CONTROVERSIAL ASPECTS
OF NET FISHING IN FLORIDA

A report to the Organized Fishermen of Florida

by Jack Rudloe

ABSTRACT

This report addresses the controversy between commercial and sport fishing interests over the use of large commercial nets in capturing food finfish. Closure of areas to net fishing has not been demonstrated to be of any value in conserving stocks of either sports or commercial species of fish. The elimination of net fishing has significant implications for consumers, especially lower income Blacks. Fisheries resources should be managed for the enhancement of the species involved rather than by the actions of political pressure groups. More study on the ecology and population dynamics of the species involved is needed for the sound management and utilization of Florida's marine food and recreational resources for all citizens.

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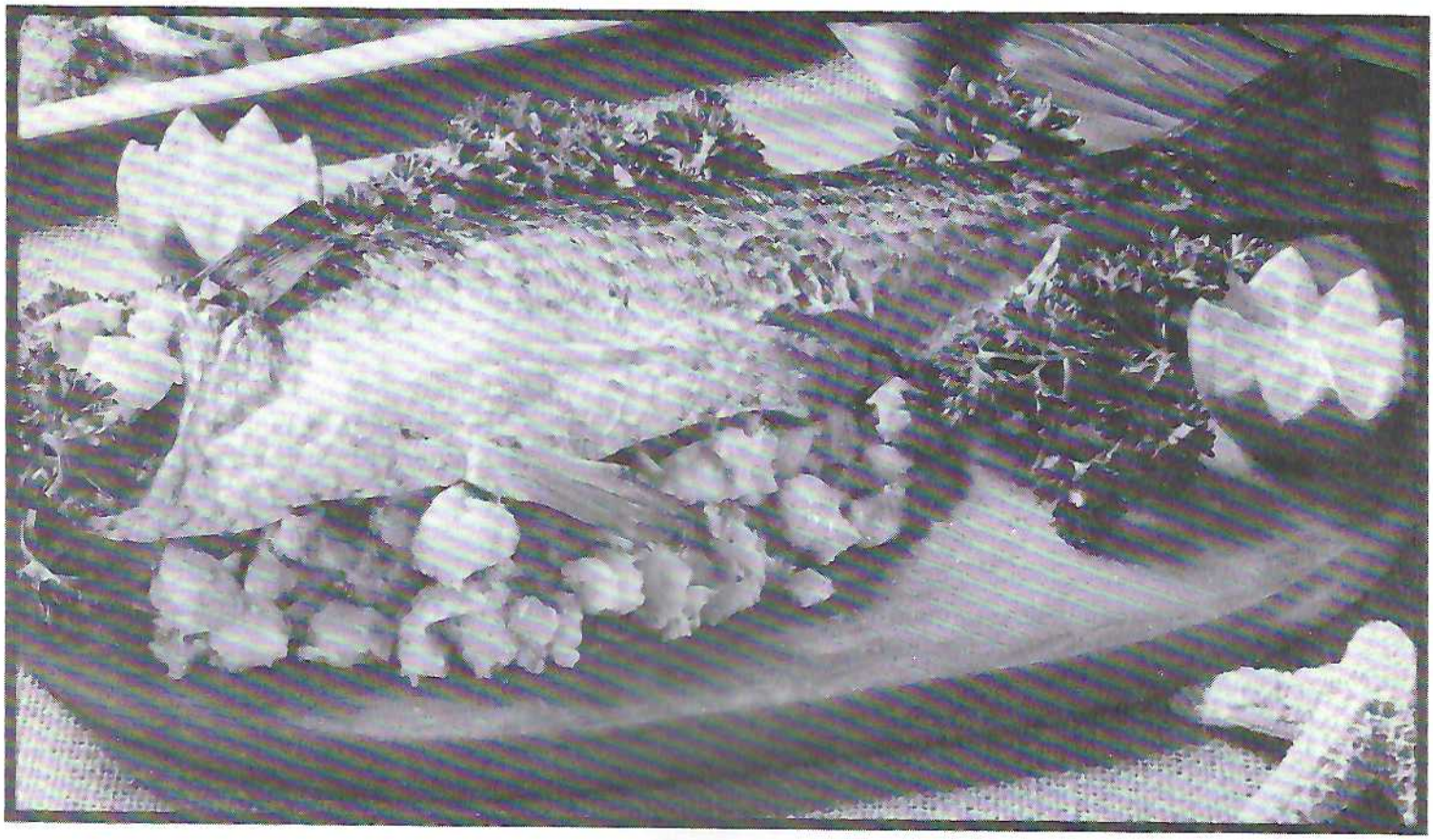


I. INTRODUCTION

At the top of the food chain is mankind. Man has always lived on fish; catching them is in his blood, a part of his nature. A school of mullet moves into the marshes, and becomes ensnared in a wall of webbing. They fight, and struggle against the shrinking net. Many leap over the cork lines or dive under the lead line to freedom, but others are hauled into the boat - frantically and noisily flapping - until life slips away. When the silvery blue king mackerel darts through oceanic waters and snaps its toothy jaws down upon a bright yellow lure, a fight begins. Against all its muscle and strength, the fish is steadily hauled into the boat, and ends its life in the cold darkness of an ice chest.

Both the netted mullet and the hooked king mackerel will end up as someone's dinner. They arrive at that final destination on a highway of intensifying controversy and misunderstanding. There is currently before the Florida Marine Fisheries Commission and the Florida Legislature a proposal to ban net fishing in state waters for finfish (except mullet) and commercial food shrimping. While such efforts have waxed and waned over the years, they are part of a long standing social conflict that has literally gone on for centuries.

The two main harvester groups, commercial and recreational fishermen, tend to be economically and socially distinctive and are often at odds over what constitutes proper management of marine species. Both groups vigorously use the political process to promote their own objectives.

According to the Florida Department of Natural resources, Florida's marine fishery resources are valued at 5-8 billion dollars annually. In addition to its economic role, marine fishery resources add immensely to the quality of life and support numerous other species, many of whom are legally protected and/or endangered. Clearly, the protection and wise, equitable use

of these resources is a serious public concern.

THE SPORTS FISHERMENS' PERSPECTIVE:

The recreational fisherman looks to the sea as a place of escape from his office, and the congestion and bustle of the land. It is one of the few places where one can go and enjoy quiet open spaces. To the sportsman, trolling from his fiberglass boat with light tackle, landing one fish at a time, the sight of a commercial fisherman hauling up thousands of fish may be appalling. Sportsmen often feel that net operations are stripping out the fish he enjoys catching and he vociferously voices his objections.

This year the Florida Conservation Association (FCA) and **Florida Sportsman** Magazine has launched a "Ban the Nets" Campaign. According to a Texas A & M publication, the Gulf Coast Conservation Association, the parent group of the FCA, is concerned with protecting the interests of recreational fishermen. The association, "evolved out of a concern for the commercial fishing 'threat' to redfish and speckled trout." California and Texas, two of the most populous and most environmentally troubled states, have instituted total net fishing bans in recent years. In Texas trout and redfish have been taken off the commercial market and are now classed as "game fish." Although Florida sportsmen have yet to succeed in their efforts to do the same, after a bitter political fight, they succeeded in getting redfish declared a protected species, and suspended the commercial fishery for them indefinitely.

Redfish, or red drum is now taken exclusively by sports anglers. The current impetus to ban net fishing in Florida appears to be derived in part from the widespread belief that the current abundance of juvenile redfish is due to the three year closure followed by a reopening for sports fishing only. If it worked for redfish, the reasoning goes, then let's try it everywhere.

In Florida the FCA has formed an alliance with some environmental groups concerned with protection of endangered species. Shrimp trawls and gill nets have caused the drowning of sea turtles. On rare occasions a few marine mammals have become entangled in nets and died. Trawls in particular have a significant bycatch of other species, killing mackerel, trout and so on. Abandoned or lost nets sink to the bottom, and if left unattended in the ocean they may go on uselessly killing fish for years. Sports anglers also point to the trash and debris often associated with commercial fishing facilities, the inconsiderate behavior of air boat fishermen and the waste water from processing plants that often flows back into the bay. The FCA is trying to stop all shrimping in state waters except for bait shrimping.

THE COMMERCIAL FISHERMENS' PERSPECTIVE:

Commercial fishermen point to their long term presence as proof that their activities are sustainable, blame environmental degradation for declines in landings, and see themselves as scapegoats for society's ills. While many acknowledge that lost nets are a problem, they feel careful regulations are preferable to shutting down their livelihood. They look with disdain at the increasing number of sport boats ripping back and forth across the bays with their powerful outboards. They feel the sportsmen are scattering the fish, breaking up schools and giving them no peace and are responsible for killing manatees. Eighty percent of the manatees in Florida have propeller cuts on their backs, and pelicans and other sea birds often perish from becoming

Inexpensive mixed bottom fish such as this sheepshead may disappear from the market entirely if net fishing is banned. Sportsmen are unlikely to supply the demand.

entangled in "ghost" monofilament fishing lines.

Because of the overwhelming number of recreational boats, they blame the sportsmen. In 1979-1980 there were 466,775 pleasure craft registered in Florida and 31,116 commercial vessels or a ratio of 15:1. In 1990- 1991 the number of pleasure boats jumped up to 685,075 and 31,136 commercial craft, a ratio of approximately 22:1. Together there are 716,201 vessels, many with sophisticated electronics and communications, roving Florida waters from time to time searching for fish.

Although the figures show that the commercial vessels have remained stable, certain types have declined. In 1990 a search of DNR's Vessel Titling and Registration System revealed that there were 720 shrimp boats, fifty five feet and longer registered in the State of Florida. Although figures have not been taken from prior years, many shrimpers feel that there are only half as many such vessels as there were ten years ago.

It should be noted that commercial boat totals include oyster and crab boats, party boats and deep sea trawlers. With the exception of small bay shrimpers, these craft do not cause fishing pressure on shallow water, estuarine finfish. Commercial vessels such as party boats, charter head boats and rental skiffs should more accurately be included in the recreational fishery.

Two main commercial fishing organizations, the Organized Fishermen of Florida and Southeastern Fisheries Association represent the men who make their living from the sea along with seafood processors, truckers, restaurants and sea food markets.

Their leaders tick off a long list of environmental ills that affect fish populations, including the armoring of the coast with sea walls and rip rap, the draining of swamps, destruction of wetlands, construction of marinas, pollution, pesticides and many others.

Commercial fishermen point to the lights of the condominiums glaring down on the water, the increasing land traffic with headlights beaming up and down the beaches, and swear they are responsible for chasing off the mackerel. Often residential developments have been built in fragile estuaries and wetlands where fish breed. Marshlands have been impounded for mosquito control, closing them off to larvae. Finger-fill canals and housing developments have replaced marshlands and mangrove swamps and the commercial fisherman asks, "Why single out me?"

Unfortunately, while commercial fishermen complain about environmental degradation privately, they rarely take public stands on behalf of environmental protection. Although sportsmen acknowledge environmental considerations, they often don't give them priority in considering declines in the resource. They insist commercial practices are devastating and should be restricted immediately because it is an easier target than the morass of coastal zone management problems.

The sports fishing lobbyists insist that banning net fishing in the inshore waters of Florida will not hurt the supply of seafood coming into restaurants and fish markets. Since the State currently imports 80 percent of its frozen seafood from Central America, China and Thailand, whatever is lost from local production can be easily substituted. They assert commercial hook and line fishermen will replace whatever fresh seafood products are lost if and when nets are permanently banned. Commercial fishermen strongly disagree, saying that bringing seafood from other countries, where they are caught in nets and trawls is hypocritical. All that's accomplished is putting American fishermen out of work and adding to the trade deficit.

