

THE DEPLETION OF WORLD FISHERIES

HONORS THESIS

Presented to the Honors Committee of

Texas State University-San Marcos

In Partial Fulfillment of

the Requirements

For Graduation in the University Honors Program

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San Marcos, Texas

May 2008

The Depletion of World Fisheries

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Fishery Depletion and Fishery Management Agencies

The continued overfishing of world fisheries is a serious problem that already has and will continue to affect millions more people in the coming decades. The

problem can be attributed to a number of factors in recent years. According to some, the escalating killing power of new fishing technologies and the influence of international corporations making vast amounts of revenue is reason enough to be worried (Montaigne). Consumers, governments, and fishery management agencies are currently not doing enough to prevent the decimation of most world fisheries in the coming years.

Fishery management agencies in some cases have allowed too many licenses to be issued, making it difficult to maintain sustainable fish populations. These fishery management agencies mean well, but do not receive enough funding from their state governments to patrol for illegal fishing. “We pass regulations with no way of enforcing them.”, said a Program Specialist from Coastal Fisheries Management, a division of Texas Parks and Wildlife. What is true in the United States is sometimes even more prevalent in other, less developed countries.

In the documentary *Where's the Catch?*, Villaine Napoto, a commander of the Fiji Navy says, “The battle that we fight, if I use that term, is a battle against multinational companies. They have a lot of resources. They’ve got the best lawyers. They’ve got a lot of money. You have to have the support-mechanism from government to support us, the people that go to the front line and do these jobs.” Unfortunately, many island nations cannot afford the funding to support these programs. Due to a lack of funding, the patrol boats cannot afford fuel and sit anchored in the harbor. This is a common story told to scientists and researchers world wide. However, not all governments do everything in their power to help control and stabilize fisheries. Many countries are attracted to the prospect of issuing

licenses to foreign operators because of the highly sought after foreign revenue. In *Where's the Catch*, Abraham Baenesia, Director of the Solomon Islands Development Trust said, "Politicians that are decision-makers are involved in corruption, so negotiations about fishing industry and other industries normally end up in under-table dealings, which is a corruptive practice."

Oceans cover 70% of the Earth's surface. Because of that fact, it is not surprising that some scientists and fishermen used to think that humans would never cause major damage to the world fisheries. Fishery production throughout the world has been on a significant rise in the past century. In 1950, the world fishery production was 19 million metric tons, compared to 140 million tons in 2004. Production passed the century mark in 1989 and has continued strong ever since. These numbers come from fish that are captured both in the wild (Marine Capture) and fish that are raised in a farm (Aquaculture). (Turning the Tide) Marine capture production peaked at approximately 80 million tons in the mid 1980's and has continued to stay at that level today. Table 1 below shows Marine Capture and Aquaculture production numbers from 2000 to 2004.

World Fisheries and aquaculture production and utilization – Table 1					
	2000	2001	2002	2003	2004
Production (million tons)					

<u>Inland</u>					
Capture	8.8	8.9	8.8	9	9.2
Aquaculture	21.2	22.5	23.9	25.4	27.2
Total inland	30	31.4	32.7	34.4	36.4
<u>Marine</u>					
Capture	86.8	84.2	84.5	81.5	85.8
Aquaculture	14.3	15.4	16.5	17.3	18.3
Total Marine	101.1	99.6	101	98.8	104.1
Total Capture	95.6	93.1	93.3	90.5	95
Total Aquaculture	35.5	37.9	40.4	42.7	45.5
Total World Fisheries	131.1	131.1	133.7	133.2	140.5
<u>Utilization</u>					
Human Consumption	96.9	99.7	100.2	102.7	105.6
Non-Food uses	34.2	31.3	33.5	30.5	34.8
Human Population (billions)	6.1	6.1	6.2	6.3	6.4
Per capita food fish supply (kg)	16	16.2	16.1	16.3	16.6
Note: Excluding aquatic plants					
Source: FAO					

While it may seem that this Marine Capture production level has allowed the natural fishery population to replenish itself because of the steady catch rate, this is a deceiving statistic. Marine capture fishermen have used a plethora amount of new

fishing techniques and technologies that allow them to keep an edge on the fish every year. More technology is being used every year than any previous year in history, just to maintain the status quo of the fish catch. The impact of this technology on the fisheries is severely damaging and at the current rate we are catching fish, is unsustainable. Smaller and smaller fish are harvested from the sea and fishery populations diminish each season (Turning the Tide). In an interview, Nelson Arnold, a fisherman for the multi-national corporation Tri Marine says, “The size of the fish is getting smaller. The size of fish that have been brought in by purse-seiners look like its being less [sic] and took more days to catch.”

