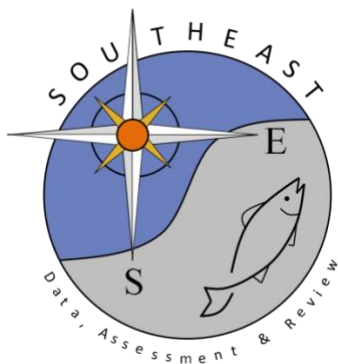


Portrait of the Spiny Lobster (*Panulirus argus*) Fishery in Puerto Rico  
during 1998 - 2013

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# Portrait of the Spiny Lobster (*Panulirus argus*) Fishery in Puerto Rico during 1998 - 2013

## Semblanza de la Pesquería de Langosta Espinoza (*Panulirus argus*) en Puerto Rico durante 1998 - 2013

### Portrait de la Pêcherie de Langouste (*Panulirus argus*) à Porto Rico au cours de 1998 à 2013

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#### ABSTRACT

The spiny lobster (*Panulirus argus*) has been a very important fishery in Puerto Rico since 1970s. However, during the 1950 and early 1960's this species was used as bait in the fish traps. In Puerto Rico the spiny lobster has been caught mostly by fish trap, trammel net and SCUBA divers. Currently most of the full time commercial fishers in Puerto Rico are SCUBA divers. Their primary target is the queen conch and lobsters, thus both species have been in the top five landed in Puerto Rico since 1988.

The Puerto Rico's Department of Natural and Environmental Resources (DNER) has the responsibility of manage the fisheries resources in the Island. The DNER Commercial Fisheries Statistics Program (CFSP) has been collected landings, biostatistical and census data from commercial fisheries since 1968. During 1998 - 2013, an average of 217,441 pounds/year of spiny lobster was reported in Puerto Rico by commercial fishers. The wholesale price represented an average of \$1.28 million/yearly. The retail sales of spiny lobster would be estimated in an average of \$3.9 million/yearly. The fishing pressure resulted in an overfishing resource. The DNER and NOAA fisheries established fishing measures to avoid the collapse of the fishery. Since 1985, was established a minimum legal size of 3.5 inches carapace length. This paper will show the landings (pounds), effort, price and marketing of spiny lobster during 1998 - 2013.

KEY WORDS: Puerto Rico, spiny lobster, commercial landings, management, socioeconomic

#### INTRODUCTION

The spiny lobster fishery in Puerto Rico started as food for the poor people whom were not able to pay for the first class fish. Jarvis (1932) mentioned that the marketing was bad for this species. The people at this period of time prefer this snapper and groupers. Jarvis (1932), also mentioned that the spiny lobster were considered that spoiled faster than the reef fishes. Feliciano (1958) mentioned that around 1947 the spiny lobster were considered the first class fish and was sold to the tourists and general public. However, old commercial fishers mentioned to the author that for most fishers during the 1950s the spiny lobster was used as bait in the fish traps. It was reported that for 1951, the average carapace length of the spiny lobster in Puerto Rico was 117 mm (Mattox 1951). During 1958, Feliciano reported that the spiny lobster carapace length in Puerto Rico decreased to 107 mm. During the 1960s and 1970s the marketing of the spiny lobster improved and this species is now of the most important commercial shellfish in Puerto Rico. The spiny lobster shown overfishing indications during the 1980's. For example, Matos-Caraballo (1989), reported that for the period of 1989 - 1991, the average carapace length of this species was reduced to 91 mm. Due to the mentioned indications, in 1985, the Caribbean Fishery Management Council (CFMC) and the Department of Natural and Environmental Resources (PRDNER) developed a management plan to stop the overfishing of this resources.

The spiny lobster management developed by CFMC and PRDNER established a minimum legal size of 3.5 inches and prohibited to fish gravid females.