In the case of large, expensive fish like pompano, speckled sea trout or king mackerel, where a single fish can bring between seven and twenty dollars apiece, catching them one at a

time on hook and like can be economically feasible. However, with black drum, croaker, sheepshead, and other mixed bottom fishes, or even spanish mackerel, where the fish are small, and worth a quarter to fifty cents a pound, hook and lining fishing is simply not practical.

In proposed legislation, the Marine Fisheries Commission would be directed to prohibit, "no later than January 1, 1994, the use of any net or trawl, other than a cast net, dip net, landing net, or scientific research net, for the taking of saltwater finned fish in the waters of the state." According to the proposed legislation, limited gill netting would be permitted for mullet, but not less than a thousand feet seaward of any state shoreline. This would put a stop to most mullet fishing because the fish gather around shallow intertidal oyster bars, moving up into the marsh grass on high tides to feed where most fishermen catch them. The law, if enacted, would also require zero bycatch, a provision that is not technically feasible and would close this major fishery.

Commercial fishermen maintain that cast netting, which is advocated by the FCA, would not produce enough mullet to meet market demands. Analysis of salt water products licenses in 1991 show that 2,172 fishermen caught a total of 21,500,000 pounds of mullet. Out of that total, only six million pounds were caught by 1,648 fishermen using cast nets. The rest, fifteen and a half million pounds came from slightly over five hundred gill net fishermen. Likewise, the 2,554,000 pounds of spots, a small panfish, which were produced on hook and line represented less than twenty percent of the total harvest.

Commercial fishermen maintain that banning the nets would the destroy the economy of the Florida panhandle and parts of the west Florida coast, where small fishing communities depend upon netting mullet and other mixed bottom fish. Not only are restaurants, cafes, bars and sea food markets and associated seafood haulers dependent upon net fishing, but a way of life would be lost as well. As one fisherman in Port St. Joe said, "It's more than just food. You lose mullet and you'd lose the 'goodness.'. Fish fries, which are based around cheap, fresh mullet are the basis of fund raising, church socials and political rallies.

Jerry Sansom of the Organized Fishermen of Florida comments, "Part timers can't keep the production up. It takes professional, full time fishermen who know what they're doing to supply the public with fish. You can't depend on back yard gardeners keeping the supermarkets stocked with tomatoes."

II. THE LEGISLATIVE FRAMEWORK

Since the early part of this century the Florida State Legislature has been charged with the responsibility of managing the State's marine resources. The laws granting the Department of Natural Resources the authority to regulate the fisheries were originally written in an attempt to halt the proliferation of conflicting local laws, as municipalities, county and city governments attempted to restrict fishing and set regulations. Nevertheless, the intent of bringing state-wide uniformity to the management of Florida's marine resources has not been achieved.

Since 1909 hundreds of local Special Legislative Acts were passed, a virtual morass of rules and regulations: In the 15 year period, 1930 to 1945, twenty-six laws were enacted. In the 15 year period 1946 to 1960, twenty-seven Special Acts were signed into law. From 1960 though 1977, 49 new local acts were passed by the Legislature limiting net fishing -nearly double the

rate of the preceding two fifteen-year periods. Currently just under two hundred such ordinances are in effect. In an attempt to deal with these burgeoning problem, in 1983 the Florida Legislature created the Marine Fisheries Commission to oversee and manage commercial and recreational salt water fisheries. In 1989 the recreational salt water fishing license was instituted.

Historically, sports fishing interests have lobbied to restrict commercial fishing, especially net fishing, by species, gear type and closures. Over the past century fishing clubs and sportsmen have banded together to obtain legislation that has closed entire bays and whole counties to net fishing. Currently just under two hundred such laws restrict the use of nets, impose closures and so forth around the state.

As Ken Woodburn, an environmental advisor to Governor Chiles, then a biologist with the Florida Department of Natural Resources, wrote over twenty years ago:

> "Excluding seasonal trawling for fishes and shrimp in certain bays and sounds, most contention has arisen over gill-netting, seining and trammel-netting fin fishes in inshore waters. Although 85 percent of the inshore commercial catch in Florida is comprised of mullet, not a sport or hook-and-line fish, there have been demands by sport fishing groups to have whole counties closed to commercial netting of fishes. Spotted sea trout, weakfish and redfish have been the center of sport-commercial struggles, especially during the winter tourist season. Netting has been blamed for bottom damage, destruction of young fishes and shrimp and the elimination of schools of fishes sought by sports fishermen."

Six counties in Florida, St.Johns, Flagler, Volusia, Palm Beach, Broward and Dade, have banned net fishing inside the Col Regs. The waters of Florida Bay inside the Everglades National Park are also closed. There are local laws banning gill nets in Okaloosa County to Choctawhatchee Bay, and throughout the state additional local laws prohibit net fishing in certain lakes, rivers, bayous and canals. And each year the Marine Fisheries Commission continues to receive requests to ban nets in small body water and canals in residential areas.

Thus far, however, there is no evidence that fish populations have increased as a result of those actions. In fact until recently in Texas, which totally banned commercial netting in State waters in 1988, redfish and trout populations have decreased. The poor fishing is thought to be the result of severe winters.

III. HISTORY OF THE LAWS

In the past, as now, the battles to ban commercial netting were hard fought in the press and the legislature. The first complaints about declines in fish came within a few years of the Pilgrims' arrival at Plymouth Colony. In 1902 sportsman complained of declining catches in Florida. As early as 1919, efforts to limit net fishing in St Lucie County were initiated by those who believed fish were declining and blamed net fishing. Then as now, advocates of such a ban overlooked the impacts of urban growth and altered freshwater flow into coastal waters.

In 1931, mullet were said to be scarce and net ban proposals appeared. That this did not

solve all perceived problems in fish abundance is suggested by the fact that in 1949, the scenario was repeated in Broward County. Once again, sports fishermen felt that stocks were declining and attributed it to commercial fishing. The solution was a bill to ban commercial seines and other nets. The commercial fishermen retaliated with an unsuccessful bill to ban sport fishing tournaments. At the same time that the Broward bill to ban nets was under consideration, local newspapers reported superb sports fishing catches. The ban was enacted anyway.

Thus, the current controversy should be seen as part of an old and standard pattern of decline, real and/or perceived, blame assigned to commercial fishing, and little consideration of underlying problems of human growth and habitat destruction.

What happened to the precipitous decline of fish stocks in the 1870's? Apparently nothing, because twenty years later there was a healthy fishing industry and no one said anything about it, even though fishing pressure had increased substantially.

Just as fish stocks undergo rises and falls in their population, and there are biological cycles, there also appear to be cycles of contention. When fish stocks cyclically decline, people get on the band wagon and cry "ban the nets."

On the other hand, many commercial fishermen will attribute a poor harvest to anything and everything except overfishing, although in Linda L. Lample's report on the redfish controversy, "Feeding the People from Generation to Generation. An Ethnology of the Pine Island Fishermen," she wrote:

> "The fishermen do not hold themselves blameless if the fishery is in trouble.... Those over 40 believe that the underwater exhaust noise of their kicker boats, like the outboard pleasure boats, change the feeding habits of certain species. They also believe that the fishery itself.. may be over-capitalized in the sense that more fishermen can afford the boats, motors, nets and other gear necessary to chase mullet, trout, reds and grouper because of 'subsidies'... retirement pensions, as well as money made from hauling illegal drugs. Such subsidies allow less skillful fishermen to compete in the fishery."

Sportsman continue to blame netters, netters point to growth and environmental change, and both sides ignore the reality that all of these factors - commercial landings, sport landings, habitat destruction and normal seasonal fluctuation - all affect the population of a fish stock in any given year.

The reality is that nets catch a lot of fish, hook and lines catch a lot of fish, wanton overfishing has been practiced by individual fishermen, both sports and commercial, habitat has been destroyed wholesale and fish populations fluctuate naturally in ways that are poorly understood. A return to a mythical fishing "good ol days" of the 50's and 60's, which some sportsmen claim will happen when net fishing is banned, is hardly a realistic goal since they evidently never existed.

Today the conflict between sportsmen and commercial fishermen has proliferated until it has passed from a county by county issue to a state wide conflict. One hears stories of irate ladies watching from their condominium windows as gill netters strike their nets. Swimming out with knives clenched in their teeth, at least one such lady was said to cut at the webbing in an attempt to free the fish. The fishermen tried to shove her away with oars. Net fishermen on both coasts complain of sportsmen with two hundred horsepower engines deliberately running

through their nets at full throttle. Fishermen have been pelted with garbage as they strike their nets in canals, and squirted with garden hoses from piers.

On the other hand, property owners and sportsmen complain bitterly of "rowdy and intoxicated commercial fishermen" who allegedly strew the beaches with dead trash fish, keep them awake at night with clatter, profanity and lights, block their canals for navigation while they strike their nets, and even sabotage their boats. Today, noisy commercial air boats operating at night near coastal residences create further ill will.

IV. HISTORY OF FLORIDA FISHING

The first-known fishermen in Florida were prehistoric Indians. Little is known of their culture, but archaeologists have sifted through kitchen and burial middens, dating back to 9,000 B.C., and have unearthed the remains of ancient nets made of hemp along with bone fish-hooks. These early people ate an enormous amount of shellfish. Middens fifty feet and higher have been built almost entirely of clams and oysters. Zooarcheologists digging in such middens have identified the bones of mullet, crevalle jacks, sea trout, redfish, black drum, catfish, channel bass and numerous other species.

Because shellfish and remains of salt water fish, conchs and turtles have been excavated from inland middens, sometimes hundreds of miles from the coast, it has been assumed that trade routes had been long established. The coastal middens in turn have their share of inland products including maize, grain, clay pottery and even metal. So with a little stretch of the imagination, we can assume that these salt water products represent the efforts of the first "commercial" fishermen.

Although the coastal zone was abandoned in some areas of Florida by the time the English arrived, settlers moving down from Georgia and the Carolinas continued the tradition of commercial fishing. They were generally farmers, with fishing as a seasonal occupation to supplement their diets. Commercial fishing in the Southeast was well established before the Civil War and by the turn of the century, mullet was much in demand.

But it was a very different fishery in the 1880's than it is today. While much of the mullet was sold fresh, a large part was also salted down in wooden barrels, and shipped out by mule-drawn wagon or railroad. Rough and hardened seasonal fishermen lived in fish camps on remote shorelines during running season and hauled in huge seines. When they weren't fishing they were splitting and salting fish. Farmers would drive down the coast to exchange salt, produce vegetables and sometimes money for fish.

Salt-mullet was an essential food of the early timber and turpentine camps. %GMK%It is said that salt made the men thirsty, they drank more water, sweated profusely and were able to keep working longer in the burning sun. Mule-drawn carts, and later Model "A" Fords were used to haul the fish out on the plank roads that led up through the marshes to the rutted sand roads from the coast. Early peddlers sold their fish --first in salt barrels and later on ice-- to inland farms and towns.

Then as now, in periods when fish were scarce, the controversy over net fishing appeared. In 1887, R. Edward Earll wrote:

"Probably no species is so little understood as the mullet..

> A majority of the fishermen consulted report that the species has not decreased in numbers during their recollection, though several think... the catch is much smaller than in former years. They assign various causes for the decrease, chief among which is the excessive use of seines or nets.. There is no evidence, however, to show that a general decrease has occurred, though for various reasons the catch fluctuates within certain limits from year to year." (Earll, 1887, pp. 555-556)

It is important to note that the total landings in Florida at that time were less than ten percent of the average landings for the past few decades. The average landings for the years 1879 and 1880 was approximately 2.75 million pounds of mullet. Throughout the 1970's and 1980's there has been a sustained catch average of approximately 30 million pounds per year. In 1988, it was 27,938,666 pounds.