Unless something drastically changes in the immediate future, many fisheries will soon be at levels that they might not be able to fully recover from. Consumers in developed nations continue to purchase Bluefin tuna, Red Snapper, and other overfished species at trendy sushi bars or seafood restaurants, helping fuel the multi-billion dollar fishing industry. Current fish consumption statistics show that instead of reversing the fishery depletion problem, humans are harvesting and consuming more and more fish every year. In the documentary *Where's the Catch?*, Atera Ari, a fisherman from the island nation of Kiribati said, “I have always taken my children with me to sea. I brought them so they would get used to the ocean and would learn to love its smell. It used to be very easy. It would take two hours to fish. But these days you sometimes spend the whole day and you will catch only five fish.” Per capita consumption across the world has increased from 10.5 kilograms to 16.5 kilograms in the past thirty years. According to the U.S. Census Bureau, there is a little more than approximately 6.67 billion people on earth right now, as of April

24th, 2008. If you go back just thirty years to 1978, the world population was 4.29 billion. So, in the past thirty years the earth has fed an extra 2.38 billion people (U.S. Census Bureau). Combine that with the previous statistic that people are eating more fish now than they did thirty years ago and this amounts to a problem of over-harvesting and possible collapse of the world's major fisheries. Table 2 below shows the top ten exporting and importing countries of fishery products. The percentage growth rate average is growing for most countries, a trend that could be correlated to the same rate that world fisheries are being depleted.

Top ten exporters and importers of fish and fishery products – Table 2			
	1994	2004	Annual Percentage Rate
Exporters			
China	2,320	6,637	11.1

Norway	2,718	4,132	4.3
Thailand	4,190	4,034	-0.4
United States of America	3,230	3,851	1.8
Denmark	2,359	3,566	4.2
Canada	2,182	3,487	4.8
Spain	1,021	2,565	9.6
Chile	1,304	2,484	6.7
Netherlands	1,346	2,452	5.5
Vietnam	484	2,403	17.4
Top Ten Subtotal	21,243	35,611	5.3
Rest of the World Total	26,267	35,897	3.2
World Total	47,511	71,508	4.2
Importers			
Japan	16,140	14,560	-1
United States of America	7,043	11,967	5.4
Spain	2,639	5,222	7.1
France	2,797	4,176	4.1
Italy	2,257	3,904	5.6
China	856	3,126	13.8
United Kingdom	1,880	2,812	4.1
Germany	2,316	2,805	1.9
Denmark	1,415	2,286	4.9
Republic of Korea	718	2,233	12
Top Ten Subtotal	38,063	53,090	3.4
Rest of the World Total	13,104	22,202	5.4
World Total	51,167	75,293	3.9
Note: APR refers to the average annual percentage growth rate from 1994-2004.			
Source: FAO			

The FAO (Food and Agricultural Organization of the United Nations) categorizes the area of sea commonly referred to as “The Gulf of Mexico” as a part of the larger “Western Central Atlantic” (WCA), labeled as FAO Statistical Area 31.

This WCA area is larger than just the Gulf of Mexico; it stretches from the middle of the U.S. East coast down to Northern Brazil. With such a large area of sea, one should expect a wide range of diverse sea life and indeed the WCA has at least 1172 species of invertebrates, fish and tetrapods. Out of the 1172 species, 987 are fish species and 23% of fish species in the WCA are classified as “rare or endemic to the region” (FAO). Fishing in this region has fluctuated in the past few years, but since 1950, harvesting of marine capture fish has steadily and greatly increased. The Western Central Atlantic region reported just 500,000 tons of fish catch in 1950. Current catches are putting the amount of fish harvested each year at between 1.6 and 1.7 million tons. The WCA had two major production peaks over the past 50 years: 2.5 million tons in 1984 and approximately 2.0 million tons in 1994 (FAO).

