

## **Lessons Learned from the Puerto Rico's Commercial Fishery, 1988 - 2008**

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### **ABSTRACT**

In 1988, Puerto Rico's commercial fishery was regulated by Law No. 83 of May 13<sup>th</sup>, 1936. This law contained numerous regulations pertaining to the conservation of fish resources. For example, it banned dynamite fishing and the use of nets in the mouth of rivers. Between 1979 and 1988, Puerto Rico's landings decreased. In addition, the dominant commercial grouper species since the 1950s, the Nassau grouper (*Epinephelus striatus*) vanished from the commercial fishery. Other Puerto Rico fishery resources also showed symptoms of overfishing. The government's scientific personnel concern over the state of local fisheries prompted government agencies to better regulate and manage these resources.

During the 1990s, various organizations continued to pressure government agencies to establish new fishing laws and additional fishing regulations. Finally, on November 29, 1998, Puerto Rico's government established Law No. 278, also known as Puerto Rico Fishing Law. This law ordered the Department of Natural and Environmental Resources (DNER) to create regulations. The DNER worked with fishers and scientists between 1999 and 2003 to this end. Finally, on March 11<sup>th</sup>, 2004, Regulation No. 6768 was approved. This paper discusses the lessons learned from the commercial fisheries in Puerto Rico during 1988-2008, including the adoption of these new regulations and discusses the impacts of rising fuel costs on landings composition, gear utilization, and effort distribution.

KEY WORDS: Puerto Rico, commercial fisheries, management, catch composition, economy

### **Lecciones Aprendidas de la Pesquería Comercial de Puerto Rico, 1988 - 2008**

En 1988, la pesquería comercial de Puerto Rico era regulada por la Ley No. 83 de mayo 13 de 1936. Esta ley contenía varias regulaciones para la conservación recursos pesqueros. Por ejemplo, prohibía la pesca con dinamita y el uso de redes en la desembocadura de los ríos. Entre 1979 y 1988, los desembarcos en Puerto Rico disminuyeron. Además, la especie comercial más importante de mero desde los años cincuenta, la cherna (*Epinephelus striatus*) se desvaneció de la pesca comercial. Otros recursos pesqueros de Puerto Rico también mostraron síntomas de sobrepesca. La preocupación de la comunidad científica gubernamental sobre el estado de las pesquerías locales motivó al gobierno a mejorar en la manera en que regula y administra estos recursos.

Durante la década de 1990, varias organizaciones continuaron presionando a las agencias de gobierno para establecer una nueva ley de pesca y más regulaciones. Finalmente, el 29 de noviembre de 1998, el gobierno creó la Ley No. 278 conocida como Ley de Pesca. Esta ley ordenó al Departamento de Recursos Naturales y Ambientales (DRNA) a crear un nuevo reglamento de pesca. El DRNA trabajó con pescadores y científicos durante 1999-2003, para ese fin. Finalmente, el 11 de marzo de 2004, se aprobó el Reglamento 6768.

Este documento analiza las lecciones de aprendidas de la pesquería comercial de Puerto Rico, incluyendo la aplicación del nuevo reglamento y también se analiza los impactos del alza del costo de combustible sobre la composición de los desembarcos, uso de artes de pesca y distribución de esfuerzo.

PALABRAS CLAVES: Puerto Rico, pesca comercial, administración, composición de especies, economía