The advent of widespread refrigeration in the earlier part of this century was largely responsible for the increase in fishing pressure, along with the increased availability of the outboard motor in the '40's and '50's. Pressure increased not only for mullet, but for trout, redfish, sea trout, and other species as well. Refrigerated trucks made it possible to distribute fresh seafood to consumers far away from the seashore. All along the coast there were fish shacks with piles of webbed nets coiled up on giant reels. Seine boats would travel up and down the shoreline, looking for schools of fish and would encircle them with their mile-long nets.

As the population of Florida grew, sport fishing also grew. At first, when there were few highways leading down to villages and towns, people came by railroad or tram car to socialize and go hunting and fishing at the hotels and lodges. Many of the fishermen saw an opportunity to make money by hiring out as guides and taking small parties out to fish the flats for trout and redfish. Later, fish camps rented small wooden boats directly to weekenders with or without a guide. Almost invariably, boats with fishing guides produced much higher yields than boats without such help.

But the patterns of sport fishing began to change radically with the expansion of the highway system and the construction of boat ramps. The trailerable boat proliferated until it has clogged the coastal highways, and the sea has become filled with boats racing back and forth to the fishing grounds.

V. FISHERIES MODELS

There is often minimal biological information on fluctuating populations in the ocean, and in the absence of facts, opinions flourish. While it is easy to believe whatever one wishes to believe, the more difficult role of the fishery management professional is to evaluate all impacts objectively and manage the stocks in a biologically sound manner. Governing bodies must find reasonable and fair solutions to such conflicts in the midst of the sound and the fury of fishery politics and make approximations to cover uncertainty.

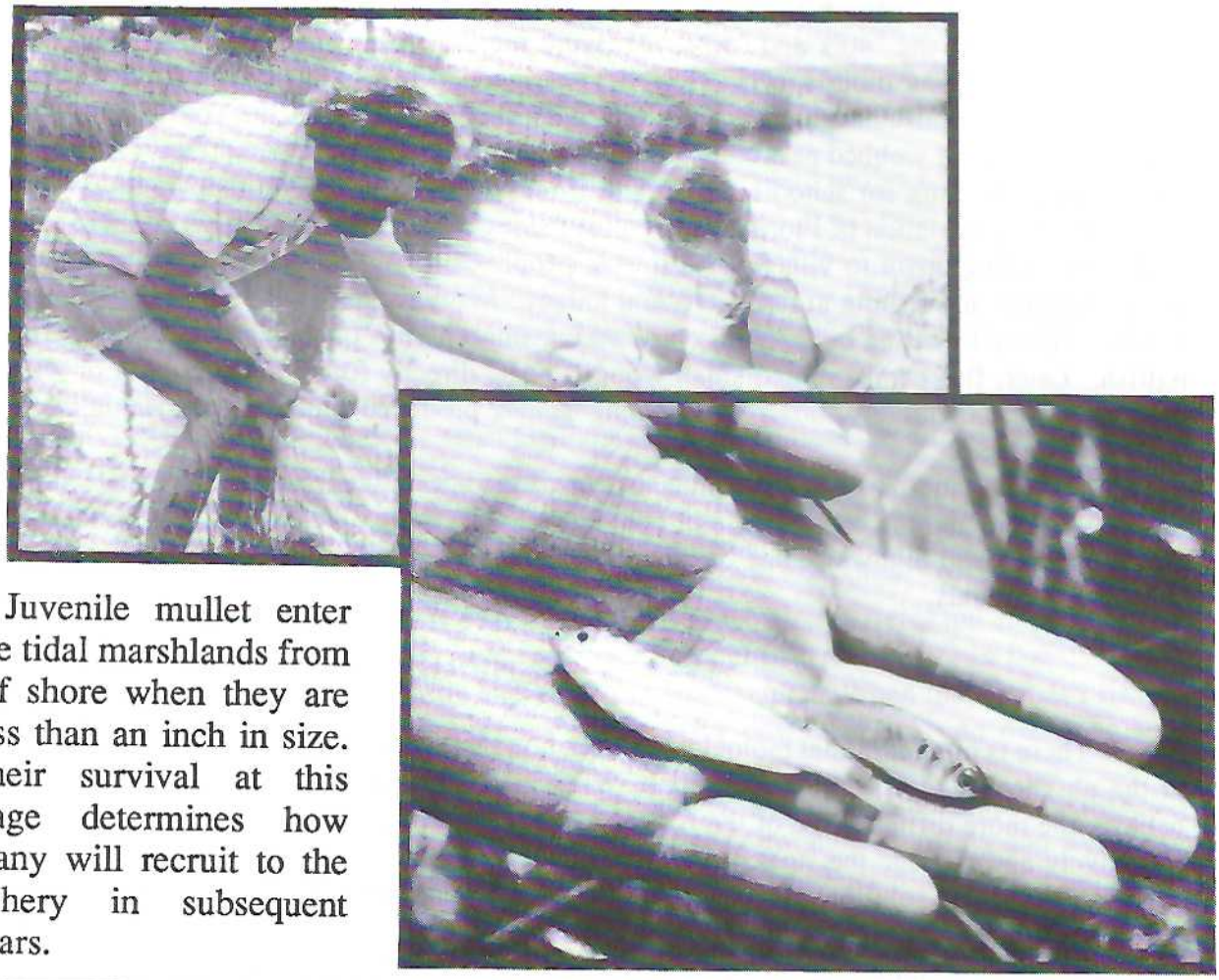
Scientific opinions are based on "models." Using complex mathematical systems, fisheries biologists plug in whatever hard data is available such as landing figures, and catch per unit effort, and mix it with assumptions. They add assigned values for natural fish mortality, survival of spawning stocks and recruitment of juvenile fish into nursery grounds to come up with population estimates. Several different models are used.

Most models involve one of the following assumptions:

1. If the spawning stock is impacted (such as taking gravid salmon) then recruitment (juvenile fish arriving in the nursery grounds) will be impacted.

2. If the spawning stock is impacted, because of the vast numbers of eggs and larvae that are produced in the sea, (a single shrimp produces half a million eggs or more) the recruitment will essentially remain the same from year to year regardless.

3. The third model says there is no relationship between spawning and recruitment one way or the other. Recruitment, (i.e.larval blue crabs settling out of the plankton and growing up in the estuaries) is more a function of water temperature, rainfall, lack of predators, sea state, currents, etc. and other conditions that favor an increase or decrease in a particular species.



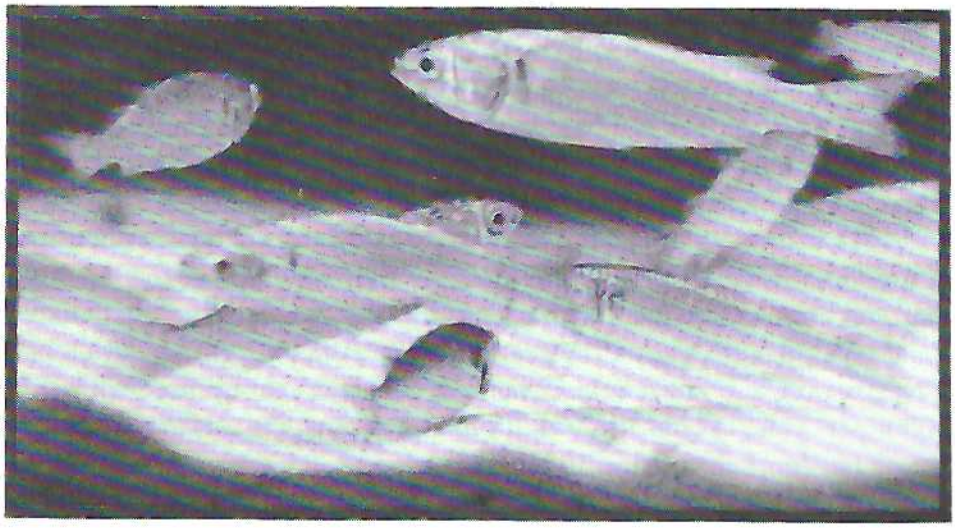
Juvenile mullet enter the tidal marshlands from off shore when they are less than an inch in size. Their survival at this stage determines how many will recruit to the fishery in subsequent years.

Each assumption may yield different conclusions from the others. In the absence of long term data and field work, it becomes a matter of opinion as to which is best in a given fishery. As a rule, the Marine Fisheries Commission has preferred to use the first assumption, preferring

to err on the side of the resource in setting commercial quotas. A quota serves to cap the total fishing mortality so there will be adequate numbers of spawning, parent fish to repopulate the estuaries. For example the MFC has a twenty percent goal for the sea trout spawning ratio. They endorsed a thirty percent spawning stock ratio for mullet, and thirty percent for spanish mackerel.

Quotas are all based on estimates of fish mortality, natural and man induced, plus size at sexual maturity. They take into consideration fundamental life history parameters such as aging and growth, natural mortality and reproductive rates. Fish that live a long time typically have a smaller fraction of the population available as yield. Those that are short lived, and have high fecundity like shrimp, can be intensively harvested without damaging the stocks. Given the right environmental conditions, their populations can explode like love bugs. And like love bugs their rate of natural mortality is very high. It's the longer lived fishes, or the species that have a low reproductive rate that have to be handled more gingerly. Susceptibility to fishing is ultimately determined by reproductive strategy. For instance sharks produce few offspring every one or two years and have great longevity. Consequently they have been over fished.

Scientific computer models are thought out opinions, constantly being tested and corrected as facts become available. However, most biologists agree that trying to manage a single species in the midst of an ocean of fish, fishermen, and a diminishing environment are fraught with unavoidable uncertainty and controversy.



A school of inch long mullet.

VI. IMPACTS OF SPORTS VERSUS COMMERCIAL FISHING ON THE RESOURCE

Until the present time, when Florida's population has blossomed to unimaginable and unmanageable proportions, the question has always been academic. But now the moral and legal implications are becoming very real. Who indeed is entitled to dine on the delicious fillets of mackerel broiled with lemon and butter? The fortunate few who are able to streak off shore in their seventy thousand dollar boat and troll for them? Or the housewife who couldn't care less about the sport involved, or whether they were caught in a net or not, but looks forward to buying them over the counter? What about the tourist who comes down from New York and wants to eat fresh Florida seafood in a restaurant? Many people claim that these resources are

quickly diminishing, and it doesn't make any difference who is eating them. In all of these controversies, facts have always been scarce and secondary to passionately held opinions.

Today, however, with the increasing role of professional fisheries biologists, more facts are becoming available. If Florida's seafood resources are to be conserved and managed for the benefits of all user groups, it is absolutely necessary to accurately evaluate all the sources of pressure being placed on our resources.

To do so, the Marine Fisheries Commission is now using a trip tickets system for statistical purposes in making policy for the commercial fishery. The agency, which was established in 1983, is fueled by money collected from the commercial and recreational salt water fishing license. Before the trip ticket system was instituted, landing data was gathered by the National Marine Fisheries Service. They made monthly visits to fish houses to get information on the monthly landings. The program was not as highly structured or accurate as the Trip System now in effect. The DNR's St. Petersburg Marine Lab keeps all the trip tickets, and can now tell the amount of all croakers, whiting, mullet, red snapper, grouper etc. being landed. It gives hard numbers on fish being taken commercially, and shows roughly where they're being caught.

Unfortunately, accurate data for sports landings is much more difficult to obtain due to the vastly greater number of boats and their more scattered distribution. The National Marine Fisheries Service keeps records on the recreational fishery. They interview sportsmen on beaches, on bridges, docks and boat ramps, inventorying their catch, and asking questions to arrive at a catch per unit of effort. They also conduct random telephone interviews to learn how often people go fishing, and what they catch. It provides trends rather than hard data. Under the new regulations, sportsmen can't sell their catches unless they have a salt water products license. Restaurants have to have a wholesale license permit to buy directly from fishermen.