One of the main problems for fishery management agencies is that it is difficult to determine the population of different species across the world. In a review of the Western Central Atlantic region the FAO discovered surprising facts about the lack of information that is available about fisheries in the WCA:

In its 2002 report to Congress (NMFS, 2002), the National Marine Fisheries Service of the United States (NMFS) recorded that of the 57 stocks falling under the jurisdiction of the Gulf of Mexico Fisheries Management Council (GMFMC), the status of 46 (81 percent) was either unknown or undefined. Of the 179 stocks falling under the jurisdiction of the United States Caribbean Fisheries Management Council (CFMC), the status of 175 (98 percent) was unknown or undefined.

This incomplete information hinders governments across the world from taking strong legislative action because they cannot be expected to pass laws concerning fishery rehabilitation on such deficient evidence. More than new laws

and restrictions, it seems that many fishery management agencies need to be allocated more money or more cooperation in the form of manpower from other government agencies. “If you look at the Gulf of Mexico, they have very few federal agents that are out there and the coast guard at one time enforced a lot of marine laws, but they’ve been called of a lot of that and been put on homeland security.”, said an official from Coastal Fisheries Management.

Both developed and developing countries alike need to take steps towards implementing systems that improve their existing fishery monitoring programs. Each fishery and their species are unique and as such, each monitoring program should be customized to get the most accurate data possible from the fishery. Unfortunately, such customization will prove to be too expensive for a lot of countries around the world. It is important to remember that many fisheries are shared by different countries within the same region. Two or more countries could join together to start a data collection program that will benefit the entire region, while taking own only partial investment responsibility. Kevern Cochrane, from the FAO: Fishery Resources Division agrees that countries should focus on new data collection projects, but should also focus on fishery management techniques that do not depend so heavily on the change in population levels, but rather just simple strategies that could improve the over-all habitat of the region and the local fisheries.

Management measures that, properly applied, can be relatively robust to uncertainty include strict management of fishing effort and fishing capacity, greater use of closed seasons and closed areas (including Marine Protected Areas, MPAs), and suitable gear restrictions aimed at minimizing bycatch of undesired species or size groups and other undesired ecosystem impacts. Fishing

should also be prevented where species pass through particularly vulnerable life history stages, such as dense spawning aggregations. No single management measure or approach will adequately address all the conservation and utilization objectives of fisheries, and an effective management system will usually consist of a suite of complementary management measures that, typically, would include a combination of closed areas and/or seasons, gear and vessel restrictions, an appropriate limited entry system, and input (effort) or output (catch) controls. Adequate enforcement of these measures is, of course, essential.

One of the most important aspects of Cochrane's plan is spelled out in the last sentence; individual countries need to take care of their responsibility of their own fisheries, as well as the international fishery management agencies they might be a part of and enforce the rules that they lay out. A country's parliament or congress could pass as many fishery protection laws as they want, but it will take fiscal appropriations and a lot of man-hours to ensure that these laws are enforced. In the documentary *Where's the Catch*, Don Aldous, a Canadian Fisheries consultant says,

"It's obviously not sustainable to have a large fleet of super-seiners continuing to fish in the Western Pacific. No, it's not sustainable. What is controllable is to have a small fleet that involves some super-seiners fishing under strict licensing guidelines and strict reporting practices. That may be sustainable. In order to really improve the situation here in the Pacific, the Pacific Island Nations have got to do a couple of things. One is to learn from other commissions. Another is that have to continue to work together. I've spent twelve frustrating years at ICAAT meetings and I haven't seen a great deal of progress over those twelve years in addressing the major issues with regard to conservation of the fish stocks and it's mainly because of the difficult stand that some members take to protect their own industry."

“Nobody—or everybody—owns the fish.”