### **Leçons Apprises de la Pêche Commerciale a Porto Rico de 1988 à 2008**

En 1988, la pêche commerciale à Porto Rico était régulée conformément à la loi No 83 du 13 mai 1936. Cette loi contenait de nombreux règlements se rapportant à la conservation des ressources de poissons. Par exemple, la pêcher à la dynamite et l'utilisation de filets dans les embouchures de rivières était interdit. Entre 1979 et 1988, les débarquements de pêche à Porto Rico ont diminué. De plus, l'espèce de mero commerciale dominante depuis les années 1950, le mero de Nassau (*Epinephelus striatus*) a disparu de la pêche commerciale. D'autres ressources concernées par la pêche commerciale à Porto Rico ont aussi montré des symptômes de surpêche. L'inquiétude de la communauté scientifique de l'état de la pêche locale a incité les agences gouvernementales à mieux réguler et gérer ces ressources. Pendant les années 1990, diverses organisations ont continué à faire pression sur les agences gouvernementales pour établir des nouvelles lois de pêche et des règlements supplémentaires pour la pêche. Finalement, le 29 novembre 1998, le gouvernement de Porto Rico a voté la loi No 278, aussi connu comme la Loi de Pêche. Cette loi a commandé au département des Ressources Naturelles et Environnementales (DNER) de créer des règlements supplémentaires. Le DNER a travaillé avec les pêcheurs et les scientifiques entre 1999 et 2003 à cette fin. Enfin, le 11 mars 2004, le décret n° 6768 a été approuvé. Cette présentation discute les leçons apprises de l'adoption de ces nouveaux règlements ainsi que des impacts de coûts naissants de carburant sur la composition des débarquements et de l'effort de distribution.

MOTS CLÉS: Puerto Rico, peche comercial

## INTRODUCTION

Puerto Rico (PR) is a tropical Island considered as the smallest of the Greater Antilles. PR is the 82<sup>nd</sup> largest island in the world, and the third largest island belongs to USA (Quiñones-Calderón 1983). The Island has 110 miles (177 km) east to west and 40 (64 km) miles north to south. Quiñones-Calderón (1983) also mentioned that the Island continental platform cover approximately 1,900 square miles (4,900 km<sup>2</sup>).

The climate of Puerto Rico is tropical, resulting in high species diversity, but few individuals of each species. Contrary to this fact, during the decades of 1960s to 1980s, the general idea was that PR's fishery resources were unlimited, and the government agencies promoted the development of a fishing industry (Suárez-Caabro 1979). During the 1970s the Puerto Rican government, through the Department of Agriculture (DA), built docks and facilities for commercial fishers (Suárez-Caabro 1979). Also, they provided larger boats, gears (traps, nest and hooks), and more powerful motors to improve the commercial fishery effort (Suárez-Caabro 1979). The commercial fishers increase their fishing effort on the Puerto Rican platform, and also 12 - 15 fishing vessels were able to fish in the Bahamas, Turk and Caicos, and the Dominican Republic. Due to the mentioned facts an increase in landings was observed from 4.9 millions pounds landed in 1971 to 7.4 millions in 1979. However, some researchers as Brody (1974) and Kawagushi (1974) thought that the PR's fishery resources had been over exploited during the 1970s.

Since 1936, Puerto Rico commercial fishing activity was regulated by Law No. 83 of May 13<sup>th</sup>, of the mentioned year. This law contained regulations pertaining to the conservation of fish resources. For example, it banned dynamite fishing and the use of nets in the mouth of rivers. However, on the contrary of the government agencies expectations, between 1979 and 1988, Puerto Rico's fishery landings decreased significantly, from 7.4 million to 2.0 million pounds in 1988 (Matos-Caraballo and Sadovy 1989). The decrease in commercial landings affected the fishing activity. One dramatic example of this fact was the Nassau grouper fishery. This species was heavily fished during the 1950s thru 1970s, during their spawning aggregation period. During the early 1980s, the species landings decreased significantly, and for the middle 1988 was considered commercially extinct.

From 1979 - 1989, the CODREMAR ("Corporación para el Desarrollo de los Recursos Marinos y Lacustres de Puerto Rico") was the agency responsible to work with Puerto Rico fisheries. This agency was part of the DNER. The FRL was part of this agency until July 1<sup>st</sup>, 1990, when the law that created CODREMAR was derogated. All fishery management was transferred to the DNER, thru Law 61 of August 23, 1991. The mentioned law assigns the FRL to work under the DNER authority. Puerto Rico's Legislature recognized the functions of the FRL in the

fishery resources monitoring.