According to the Florida Department of Natural Resources, salt water sport fishermen who use state parks and boats are "relatively affluent white males". Salt water sport fishing from land, aside from parks, is also predominantly male, with unemployed individuals especially likely to participate. At the national level, the average salt water sportsman fishes 11 days per year and spends $528 on expenses. Nearly 60% had household incomes of $30,000/year or more with 28% earning more than $50,000 per year. Some 13.7 million Americans fished in salt water recreationally in 1985. Florida has more than 2.1 million resident sports anglers plus another 1.2 million tourist anglers.

Florida commercial net fishermen have been sociologically profiled in a report by Lample (1986) of the Pine Island community in southwest Florida. Usually small independent entrepreneurs, net fishermen work according to a schedule set by tides, weather and the movements of fish. Daily personal life and work are not separate and working hours are generally well above 40 hours per week. Income is erratic and irregular.

Their specialized job skills are often not transferrable to other jobs. They tend to not be integrated into the larger urban society that increasingly surrounds them and are often perceived by that society as "rag tag commercials," "rowdy and intoxicated," and a nuisance to polite society with night fishing in canals and so forth.

In addition to long and irregular hours, net fishermen prize their self sufficiency to the point that they are often unable to be effective in organized group efforts, be they economic cooperatives or political battles. More often than not, commercial fishermen as individuals have

been uninterested or ineffective at convincing the larger society of the validity of their perspectives on fishery issues. The recent well publicized opposition of shrimpers to endangered species protection and TEDs was a good example of this. Their long slow decline in the face of urban growth can be partly attributed to these problems. Nevertheless, sports anglers perceive the commercial industry as a whole to be a well organized well funded Goliath to their David - as wealthy corporate opponents.

The number of commercial fishermen in Florida has been relatively stable, with 10,120 fishermen in 1950 and 10,200 in 1973. There are currently, according to the Organized Fishermen of Florida,18,000 fishermen. According to Jerry Sansom, Executive Director of the Organized Fishermen of Florida, approximately 4,000 of those have purchased commercial fishing licenses to avoid recreational bag limits, or to use certain gear items which would be otherwise prohibited and are not in fact making a living from fishing. The number of seafood processing plants and fishing operations has declined drastically in recent years. In 1986, Florida had 527 processing plants employing 6800 people.

Approximately 3000 individual commercial fishermen in Florida report landings taken with gill or trammel nets. Their catch in state waters of 11 species (bluefish, black drum, king mackerel, spanish mackerel, black mullet, silver mullet, pompano, spotted sea trout, sheepshead, spot, whiting) for the 12 month period July 1989 to June 1990 was 27,195,337 pounds worth $14,597,758. Of these, 21,578,920 pounds were black mullet worth $10,357,881.

In addition to this, 11,362,277 pounds of food shrimp worth $21,964,188 were landed from state waters. According to NMFS, 172.7 million pounds of fisheries products were landed in Florida in 1987 with a dockside value of $156.6 million and a total economic value of $1.95 billion. Shellfish made up 66% in value of the landings while finfish were 34%. Florida was 2nd in the Gulf states in total production, 6th in national dockside value of products landed and 10th in tonnage landed. Three of the top 50 seafood ports in the US are in Florida, Apalachicola, Key West and Cape Canaveral.

According to figures compiled by the Organized Fishermen of Florida, some 70 species of fish and 15 species of shellfish are landed in Florida. Of these, 15 are worth more than $1 million per year - shrimp, spiny lobster, grouper, oyster, calico scallop, stone crab, snapper, mullet, swordfish, blue crab, clam, king and spanish mackerel, tuna and spotted sea trout. Of these landings, coastal finfish, including trout, mullet, black drum, pompano, whiting and sheepshead are the species that would be affected by a gill net/trammel net/ trawl ban.

However, there is also concern that shrimp trawling may be impacting red snapper recruitment in the Gulf of Mexico, destroying habitat and killing juvenile snapper and trout. This is currently being investigated by the Marine Fisheries Commission and the National Marine Fisheries Service. Recent estimates of shrimp trawl bycatch in the U.S. offshore waters are over one billion pounds annually. Bycatch includes all non-targeted species caught. In addition to numerous small species, it includes sharks and significant numbers of protected species such as sea turtles.

In 1989, an estimated 5 billion croaker, 19 million red snapper, and 3 million spanish mackerel were taken incidently to shrimp trawling in offshore Gulf waters according to NMFS. Although ratios of shrimp to fish in the Gulf of Mexico have been reported from 6:1 to 15:1, studies by the Dr. George Burgess at the Florida State Museum in the lower St. Johns River, are much lower, 0.79:1. Studies to more carefully evaluate the bycatch issue are currently underway.

Environmentalists and recreational fishermen consider bycatch a waste, a loss of foregone recreational and commercial fishing opportunities and a loss to the ecosystem. Shrimpers don't see it as a significant problem because the discarded fish are consumed by predators and scavengers, many of which are also commercial species such as shark, jack, bluefish and others.

A comparison of landings by sport and commercial fishermen of species taken by both has always been difficult, largely due to lack of accurate comprehensive data on sports landings. One commercial vessel may harvest thousands of pounds at a time, making it a visible target of concern for over harvesting, but the widely dispersed sport fishery is also substantial and growing rapidly. In recent years some recreational landing estimates have become available. For inshore finfish, NMFS provides the following figures in 1990 comprising sports and commercial landings in pounds:

SPECIES	SPORTS LANDINGS	COMMERICAL LANDINGS	APPROXIMATE RATIO, SPORTS TO COMMERCIAL
Whiting	1,099,657	1,229,026	.89:1
Sheepshead	2,216,989	771,370	2.87:1
Croaker	198,685	133,669	1.49:1
Black Drum	4,856,275	68,612	70.78:1
Spotted trout	3,628,104	997,220	3.64:1
Redfish	1,162,742	0	---
Bluefish	3,760,314	1,462,789	1.89:1
Spanish Mackerel	2,463,000	4,360,646	.56:1
Amberjack	6,718,607	2,368,613	2.84:1
Pompano	103,101	961,673	.11:1
King Mackerel	5,426,441	2,699,878	2.01:1
Spot	858,610	1,606,020	.53:1
Mullet	991,773	25,428,745	.04:1

Almost all of these landings and bycatch except the mullet would be eliminated by the net ban proposal currently under consideration.

For grouper and snapper, the catch is almost evenly split between recreational and commercial fishermen. In 1991 the South Atlantic Fisheries Management Council permitted a four million pound total allowable catch. The commercial catch was 2.04 million, and recreational 1.96 million. The Gulf Red Snapper Fishery was closed after the 2.1 million pound quota was reached.

While overfishing by all user groups is one of many human induced environmental impacts, the view that net fishing alone is responsible for perceived shortfalls in sport catches and that banning nets will solve the problems and restore catches to some mythical golden age verges on the ludicrous. It ignores the enormous population growth and accompanying environmental degradation that Florida has experienced in recent years.

Key West Harbor was the hub of the pink shrimp fishery in the State of Florida, with landings up to fourteen million pounds, according to Terry Leary of the Gulf of Mexico Fisheries Managment Council. The fifties was the hey day of the pink shrimp fishery, and for years the landings remained stable at ten million pounds. Then in the past five years that once lucrative fishery collapsed to five million. Shrimpers and fisheries biologists both deny that over fishing was the cause, because penaeid shrimp have such a high level of fecundity. Most agree that causes are environmental, both man induced and natural. Five years of drought, the Southwest Florida Water Management District shunting water through the canals to serve the cities on the East Coast and depriving Florida Bay of fresh water may have something to do with it. The mysterious death of vast acreage of sea grasses in the Keys, where pink shrimp feed could be another cause.

Fleets of shrimp boats once came from all over the Gulf and South Atlantic to work the Tortugas pink shrimp fishery. Where three or four hundred shrimp boats used to dock in Key West Harbor, now it's down to practically zero. With the demise of the fishing industry comes the rise of the condominums. "Developers want it that way," says Robert Jones of the Southeastern Fisheries Association, "These sea food houses have developers and engineers licking their lips trying to get that land for a variety of reasons. You don't need a permit to dig a channel, it's already there, you don't need a permit to build a dock, it's already there. You don't need a permit for much filling because the fish house and shore side facilities are already there on high ground. If you can move the commercial people out of there, and tear down the buildings, what you end up with is some of the most valuable property in the southeast, or even the United States. That's really what's behind the 'Ban the Nets' movement."

Florida's population continues to explode. Seventy five percent of Florida's population lives in the Coastal Zone. Over eighty percent of the State's population growth during this decade has been concentrated in the coastal counties. Each day 687 people are moving into the state, and 550 end up at the coast.When an earlier version of this report was compiled in 1977, there were nine million people in the State. Now it's 13 million. In a letter to the editor in the St Lucie County Tribune, written in 1919 to oppose a proposal to ban nets, County Commissioner W. H. Merwin wrote:

"Years ago, we had lots of bear on our ocean beaches. They were not all shot. They are not here. Still we do have a few now and then. Statisticians tell us that the wild things decrease in direct proportion to the humans in any community...It is beyond reason to expect any self respecting fish to hang around Fort Pierce and breathe the water from those sewer pipes that stick out into the river...Our round clams were all killed by fresh water three years ago. This water came from your drainage canals. Why not close the canals up?"

Why not indeed?

In the 1950's grass beds off St. Petersburg were destroyed from widespread causeway

construction, sea walls and numerous sewer out falls. The channel into Tampa Bay was widened and deepened as well. The over enrichment of the waters, the suspended silt coming from numerous impacts, all destroyed vast acerages of sea grasses, with a resultant drop in shrimp, scallops, trout, and other species.

In the Pine Island Fishery report, Lample expressed the views of the commercial fishermen:

> "They ask why the mackerel, trout and pompano declined in near shore areas immediately after the beach was renourished at Captiva in 1982; and they theorize that the Sanibel Causeway interrupted the saltwater regime around Pine Island in the early 1960's and killed the 10-year-old bay scallop industry. Hundreds of miles of concrete seawalls and deep water canals replaced tidal flats and mangrove fringes. Worse yet, the waterfront community attracted newcomers who know little about the natural system, but are quick to blame the fishermen's nets for what the fishermen say is the resident's own inability to catch fish."

Degradation from urban run off kills grass beds, doing incredible damage but it is not visible. It's all happening beneath the water, and suddenly people start wondering, didn't there used to be a lot more fish here? Spraying for sand flies, and diking wetlands to control mosquitoes all contribute to the long range, gradual decline. It is well understood by scientists that larval crabs, shrimp, mullet and other rough fin fish are dependent upon unspoiled wetland habitats to complete their life cycles. And here they're on a collision course with humanity.

To accommodate the six hundred and fifty thousand odd sports fishing vessels, nearly 1000 marinas have been constructed and operate today in Florida. These dredged out basins become major point sources of pollution. They collect heavy metals, petrochemicals and toxins from anti foulant paint which builds up in anoxic sediments and bottom waters. Many are contaminated with sewage, and DNR's shellfish division, automatically and permanently closes all waters to shell fish harvesting within specified distances from a marina.

