Comprehensive Census of the Marine Commercial Fishery of Puerto Rico 2002

by

Daniel Matos-Caraballo, Milagros Cartagena-Haddock and
Noemí Peña-Alvarado
Puerto Rico Department of Natural and Environmental Resources
Fisheries Research Laboratory
P.O. Box 3665
Mayagüez PR 00681-3665

Telephone 787-833-2025
Fax 787-833-2410
E-mail – fspfrl@coqui.net

ABSTRACT

Puerto Rico's marine commercial fishery is artisanal. Important features of Puerto Rico's fishery include multispecies nature, multigear competition, population pressure, technological change and often the absorption of unemployed or part time labors. The fishery resources of the mentioned Island are overexploited. The Puerto Rico Department of Natural and Environmental Resources (PRDNER) gives the commercial fishing license for a four years period. Due to the overexploited fishery resource and socioeconomic fluctuations the number of commercial active fishers change constantly year by year. Also the fact that fishing license has a validation period of four years, does not allow the PRDNER to account how many fishers are active thru the license system. Thus PRDNER Fisheries Research Laboratory realized a comprehensive census of the marine commercial fishery of Puerto Rico during 2002. This fishing census accounted the number of active fishers, fishing vessels and number of fishing gears.

For year 2002, a total of 1,163 active commercial fishers were reported by this census. Also 956 fishing vessels, 2,792 nets units (e.g. trammel nets, gill nets), 12,310 line units (e.g. hand line, troll line), 13,146 traps units (fish and lobster pots) and 3, 758 diving units (e.g. tanks, spears) A decreasing trend in the number of active commercial fishers and number of full time fishers was observed. Active fishers were questioned about their perception of the status of the fishery resources. The report also discuss the fishery trends observed.

Key words: Commercial Fishery Census, Overfishing, Puerto Rico.

RESUMEN

La pesca comercial en Puerto Rico es artesanal. Aspectos importantes de la pesca en Puerto Rico incluyen la naturaleza de multiespecies, competencia entre artes de pesca, presión poblacional, cambios tecnológicos y a menudo el desempleo o trabajadores a tiempo parcial. El recurso pesquero de Puerto Rico está sobre explotado. El Departamento de Recursos Naturales y Ambientales de

Puerto Rico (DRNAPR) ofrece una licencia de pesca comercial por un período de cuatro años. Debido a la sobre explotación del recurso pesquero y a las fluctuaciones socioeconómicas el número de pescadores comerciales activos cambia constantemente de año en año. También el hecho de que la licencia de pesca tiene un período de validez de cuatro años, no le permite al DRNAPR contabilizar cuantos pescadores están activos mediante el sistema de licencias. Por lo tanto el Laboratorio de Investigaciones Pesqueras del DRNAPR, realizó un censo de la pesca comercial en Puerto Rico durante el 2002. Este censo pesquero contabilizó el número de pescadores comercial activos, embarcaciones de pesca y el número de artes de pesca.

Para el año 2002, un total de 1,163 pescadores comerciales activos fue reportado en este censo. También 956 embarcaciones de pesca, 2,792 unidades de redes (ej. mallorquín, trasmallo), 12,310 unidades de línea (ej. línea de mano, silga), 13,146 unidades de trampas (nasas y cajones) y 3,758 unidades de buceo (ej. tanques, fisga). Se observó una disminución en el número de pescadores activos y el número de pescadores a tiempo completo. Se les preguntó a los pescadores activos su percepción acerca del estatus del recurso pesquero. El reporte también discute las tendencias observadas en la pesquería.

Palabras claves: Censo de Pesca Comercial, Sobrepesca, Puerto Rico.

INTRODUCTION

Puerto Rico's fishery is artisanal. Important features of Puerto Rico's fishery include multispecies nature, multigear competition, population pressure, technological change and often the absorption of unemployed or part time labors. The fishery resource of Puerto Rico have to date shown the classic signs of overfishing which include reduced total landings, declining catch per unit effort, shifts to catch per unit effort, shifts to catch smaller sized individuals and recruitment failures (Matos-Caraballo, in press).

Puerto Rico's fishing law (Law 278) did not define the terminology "commercial fishers." This lack of definition obligated the Department of Natural and Environmental Resources (DNER) to approve approximately 3,500 commercial fishers' licenses during 2000.

Due to the complexity of the fishery and to the continuing and constant changes in the fishing communities, assessing the status of the artisanal fishery in Puerto Rico is necessary, thru a census.