During the 1990s, various organizations continued to pressure government agencies to establish new fishing laws and additional fishing regulations. Finally, on November 29, 1998, Puerto Rico's government established Law No. 278, also known as the Fishing Law. This law ordered the Department of Natural and Environmental Resources (DNER) to create additional regulations. The DNER worked with fishers and scientists between 1999 and 2003 to this end. Finally, on March 11<sup>th</sup>, 2004, Regulation No. 6768 was approved. As a consequence of the enactment of the new regulations, many changed impacted the commercial fishery. For example, many fishers left the fishery while others continue to practice commercial fishery without DNER authorization (fishing license).

In 1988, I started to study Puerto Rico's commercial fishery in two aspects. First, I was the principal investigator of the PR's commercial fishing census. Second, I was the principal investigator of the FRL/Commercial Fishery Statistics Program (CFSP). In this paper, I will describe the PR's commercial fishery activities, trends and expectations. Lessons learned from the adoption of the new fishing regulations are discussed, also the impacts of rising fuel costs on landings composition, gear utilization, and effort distribution.

## METHODS

For this historical review many reports, papers, proceedings and books were reviewed to describe Puerto Rico's commercial fishery during 1988 - 2008. Many projects made at Puerto Rico's Department of Natural and Environmental Resources (DNER)/Fisheries Research Laboratory (FRL) were reviewed and used. Also, the author knowledge by his professional relationship with commercial fishers and fishery managers has been used in this paper. The results were divided in three important elements in commercial fishers.

- i) The commercial fishing census among 1988 - 2008,
- ii) Reported landings trends, and
- iii) Fishing regulations.

Finally, in the discussion the author will present the most important lessons learned from Puerto Rico's fishery occurred among 1988 - 2008.

## RESULTS

### Commercial Fishing Census 1988 - 2008

The commercial fishing censuses were carried out during 1988, 1996, 2002 and 2008. A decrease in the number of active commercial fishers, vessels and gear was observed (Table 1). In 1988, a total of 1,731 commercial fishers were interviewed (Table 1). Sixty four (64%) percent of the interviewed fishers had commercial fishing license (Matos-Caraballo and Torres-Rosado 1989). Approximately 75% of the commercial fishers were full

time and 25% were part-time. The 2008 commercial fishing census is in progress however, it is estimated that 95% of the active commercial fishers were interviewed. Thus I will compare the collected data with previous censuses. A total of 809 active commercial fishers were interviewed in 2008 (Table 1). That means 922 commercial fishers left the fisheries since 1988. Sixty nine (69%) percent of the active commercial fishers had license in the 2008 census compared with 64% in 1988. Seventy six (76%) percent were full time fishers. These two results are very similar although the number of active fishers decreased dramatically since 1988.

**Table 1.** Puerto Rico Commercial Fishery Census 1988-2008. In 2008, preliminary results, approximately 95% of the fishing centers were covered. The beach seine has been prohibited since March 12th 2007.

Year	1988	1996	2002	2008
<b>Total Commercial</b>				
Fishers	1,731	1,758	1,163	809
# of Full time	1,306	1,262	423	614
# of Part time	425	496	740	195
Fisher with License	1,107	1,414	955	557
Fisher without License	624	344	208	252
Average Age	Unknown	46	48	49
<b>Gears</b>				
	<b># of units</b>	<b># of units</b>	<b># of units</b>	<b># of units</b>
<b>Nets</b>				
Beach Seine	117	231	147	0
Gill Nets	894	1,385	993	560
Trammel Nets	426	861	391	439
Cast Nets	946	1,136	1,297	769
<b>Hook and Lines</b>				
Hand Lines	5,349	6,727	9,306	7,366
Troll Lines	1,712	1,028	1,356	1,356
Long Lines	586	920	508	223
Rod and Reel	283	1,130	1,144	1,162
<b>Traps</b>				
Fish Traps	11,710	11,21	10,37	
Lobster Traps	1,798	4,268	2,774	3,545
<b>Diving</b>				
Skin	19	281	160	139
SCUBA	300	598	225	219
<b>Fishing Vessels</b>				
<b>(length in feet)</b>	<b># of units</b>	<b># of units</b>	<b># of units</b>	<b># of units</b>
<= 15	177	369	124	73
16 -21	541	915	653	389
22-29	120	188	147	144
>=30	44	29	32	16
Total Units of vessels	882	1,501	956	622
<b>Commercial Fisheries</b>				
<b>Statistics</b>	1988	1996	2002	2008*
<b>Program Average</b>				
<b>CPUE per Year</b>				
<b>(pounds per trip)</b>	73	72	63	60