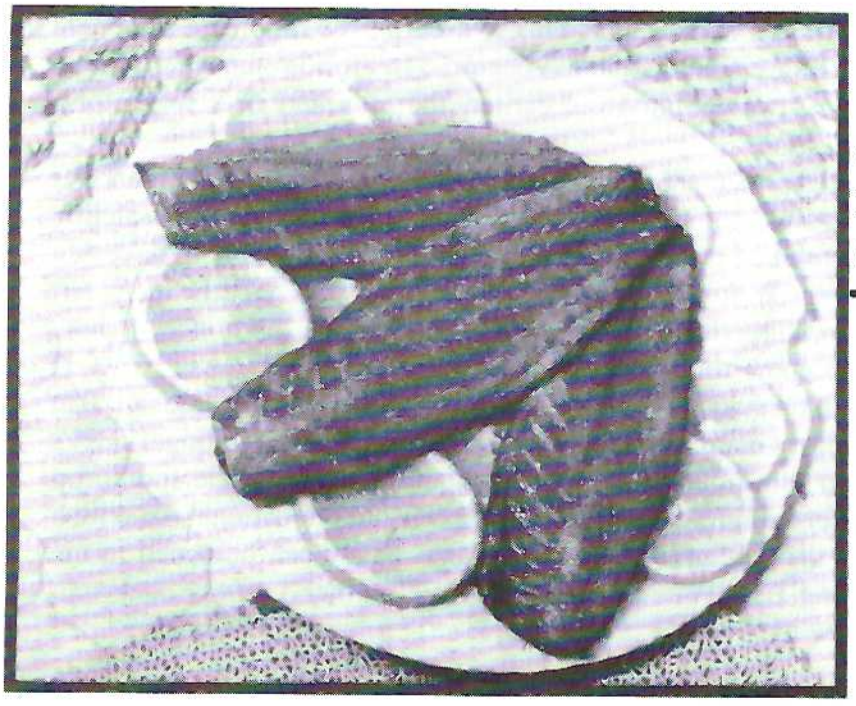
Pressure to build ever more of these pollution intensive facilities to accommodate recreational users is constant and enormous. Marinas have been dredged, navigation channels provided, and all along the Florida coastline, finger-fill-canals have been sliced through the wetlands to provide better access to waterfront living. More than twenty percent of Florida's coastline has been radically altered through dredge and fill operations. Boca Ciega Bay is among the most infamous examples of how a productive nursery ground for speckled sea trout, mullet, pink shrimp and a variety of other estuarine fishes has been converted into real estate. After the land was pumped up, people moved in and one of their first acts was to close net fishing. Today, Citrus and Hernando Counties have closed off sections of their bays and rivers to net fishing by a Special Act of the Legislature, but only after extensive networks of canals had been dredged. And in Broward County, which prohibits completely the use of nets, the coastal zone has been converted into a two hundred mile system of canals.

Such landings are merely the starting point in evaluating a fishery. For each species, optimum sustainable yield must be determined. This is an estimate based on a variety of estimated parameters including recruitment, natural mortality and so forth that are often very poorly known. It is a technical, biological determination. Even if an OSY estimate can be reached, then managers must allocate the harvest to different user groups and that is a political rather than a biological decision. It usually involves sociological and economic decisions that biologists are not qualified to make.

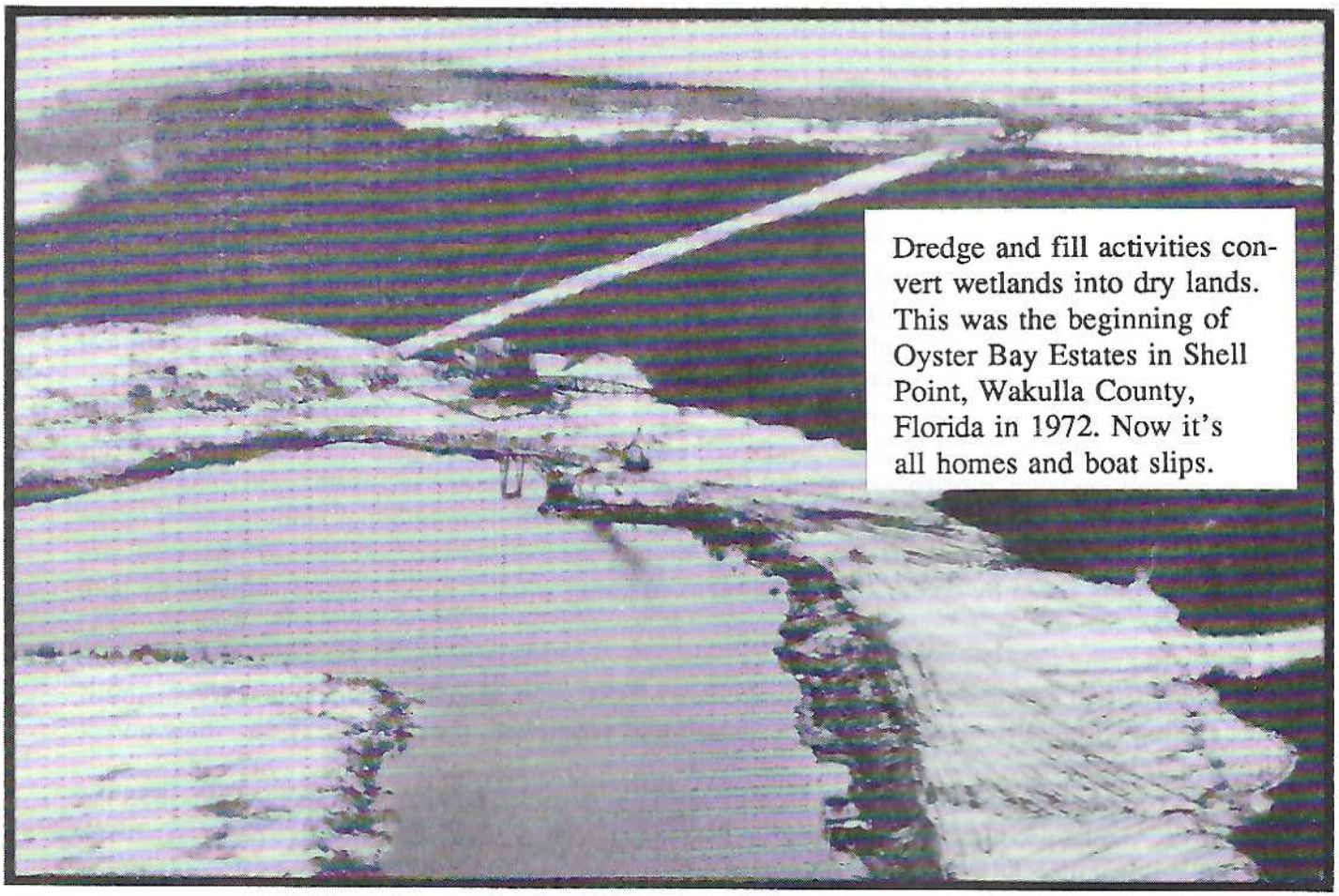
The comparison of the 1990 Sport versus Commercial landings in Florida clearly reveals that the preponderance of fishing mortality for most species is derived from sports anglers and not from commercial landings. Sports landings greatly exceed commercial landings for 8 of the 13 above species. Only four fish including mullet, spot, pompano and spanish mackerel are predominantly taken by commercial fishermen. Whiting is taken approximately equally by both groups.

Banning nets will clearly not affect fishing mortality significantly for those eight species. However it will eliminate the commercial catch of spot, pompano and spanish mackerel. And if net fishing within a thousand feet of the shoreline is prohibited, it will virtually eliminate mullet from the fishery.

The trends of sports fishermen catching the bulk of the fish has not changed. In 1975 the State of Alabama conducted a survey of its recreational fishery. According to the Alabama Marine Resources Division, those species which are sought by both sports and commercial interests were monitored with the following results. The commercial harvest of spotted sea trout was 28,200 pounds, only 3.5% of the recreational harvest of 798,637 pounds. King mackerel harvest for the recreational fishery was almost 800,000 pounds while there was no harvest from commercial interests. And, finally, the bluefish recreational harvest was 908,260 pounds while the commercial harvest was less than one percent of this amount. The Alabama figures clearly indicate that recreational fishing pressure was considerably more than commercial pressure on these species.



Mullet plates attract thousands of restaurant customers to the Florida coast. Smoked mullet delicacy in the South.



Dredge and fill activities convert wetlands into dry lands. This was the beginning of Oyster Bay Estates in Shell Point, Wakulla County, Florida in 1972. Now it's all homes and boat slips.

VII. LONG RANGE ENVIRONMENTAL IMPACTS

Who owns the fish?

A leader in the current ban the nets campaign, Karl Wickstrom, publisher of "FLORIDA SPORTSMAN" magazine has repeatedly stated that banning nets will return fish populations to the "high abundance" levels of the 1950's and 1960's. This is a curiously simplistic statement that ignores the massive environmental degradation that has occurred in Florida since then. It also ignores the history of this conflict. As was pointed out earlier, the 50's and 60's were not a golden age in the perceptions of that time.

Both sports and commercial fishermen are using more sophisticated technology than was previously available. Modern electronics, such as loran, depth recorders, radars and satellite positioning equipment and radios, combined with faster, more efficient craft capable of covering great distances, have made fishing easier for all concerned, and hence has greatly increased pressure on stocks. Every little bump, loggerhead sponge, and coral head on the bottom is now visible to sonar, and the ocean has become transparent.

If it weren't for their importance to navigation, the fastest way to increase all fish populations might be for the U.S. Coast Guard to turn off loran stations so "X" no longer marks the spot. Now lorans are hooked into auto pilots enabling sportsmen to arrive on the spot, drop a line down and start reeling in snapper and grouper. Both commercial and recreational fishermen often use electric reels. Because of the "unfairness", spotter planes have been outlawed in the commercial fishing of surface feeding fish. Perhaps its time to put similar fairness back into fishing for bottom feeders.

particles that are overgrown with bacteria and have organic molecules absorbed on their surface. Their sensitive mouths selectively reject the larger and coarser grains as they ceaselessly browse the bottom, feeding on vegetable matter. Occasionally, they are caught on tiny treble hooks, often baited with crab eggs. But by no means is mullet considered a sport fish.

Carried by winds and tides from the open ocean as tiny larvae, they enter the estuaries and marshy creeks and grow rapidly. Recruitment of juveniles into the wetlands from year to year appears to be stable. During the first year of their life, when they enter the estuarine systems, mullet are an inch in size. If there's a change in habitat, or a major change in oceanographic conditions that could affect the year class, the amount of recruitment to the fishing ground and ultimately the fishery, two or three years ahead will be affected. Growth occurs primarily in the spring and summer. Along the southern coastline their growth is more rapid than along the northern panhandle. Likewise, mullet are smaller at sexual maturity along the more northern sections of the coast. It is estimated that it takes about two years for them to become sexually mature and to enter the commercial fishery. They live to be eight years old, possibly more.

Mullet, like nearly all other forms of mobile marine life, run in cycles. Some years they occur in large numbers that practically blacken the water as they leap and splash along the salt marshes and travel into the fresh water rivers. Their movements are generally thought to be affected by the tides, winds and storms.

No one really knows what makes them abundant one year and scarce the next. Scientists are just beginning to learn how the estuarine systems and cycles work. The flooding of the swamps during wet years - carrying a pulse of nutrients out to sea - combined with drought periods the next, might produce a bumper crop with hundreds of happy fishermen. Too much rain, or too severe a winter might produce a paucity.

Movements of schools of mullet have been traced through tagging studies. Along the east coast of Florida, movements are predominantly southward. On the Gulf Coast, north of Tampa, mullet move northward and then westward along the panhandle coast. The Florida Department of Natural Resources has tagged mullet over the past two years along Florida's West coast. The majority of the tagged fish stayed in Charlotte Harbor and a very few, five or ten percent, moved north to Tampa Bay. A few fish from Tampa Bay end up in Apalachicola Bay. Small black mullet, nine to eleven inches, move from south to north, from Naples to Charlotte Harbor to Tampa Bay in October and November. Their results were consistent with other mullet tagging studies done in the 1950's. Mullet don't move around too much, they huge the shorelines, feeding around the littoral zone of mud flats, oyster bars, marsh grasses and mangroves. Fish tagged prior to spawning season,appeared to have moved out and came back to the same system.

