

## Conservation and Water Quality

by

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Most people know that the productivity of our marine and estuarine systems depend on the water quality. We can't have the shrimp, crabs, oysters and fish we enjoy if they don't have water that meets the quality that they need to survive. But most people do not realize the water quality depends on the shrimp, crabs, oysters, fish and many other consumers that live in our bays.

Eutrophication is a water quality problem that affects many of our bays or estuaries and even our costal waters. It causes problems such as the lack of oxygen or hypoxia and loss of seagrass beds due to decrease in light penetration in the water. Eutrophication is usually thought of as being caused by excess nutrients, but the scientific definition is an increase or excess of organic matter in the system. This increase in organic matter in the system can be caused by a decrease in the consumers like shrimp, fish and oysters.

All of the organisms in our estuaries have a function. They are all part of the conveyor belt that transfers the primary production up the food chain to us. Primary production is all of the plant production produced in the system, the growth of all the algae, marsh grass and seagrasses. This plant growth is the base of the food web that fuels the production of all the organisms we want out of our estuaries and costal waters. However, when there is more production than can be consumed it causes problems, and these problems can be major problems such as the lack of oxygen. As we all know, crabs shrimp and fish can't live without oxygen—oysters can, but only for a short time.

Eutrophication can be caused by an increase in nutrients supplied to the system, but it can also be caused by a loss of consumers in the system. Oysters are valuable consumers in the system, each full size oyster can filter over a gallon of water an hour. However, all of the consumers are important, some for the amount they consume, some for the kind or size of algae they consume. One of my favorites is the copepod—maybe just because I did my dissertation research with them---but really they are fascinating consumers. They are tiny consumers about the size of a grain of sand, but can eat tens of thousands of algal cells a day and when the water gets warm, they can go from egg to egg laying adult in just 4 days and produce thousands of eggs a day.

Copepods are also important food for juvenile fish. But it is also important that the juvenile fish are there to consume the copepods, both as a major link in the conveyor belt transferring that production up to us, but also a form of population control on the copepods. Without population control, the copepods can easily consume all of the good algae in the system, leaving only algae that is harmful (like red tides) or too small for most consumers (like cyanobacteria).

Fish like menhaden are important too, even though we don't eat them. They swim around in large schools with their mouths wide-open, filtering algae out of the water. Forage fish like menhaden and others are also important for their function of transferring the

production to the adult fish we like to eat, fish like redfish, speckle trout and king mackerel. The life cycle of shrimp and many of our estuarine fish involves growing up in our estuaries because that is where the food is, but many of them migrate out of the estuary in the fall to spawn in the Gulf during the winter. Water quality problems usually occur in the summer because that is when the productivity is the highest and oxygen solubility in water is lowest.

So conservation is important to water quality. Our bays and estuaries can be more productive and our water quality improved if we restore populations of consumers to their historical levels. If we postpone our harvest of things like shrimp and oysters through the summer, they will only get bigger and more valuable for harvest in the fall. That allows them to serve their ecological function as consumers as well as and the fish that would be lost as bycatch (which also adds to oxygen demand in the critical summer period). Most of these fish leave the estuary in the fall to spawn in the Gulf. When we take these consumers out of the system before they have had a chance to perform their critical ecological functions, we harm the system. I know everybody has heard the old phrase “a chain is only as strong as its weakest link” –that applies to our estuarine food chain as well.