When we observed the gear changes thru 1988-2008, the most dramatic decrease is observed in the number of fish traps (Table 1). A total decrease of 6,119 fish traps less were reported, which means a reduction of 52% in twenty years. Regarding nets, it is necessary to mention that the beach seine gear was banned by the Regulation 6768 since March 12<sup>th</sup>, 2007, due to the high mortality of juvenile fishes caused by this gear. Another decreasing trend was observed for gill nets from 1385 units in 1996 to 560 units in 2008 (Table 1). This represents 825 less units or 40% reduction in a 12 years period. For the same period the number of SCUBA divers reduced from 598 to 219 (Table 1). That means is a 64% reduction in this gear.

On the other hand, an increasing trend was observed in the use of hand lines, in 1988, was reported 5,349 and in 2008, were reported 7,366 (Table 1). Rod and reel also increase from 283 reported in 1988 to 1,162 reported in 2008. On the contrary, the active commercial fishing vessels decreased from 1996, when 1,501 was reported to 622 commercial fishers in 2008. That means a reduction of 42%. The boats larger than 30 feet were reduced from 44, in 1988 to only 16 in 2008 (Table 1).

#### Reported Landings Trends, 1988 - 2008

Commercial fishing landings were reported voluntarily among 1968 - 1998. The Law 278 of November 29<sup>th</sup>, 1998, mandate commercial fishers to submit their landings reports to the DNER. Landings reported from 1971-1979 shows a significant increase (Figure 1). This increase occurred because during the 1970s the government, through the Department of Agriculture (DA), built docks and buildings to help commercial fishers to increase their production (Suárez-Caabro 1979). The effort included provide bigger boats, more unit of gears (traps, nets, and hooks) and more powerful motors to improve the commercial fishery effort (Suárez-Caabro 1979). As a result, commercial fishers increase their fishing effort on Puerto Rico's platform and also 12 - 15 fishing vessels (length 40 - 55 feet length) were able to fish at the fishing banks of Bahamas, Turk and Caicos, and Dominican Republic. The mentioned fishing vessels were located at Puerto Real, Cabo Rojo, the most important fishing center in terms of pounds landed and number of active fishers. Due to the mentioned facts an increase in landings was observed from 4.9 millions pounds landed in 1971 to 7.4 millions in 1979. On the other hand, a decrease in landings reported occurred during 1980 - 1992 (Figure 1). Landings decrease from 6.5 millions pounds reported in 1980 to 2.04 million pounds reported in 1992 (Figure 1). During 1985 - 1990, the Islands of Turk and Caicos, Bahamas, and Dominican Republic prohibited Puerto Rican deep-water snapper (DWS) fishing vessels to fish in their waters. Puerto Rico's fishing vessels that tried to fish illegally in the mentioned Islands were confiscated, and fishing crews were arrested. Early in the 1990s, the fishing activities of

the Puerto Real fishing fleet on the mentioned Islands were over. However, the landings decrease was caused by the overfished resource on the Puerto Rico platform (Matos-Caraballo 1998, 2005). From 1993 to 2002, the landings reported were around 2 - 3 million pounds (Figure 1). Again during this period, Puerto Rico's fishery resources showed overfishing symptoms, but also shown that was not exhausted (Matos-Caraballo 2004). Then during 2004 - 2007, landings reported were around 1.8 - 1.2 millions pounds (Figure 1). This decrease can be attributed to a combination of several factors such as overfishing, the enactment of the new fishing regulations that limited the fishing effort, a decrease in fishers landing's reports, and the cost of fuel (Matos-Caraballo In press). The CFSP estimates the non reported landings using a correction factor (Matos-Caraballo 1998, In press, Matos-Caraballo and Sadovy 1989)). Figure 2 shows the landings with the correction factor included for years 1971 - 2007.

