as fifteen boats fishing on top of one public reef. When a reef is overfished it takes time for the fish populations to recover, and Cox does not think the public ones ever fully recover.

The same is true in Florida. Mike Eller believes that "the difference between the private[ly created] reefs and the public ones is huge." "A private reef might be fished on once a month, as opposed to ten times a day[for a public reef]." Jon Dodrill, an official with the Florida Department of Environmental Protection, agrees. He admits that "if I were a legal sized fish I wouldn't want to be on a public reef" because "the more accessible public reefs are overharvested."

Charter Boats and Cooperation

There are about 100 boats in the charter fleets of both Orange Beach, Alabama and Destin, Florida, forming a significant part of the local industry. Both Nathan Cox and Mike Eller agree that having one's own reef is essential in the charter business, and the charter boat fleet is very active in reef creation.

The literature on common property arrangements to conserve natural resources goes into some detail about the criteria for effective cooperation, but it is beyond the scope of this case study to explore this topic fully. Suffice it to say that the level of cooperation depends both on the rewards and the difficulties of getting together and keeping track of each other.

Charter boats within these two fleets do cooperate with each other, but in different ways. In Alabama, the permit areas are large, the permitting process is liberal, and a large number of reefs exist. There, the only cooperation is among smaller groups like the 22 boats that dock at Zeke's Marina. These boats make up Zeke's Charter Fleet Association, a private group that enforces the rule that to keep a boat at Zeke's Marina, a boat owner must agree to create at least ten new artificial reefs every year. The rule is effective at Zeke's, but according to Nathan Cox, it would simply be impossible to get all the charter boats around Orange Beach to agree on a similar arrangement.

Once the fleet is out on the water there is very little cooperation. The sheer numbers of reefs means that many are either abandoned or lost (reefs can be moved by larger storms like hurricane Opal). There are simply too many reefs to keep track of; it is easier for the charter boats to find or build new reefs than to try to protect old ones. Interestingly, the best strategy to follow when another boat is on a favorite reef is to leave quickly. That way the other boat may think it has found a new reef that it can "own" and take care of. Otherwise, it may think it has found a well known reef and simply fish it out.

The charter boat association in Destin, Florida, is a much more cooperative group, in part because there are fewer reefs than off Alabama. The large permit areas in Florida are newer and the rules for creating reefs are stricter, so the reefs that do exist are more valuable.

There are no formal agreements among the charter boats, but the group is relatively cohesive. They do look for each other's reefs, but if they linger on someone else's spot, they will probably be asked to leave, and they will probably comply. They talk about the

state of the reefs "every day" and encourage each other not fish any one site too much. If a boat lingers too long on a reef, it's captain will hear about it later.

Destin charter boats have also informally agreed to limit their catch of red snapper (a popular game fish) on any one reef, even if it is teeming with them. They also limit catches of migratory fish so that "they last for 4 weeks instead of 2."

Both the formal and informal agreements among charter boats in Orange Beach, AL and Destin, FL demonstrate that a sense of ownership not only encourages stewardship, but cooperation among individuals to protect and enhance resources. The more valuable the reef, the more people will try to take care of it. Strengthening the control that these groups have over these resources would only increase their protection.

Environmental Entrepreneurs

95 percent of the reef creation in Alabama is done by private groups and individuals, and two reef building businesses have formed. David Walter, the founder of the The Reef Maker, started out in the marine repair business, but for the last eleven years has spent his time creating over 11,000 artificial reefs. For most of the reefs he uses auto bodies, which he currently charges about \$250 to obtain and deploy. For \$900 he will sink a school bus. Half of Walter's business comes from the charter boat industry, the other half from individuals.

Alabama will soon prohibit the use of cars to build reefs, but Walter is thinking ahead. He has bought a bigger boat to handle larger structures, and is also experimenting with a large concrete mold that will last much longer than a car and which will be moveable. That way the vague ownership of a reef can be reclaimed if someone else finds the reef. He is also experimenting with a plastic reef that will be harmless to boat bottoms, which could then be sunk in shallower waters (current law stipulates that there must be at least 55 feet of water above a reef to allow safe ship passage).