#### METHODS

Commercial fishery landings data were collected from fishers, fish buyers, and fishing associations from around Puerto Rico. Commercial fishery statistics must be submitted to DNER/CFSP as a compulsory requirement of Law Number 278 (November 29, 1998) and PR Fishing Regulation 6768 (March 2004) and later for newest Fishing Regulation 7949 (November 24, 2010). Port samplers and the principal investigator visited the 88 identified fishing centers in the 42 coastal municipalities including the islands of Vieques and Culebra (Figure 1). The data collection occurred from 1998 - 2013. Data were collected using a landing trip ticket system (Figure 2) on a monthly basis during the project. The Trip Ticket System (only one trip reported by one ticket) was established by the CFSP in 2003. Efforts were made to collect the following data: fishing date; name of fish buyer, fisherman and/or helper (to avoid data duplication); fishing license number; municipality; fishing center (municipality landing area); number of trips; gear type; fishing effort (hours spent fishing); weight in pounds by species or taxonomic family; market value to the fisherman (price in U.S. dollars/pound); maximum and minimum fishing depth; and fishing area. Trip tickets were completed using species common names and identification was possible by using an amended version of the bilingual technical report *Common Names of Fishes in Puerto Rico* (Erdman 1987). A numerical system of species identification was developed to correspond with species codes used in Erdman's publication. Species reported not included in the mentioned publication are added and numbered by CFSP's principal investigator. Fishers usually landed fishes in the round (not eviscerated), except the deep water snapper and large grouper that they usually landed gilled and gutted. Lobster, oyster, and octopus were also landed in the round, and conch weights included meat only. However, this paper will analyze the spiny lobsters reported landings.

The top map is a detailed road map of Puerto Rico, showing major highways, cities, and geographical features. The Cordillera Central is highlighted in green. The map includes labels for various towns and cities, as well as the names of the surrounding bodies of water: Atlantic Ocean, Caribbean Sea, and San Juan Bay. A scale bar and a compass rose are also present.

The bottom map shows the location of Puerto Rico in the Caribbean Sea, bordered by the United States, Cuba, Haiti, and the Dominican Republic. It includes labels for neighboring countries and islands, as well as the names of the surrounding bodies of water: Atlantic Ocean, Caribbean Sea, and San Juan Bay. A scale bar and a compass rose are also present.

Table 1 shows that a total of landings in pounds reported by commercial fishers during 1998 - 2013. There was a total of 3.47 millions of spiny lobster caught for the mentioned period. The highest production per year occurred in 1999 with 327,806 pounds reported) and the lowest was 2010 with 147,115 pounds reported (Table 1). During 2003 - 2010 a decrease in spiny lobsters reported landings were observed (Figure 3). On the other hand it was observed a trend to increase in the landings reported among 2010 - 2013. This trend probably occurred due to two facts. First, it was observed a decrease in the number of active commercial fishers (Matos caraballo and Agar 2010). Second, during 2004, the DNER established the Fishing Regulations 6768 (Matos-caraballo and Agar 2010). Most commercial fishers were angry with the implementation of closed seasons, special permit to catch lobsters and minimum legal sizes for various important commercial species. The result of this action discourage many fishers to report their catch to the DNER/CFSP (Matos-Caraballo 2012). Approximately for year 2010, most fishers observed the benefits of the closed seasons and the fishing regulations and more commercial fishers started to report once more (Matos-Caraballo 2012).



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 SISTEMA DE CONTROL POR VALOR

Formulario de Datos de  
 Pesca

**Fecha del desembarco** \_\_\_\_\_

**Reportado por:** ☐ Pescador/a ☐ Pescador

**Municipio de desembarco** \_\_\_\_\_ **Centro de desembarco** \_\_\_\_\_

**Nombre del pescador** \_\_\_\_\_ **Número de licencia (1)** \_\_\_\_\_

**Nombre del pescador (2)** \_\_\_\_\_ **Número de licencia (2)** \_\_\_\_\_

**Nombre del pescador (3)** \_\_\_\_\_ **Número de licencia (3)** \_\_\_\_\_

**Número de teléfono** \_\_\_\_\_ **Refundición donde ocurrió la mayor captura** \_\_\_\_\_ (breves)

**Registro de embarcación** \_\_\_\_\_ **Área de captura** \_\_\_\_\_ (puede ser más de un área)

**Seas (incluya una descripción de cada una)** \_\_\_\_\_ **Si pescó con redes o capotes, ¿cuántos días estuvo en sumergidos?** \_\_\_\_\_