The most caught species of fish during 1988 - 2008, were silk snapper (*Lutjanus vivanus*), queen snapper (*Etelis oculatus*), yellowtail snapper (*Ocyurus chrysurus*), lane snapper (*Lutjanus synagris*), mutton snapper (*Lutjanus analis*), red hind (*Epinephelus guttatus*), king mackerel (*Scomberomorus cavalla*), dolphinfish (*Coryphaena hippurus*), yellowfin tuna (*Thunnus albacarus*) skipjack tuna (*Euthynnus pelamis*), blackfin tuna (*Thunnus atlanticus*), various species of trunkfishes (family Ostraciidae), grunts (mainly *Haemulon plumieri*), and parrotfishes (mainly *Sparisoma viride* and *S. chrysopterum*). The most caught species of shellfish were spiny lobster (*Panulirus argus*) and queen conch (*Strombus gigas*). If the reader is interested to see landings in pounds by species and the percentage per year, are available at Matos-Caraballo and Sadovy 1989, Matos-Caraballo 1998, 2004, 2005, In press.

Puerto Rico's west coast (Aguadilla to Cabo Rojo) was the most productive coast in terms of pounds landed and number of fishers and fishing vessels during 1988 - 2008 (Matos-Caraballo and Sadovy 1989; Matos-Caraballo 1998, 2004, 2005, In press). The west coast was responsible for landings approximately the 50% of the total landings during this period. South coast was the second most productive coast followed by the east and north coast (Matos-Caraballo and Sadovy 1989; Matos-Caraballo, 1998; 2004; 2005; in press). Cabo Rojo was the most productive municipality in terms of pounds landed (Matos-Caraballo and Sadovy 1989, Matos-Caraballo 1998, 2004, 2005, In press). Approximately 30% of all the landings reported during this period came from Cabo Rojo. Landings per trip decreased from 71 pounds per trip in 1988 to 63 pounds per trip in 2002. In 2008, the result was 60 pounds per trip in 2008 (Table 1), however, this result is preliminary.

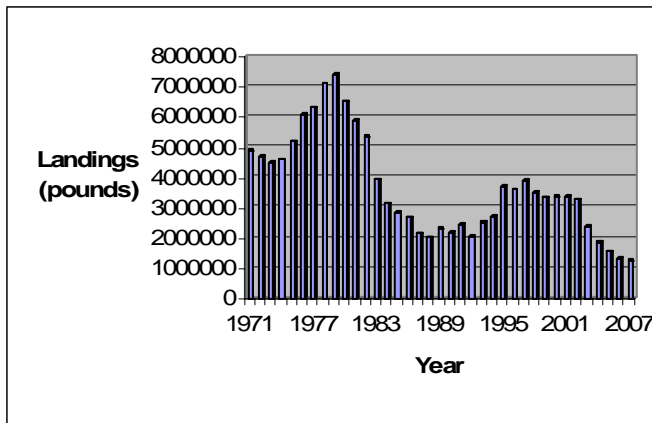


Figure 1. Puerto Rico's commercial landings reported during 1971-2007.