Information on the universe of commercial fishing in Puerto Rico (number of active commercial fishers, vessels, gears, and socioeconomic data) will provide fishery managers with precise and accurate data. This data will enable them to formulate measures that will be applicable to the current operations of the fishery and result in a better management of the fishery resources. Thus, the objective of this project is to describe the universe of the commercial fishery in Puerto Rico, to help fishery managers in the formulation of the management strategies. The goals of this project are:

1. Collect data to determine the total number of active commercial fishers.
2. Obtain socioeconomic information to classify each commercial fishers in his corresponding category as: full time or part time.

3. Collect data to determine the number and length of active commercial vessels, number of motors and the motor's horsepower.

4. Collect data to determine the number and type of active gears.

METHODS

Two port samplers were contracted and trained to interview the commercial fishers. They visited the 42 coastal municipalities and the 92 fishing centers (landing areas), to identify and interview every active commercial fisherman (Figure 1). The coastal municipalities of Quebradillas, Manatí and Luquillo did not have commercial fishing activity during 2002.

Two census port samplers organized commercial fishers meetings in every fishing center. The fisheries statistics port samplers helped to organize some of these meetings. The census port samplers interviewed all attending fishers. The fishers that did not assist to the meeting were identified. Later, the census port samplers tried to reach these fishers at the dock or at their home. Identified commercial fishers that did not cooperate were accounted. The census port samplers tried to get the information about the vessels and gears from other fishers that know the elusive person. Puerto Rico's Commercial Statistics Program (CSP) port samplers helped to the meeting organization and to find non attendees fishers to the meetings.

Every interview included questions to determine the following information:

1. Fishing center
2. Fisher name
3. Nickname
4. Age
5. Postal address and telephone number
6. License number or social security number
7. Number of hours spent weekly in a fishery. Less than 40 hours was considered a part time fisherman. Forty or more hours were considered full time.
8. Fishing association belonging to
9. Number of vessels used in the commercial fishery
10. Length of each vessel (feet)
11. Horsepower for every motor
12. Fishing categories (e.g. reef fish, pelagic, deep snapper, bait)
13. Catch handling (gutted, iced, nothing)
14. Fish marketing: sells the catch to a fishing association, private fishing enterprise, a restaurant, own business, walking)
15. Number and description by gear type (e.g. fish trap, trammel net, hand line).
16. How fishers feel about the status of the fishery resource compared with the past (better, same, worst)

All the information was entered in Microsoft Access format. Later the information was analyzed. Analysis of the universe of the fishery by coast and by municipality was generated. Individual fishers and/or fishing business that cooperate giving information to this project are protected by Magnuson Act's confidentiality regulations.

RESULTS

A total of 1,163 fishers were interviewed by the port samplers (Table1). A 36% (423) of persons mentioned that they were full time fishers and 64% (740) mentioned that they were part time fishers (Table 1). The west coast had the highest number of fishers by coast, with 325. The municipality that reported more fishers was Cabo Rojo, with 125 (Table 1). An 82% (955) of the interviewed fishers have DNER license (Table 1). A 66% (762) of the interviewed fishers belong to a fishing association (Table 1).

The older average age by coast was the north coast, with 50 years old (Table 1). On the other hand, the younger average age by coast was the south and west coast with 47 years old (Table 1). The municipality of Guayanilla reported the older population of fishers, with 57 years old and Patillas had the younger with an average of 34 years old.

Due to the multispecies and multigear fishery, it was observed that most fishers exploited two or more fishing locations. A total of 17 % of the fishers interviewed fished on the shore, 83 % on the continental shelf, 19 % on the shelf edge and 48 % on oceanic waters. Also the multigear and multispecies characteristics lead most of puertorrican commercial fisher to use two or more fishing types. Reef fish (including conch and lobster) were exploited by 87 % of the total fishers, 36 % exploited the pelagic, 37 % exploited the deep water snapper and 56 % exploited the bait . Some regional specializations in fishing type are observed by municipality.

Most fishers used two or more ways to market their catch. Fish marketing results shown that 30 % of the fishers sold to a fish buyer, 47 % sold to an association, 28 % sold walking, 7 % sold to restaurants and 3 % sold thru their own business. The management of the catch has been reported as 40% of the interviewed fishers gutted the catch and 60 % used ice.

A total of 956 fishing vessels were reported (Table 2). From this 13 % (124) were < 15 feet, 68 % (653) were 16-21 feet, 15 % (147) were 22-29 feet and 3 % (8) were larger than 30 feet (Table 2). A total of 889 motors were reported (Table 2). The average of horsepower of the mentioned motors was 66 (Table 2).

Net categories reported 2,792 units (Table.3). From the total nets, the beach seine was 5 % (147 units), gill net was 36 % (993 units), trammel net was 14 % (391 units) and the cast net was 45 % (1,267 units).

Line categories reported 12,310 units (Table 3). From the total lines, the long line was 4 % (508 units), hand line was 76 % (9,306 units) troll line was 11 % (1,356 units) and rod and reel 9 % (1,144 units).