**Menor a qué s (9 millas)** \_\_\_\_\_ **Mayor a qué s (9 millas)** \_\_\_\_\_

CLASE DE PESQUERO	PEZO	PIELO (LIBRAS)	LATE	HOJAS RECIBIDAS	EXEMPTO (TARJETA)	CLASE DE PESQUERO	PEZO	PIELO (LIBRAS)	LATE	HOJAS RECIBIDAS	EXEMPTO (TARJETA)
<b>OLAJADO</b>						<b>PARGOS Y MERLOS DE AGUAS PROFUNDAS</b>					
12101 TUNTES (Wahoo)						(142) BEEBUD (Vermilion Snapper)					
12209 BACORA (Blacktip Tuna)						(143) CARATUCHO (Queen Snapper)					
12218 BONITO (Blue Tuna)						(139) CHILLO (Bass Brainer)					
12300 YACA (Lime Tuna)						(144) TUNAVIA DE AGUAS PROFUNDAS (Giant Snapper)					
12310 PATUDO (Spade Tuna)						(141) CHOPA NEGRA (Black Snapper)					
12410 PAVANALUNA (Pompano)						(138) NEGRA O ALBUQUERA (Giant Snapper)					
12201 ATUNES (Tuna)						(140) NEGRO AZUL DEL VORDE (Yellowtail Snapper)					
12810 DOMBO (Common Snapper)						(136) NEGRO GUASA (Blue Groper)					
12312 PEPO (Wahoo)						(137) MERO (Grouper)					
<b>ESPECIES DE PISCICULTURA</b>						<b>PECES DE AGUAS PROFUNDAS</b>					
13010 MERO (Grouper)						(139) MERO (Grouper)					
13011 TIGRE (Snapper)						(138) CARILLERA (Red snapper)					
13012 LITON (Lemon Shaker)						(139) GUAIL (Yellowtail Snapper)					
13013 YACA (Lime Snapper)						(135) MANTADO (Lemon Snapper)					
13014 YACA (Lime Snapper)						(136) PARGO (Pompano)					
13015 YACA (Lime Snapper)						(137) ARRAYADO (Lime Snapper)					
13016 YACA (Lime Snapper)						(140) COJUELLA (Yellowtail Snapper)					
13017 YACA (Lime Snapper)						(134) SENA (Yellowtail Snapper)					
13018 YACA (Lime Snapper)						(135) NEGRO AZUL DEL VORDE (Yellowtail Snapper)					
<b>MARINERO</b>						<b>PECES DE AGUAS PROFUNDAS</b>					
13019 YACA (Lime Snapper)						(139) CAPITAN (Grouper)					
13020 YACA (Lime Snapper)						(136) CHARNES (Pompano)					
13021 YACA (Lime Snapper)						(134) GALLOS (Grouper)					
13022 YACA (Lime Snapper)						(135) JAROS (Pompano)					
13023 YACA (Lime Snapper)						(137) PELLE PUERCO (Queen triggerfish)					
13024 YACA (Lime Snapper)						(138) NEGRO AZUL DEL VORDE (Yellowtail Snapper)					
13025 YACA (Lime Snapper)						(134) PULPAS (Pompano)					
13026 YACA (Lime Snapper)						(135) SALICOTE (Yellowtail Snapper)					
13027 YACA (Lime Snapper)						(136) JUREL E (Family)					
13028 YACA (Lime Snapper)						(137) JUREL E (Family)					
13029 YACA (Lime Snapper)						(138) JUREL E (Family)					
13030 YACA (Lime Snapper)						(139) JUREL E (Family)					
13031 YACA (Lime Snapper)						(140) JUREL E (Family)					
13032 YACA (Lime Snapper)						(141) JUREL E (Family)					
13033 YACA (Lime Snapper)						(142) JUREL E (Family)					
13034 YACA (Lime Snapper)						(143) JUREL E (Family)	</				