One reason for the fluctuations may be climatological variability. Low production could be associated with the lower frequency of the cold fronts which are an important factor during the roe season. The fronts cause aggregations and escapement of mullet to offshore spawning grounds. During cold snaps, outside of the spawning season, mullet school and run off shore. The drop in barometric pressure causes them to aggregate. Then the wind and temperature drop stimulates migratory movements. For successful fishing, there must be enough wind to cause movement but not so much as to make it too rough to fish. During cold snaps outside of the spawning season, with many other species of estuarine fish, they congregate in deep holes with warmer temperatures than the surrounding flats and marshes. If there is a lower frequency of

cold fronts, there will be less fish and less aggregation.

Mullet are thought to shed their sperm and eggs into oceanic waters, possibly as far as two hundred miles from shore, above the 700 meter isotherm. Because the smallest larvae have been found at the shelf's edge in full strength sea water, 35 parts per thousand, and larger, more developed forms were found closer in, they are growing as they move towards the estuaries.

By the time they're an inch long, their osmoregulatory system is better developed and they can tolerate brackish waters. Juveniles can be thirty to fifty days old by the time they get to the mouth of the estuaries where fresh water rivers meet the sea. With increasing frequency, they meet bulkheaded sea walls instead of the blades of marsh grasses, and the tangled roots of mangroves to hide in.

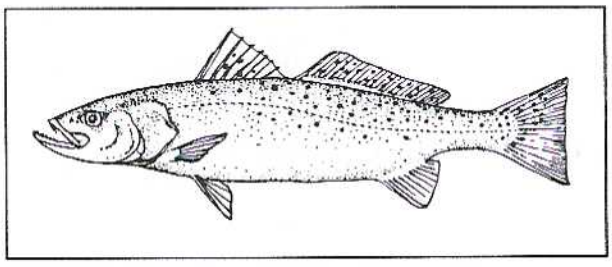
ATLANTIC CROAKER, Micropogon undulatus

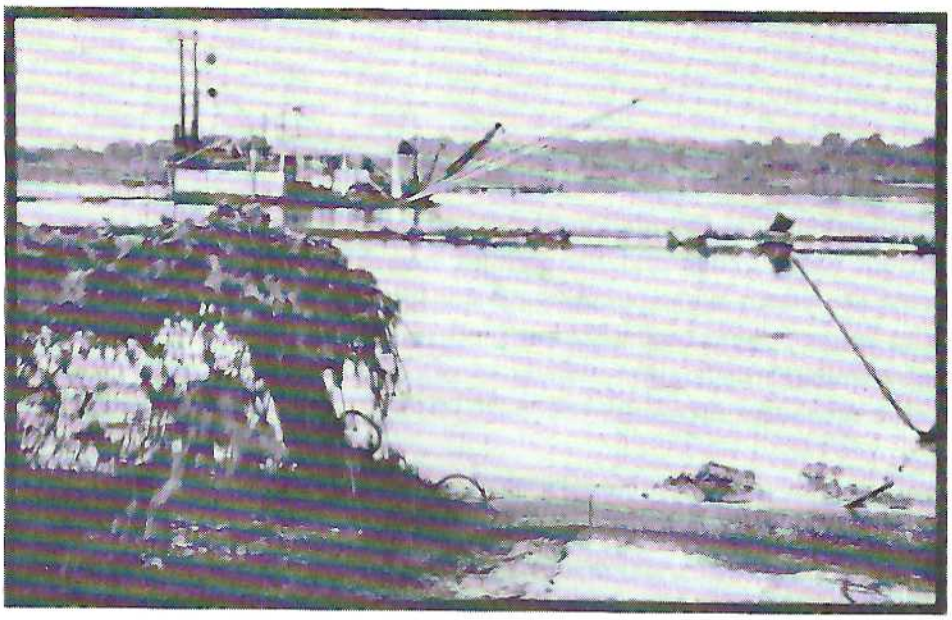
Croakers, although caught by hook and line off piers and in shallow waters, are not considered sport fish. However, they are among the most abundant fish of Florida estuaries. A carnivorous feeder, croakers travel in tight schools and feed on annelid worms, smaller fish and crustaceans, including small species of shrimps, crabs, amphipods and other small invertebrates. Shrimpers catch croakers and spots (Leiostomus xanthurus) by the heaping tons, and gill netters circle them with their nets and load their boats. No one has yet argued that there is a shortage of croakers.

Most are thought to spawn at two years of age, although some may mature only after one year. Adults engage in extensive migrations as they leave the estuaries in late summer and fall to spawn off shore. After spawning, the fish does not return to the estuaries, but later that year, around December and January, the waters are teeming with the clear, wraith-like larvae that move into the marshlands to grow into next year's croakers.

SPOTTED SEA TROUT, Cynoscion nebulosus:

Speckled trout range from Cape Cod to Mexico although they are rarely found north of Chesapeake Bay. Populations are not continuous throughout the range. A fish of warm, shallow waters, speckled trout occur in bays and estuaries rather than along open, exposed shorelines. Adults are aggressive predators, snapping down fish, crustacean and squid. They have been known to take a mullet of nearly half their own weight, and are often found with their guts crammed with large shrimp and menhaden. Adults spawn in shallow grass beds and the juveniles remain there, feeding on grass shrimp, amphipods and other small crustaceans while growing. Most fish mature at two years, although growth is slower in North Florida than along the southern coast. In the north local populations spawn between two and four years of age. Females grow faster than males and outnumber them in population. A single female may release up to 560,000 eggs. In Georgia, spawning occurs in April through August, with peak activity in May.





Hydraulic dredging operations digging channels often turns the water column into a nightmare of siltation, and suspends heavy metals. It can change the bottom substrate into fluid muddy substrates that are unsuitable for fish to live.

It appears to be a consistent pattern. First come the draglines and dredges ripping up the swamps and wetlands, then comes the deluge of people moving down from the North, and with them comes a deluge of ordinances and laws. Lake Worth was dredged into a matrix of canals, and fishing with nets is prohibited there.

According to DNR, by 1971 43% of Gulf Coast estuaries were significantly polluted. Today over 50% show elevated levels of toxic metals and 30% have problems with eutrophication and algae blooms. By 1976, 150-200 square miles of marsh, grassbeds and tidal bottoms -- critical nursery habitat for marine species-- had been destroyed by dredge and fill. All too often, the waterfront property owners who complain about mullet netters are living on top of such destroyed habitat, oblivious to the destruction from which they have benefitted.

A total of 60% of Florida wetlands have been lost since the 1940's. Some 56,000 acres of seagrasses in Florida Bay have died in recent years - rerouting of freshwater from the Everglades for agricultural, urban and flood control purposes is probably a major contributing factor. Ulcerated fish in the St Johns River are also increasingly common. Dredging and beach renourishment projects have repeatedly damaged reefs throughout south Florida by siltation and turbidity. Urban sprawl and its storm water runoff are major pollutants as well. It carries pollutants in the form of pathogens, heavy metals, oils and greases, and has 450 times more suspended solids than treated sewage.

If coastal fisheries are to be restored, all of these problems must be addressed. Net fishing and other fishery issues must be evaluated within a broader environmental context. The problems affecting our marine resources are complex and interrelated. Their solution demands an integrated effort in coastal zone management rather than a sterile fight over which user group will monopolize the declining goodies. While overfishing must be reduced regardless of who does it, simply trotting out the traditional 100 year old scapegoat of net fishermen is and always has been

an inadequate answer to the very real problems we face.

Fisheries alone cannot carry the burden of protecting the wetlands. The Florida Department of Environmental Regulation, the Water Management Districts and the U.S. Army Corps of Engineers issue dredge and fill permits, and allow dock, sea wall and other marine construction without system wide planning or considering carrying capacity. These agencies seldom refuse to issue permits entirely, but tend to compromise and mitigate, requiring the planting of new wetland vegetation which is often unsuccessful, and does not have the productivity of the areas that are destroyed.

VIII. BIOLOGY OF FINFISH

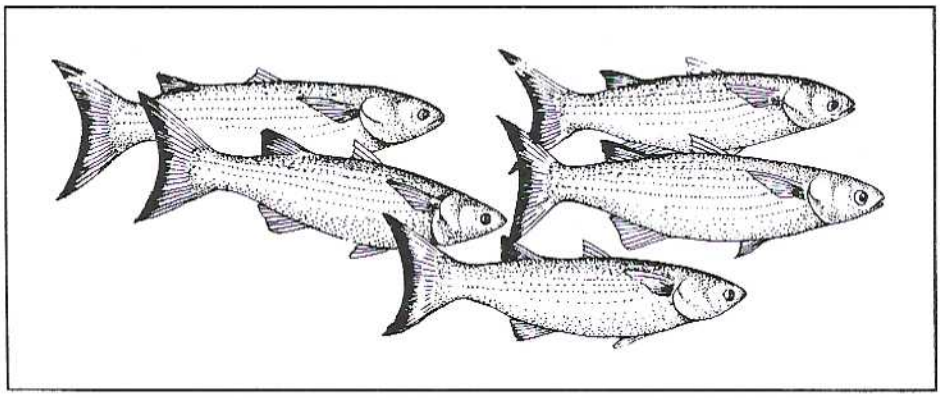
In the shallow bays, estuaries, marsh creeks and canals of Florida live vast quantities of finfish. Mullet browse the muddy bottoms gobbling up tiny plant cells called diatoms. In the crystal clear waters covering the turtle grass beds, a spotted sea trout darts forward and snaps up a pink shrimp. Large black and white striped sheepshead munch on oysters and barnacles beneath someone's pier. Flounders fan out depressions and bury themselves on the sand flats. Croaker, butterfish, black drum, whiting, mackerel and grouper all exist in the inshore waters and outer continental shelf without any help from mankind. When a man fishes his nets, or reels in a fish on a hook and line, he is reaping a harvest he did not sow. These animals exist on the radiant energy of the sun; the tiny plants, the marshes and mangrove swamps form the very basis of the food chain upon which small fish feed. The small fish are in turn eaten by larger fish.

If laws are to be passed, and regulations made and enforced, they should be based upon the biology of the species with hard facts and not mere speculation about what impacts net fishing will or will not have. It is therefore important to have an understanding of the commercial species involved, their life histories and cycles. They are, after all, a renewable resource, depending upon the swampy shallows. When their habitats are altered, drained, ditched, diked and polluted, they diminish, depriving present and future generations of a delicious source of both food and recreation.

A major part of the commercial fishery consists of mullet and croaker. Speckled trout is sought by both sports and commercial fishermen as is king mackerel.

STRIPED MULLET, Mugil cephalus

Striped or black mullet are found world wide in coastal waters of the tropics and subtropics. Most of their lives are spent in bays and inlets, foraging on the bottom, feeding on microscopic algae, plant detritus and small sediment



Tagging studies indicate that trout do not move from bay to bay. Rather than moving off-shore with the advent of cold weather, most fish appear to move into deeper areas of creeks and bottom depressions. Temperatures below 16 degrees C. or above 25 degrees C. trigger these movements to the refuges. These deep-water refuges may often be dredged out finger-fill canals.

Because of their desperate fight and delicious taste, trout are among the most prized fish of sportsmen. But gill netters also seek them out in canals and along the grassy flats. On clear days, when trout can be seen flashing through the turtle grass, fishermen encircle them with their nets. But on windy days, when the water is turbid, fishing for them with nets becomes next to impossible.