Trap categories reported 13,146 units (Table 3). From the total of traps the fish trap was 78 % (10,372 units), lobster trap was 21 % (2,774 units) and 346 lifter gears to lift up the traps (Table 3).

Diving categories reported 3,758 units (Table 3). From the total of fishers reported (1,163), 385 practice skin diving (34 %) and 225 practice SCUBA diving (20 %). The skin and SCUBA divers used 929 air tanks, 618 spears, 1,671 gaffs, 502 laces and 38 baskets to lift up the conch (Table 3).

An interesting result was that 30 % of the fishers thought the status of the fishery is the same as in the past. On the other hand, 67 % of the fishers thought that the status of the fishery is worst than in the past, and 3 % though that it is better (Table 4). For the group of fishers that felt the fishery resource was worst they were asked for a reason the situation. They had four choices (pollution, habitat destruction, overfishing and other) and they could selected one or more choices. Pollution was the most mentioned with 50 %, followed by habitat destruction with 28 % and overfishing with 22 %.

DISCUSSION

In 1931, a total of 1,403 active commercial fishers were reported in Puerto Rico (Jarvis, 1932). Fisheries Research Laboratory data showed that since 1972, that number of active commercial fishers in Puerto Rico has not change (Figure 2). The percentage of full time fishers decreased from 72% in 1996, to 64% in 2002. The west coast and the municipality of Cabo Rojo continued being the most active coast and municipality, respectively. A significant difference was observed between the number of active commercial fishers in the 1996 census (Matos-Caraballo, 1996) and the 2002. The number of active fishers decreased from 1,758 in 1996, to 1,163 in 2002. During 1996 census, 81% of the fishers had DNER license, and for 2002, were 82%. Unfortunately, approximately 3,500 people have DNER commercial fishers license. The law 278 of November 29, 1998 established definitions for commercial fishers, unfortunately, after five years this law is not in use, because DNER did not approve the fishery regulations required by the mentioned law. On the other hand, the decrease in the number of active commercial fishers was expected by the authors. Since 1989 the PR/NMFS Commercial Fisheries Statistics Program (CSP) concluded that the Puerto Rico fishery resource showed overfishing symptoms (Matos-Caraballo and Torres-Rosado, 1989; Matos-Caraballo, in press a and b). The decrease in landings reported the decrease in the length of silk snapper and lane snapper, changes in catch composition and changes in traditional fishing gears has been documented. Due to the fact of overfished resources many commercial fishers transferred to construction jobs, agriculture jobs or move to Continental U.S.A. to work in factories or landscaping. Although 595 less active commercial fishers moved to other jobs, 3.5 millions of pounds have been reported per year in Puerto Rico since 1995-2002. That means the fishery resources continue to be on high pressure (Matos-Caraballo, in press a and b).

Average ages per coast and per municipality show that the distribution of active commercial fishers varies from 34 to 57 years. The data also indicates that fishing activity in Puerto Rico will continue for a long time, if the fishing resources withstand the exploitation rate.

Tropical waters are rich in diversity of habitat and species. Due to this fact the Puerto Rico's fishery is multispecies and multigear. The census data confirm that most fishers in Puerto Rico uses two or more fishing locations and

two or more fishing types and gears. Geographical site influence the fishing location and fishing type. For example Aguada and Aguadilla have a small continental shelf, the oceanic waters are close to the coast, and thus the fishers from those municipalities practice more pelagic fisheries. The north coast has approximately six months of strong surges that difficult vessel fishing trips, thus they practice more shore fishing. The continental shelf was the most exploited fishing location and the reef fish (including conch and lobster) were the most used fishing type in Puerto Rico. The use of the continental shelf increases from 70% in 1996 to 83% in 2002. The shelf edge decreased from 43% in 1996 to 19% in 2002. Since 1992 the PR/NMFS Commercial Fisheries Statistics Program mentioned that 90% of silk snapper was caught before reaching the minimum site of sexual maturation (410 mm FL). This species was the most landed by pounds in Puerto Rico since the 70's. However for 1999-2001 this species was the third most reported species. The decrease observed in the pressure of shelf edge may help in the recovery of silk snapper. Oceanic water increased from 46% in 1996 to 48% in 2002. The use of the shore decreased from 31% in 1996 to 17% in 2002. These data probably mean that the fishers are more aggressive and prepared to find the overfished resources of Puerto Rico. Data collected during this census, suggested that fishers learned to market better their catch. Most fish buyers mentioned to FRL's port samplers how difficult is to keep fishers selling constantly to the same fish buyer. The problem is that one fish buyer increases his price the fishers immediately sell their catch to this person. Also most fishers use two or more marketing strategies to increase their income. The percentage of fishers selling by walking decreased from 41% in 1995-96 to 28% in 2002. The percentage of fishers selling to a fish buyer decreased from 33% in 1995-96, to 30% in 2002. The percentage of fishers selling to an association increased from 40% in 1995-96, to 47% in 2002. The percentage of fishers using their catch to their own business decreased from 13% in 1995-96, to 3% in 2002. The percentage of fishers selling their catch to a restaurant decreased from 10% in 1995-96, to 7% in 2002. Fishers claim that restaurants are using fish products from USA, Mexico, Costa Rica or others Caribbean countries.