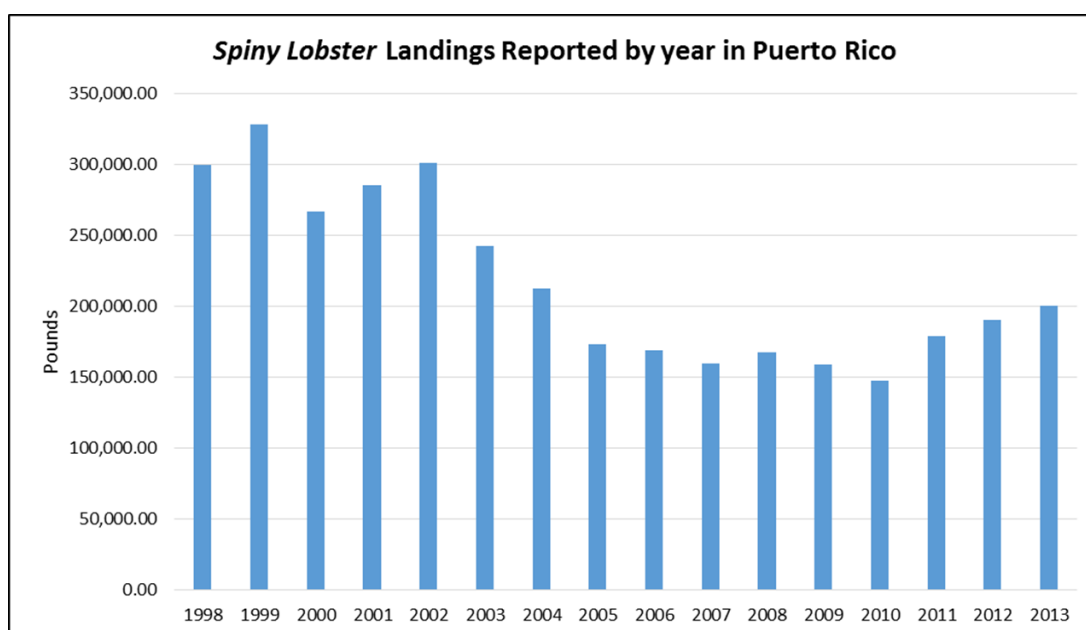
**Figure 2.** Puerto Rico's Commercial Fisheries Statistics Program Trip Ticket.

reduced their numbers of traps and left the fishing activity. Also, other fish and lobster trap fishers left the fishery on the south coast. On the other hand, the west coast increased in the number of SCUBA divers that fished lobsters the whole year but increased the fishing effort during the closed queen conch closed season (July - September since 1998 - 2011 and August-October since 2013). Also, on the west coast there were some fish traps and trammel net fishers.

Spiny lobsters landings by month did not show any regular pattern since 1998 - 2011. However, August, September, October, and November shows higher landings. This peaks occurred for two reasons. First, during the queen conch closed season, divers target the spiny lobster. Second, the hurricane season and some cold fronts caused heavy swells that resulted in spiny lobster mass migration. The fishers using trammel nets know the path of the migration catching hundreds of pounds per event. This fact caused a very interesting marketing phenomenon in the west coast. The hundred of lobster caught in the mentioned heavy swell events fill the Fish Houses storage capacity during November and December. During this period of the year, Puerto Rico's population reduced the consumption of fish and shellfish, thus the sales were slow. The fish houses were forced to stop the purchasing spiny lobster. Then the fishers reduced the price of the spiny lobster and sales to restaurants. Due to the fact that the restaurants are the best fish house customers, the lobsters sales were paralyzed. In approximately two weeks, the restaurants spiny lobster storage capacity were full. When this event occurred, the restaurants stopped purchasing spiny lobsters. Then, the commercial fishers reduced once more the spiny lobster price per pound and sales on the street were at a very low price. Thus, the restaurants and fish houses had a very low spiny lobster sales. The whole described event took approximately six-eight weeks, and then the markets were stabilized.