In 1970 following complaints from local sportsmen in Choctawhatchee Bay area of North Florida, the Florida DNR established a field station in the area to investigate complaints that commercial net fishing was depleting stocks of speckled trout and disrupting schools of spanish mackerel. The author of the study, however, concluded that the complaints from the sports fishing interests were unfounded. The report stated that:

> "...factors other than fishing pressure have a greater influence on spotted sea trout populations... (and that) ... natural mortality and other losses were 12 times greater than fishing mortality..."

The Marine Fisheries Commission has instituted both bag and size limits on trout. Ten fourteen inch trout to permitted by sportsmen, and commercial netters and hook and liners have three regional quotas amounting to approximately 1.3 million pounds of legal sized trout. They are allowed five hundred pound trips until half the quota is reached, then two hundred pound trips. When the quota is one hundred percent filled, it is closed to commercial catch.

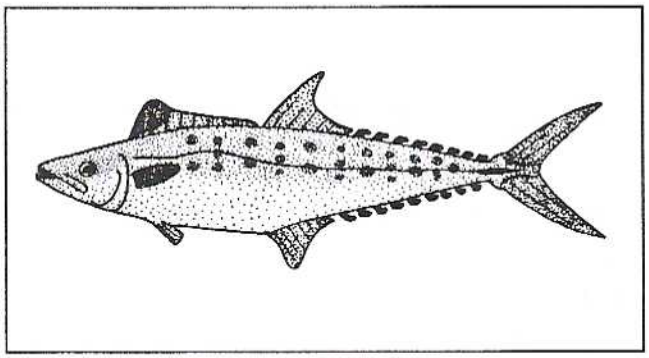
However, there is criticism of the existing policy. Both charter boats and marinas are philosophically opposed to quotas because of its economic impact on their business. Trout often travel in schools. Size limits may be counterproductive because smaller trout frequent the shallow grass flats where they are often caught by sportsmen trying to catch bigger fish. A fisherman may catch forty or fifty in a single day, measure and throw back most of them and never achieve his limit of ten legal sized, fourteen inch trout. Most consider the law to be unsatisfactory because the smaller ones often sink belly up into the depths.

In spite of the fact that they're such ferocious fighters, trout are delicate. Many swallow the hooks, and die in the process of having the hook removed. Their jaws are weak and are easily torn. Handling them removes the mucus from their bodies, making them susceptible to disease. Often trout taken from the wild and held in aquariums quickly develop fungus where they've been handled. One can see the marks of their fingers on the inflamed trout's body, and almost invariably it dies. Studies should be undertaken on whether thrown back specimens survive in the wild. Instituting a smaller size limit, so an angler won't have to sort through so many, may prove more beneficial in the long run.

Commercial fishermen insist that gill netting is the better way to catch trout. Using three inch stretch or larger mesh, undersized trout can freely swim through the bars in the webbing without damage. Recreational fishermen generally disagree and insist that fish get gilled up and suffer net burns. The Florida Department of Natural Resources is studying it.

SPANISH MACKEREL, Scomberomorus maculatus

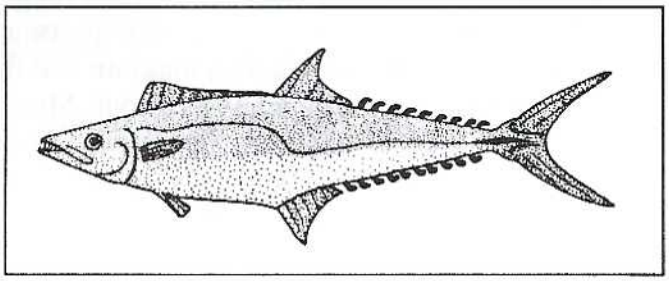
Spanish Mackerel are migratory fish that range from the Gulf of Maine to Brazil. Spawning occurs in the summer months and individuals spawn repeatedly throughout the season after they reach three to five years of age. Fishes up to eight years old have been reported.



The recreational limit on Spanish Mackerel is five twelve inch fish per person per day. Because mackerel are such fast swimming fish with a high metabolism, that requires a large amount of oxygen flowing through their gills, simply removing one from a hook, measuring it and throwing it back often kills them. Consequently both recreational and commercial fishermen feel the size limits are not accomplishing their goal. Likewise grouper and snapper, being reeled up from forty feet or more, experience a fatal expansion of swim bladders. Decreasing pressures cause gases to expand, and the swim bladders inflate like a balloon. Undersized specimens, removed from the hook and thrown back, are often seen floating belly up on the surface.

KING MACKEREL OR KINGFISH, Scomberomorus cavalla

The King Mackerel has long been a major commercial species in Florida and is one of the most sought after of all sports fish. An offshore species, the kingfish also ranges from Maine to Brazil, and is usually taken six to sixteen miles off-shore. Florida is the center of the King Mackerel range in North America. Threadfin herring, jacks, snapper, shrimp and squid are among their major sources of food. Females grow faster than males. Both sexes reach maturity after four years and spawn repeatedly throughout the summer months. Larvae have been found in the eastern Gulf of Mexico and in the Atlantic off the northeast coast of Florida. Specimens up to 13 years of age have been taken.



A recreational fisherman may take two king mackerel, with a minimum length of twelve inches. However the bag limit in the Gulf Atlantic Fishery can be reduced to one if Federal waters close to all harvest. In the Gulf of Mexico, King Mackerel were declared "over fished" by the management councils, but their numbers are recovering. Even though they were never declared over fished in the Atlantic, the drift net fishery for them was eliminated due to a thirty percent catch of other species that were also harvested and sold.

Eating fresh seafood from Florida waters is a way of life in many homes. If nets are banned, this traditional source of food may be destroyed along with a valuable source of affordable protein.

IX. THE FLOW OF FISH

Commercially landed fish find their way to the consumer's table through a matrix of transfers and handling points. There is considerable variation in both fishing vessels and wholesale seafood houses, ranging from a small tunnel or "bird dog" boat and a fish shack on a bayou to large seine boats and modern processing plants with large freezers and cold storage plants.

The wholesale seafood plant is usually, but not always, located on the waterfront. Boats unload their catches and the fish are iced and boxed. The fisherman is paid by the pound for his product and the prices are always variable. During periods of abundance, when fishermen from North Carolina to Louisiana are catching plenty of mullet, croaker, spot, whiting, drum, flounder and other food fishes, prices tend always to be lower. The buyer becomes more selective, looking for better quality as well as more usable sizes. Croakers, for example, must be as large as possible. Sheepshead and drum, on the other hand, have higher market acceptance if they are small, weighing only two to four pounds, instead of the monster fifteen and twenty-five pounders that are sold as fillets instead of panfish.

But during the colder months, especially February and March, fish are in short supply and

the retail markets, restaurants and consumers will take what they can get. To meet their demands, seafood trucks rattle up and down the highways, driving from Florida to the Carolinas, to Alabama and Mississippi, from fish house to fish house, buying whatever fish they can find regardless of the price. In order for the commercial fisherman to meet the demands of the fish house, he must be paid a higher price for his product. So in times of natural scarcity, the price of fish rises. Summertime croakers often appear on the wholesale market for 30 cents a pound wintertime croakers might be sold to a fish market for 48 cents to 60 cents depending on the supply.

The supply and the demand regulate the price. Bad weather, storms, hurricanes, severe cold snaps or flooding of rivers and subsequent drops in salinity in bays and estuaries can make fishing poor. If the wind blows for a number of weeks in succession, fishermen can't get out and catch their product, and fish on the marketplace become scarce. These are some of the natural restrictions that are placed on the commercial fisherman, and the market fluctuates to mirror his times of hardship and periods of abundance.

When fish are not available along one part of the coast for one reason or another, the seafood wholesaler must go elsewhere to procure his fish. Trucks drive up and down the highways of Florida, transporting finfish and other seafood from wholesale fish houses to retail markets across state lines. Often a fish will go rapidly through several handlings, landed at one seafood house in South Florida, shipped to another wholesaler in North Florida or South Georgia, and finally delivered to a retail market hundreds of miles away. Each time a fish is handled the price to the consumer goes up. The further the truck has to travel, the higher the cost of fish. Whiting, croaker, sheepshead and other cheaper type fish find their way into sea food markets. The quantities aren't large, but in the scheme of things, when the supply is restricted through either natural or man imposed condition, the people who depend upon them suffer.

X. CONSUMPTION OF FISH

Eventually the fish arrives at its final destination and is placed in the showcase. Who buys it? In the South there are significant differences in the consumer market for seafood. In a five-year study conducted by the Atlanta Consumer Panel (Purcell & Raunikar, 1968) in Atlanta, Georgia, the annual per-capita consumption of fresh fish by Whites was 2.9 pounds. In sharp contrast, the per capita consumption by Blacks was 8.6 pounds. The per household expenditure by Blacks for fish was approximately $9.25 while the White expanse per household was only a little over a dollar.

Here in Florida there is a similar difference in consumption patterns between the two groups for commercially sold fish. In 1977-1978, the Florida Department of Natural Resource's Marketing Division undertook a study of the market for certain species of fish. The goal of this study was to ascertain the ultimate consumer of certain Florida seafoods. Since significant amounts of Florida seafood are involved in interstate commerce, markets in Alabama and Georgia were surveyed in addition to those in Florida. A representative of the Department of Natural Resources personally interviewed wholesale and retail fish market owners.

A preliminary analysis of the DNR data indicates that almost 60% of the mullet and croaker landed is consumed by Blacks. This finding is highly significant in that Blacks comprise

only 13% of the Florida population. Clearly Blacks are among the major consumer of Florida food-finfish which are captured in gill nets by commercial fishermen. The average consumption per person of mullet and croaker is calculated to be approximately 14.4 pounds per year for blacks and only 1.7 pounds per year per white Florida resident. This represents an average consumption by Blacks of almost 10,000 tons of mullet and croaker per year. Traditionally these species have been the least expensive of all seafood products, selling for substantially less than the cheapest cuts of meat and poultry. They have therefore provided an easily accessible, inexpensive and highly nutritious source of animal protein.

These species appear on the market primarily through net fishing operations. If net fishing is further restricted in Florida, the inevitable result will be an increased scarcity and a rise in the price of available fish.

For example, back in the 70's approximately five thousand pounds a week of croaker were being caught in Pensacola by commercial fishermen netting in canals. They were wholesaled in Orlando at 30 cents a pound. However, as residential development proceeded, conflicts arose. Trespassing charges were filed against fishermen; they were arrested and fishing operations stopped. The flow of croakers into the Orlando markets was halted. A year after the canals were closed, the same sized croakers were being trucked out of North Carolina into Panacea and then sold to the West Church Street markets for 48 cents per pound. The price to the consumer went up by a third.

Both the DNR market-survey data and the Atlanta consumer study clearly indicate that Blacks eat considerably more fresh fish than Whites. Whites, on the other hand, consume much

more of the expensive seafood items such as shellfish. For instance, in the Atlanta study, whites consumed four times more shrimp per capita, four times more scallops and seven times more oysters than Blacks. Field observations of the Florida retail market conducted during this study showed this to be true of Florida markets as well. These observations also indicated that the more expensive types of fish such as grouper and snapper go almost solely to white markets.

In addition to the long standing role of net caught finfish as a cheap source of protein, they have in recent years enjoyed a boom as health conscious middle class consumers have increased their consumption of sea food and cut back on red meat.

As a case in point, let us take an informal look at the retail markets in the State's central city, Orlando, which sits squarely between the Atlantic and Gulf Coasts and receives seafood from both sides. As one seafood hauler said, it is "a seafood eating town." One finds fish markets in every neighborhood, affluent, middle income and the poverty-ridden inner-city areas.

Seafood trucks arrive from all over the state loaded with every imaginable kind of seafood. Each truck has its own particular route. They leave their seafood house loaded with boxes of fresh mullet, croaker, spot, drum, mackerel and sheepshead. In season they have stacks of select oysters in muddy burlap bags. There are wooden fish boxes with shrimp, cans of scallops and crab meat, packages of frozen grouper fillets, red snapper, pompano and flounder. They sell flounder fillet from Canada, gray and speckled trout, and sea bass, among other species.