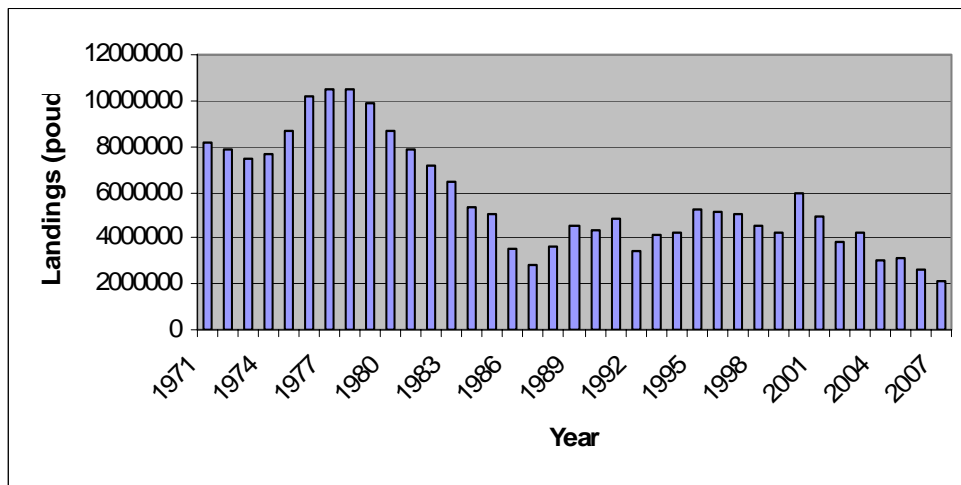


Figure 2. Puerto Rico's commercial landings estimates using the correction factor during 1971 - 2007.

### Fishing Regulations 1988 - 2008

The Law No. 83 of May 13<sup>th</sup>, of 1936, regulated the PR's fisheries for 62 years. This law contained regulations pertaining to the conservation of fish resources. For example, it banned dynamite fishing and the use of nets in the mouth of rivers. However, contrary of the government agencies expectations, between 1979 and 1988, Puerto Rico's fishery landings decreased significantly, from 7.4 millions to 2.02 millions pounds in 1988 (Matos-Caraballo and Sadovy 1989). On the other hand, the Nassau grouper (*Epinephelus striatus*) was the most important grouper species in terms of pounds landed, but this species was exploited during their spawning aggregation period. During the early 1980s, the species landings decreased significantly, and for 1988 was considered commercially extinct. Also, 90% of the silk snapper (*Lutjanus vivanus*) were caught before reaching the minimum size of sexual maturation. The queen conch (*Strombus gigas*) was caught in shallow waters (4 - 12 feet depth) during 1960 - 1980, but for late 1980s SCUBA divers were obligated to fish the queen conch deeper than 70 feet. This activity resulted in many queen conch fishers suffering decompression sickness that left them with paralyzed legs, and few fishers dove during this period. Also, it was observed that some species were exploited during their spawning aggregations (eg. mutton snapper and red hind). All the mentioned facts had shown the necessity of establishing new regulations before fishery resources became completely exhausted.

The NOAA Caribbean Fisheries Management Council (CFMC) has the mandate to conserve the fishery resource thru enactment of regulations in the USA Exclusive Economic Zone (EEZ) in the Caribbean. In the case of Puerto Rico, the CFMC jurisdiction for some resources beyond nine nautical miles from the coast. The Commonwealth of PR has nine nautical miles. The CFSP estimates that approximately 70% of the commercial fishing activity occurred within their jurisdictional waters. Nonetheless, both jurisdiction requires to establish compatible regulations to conserve fishery resources. In 1981, the CFMC established the Lobster Management Plan which established a minimum legal size of 3.5 inches (89mm) for the spiny lobster (*Panulirus argus*). In 1985, the DNER adopted the plan for local waters.

In 1985, the CFMC started drafting the Shallow Water Reef Fish Management Plan which established a minimum legal size for yellowtail snapper (12 inches total length) and Nassau grouper (16 inches total length). In 1989, the DNER adopted the same regulation. In the early 1990s the CFMC and DNER prohibited the catch, disturbance, or possession of the Nassau grouper and the Goliath grouper (*Epinephelus itajara*).

In 1996, the CFMC established the Queen Conch Management Plan, among others measures a close seasons for queen conch (*Strombus gigas*) in the EEZ. The closed season was from July 1<sup>st</sup> - September 30<sup>th</sup> every year. The DNER adopted the same regulation for July 1998 thru an

Administrative Order.

Also in 1996, the CFMC and DNER established the seasonal closures by the regulatory amendment of the Shallow Water Reef fish FMP for three fishing banks along Puerto Rico's west coast to protect the red hind (*Epinephelus guttatus*) spawning aggregation and any other grouper or snapper spawning aggregations that would occur. The fishing banks closed from December 1<sup>st</sup> to February 28<sup>th</sup> of each year were, Abril La Sierra, Bajo de Cico, and Tourmailne. Compatible regulations within Puerto Rican jurisdictional waters were established through an Administrative Order issued by DNER in 1996. These three banks are very important for commercial fishers. The three months closure of the fishing banks was good to conserve all the fishery resource in these locations and reduce the fishing pressure.