**Table 1.** Puerto Rico's Commercial Landings of Spiny Lobster by year During 1998 - 2013

<b>Lobster Landings Reported by year in Puerto Rico</b>			
<b>YEAR</b>	<b>POUNDS</b>	<b>*P/P</b>	<b>Pound % compared with 1998</b>
<b>1998</b>	299,401.00	5.44	100.00
<b>1999</b>	327,806.00	5.45	109.49
<b>2000</b>	266,996.00	5.17	89.18
<b>2001</b>	285,018.00	5.59	95.20
<b>2002</b>	300,753.00	5.66	100.45
<b>2003</b>	242,583.00	5.10	81.02
<b>2004</b>	212,226.00	5.96	70.88
<b>2005</b>	172,973.00	5.76	57.77
<b>2006</b>	169,098.00	6.07	56.48
<b>2007</b>	159,634.00	6.18	53.32
<b>2008</b>	167,276.00	6.13	55.87
<b>2009</b>	158,806.00	6.19	53.04
<b>2010</b>	147,115.00	6.27	49.14
<b>2011</b>	178,497.00	6.54	59.62
<b>2012</b>	190,414.00	6.60	63.60
<b>2013</b>	200,471.00	6.42	61.16



**Figure 3.** Commercial Fishery Landings of spiny lobster reported in Puerto Rico by year during 1998 - 2013.

### CONCLUSIONS

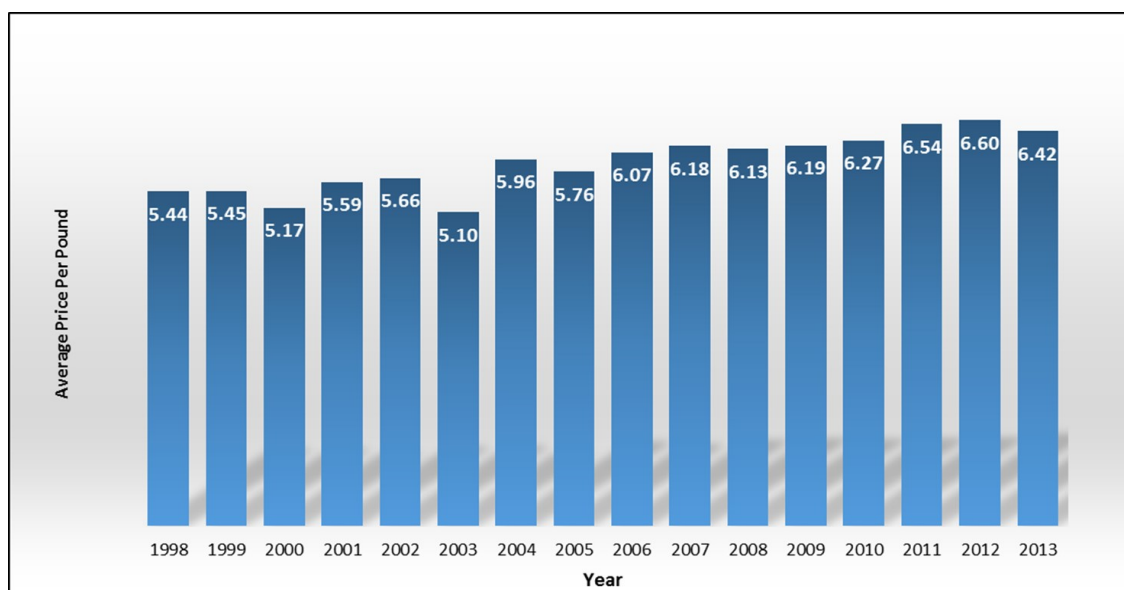
The spiny lobster landings since 1998 - 2013 has been stable. The commercial fishery of this important shellfish is not overfished. The fishery regulations by PRDNER and NOAA/CFMC that includes minimum legal size of 3.5 inches and prohibited the catch of gravid females help to keep healthy the spiny lobster population. Also, the decreased in the number of commercial fishers and traps (fish and lobster) resulted in a reduction of this species fishing pressure.