– Susan Iudicello

Fishing Technology

Recent developments in the area of technology have allowed the fishing power of each fisherman and their fishing vessel to dramatically increase. While, a lot of the major damage is being done by million dollar fishing fleets owned by billion dollar multi-national companies, even small-scale local fishermen from the countries of Fiji, Papua New Guinea, Tonga, and similar Pacific Island countries are using technology to not only increase the amount of fish they catch, but where it is that they catch it. Outboard motors on small vessels have allowed these fishermen to harvest fisheries that were previously available only to small, local communities. The major fishing fleets on the other hand are using state of the art technology that allows them to deep-sea fish in the middle of the ocean, which is a natural refuge for many fisheries. Global Positioning Systems and active sonar echo sounders have radically changed the ability of fishermen to guarantee successfully locating major fisheries in the deep-sea. These types of technologies are only one half of the recent devastating technologies, as mono-filament nets have increased the ability of fishermen to actually catch the fish and bring them on board to their holds. (Turning the Tide) The total number of fishing vessels in the world has remained relatively stable in the past twenty years, but these new technologies are one of the major reasons for dwindling fishery populations.

New and improved technology has major affects on fishing fleets revenues. For the same amount of work, many new technologies allow fishermen to catch more fish. With that trend continuing, total revenues have no choice but to increase drastically. As more technologies become more available to smaller fleets or fishing communities, such as the outboard motors in some small Southeast Asian countries,

production levels will peak and then start to decrease until all profits have been disperse. (Iudicello)

Fishermen don't only use new technology on their ships; they also use it high above them, in the sky. Fishing corporations will hire small planes to fly high above the ocean to spot where the fish are. The airplanes then radio the location back to the boats that go in for the catch. In the article *Still Water*, Eduardo Domaniewicz, a pilot that has worked spotting tuna in the Mediterranean said, "There is no way for the fish to escape – everything is high-tech. I am an environmentalist, and I couldn't stand the way they [French and Italian purse-seiners] fished with no care for the quotas. I saw these people taking everything. They catch whatever they want. They just see money on the sea. They don't think what will be there in ten years." In *Still Waters*, Alfonso Consiglio, owner of a fleet of purse-seiners says, "The price is cheap because more and more tuna are being caught. My only weapon is to catch more fish. It's a vicious circle. If I catch my quota of a thousand tuna, I can't live because the price is very cheap. I want to respect the quota, but I can't because I need to live. If boats of all countries respect the rules, tuna will not be finished. If only few countries respect the rules, and others don't respect the rules, the fisherman who respects rules is finished."

Government Subsidies

Not only are new technologies affecting the current depletion of fisheries, but government interference has also been a major part in creating some of these problems. The past few decades have seen governments playing two conflicting characters in the fishing industry and marine conservation projects. Working with the fishing industry, governments seek ways to find stable food supplies, increase jobs for their people, increase overall economic development, and increase exports, while decreasing imports. The government helps all of these causes by providing subsidies to fishing fleets and corporations.

When it comes to protecting natural resources and environmentalism, governments around the world help various environmental management agencies by providing them with funding or subsidies. On the other hand, worldwide, governments subsidize fishing fleets with \$30 to \$34 billion dollars every year. Up to \$20 billion of those dollars are given to fleets that could survive on their own, without government aid. (Oceana) Such vast sums of money being divvied up by the government means more people want a share. This helps spawn more and more boats out on the ocean, catching less and less fish. Governments then contradict themselves by giving subsidized millions to fishery management agencies, as well as oceanic conservation programs. These pro-conservation subsidies are in direct conflict with what the subsidies for the fishing industry are trying to accomplish. The subsidies for the fishing industry distort the free market and help to perpetuate other problems in the fishing industry. Government subsidies allow fishing fleets to update their equipment, increase their fishing power and reduce costs such as fuel. With the amount of fishing power each vessel has, and the number of vessels on the ocean

today, we cannot maintain the same level of fish catch and sustain natural fisheries. (Oceana) Japan leads the world in total fishing subsidies with over \$5 billion in the year 2000. The United States is in 7th place, with total subsidies totaling just over \$1.2 billion, as shown in Table 3.