The number of active fishing vessels in 1995-96 was 1,501, which means a decrease of 545 fishing vessels less in 2002 (Figure 3). The data shows a relation between the number of vessels and the quantity of fishers, which indicates that more fishers acquired their own boats. Since 1992, the Puerto Rico's Department of Agriculture started a Fisheries Loan and Incentive Program. Probably the mentioned program and the improvement of the fish marketing observed in 2002, helped many fishers to obtain their own first fishing vessel or a second one. On the other hand the number of motors (889) was less that the number of fishing vessels, in 2002. Thus some fishers use one motor for two or more boats.

Since 1976-2002, the number of gears has been monitored by FSP (Figure 4). A total of 821 less nets units were reported in 2002 than in 1995-96. In 1996, a total of 231 beach seine units were reported and 84 less beach seine were reported in 2002. This gear frequently fish nursery areas of fish and shellfish, resulting in the catch of juvenile's individuals. However has been observed by the author and FSP port samplers that the use of this gear has been

declining. The reduction in use of the beach seine will benefit fishing resources. A total of 392 units of gill nets and 470 units of trammel nets less were reported in comparison with 1996 census. The cost of these nets is high so the catch by them result in a low profit, the use of this gear is supposed to be reduced. The number of cast nets in 1996 and 2002 census were similar. It is probable that many active commercial fishers moved from nets to hooks, due to the fact of the increase of hook units in 2002.

A total of 2,505 more line units were reported in 2002 than in 1995-96. The long line category decreased in 412 units, the hand line category increased in 2,579 units, the troll line increased in 328 units and the rod and reel remained similar. Although the number of active commercial fishers decreased from 1996 to 2002, the number of fishing gear increased, thus, the fishing pressure is still high.

A total of 2,385 less trap units were reported in 2002 than in 1996. The fish trap category decreased 841 units from 1996 and the lobster trap category decreased 1,494 units this last category has been decreasing since 1988. The fishers claimed that high cost of traps, high number of stolen traps and low quantities of catch resulted in the decrease of use of the gear.

The divers (skin and SCUBA) were 36 % in 1996, and in 2002 increased to 53 % of the total fishers. Due to the decrease in the fishery resource, the fishers are obligated to use more gears to improve their catches. The diver's main targets are the lobster and conch, two of the best priced species in Puerto Rico. Another advantage of divers is that they can fish when the weather hinders other fishing activities. Also it has been observed that younger commercial fishers are divers.

The total number of fishing gears units was very similar, 32,344 in 1996 (Matos-Caraballo, 1996) and 32,352 in 2002. On the other hand the number of active commercial fishers was different, 1,758 in 1996 and 1,163 in 2002. Probably the overexploited and scarce Puerto Rico's fishery resources are harder to catch. Almost all fishers use more than one gear to obtain a better catch (Figure 5). Consequently, fishers had to increase the fishing effort to be successful in this business.

CONCLUSION

The number of fishers in Puerto Rico did not show a significant change since 1974-1996. However, 595 less active commercial fishers were found in 2002, compared to 1996 census. On the other hand, in 2002, the commercial vessels, units of nets and traps decreased and the hooks and divers units increased. However the number of gear units of 1996 census and 2002 census were similar.

The Commercial Fisheries Statistic Program has shown strong evidence that support the overfishing problem in Puerto Rico. Evidence of habitat degradation and pollution are also responsible for the decrease fishery resource (NOAA's Plan Development Team, 1990). The 67 % of commercial fishers in Puerto Rico mentioned that the fishery resource is worst that in the past. They mentioned that pollution is the main factor, followed by overfishing and coral habitat degradation. Commercial fishers need more information about the fishery resource status.

It is recommended to the local and federal government agencies to initiate the implementation of marine reserves to conserve fishery resource and stop habitat degradation. Also, it is recommended the development of management plans and fishing regulations of the Law 278 of November 29, 1998 to limit the fishing effort in the overfishing fishery resource of Puerto Rico.