Law 278 of November 29<sup>th</sup>, 1998, supra, known as Puerto Rico's Fishing Law, required every commercial fisher to submit their landings reports to the DNER. Also, this law required that the DNER must develop new fishing regulations. The DNER Fish and Wildlife Bureau and Legal Office personnel drafted the new fishing regulations that was presented in Public Hearings. The mentioned personnel worked very hard during 1999 - 2004. They visited most of the PR's coastal municipalities to participate in public hearings where hundred of commercial fishers, recreational fishers and general public were able to be oriented and also they submitted recommendations to the fishing regulation draft. Finally, in March 12, 2004, the regulation 6768, known as Puerto Rico Fishing Regulations (PRFR) was approved (to see the whole document visit [www.dma.gobierno.pr](http://www.dma.gobierno.pr)). The PRFR is a good document to conserve the PR fishery resources. Most of the CFMC and the DNER regulations were in harmony. Unfortunately, after all the effort and participation of the fishers in the process of public hearings, approximately 70% of the commercial and recreational fishers were very angry with the DNER because of the PRFR. The commercial fishers were angry mainly with following regulations:

- i) The closed season of the spawning aggregation for red hind and mutton snapper for the whole Island,
- ii) Because they have to submit evidence of their income completing all the IRS documents and if necessary pay taxes (90% of the fishing earnings is tax free) to obtain a commercial fisher license,
- iii) They have to pay a fee per permit for the following species (queen conch, lobster, land crab, and sirajo gobies (cetí), and
- iv) The PRFR established a minimum legal size for various species, but especially the silk snapper 12 inches fork length for 2004, 14 inches for 2005 and stabilized in 16 inches (the minimum size of sexual maturation for this species). Fishers explain to the author that they had two main reasons for their displeasure. First, as I mentioned in the previous section, 90% of the silk snapper

were caught before reach the 16 inches fork length. Second, due to the fact that silk snapper is caught at 100 fathoms depth, 100% of the fish were dead before they reaching the surface. Thus, commercial fishers found that this regulation did not help to conserve the species. It is important to mentioned that the DNER emended in 2007, and since then there is a closed season from October 1<sup>st</sup>- December 31<sup>st</sup> of each year for silk snapper (*Lutjanus vivanus*) and blackfin snapper (*Lutjanus bucanella*).

- v) The beach seine was going to be banned after March 12<sup>th</sup>, 2007.

### DISCUSSION

After the mentioned results in the PR's fishery during 1988 - 2008, I learned the following lessons:

*Landings data show that Puerto Rico's fishery is over-fished but not exhausted* — Evidences of overfishing were shows in the decreasing of landings reported, fishers caught many species of fishes before reaching minimum size of sexual maturation, the observed decrease in 595 active commercial fishers among 1996 - 2002 (two years before the implantation of the PRFR) and other evidences (Matos-Caraballo In press). It is easy to conclude that the dramatic reduction in fishers during 1996 - 2002, shows that the fishery resources were not enough to sustain good profits for all the commercial fishers. CFSP's personnel reported that many commercial fishers left the fisheries to work on construction industry and other move to continental U.S.A. However, the regulations implanted helped significantly in the conservation of the resources. Some researchers that study the queen conch thought that the queen conch will be commercially extinct in Puerto Rico in a near future (CFMC 1996). However, the institution of a closed season established for federal and local waters in 1998, helped the conservation of this resource. As a result of this action, the queen conch is the second most reported landed species in Puerto Rico for 2007 and 2008. On the other hand, the first species most reported landed in Puerto Rico for the same period was the spiny lobster, regulated in federal and local waters since 1985. The landings data show that red hind was caught in larger number of pounds and larger sizes after the closed season established to protect their spawning aggregations. The mutton snapper landings show a similar trend. It is expected the same results in other species that are protected with closed seasons. These are examples of how regulations implemented help to significantly enhance the conservation of fishery resources.