Top ten Fish Industry Subsidizing Countries – Table 3

(2000) Rank	Country	Total Subsidies (US \$ '000)
1	Japan	5,046,014
2	India	4,497,718
3	China Main	2,676,449
4	Brazil	2,050,218
5	Russian Fed.	1,686,102
6	Denmark	1,275,479
7	USA	1,242,710
8	Philippines	782,772
9	Gabon	750,186
10	Canada	725,598
Source: Oceana – Fisheries Subsidies		

“The past ten years I have noticed a big decline in fish catches. I spend more time fishing now than I ever did before. Our governments must work together to protect our resources. As individuals, it is impossible”

– Kolej Kios, Marshall Islands

Countries that have a very low per capita GDP, or that are currently experiencing starvation and poverty in their population might not think that fishery conservation should be a high priority on their list of national problems. Unfortunately, if fisheries continue down the tumultuous path they are on right now, those struggling countries may be in for even more trouble. Nutritionally, fish is one of the healthiest sources of protein available. Abraham Baenesia, Director of the Solomon Islands Development Trust said, “If you go to any of the markets here, especially the fish markets, and what you will find is people catching tuna every day and selling it at the market. People buy tuna to take home, which is part of their daily diet for protein.” Besides protein, fish are also a source of micronutrients, minerals, and essential fatty acids. (Turning the Tide) In industrialized countries, fish represent eight percent of all animal protein consumed. That is a substantial number, but for the 2.6 billion people living in developing countries, fish is twenty percent of all animal protein consumed. The countries of Bangladesh, Indonesia, Cambodia, and Sri Lanka consume the most, with a staggering fifty percent of all animal protein consumed coming from fish. Not only do fisheries provide food and nutrition for these countries, but they also provide steady employment for millions of people. If these fisheries continue to be exploited, not only will food prices be raised, but there will be many more people out of work.

Government subsidies also don't only help legal exploitation of fish, but also help in the illegal exploitation of fish. These destructive fishing practices are called IUU Fishing. It stands for Illegal, Unreported, and Unregulated fishing. IUU fishing is sometimes commonly referred to as “Pirate Fishing”. Pirate fishing is estimated to

be approximately \$4 to \$9 billion market. (Oceana – Pirates) Illegal fishing is where vessels operate in violation of a fishery's rules. Unreported or Underreported fishing is fishing that does not have the catch properly reported to the vessel's national organization. Unregulated fishing is where a vessel harvests a fishery that is not within its country's fishing area. Various government subsidies have caused and helped perpetuate IUU fishing. For the past 10 years, the European Union has provided Bluefin Tuna fishing fleets subsidies for modernization of their fishing vessels. These modernizations have allowed fishermen to catch 40 percent more Bluefin tuna than the quota set by the International Commission for the Conservation of Atlantic Tunas. It is not only the European Union, as the Russian government gives more than \$1 billion in subsidies to its fishing fleet annually. The Russian subsidies are mainly for fuel and modernization of fleets. These fuel subsidies allow Russian fishermen to venture into Norwegian fisheries and illegally harvest Barents Sea cod. The Norwegian Coast Guard estimates that between 100 and 166,000 tons of Barents Sea cod is illegally harvested by Russian fishermen every year. (Oceana – Pirates)

By focusing efforts and money on the extinguishing the problems listed above, we are still only fixing part of the problem. The fisheries that have been classified as exploited could eventually become Marine Protected Areas (MPA). Fisheries that are only partially exploited need to establish data monitoring programs that will ensure the healthy habitat and population for that fishery. Countries and their respective agencies need to do everything they can to enforce all fishery regulations. A good start for industrialized country's governments is to reduce

fishing subsidies, and start programs to find a more sustainable industry that could help supplement the food supply, as well as jobs. As for developing countries, it is important that they realize the troubles that are arising and understand what they must do to battle these problems. Now is the time for an international coalition to take a pro-active approach to the depletion of world fish resources, with the ultimate goal of a growing economic market that is fair to all people and a sustainable world fishery population that avoids the pollution, over-fishing, illegal fishing, and other various degraders that plague our oceans today. Local fishermen are more than aware of the reasons why their fish catch has been dwindling. They can see the foreign vessels on the horizon when they go out on the ocean. In *Where's the Catch?*, Kolej Kios, a fisherman from the Marshall Islands said, "I want to share my concerns with other fishermen. It is really difficult to fish these days because of the foreign vessels in our waters."