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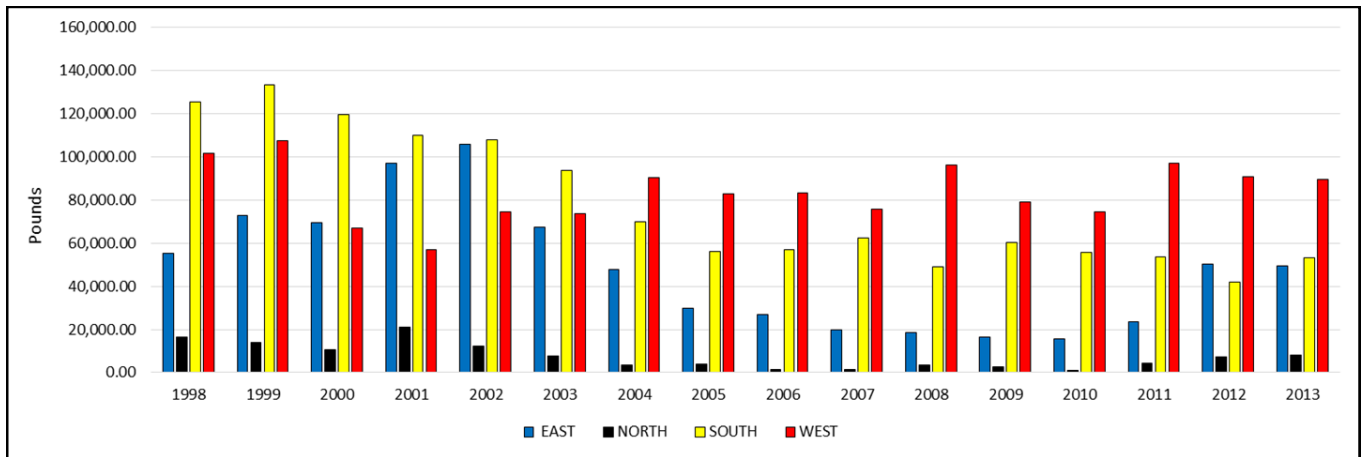
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**Table 2.** Puerto Rico's Commercial Fisheries Landings and mean price per pound for spiny lobster reported during 1998-2013.

YEAR	EAST		NORTH		SOUTH		WEST		TOTAL	
		*P/P		*P/P		*P/P		*P/P		*P/P
1998	55,497.00	5.28	16,683.00	6.20	125,689.00	5.13	101,532.00	5.15	299,401.00	5.44
1999	73,047.00	5.50	14,064.00	6.03	133,353.00	5.08	107,342.00	5.18	327,806.00	5.45
2000	69,541.00	5.43	10,840.00	5.51	119,597.00	4.83	67,018.00	4.91	266,996.00	5.17
2001	97,141.00	5.79	20,955.00	5.96	110,004.00	5.35	56,918.00	5.26	285,018.00	5.59
2002	106,080.00	5.82	12,329.00	5.99	107,916.00	5.50	74,428.00	5.32	300,753.00	5.66
2003	67,401.00	5.25	7,743.00	5.48	93,929.00	5.24	73,510.00	4.42	242,583.00	5.10
2004	47,796.00	5.96	3,734.00	6.61	70,085.00	5.96	90,611.00	5.31	212,226.00	5.96
2005	29,975.00	5.54	3,834.00	6.58	56,128.00	5.62	83,036.00	5.30	172,973.00	5.76
2006	27,060.00	6.05	1,620.00	6.76	57,149.00	5.81	83,269.00	5.66	169,098.00	6.07
2007	19,824.00	6.04	1,387.00	6.86	62,439.00	6.00	75,984.00	5.81	159,634.00	6.18
2008	18,753.00	6.02	3,442.00	6.51	48,989.00	6.07	96,092.00	5.93	167,276.00	6.13
2009	16,567.00	6.22	2,658.00	6.47	60,426.00	6.11	79,155.00	5.94	158,806.00	6.19
2010	15,785.00	6.27	1,111.00	6.63	55,769.00	6.25	74,450.00	5.92	147,115.00	6.27
2011	23,446.50	6.34	4,222.00	7.44	53,794.00	6.38	97,082.00	5.98	178,544.50	6.54
2012	50,409.00	6.31	7,300.00	7.18	41,898.00	6.24	90,807.00	6.05	190,414.00	6.60
2013	49,643.00	6.23	8,094.00	7.13	53,299.00	6.23	89,435.00	6.10	200,471.00	6.42



**Figure 4.** Puerto Rico's commercial landings of spiny lobster average price per pound per year 1998-2013.



**Figure 5.** Puerto Rico's commercial fisheries landings spiny lobster reported by coast during 1998 - 2013.