Another firm called Reef Ball Ltd., located in Georgia, designs reef molds for creating concrete artificial reefs. In Alabama, a deployed ReefBall model sells for only slightly more than a car body (about \$300) and lasts much longer. Reef Ball Ltd. is an all volunteer operation that so far has been a non-profit organization (it has lost money every year). Its reefs are inexpensive. In 1995 the state of Florida spent over a million dollars on artificial reef creation, but in the same year, Reef Ball Ltd. produced more reefs for only \$100,000.

According to founder Todd Barber, Reef Ball's objective is staying solvent and enhancing the overall marine environment, not turning a profit. Reef Ball is growing rapidly and in 1995 placed over 5,000 Reef Balls in 50 projects worldwide.

Problems and Solutions

One problem with the large permit areas is that people create a lot of reefs around the edges, and even outside the area, hoping to increase the chances that no one else will find their reefs. This creates conflicts with the commercial fishing industry, particularly shrimpers, who do not like to have their nets ruined by stray materials. People also put a lot of junk out into the water, which is inexpensive, moves more easily in storms and deteriorates quickly, but because it is unlikely that it will last for very long without being discovered, this is hardly a concern. This led the states to prohibit materials like shopping carts, washing machines, and derelict fiberglass boats. Still, as long as a reef can be expected to outlive its tenure of secrecy, reef creators will have no interest in more durable reefs. At present, there is no way to protect this sort of investment.

As the University of Florida study has shown, the spacing of reefs helps determine their effectiveness. Unfortunately this is rarely considered because avoiding detection is more important than maximizing the production of the reefs. Figuring out a way to move reefs is an impressive innovation, but it does little to address the spacing problem.

Another impediment to reef stewardship is the issue of liability. Currently, the states assume all liability from reef creation, so reef creators do not have to worry about damages caused by their reefs -- for example a stray hood from a car that damages a commercial fishing net. The lack of liability discourages any private interest in the long term effects of the reefs, or in what happens to the materials on a reef as it breaks apart.

Stronger ownership rights would address all of these problems. In Japan, the rights to subtidal lands are clearly defined and the level of investment in artificial reefs is huge. Custom reefs are designed for specific habitats and species production. Many fishing cooperatives even place guards to watch over productive areas day and night. Japan is hardly a perfect example, yet their vigilant reef protection and great research efforts demonstrate the potential for the positive benefits of private ownership.

In the Gulf of Mexico, reef builders would stay inside a particular area if they could control access to it. They would use stronger materials that would last longer and not be washed away by storms. If they were held responsible for any damage caused by their reefs, either to commercial fishing operations or to the environment, they would take much more care in reef construction.

Reef builders respond innovatively to the constraints they are given. If the greatest benefits come from secrecy, people like David Walter invent moveable reefs. If the rights to reefs were more secure, the energies that have so far been channeled into producing many reefs inexpensively or in keeping reef locations secret would be directed instead into the stewardship and protection of existing reefs.

In fact, both Alabama and Florida already have arrangements in place to lease the seafloor for aquaculture operations. Extending those leases to include artificial reef areas would produce tremendous benefits.

In Alabama, shore owners have riparian rights for oyster culture that extend out to 1800 feet from the shoreline. These rights are very limited -- they exist only for oyster cultivation where none occur naturally -- but do set a precedent. The commissioner of the Department of Conservation has the authority to grant new leases, and recently did so for an experiment with off bottom oyster culture in Mobile Bay.

In Florida, leased grounds exist in state waters for oyster, clam, and live rock cultivation. These leases occupy areas where no natural reefs exist -- just as the case would be for artificial reefs.

Limited ownership schemes already exist in offshore waters for aquaculture as well as for oil and gas exploration. Extending those leases to artificial reefs would build on the already impressive efforts of private stewards, and would be a simple step toward encouraging the kind of protection of artificial reefs that has been so successful in Japan.