When it comes to the economics of fisheries, fishermen and countries with large fishing industries are slowly coming to the realization that fishery resources are not free at all. It was a common thought among fishermen and past government officials that if what they took did not really effect what was left over for everybody else, than that resource was "free". As fishermen and scientists are finding out, fish are not a "free" resource, but a scarce resource.

As with all scarce resources, these resources must be managed to determine who gets them and the market determines at which price. When a resource such as an open fishery is open to anybody for free, unrestricted access, the economic idea of contractual exchange cannot occur. Fish and other similar types of resources are

known in economics as captures resources. With the ocean historically being open access to anybody that has the means to fish, some humans have abused that privilege in areas that are traditionally an international commons. This common area of natural resources that are captured is known in scholarly circles as common pool resources (Iudicello).

The United Nations Law of the Sea recognizes that each coastal country has a 200 mile Exclusive Economic Zone (EEZ) that they are obliged to regulate activity, but not to prohibit foreign vessels unless the national capacity is capable of fishing at the optimum sustainable yield. There are other zones that are defined by the Law of the Sea also. The coastal area closest to the countries land is known as Internal waters. Internal waters are generally considered to be 2 miles from the coast. In internal waters, each nation is free to use all resources and foreign vessels have no rite of passage. The next zone is Territorial waters. Territorial waters are 12 miles from where Internal waters end. Inside the zone of Territorial waters is nearly exactly the same as Internal waters, except that foreign vessels are now given the rite of “innocent passage”. Another 12 miles further, the zone becomes the Contiguous zone in which the nation still has the same resource and use rights, but its authority on foreign vessels dramatically decreases. In the contiguous zone, a country is allowed to only enforce major regulations, such as drug smuggling or illegal immigration. The Exclusive Economic Zone includes the Territorial and Contiguous as a part of the EEZ (UNCLOS). The UN’s Convention on Law of the Sea was a replacement for a part of the idea of the “freedom of the seas” and the “cannon shot rule”. The latter idea was created by Dutch Jurist, Cornelius van Bynkershoek. The cannon shot rule

stated that coastal countries have a right to the waters next to their land. To determine how far their right to the water extends into the ocean, it was determined that it should be about as far as a cannon could shoot a cannon ball into the ocean. This was normally about three miles (Akashi).

Past most EEZs and in International Waters, fisheries are a common pool resource because the fish are available on a first come, first served basis. Since the fishermen are provided with an incentive (money per pound) to catch more fish, the fishermen catch as much as they can, because there is no guarantee that the fish will be there tomorrow. It is expected that if one fisherman does not catch the fish, than another will. One of the unexpected cruelties of the law of supply and demand as it relates to fishery depletion is that the more fisheries that are depleted, the more that fishermen will attempt to catch as much fish as possible. With a dwindling number of fish, the price per fish will rise and create even larger incentives for commercial fishermen to harvest as much as possible from the sea. A high yield will only last for a short time, as the population will soon dwindle from the exploitation.

As a unified group, the people of planet Earth must find a way to conserve our world's fisheries. Individual countries can protect small areas close to their coast, but the world fishery of the 4 major Oceans and various Seas should belong to everybody and should not be ruined by a select few. In the book *Battle Against Extinction*, Minckley says, "Conservation must always look ahead because hard-fought gains can be lost instantaneously and permanently by momentary lapses of vigilance." Truer words have never been spoken on the subject of fishery management.

Red Snapper Case Study

It is important for the fishing community to realize which species of fish and which fisheries are being depleted and may be close to extinction and which species and fisheries are healthy and on a currently sustainable course. It might be easy to just lower the amount of tons that each species can be fished, but that could have unforeseen consequences. If fishermen reduced fishing certain fisheries that are at currently healthy and stable populations, they could potentially grow too large and overtake other species habitats or eat other species' food. A major fish species that is currently being over-fished is the Red Snapper. Red snapper populations range from North Carolina to the Southern Florida and stretch from the Gulf of Mexico to Southern Yucatan. The Red Snapper (*Lutjanus campechanus*) has many different fisheries that are in the Western Central Atlantic region that are presently in danger. Currently, there are two main Red Snapper fisheries in the WCA. Those fisheries are the Gulf of Mexico Red Snapper fishery and the South Atlantic Red Snapper fishery. In the South Atlantic, the fishery is managed by the Snapper Grouper Fishery Management Plan, a branch of the South Atlantic Fishery management Council. In the Gulf of Mexico, the fishery is managed by the Gulf of Mexico Fishery Management Council. The Gulf Red Snapper population is currently very low and is being over-fished. The South Atlantic Red Snapper fisheries do not have enough data to say if the population is over-fished, but do admit that the fishermen are over-fishing the stocks. (FishWatch) The National Marine Fisheries Service determines where over-fishing is going on in each species as well as if the species is being over-fished. The wording is confusing (at best) but, the difference is that over-fishing is