ACKNOWLEDGEMENT

We want to express our deep gratitude to all that made possible this fisheries census. To NOAA/NMFS cooperative fisheries statistics program that provided the funds. To Puerto Rico's Department of Natural and Environmental Resources (DNER) that assisted with administrative affairs. To Puerto Rico's Commercial Fisheries Statistics port samplers Walter Irizarry, Jesús León, Héctor Y. López, and Luis A. Rivera, whom helped to coordinate commercial fisher meetings where fishers were interviewd. To DNER's biologists Grisell Rodríguez and Yamitza Rodríguez, who helped to develop Access data entry software. To Miguel Figuerola who edited the paper. Finally, we want to acknowledge all the commercial fishers that participated during the data collection; without their support this project couldn't have a success.

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Municipality	Full time	Part time	Total	Average age	License owner	Associate
North Coast	**68**	**198**	**265**	**50**	**233**	**212**
Isabela	5	15	20	45	12	15
Camuy	5	8	13	50	11	13
Hatillo	0	4	4	43	3	0
Arecibo	3	29	32	49	31	29
Barceloneta	2	10	12	54	8	8
Vega Baja	7	29	36	51	31	22
Vega Alta	8	5	13	51	12	11
Dorado	1	8	9	55	8	9
Cataño	5	20	25	44	21	19
San Juan	22	20	41	54	40	40
Carolina	1	13	14	52	13	10
Loiza	6	14	20	50	19	19
Rio Grande	3	23	26	55	24	17
East Coast	**106**	**148**	**253**	**49**	**225**	**181**
Fajardo	20	30	50	53	47	52
Ceiba	3	12	15	53	15	12
Naguabo	13	17	30	56	30	28
Humacao	29	21	50	50	43	46
Yabucoa	10	3	13	54	11	10
Maunabo	7	4	10	41	7	4
Culebra	4	20	24	42	16	12
Vieques	20	41	61	40	56	17
South Coast	**136**	**182**	**317**	**47**	**257**	**192**
Patillas	8	3	11	34	8	7
Arroyo	2	19	21	47	16	11
Guayama	6	25	31	48	30	11
Salinas	11	15	26	53	16	8
Santa Isabel	13	19	32	49	30	30
Juana Diaz	6	9	15	41	10	7
Ponce	29	17	46	51	42	42
Peñuelas	11	10	21	45	17	19
Guayanilla	7	13	20	57	16	14
Guánica	17	15	32	41	20	15
Lajas	26	37	62	51	52	28
West Coast	**113**	**212**	**325**	**47**	**240**	**177**
Cabo Rojo	37	88	125	46	86	49
Mayagüez	12	36	48	51	37	38
Añasco	12	22	34	53	29	18
Rincón	23	12	35	38	19	21
Aguada	15	9	24	47	19	17
Aguadilla	14	45	59	48	50	34
Total	**423**	**740**	**1,163**	**48**	**955**	**762**

Table 1. Number and type of fishers reported in Puerto Rico's commercial fishery during 2002.

Municipality	Number of fishing vessels length (Feet)							Motors	
	≤ 15	16-21	22-29	30-39	40-64	>65	Total	# of Motors	HP Average
North Coast	**37**	**150**	**23**	**4**	**2**	**0**	**216**	**207**	**73**
Isabela	2	5	0	0	0	0	7	7	43
Camuy	4	6	0	0	0	0	10	10	45
Hatillo	1	2	1	0	0	0	4	4	48
Arecibo	2	21	1	0	0	0	24	24	75
Barceloneta	4	7	2	0	0	0	13	12	76
Vega Baja	5	18	4	1	0	0	28	28	93
Vega Alta	6	5	1	0	0	0	12	11	49
Dorado	0	8	1	0	0	0	9	9	55
Cataño	3	16	1	0	0	0	20	22	50
San Juan	1	29	3	1	1	0	35	33	80
Carolina	4	10	3	2	1	0	20	17	202
Loíza	3	10	0	0	0	0	13	11	35
Río Grande	2	13	6	0	0	0	21	19	92
Luquillo	0	0	0	0	0	0	0	0	0
East Coast	**14**	**115**	**61**	**5**	**4**	**0**	**199**	**191**	**79**
Fajardo	3	27	5	4	1	0	40	38	79
Ceiba	0	13	1	0	0	0	14	12	74
Naguabo	0	12	6	0	2	0	20	20	93
Humacao	4	25	14	1	0	0	44	42	72
Yabucoa	4	3	0	0	0	0	7	7	35
Maunabo	0	5	2	0	0	0	7	7	71
Culebra	1	10	11	0	0	0	22	21	72
Vieques	2	20	22	0	1	0	49	44	133
South Coast	**37**	**195**	**38**	**9**	**0**	**0**	**279**	**272**	**48**
Patillas	0	6	0	0	0	0	6	6	77
Arroyo	2	11	1	0	0	0	14	14	41
Guayama	6	18	9	6	0	0	39	38	74
Salinas	8	11	2	0	0	0	21	21	55
Santa Isabel	2	19	0	0	0	0	21	20	23
Juana Díaz	0	13	0	0	0	0	13	12	34
Ponce	1	32	11	1	0	0	45	44	60
Peñuelas	0	11	0	0	0	0	11	11	53
Guayanilla	3	11	3	0	0	0	17	17	22
Guánica	1	20	4	0	0	0	25	25	72
Lajas	14	43	8	2	0	0	67	64	52
West Coast	**36**	**193**	**25**	**6**	**2**	**0**	**262**	**219**	**62**
Cabo Rojo	8	60	18	6	1	0	93	88	96
Mayagüez	15	22	3	0	0	0	40	40	57
Añasco	2	18	1	0	1	0	22	22	66
Rincón	1	21	2	0	0	0	24	23	90
Aguada	6	26	0	0	0	0	32	23	39
Aguadilla	4	46	1	0	0	0	51	46	26
TOTAL	**124**	**653**	**147**	**24**	**8**	**0**	**956**	**889**	**66**