The trucker knows his market well. He knows which stores will move the prime grouper fillet and red snapper, who can afford the crab meat at an average of $8.00 per pound and who will purchase the rough finfish. There will be no croaker off loaded in the affluent sections of town where the retailers arrange their showcases and freezers in artistic displays of imported Dungunese crabs, big jumbo shrimp and glistening snappers. Few mullet are sold in stores where red lobsters rest on a bed of ice among attractive green parsley, or where the cherrystone clams are set off by the bushel.

But when the trucker drives into the poorer parts of Orlando, and to the Black neighborhoods, the more expensive items are left on the truck. When the truck pulls into West Church Street and Parramore Street, the rough finfish are dragged forward and unloaded. There are more seafood markets concentrated in that fourteen block area than any other part of town. The truck winds down alleyways and narrow crowded streets, and pulls in behind the little stores. As the cooling units clatter noisily, melting ice drips down on the bleak cracked concrete, and the owner climbs in and looks over the selection. Here the golden croakers are pulled off the truck, along with mullet, sheepshead, spot and drum.

Money flows like water, as box after box is hauled off and dragged inside to the cooler - five hundred pounds of large mullet from Pensacola, two hundred pounds of medium size mullet from Panacea, a hundred Alabama sheepshead and a hundred pounds of white trout netted on the east coast. The owner happily writes a check for several hundred dollars.

Even while the truck is being unloaded, customers begin to wander in and look over the show cases. Some will buy the fresh mullet for the evening's meal, but other eager customers are after the "panfish," the spot, croaker and freshwater bream from Lake Okeechobee to cook for breakfast along with grits and eggs. Eating fish is a cultural tradition and heritage among many people. Often the truck visited retail seafood market/cafes where customers would come

Eating seafood is taken for granted by millions of restaurant customers. But will there still be fresh Florida seafood available in the future?

in and select a particular fish from the showcase. They would watch it being scaled, drawn, filiated and then cooked on a back stove. These little restaurants were social centers where people came together. Social centers built around those rough finfish caught in nets.

Friday is fish day all over the South, and Orlando is no exception. Starting around three o'clock, when people start getting off from work, the crowds begin to arrive. The fruit pickers and migrant laborers come in from the orange groves. The factor worker and city employees on their way home stop off to buy fish, and the housewife planning the evening meal. Soon the parking lots of these little retail markets are jammed with cars, and by late afternoon the vehicles are parked all up and down the streets. The stores are mobbed with people. Sometimes they have to wait in line thirty minutes to get their turn at the counter.

Generally the quality of the seafood products delivered to these markets is good. Because the turn-over is so rapid, the fish can be caught one day, iced, boxed and delivered to the seafood store the next. For example, one seafood truck from Panacea, after making its round of deliveries in Orlando and Titusville, stopped at a fish house in Oak Hill on the east coast around 10 P.M. and picked up 1,300 pounds of speckled trout that had just been caught by a gill netter. All

thirteen boxes were loaded, and the truck departed to Chiefland where it rendezvoused with another tractor-trailer from the same Panacea seafood wholesaler. Nine hundred pounds of trout were unloaded at 2 A.M. and the second truck continued its route to Sarasota and Fort Myers. The remaining four hundred pounds were hauled back to Panacea. But at 7:30 the next morning, workers at the Panacea seafood house had loaded three boxes of those trout onto a smaller truck belonging to a retail market in Tallahassee, where we learned that all the trout were purchased by retail customers before closing.

It is clear that net restrictions will penalize many Black people in the poorer parts of town. The more expensive snapper, grouper and larger ground fish are caught by hook and line. Net restrictions will not stop the supply of these offshore fish, and neither will the supplies of oysters or crabs be reduced. They will continue to be available in the more expensive markets to the more affluent. However, there will be a great economic impact by the reduced availability of estuarine, shallow water species eaten primarily by Blacks.

The relative merits of sports fishing and commercial fishing should be considered in light of our growing energy problems. A commercial fisherman's gasoline is perhaps more efficiently used - in terms of our society as a whole - than the sport fisherman's gasoline.

XI. CONCLUSIONS AND RECOMMENDATIONS

1.a In Florida there is no evidence that net fishing restrictions serve to conserve fish populations, despite the fact that sections of the coastline have been closed to net fishing for years.

b. A substantial part of the food fish handled by commercial net operations in Florida does not consist of species sought by sports fishermen.

c. A substantial part of the food fish landed by commercial net operations in Florida, particularly for mullet and croaker, provide a needed source of inexpensive animal protein.

d. Net restrictions that reduce the harvest of these inexpensive species will have a disproportionatly greater impact on black and other minority consumers.

e. Net restrictions that will remove any species of food finfish, including mackerel and trout, from the commercial market will prevent many non-fishermen consumers from obtaining these fish, regardless of their socio-economic status or race.

2. In view of relative fishing pressures, there is an overwhelming need for more information on the impact of sport fishing activities on stocks of the various species sought. Comprehensive sport landing data should be available to accurate compare impacts of both user groups. In addition, biological information on the effects of nets on the fish populations needs to be compiled.

3. Legislative efforts to conserve and mange marine resources should be based upon the biological requirements of the species rather than upon the simple exclusion of one user group over another.

4. Immediately programs should be undertaken to restore degraded habitats, including removing causeways in favor of bridging estuaries whenever possible to increase water flow. Mosquito impoundments that diked wetlands should be opened, and vigorous programs to reduce urban storm water runoff should be undertaken. Engineering solutions should be used to create water flow in stagnant dead end canals, and whenever possible, wetland vegetation should be planted in favor of concrete seawalls.

5. DNR should continue to expand research programs aimed at establishing the relationship between the amount of recruitment of juvenile fish to the amount of wetland acreage.

6. Methods of restricting marine electronics should be explored, to reduce the ease of locating and catching fish, for both commercial and sports fishing, at the same time retaining necessary navigational and safety features.

7. Non-removable identification tags should be affixed along the entire length of cork and lead lines of gill nets so that the owners of lost or abandoned nets can be located.

8. Regional panels should be created to pool the knowledge of commercial and sports fishermen, scientists, tropical fish collectors, spongers, spear fishermen, recreational and commercial divers and other people who use and benefit from the water,with a common goal of solving Florida's marine environmental problems, and assuring a continued supply of fish.

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ABOUT THE AUTHOR

Jack Rudloe was born in New York in 1943 and moved to the Florida panhandle in 1957 and attended Florida State University. In 1964 he founded the Gulf Specimen Marine Laboratory, an environmental education and research support center in Panacea, Florida that provides marine life to schools and research laboratories throughout the nation.

He participated in the International Indian Ocean Expedition to Madagascar, trips of the New York Zoological Society to Surinam to collect giant toadfish, and led deep sea trawling trips in the Gulf of Mexico to bring back giant sea roaches. Mr. Rudloe has conducted sea turtle research in conjunction with the Caribbean Conservation Corporation and the National Marine Fisheries Service. He sits on an ad hoc advisory panel for the National Cancer Institute's Natural Products Division, reviewing proposals on drugs from the sea, and has been active in fisheries development projects. In 1972 he founded the rock shrimp and slipper lobster fishery in the Northern Gulf and recently traveled to Malaysia and Thailand to collect information to start a domestic fishery for cannonball jellyfish.

His articles have appeared in Audubon, National Geographic, Natural History, Sports Illustrated, Smithsonian, Boating, and other magazines. His books include, "The Sea Brings Forth,"; "The Erotic Ocean"; "The Living Dock"; "Time of the Turtle"; and "The Wilderness Coast." He has frequently appeared on the NBC Today Show, Good Morning America, and National Public Radio. His conservation efforts to save Florida wetlands and his writing career have been the subject of a Walt Disney television program and a Florida Public Television documentary.

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PHOTO CREDITS

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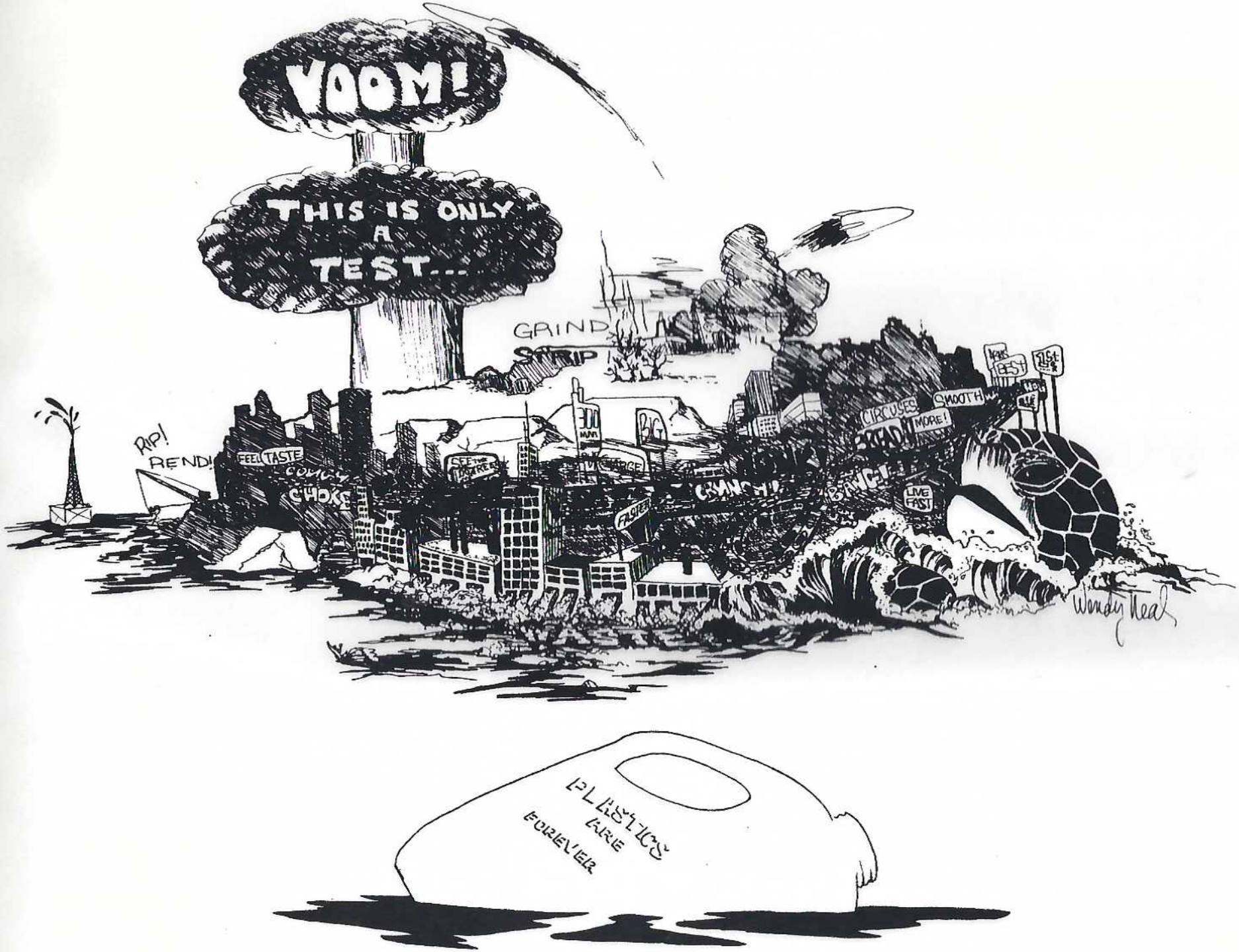
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