occurring when fishermen bring in more fish at a faster pace than the fish can naturally reproduce. A species that is over-fished is when there is statistical evidence that the populations of this species fisheries have dipped below a certain number.

The Red Snapper is caught in both the Atlantic and Pacific Oceans. Combined world catch of Red Snapper every year is 1,814,369 kilograms, worth more than \$11 million. (NMFS) A specific problem with Red Snapper is the size of the fish that most fishermen desire to catch. As with most living organisms, the juvenile fish is smaller and weighs less than the larger, mature fish. Fishermen want to catch the largest fish they can because they are usually paid by weight. The problem with catching the largest fish in the fisheries is that the largest and most mature fish are usually the ones that have the most eggs and can spawn the highest amount of new larva. For the Red Snapper fisheries, one 10 kilogram Red Snapper produces more than twenty times the amount of eggs that ten 1 kilogram Red Snappers can produce. The eggs that the older fish produce have also been found to produce larva that mature quicker and are less prone to starvation than the larva from the younger fish. (World Bank and Partners)

Red Snapper Management

Beginning in the late 1980's, Red Snapper has been deemed overfished in the Gulf of Mexico. The Gulf of Mexico Fishery Management Council (GMFMC) currently manages the Red Snapper fisheries in the Gulf. Currently, the breeding population of the Gulf of Mexico's Red Snapper fisheries is only 6% of its target size. This is due to a number of problems. One of the major problems in rebuilding the Red Snapper's stocks is that juvenile Red Snappers often get caught in shrimp trawls that are present where young Red Snappers congregate, close to offshore reefs. The GMFMC has instituted a plan to rebuild the Red Snapper stocks by 2032. This plan's main course of action is simple, lower the number of fish that humans harvest from the sea. Recreational Red Snapper fishermen are now allowed only two fish per person, with a 16 inch minimum when fishing in the Gulf. Commercial regulations are allowing 3.1 million pounds to be harvested from Gulf fisheries annually, along with closed areas and gear restrictions. Fishermen are allocated a specific quota of Red Snapper and must report their catch to the GMFMC. A penalty is given to any vessel that exceeds their quota.

How Red Snapper depletion affects consumers

As Red Snapper fisheries become more and more depleted, the commercial fishermen who used to have plentiful catches in the Western Atlantic and the Gulf of Mexico have found the species to be overfished. Due to its overfished status, the Red Snapper is often substituted with other fish and then unknowingly sold to consumer under the name Red Snapper (Fuller). Different genetic tests have been run on fish labeled “Red Snapper” by separate institutions in recent years. One such test was run by Peter Marko, professor of Marine Biology, and other scientists at the University of North Carolina. The study from UNC took 22 samples of fish labeled “Red Snapper” from 8 different states, including Delaware, Florida, Illinois, Massachusetts, New York, North Carolina, South Carolina and Wisconsin. When genetic tests were run on the samples, only 5 of the 22 samples were proven to be *Lutjanus campechanus* (Weise).

In a separate study by the Chicago Sun-Times, there were samples taken from 14 different seafood and sushi restaurants in the city of Chicago. Surprisingly, not one single sample was actually *Lutjanus campechanu*. Nine of the samples turned out to a species of fish commonly called “Tilapia”. Four samples were found to be “Red Sea Bream”, scientific name, *Pagellus bogaraveo*. One sample could not be positively identified. While Red Snapper usually sells for Nine dollars per pound or more, Tilapia usually sells for less than five dollars per pound. This sort of consumer fraud does not happen only in the United States. Tilapia is often mislabeled overseas as well. Three years ago, the Japanese government began calling for fish and seafood retailers to start properly labeling all their products because of Tilapia mislabelings.