*Most of the Puerto Rico's commercial fishers support the closed seasons* — Commercial fishers support the closed season, otherwise there was improbable to observe the success of the conservation in the closed seasons species

previously mentioned. However, a small number of fishers continue to fish during the closed season. Commercial fishers claim for more active DNER rangers enforcement of the PRFR.

*Most of commercial fishers cooperate with CFSP* — Every time the CFSP need to collect landings, biostatics and census data, most fishers cooperate. Although many fishers were annoyed with the DNER and the CFSP during the first two years of the PRFR implementation, currently most of those are friendly and comply with the requirements. The commercial fisher support is extremely important in the future study and monitoring of this resource. The DNER must acknowledge the valuable contribution of commercial fishers.

*Puerto Rico's commercial fishing effort has been decreased* — A decrease in fishing effort is observed in the number of commercial fisher account in the fishery census 2008 and in the number of landings pounds reported. The reduction observed in the number of fishers during 1996 and 2002, might be due to the overfished resource. The reduction observed between 2002 and 2008, occurred mainly because of the enactment of the PRFR. The closed seasons, minimum legal sizes and the requirement of submitting the IRS documents and payments as evidence of their income to obtain commercial fisher license were enough reasons to discourage many part time fishers that decide to left the commercial fishery. The CFSP port sampler and the author know tens of ex-commercial fishers that reported the mentioned reasons for leaving fisheries. It is expected that the mentioned fact will help the conservation of the fishing resources. In addition, the gasoline cost increased three times from 2006 - 2008. Also, a decrease in the fishing gear units has been observed. Most commercial fishers use gasoline motors. The global economy was weak during this period, resulting in the limited increase of price per pound. Commercial fishers decreased the number of fishing trips during this period. This is another reason for the decrease of the fishing effort.

*Education efforts in conservation is never enough* — Although a huge effort was undertaken to educate all interested parties in fisheries there is still a need for outreach and education of the PRFR. Four years after the implementation of the PRFR, it is observed confusion in various regulations. The minimum legal sizes of many species, marine reserve areas with no fishing zones, and the closed season dates have to be informed continuously for commercial fisher and for DNER Rangers. It is recommended that a group of DNER Rangers specialized in the PRFR will be trained and work exclusively in fisheries. It is recommended that commercial fishers must take conservation training (about regulations and their benefits) and as a required to obtain the commercial fisher license. Fisheries without education there is no conservation.

*Commercial fishers will find the way; the Puerto Real, Cabo Rojo's story* — Historically, the most important fishing center in terms of pounds landed and higher number of active commercial fishers since 1968 - 2008, is Puerto Real Cabo Rojo. As was mentioned in the results of reported landings trend, during the 1970s - 1985, they had 12 - 15 fishing vessels capable to sail and fish DWS in others Caribbean Islands. During 1985 - 1990, the Caribbean Islands prohibited Puerto Rican fishing vessels to fish in their waters. In the early 1990s, the mentioned prohibition disappeared. However, the young fishers of Puerto Real, many of them sons of crews of the DWS large vessels, became in SCUBA divers commercial fishers. Puerto Real continue to be the most important fishing center in landings, however the fishery changed from DWS and lobster fishery in large vessel to SCUBA diving for mostly target conch followed by lobsters and reef fishes. Commercial fishers are able to adapt for the changes imposed by the PRFR or any other natural change.

*Puerto Rico's fishery needs continued to be studied* — The PR's fishery is a very important natural resource in Puerto Rico. This natural resource provides food for the local community, food for tourists and employment for commercial fishers, fish houses, and restaurant's personnel. The mentioned resource is complex because it is multispecies, multigear, and artisanal. The human factor and the socio economic problems also contribute to the complexity of this fishery. The study of Puerto Rico's fishery is a constant process of learning. It is necessary to continue the study and the monitoring of the fishery resources and the study of the anthropogenic factor of Puerto Rico's fishery to conserve this natural resource for future generations.

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