Table 2. Number of fishing vessels and motors reported in Puerto Rico's commercial fishery during 2002.

Gears	North Coast	East Coast	South Coast	West Coast	Total
Beach Seine	22	25	34	66	147
Gill net	320	224	377	72	993
Trammel net	31	96	153	111	391
Cast net	313	377	395	182	1,267
Long line	160	76	115	157	508
Hand line	2,178	2,272	2,720	2,136	9,306
Troll line	335	401	313	307	1,356
Rod and reel	495	142	384	123	1,144
Fish trap	627	4,269	3,568	1,908	10,372
Lobster trap	105	1,378	1,191	100	2,774
Winch	71	32	27	33	163
Snapper reel	27	34	30	92	183
SCUBA	38	65	64	58	225
Skin	36	33	76	15	160
Number of tanks	149	303	272	205	929
Spear	148	174	200	96	618
Gaff	423	397	540	311	1,671
Lace	142	187	88	85	502
Basket	12	11	13	2	38
Total	**5,632**	**10,496**	**10,560**	**6,059**	**32,747**

Table 3. Number of gears reported in Puerto Rico's commercial fishery during 2002.

	Coasts				
Status	North	East	South	West	Percentage
Better	6	1	1	4	3
Same	23	42	26	23	30
Worst	87	49	69	64	67
Reasons of worst status					
Pollution	59	22	43	35	50
Habitat Destruction	34	38	20	11	28
Overfishing	10	15	15	22	22

Table 4. Percentage of how commercial fishermen feel about the status of the fishery source.