(Fuller) Jane Lubchenco, a professor of marine biology at Oregon State University says not only Red Snapper is mislabeled, but other species of fish as well. She says "In general, market names may bear little resemblance to what the product really is." Janet Fuller from USA Today writes,

In the United States, the Congressional Research Service -- Congress' research arm -- issued a report last month citing a government survey that found 37 percent of fish examined by the National Marine Fisheries Service were mislabeled. A separate survey by the Fisheries Service found a whopping 80 percent of red snapper was mislabeled.

This sort of mislabeling does not only happen with fish, but numerous and various other types of seafood as well. Joey Ritchie Brookhart of the Seafood Choices Alliance says "For scallops, they'll take a cookie cutter and cut out the flesh on the wing of a skate, which are related to sting rays." An FDA spokesperson who spoke to USA Today said that although the mislabeling of fish would be considered adulterated food, the FDA's main priority is health and food safety. Mislabeled fish, while considered illegal, does not pose any major health risk to an individual's health. With a lack of resources to test mislabeled fish the spokesperson said, the FDA does not focus much time, energy, or money into this problem. (Weise) While it is certainly helpful to the overall cause that endangered fish are being replaced by non-endangered fish in some supermarkets and restaurants, it may start to become a disturbing trend. The lengths that those in the fish markets will go to to deceive the public is a definite sign of the status of certain fish stocks.

Conclusion

Effective fishery management can be a difficult thing to achieve. However, it can become ever harder to achieve when you have millions of dollars of government money, in the form of fishing subsidies, working against you. Perhaps one day when truly effective fishery management starts to take place around the world, countries may be able to subsidize certain ships or fleets. However, this should only be done after it is clear that the fishery populations in that area are on a stable track and not in any danger of being exploited. High Seas regulation is something that many countries and even some fishermen would like to see happen. Unfortunately, regulation on the high seas is literally and figuratively, an area of murky waters. With a plethora amount of fishery management agencies around the world and as more and more fishing fleets become international corporations, exactly what agency is regulating which fleet in whose area can become rather complicated.

A major international organization that is operated by funds from member countries could possibly help with any managerial or organizational problems between countries, however many countries fear giving up too much power over their own waters and losing their sense of sovereignty. An IO with a good organizational structure could help on research into getting more accurate numbers on the large schools of migratory fish. The International Seabed Authority is the closest IO that is currently still being managed today. However, the organization has failed to gain 100% constitutional ratification from all countries, including the United States, for various political reasons. The ISA is too underfunded to attempt any fishery management on a large scale. Unfortunately, it may have to take a series of

unfortunate food droughts in some of the main fish eating small islands for many of the larger nations to appropriate money to the ISA.

As more and more new boats come into the oceans every year and join the world fishing industry, it has become apparent that many older, traditional ways of regulating fisheries are no longer working. With limited funding and manpower, fishery management agencies must find ways to effectively manage their stocks by exploring new and different forms of licensing. One of the more popular ideas is called Individual Fishing Quotas (IFQs). In *Fish, Markets, and Fishermen*, Susan Hanna, Professor of Marine Economics at Oregon State University says IFQs are a “right to catch a certain share of the quota.” With IFQs, a fishery is determined to have a quota of fish that can be harvested, while maintaining a stable population. Each fishermen can apply for a license for a share of the quota, which is an IFQ. A fishermen can use his IFQ, or he can sell it to other fishermen. If someone is looking at expanding their business, they are able to purchase other people’s IFQs. This idea had a moratorium placed over it by the U.S. congress in 1996 until the National Research Council could provide an analysis over its effects. The National Research Council approved the system and said that this form of management would work very well for certain regional fisheries and that there were ways to improve it. (Iudicello) This system could work for many fisheries, but fishery management is more than just the fish, the fishermen, and the management style. One must look at the regional economic and political situations as well as the cultural traditions of different places and whose quality of life is negatively affected by overfishing. The overfishing problem is not going away anytime soon and it is up to many different people from

vastly different backgrounds to work together to form goals for sustainable fisheries
and to then put those ideas into practice.

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