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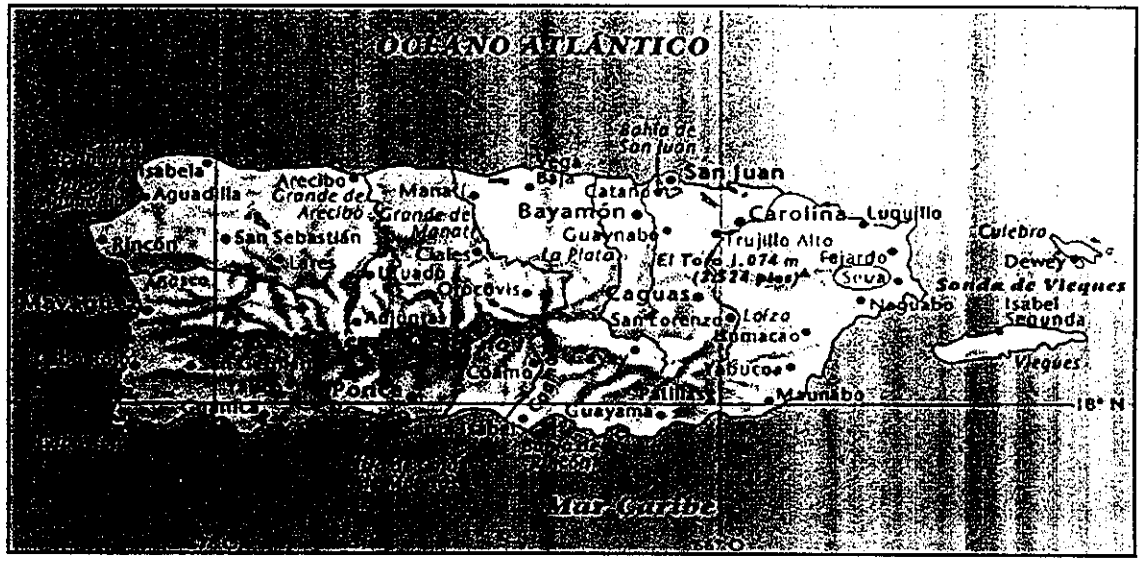
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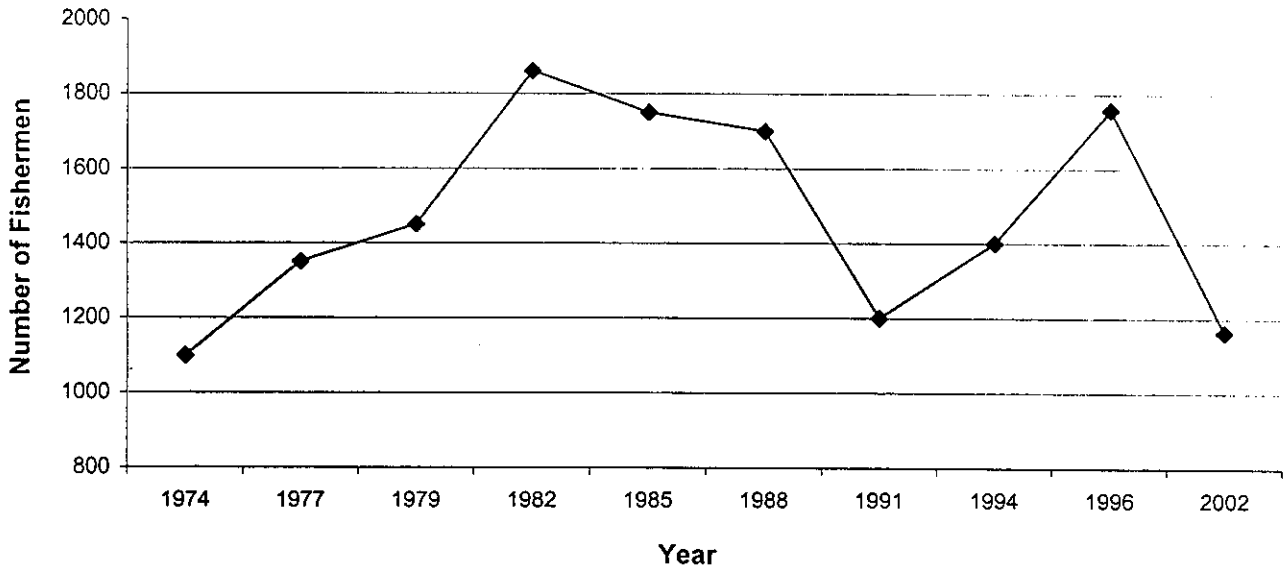
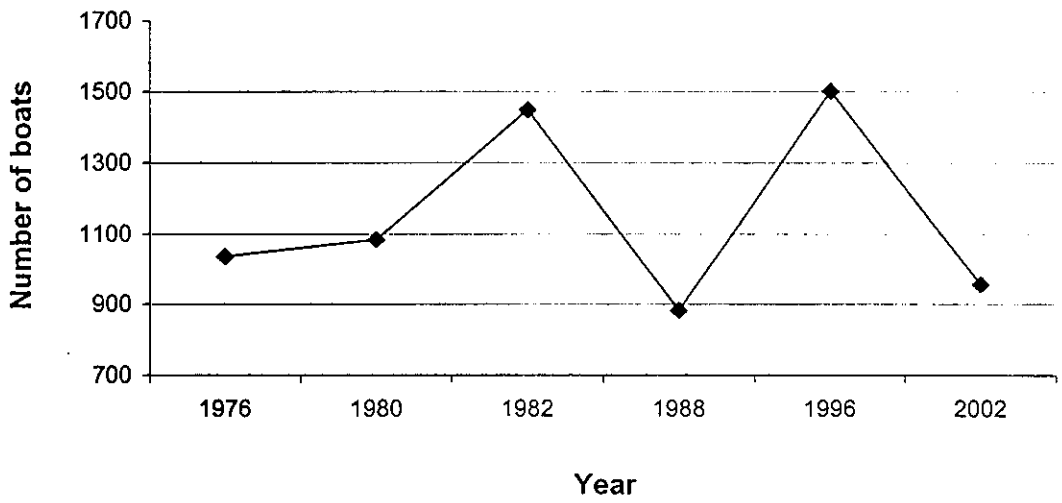
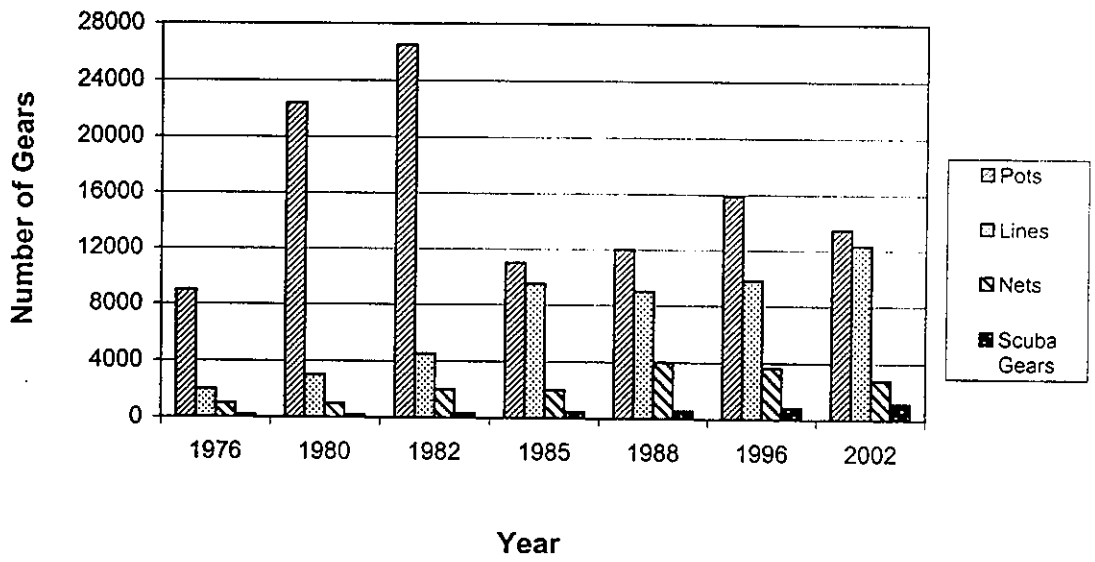
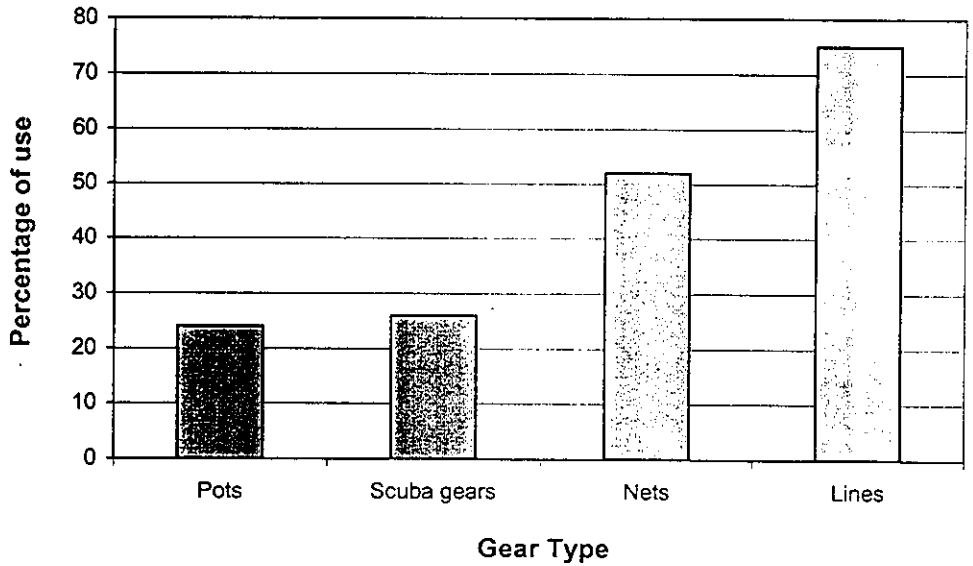
Culebra
Dewey
Rincón
San Sebastián
Guaynabo
Trujillo Alto
Fajardo
Ceiba
Aguada
Utuado
Orocovis
La Plata
El Toro 1,074 m (3524 pies)
Caguas
Naguabo
Sonda de Vieques
Isabel Segunda
Aguadilla
San Lorenzo
Loíza
Juncos
Gurabo
Humacao
Vieques
Cabo Rojo
Coamo
Yabucoa
Patillas
Maunabo
18° N
Guayama
Mar Caribe


2000
1800
1600
1400
1200
1000
800
Number of Fishermen
1974
1977
1979
1982
1985
1988
1991
1994
1996
2002
Year


1700
1500
1300
1100
900
700
Number of boats
1976
1980
1982
1988
1996
2002
Year


28000
24000
20000
16000
12000
8000
4000
0
Number of Gears
1976
1980
1982
1985
1988
1996
2002
Year
Pots
Lines
Nets
Scuba Gears


80
70
60
50
40
30
20
10
0
Percentage of use
Pots
Scuba gears
Nets
Lines
Gear Type