DEPARTMENT OF NATURAL AND ENVIRONMENTAL RESOURCES

FINAL REPORT

To

National Marine Fisheries Service
NOAA

Entitled

Job 3. Comprehensive Census of the Marine Fishery of Puerto Rico, 2002

Text by
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Submitted by

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Acknowledgement

I want to express my 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. Also I want to acknowledge Milagros Cartagena Haddock and Noemí Peña Alvarado, they interview the fishers, did the data entry and helped with the report. Thanks to fisheries statistics programs port samplers Walter Irizarry, Jesús León, Héctor Y. López, and Luis Rivera, whom helped to coordinate commercial fisher meetings to interview the fishers. Thanks to Grisell Rodríguez and Yamitza Rodríguez, who helped to develop Access data entry software. Finally, I want to acknowledge all the commercial fishers that participated during the data collection; without their support this project couldn't been a success.

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 obligates the Department of Natural and Environmental Resources (DNER) to approve approximately 5,000 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.

Materials and 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 do 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 (Figure 2) 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, to note if a significant difference occurred between 1996 census and this one in the number of fishers, vessels and gear types. Analysis of the universe of the fishery by coast and by municipality was generated.

The individual fishers and/or business that cooperate giving information to this project are protected by Magnuson Act's confidential regulations. Confidentiality???

Results

A total of 1,163 fishers were interviewed by the port samplers (Table 1). A 36% (423) of persons mentioned that they were full time fishers and 64% (740) mentioned that they were part time fishers (Table 1 and Figure 3). 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 (Table 2). 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 (Table 2). Some regional specializations in fishing type are observed by municipality (Table 2).

Most fishers used two or more ways to market their catch. Fishing 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 (Table 3). The management of the catch has been reported as 40 % of the interviewed fishers gutted the catch and 60 % used ice (Table 3).

A total of 956 fishing vessels were reported (Table 4). 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 4). A total of 889 motors were reported (Table 4). The average of horsepower of the mentioned motors was 66 (Table 4).

Net categories reported 2,792 units (Table 5). 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 6). From the total lines, the long line was 4 % (508 units), hand 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 7). 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 7).

Diving categories reported 3,758 units (Table 8). From the total of fishers reported (1,163), 385 practice skin diving (34 %) and 225 practice SCUBA diving (20 %) (Table 2). The skin and SCUBA divers used 929 oxygen tanks, 618 spears, 1,671 gaffs, 502 laces and 38 baskets to lift up the conch (Table 8).

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 9). 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 4). 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 29th, 1998, established definitions for commercial fishers, unfortunately, after four years this law is not in use, because DNER not approved 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 author. 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, change in catch composition and changes in traditional fishing gears has been documented. Due to the fact of overfished resources many commercial fishers transfer to construction or agriculture jobs. Others migrate 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 resource 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 resist 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 fisher 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 close to 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 port samplers how difficult is to keep fishers selling constantly to the same fish buyer. The problem is that one fish buyer increases the price and the fishers immediately sell the 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 or Mexico.

The number of active fishing vessels in 1995-96 was 1,501, which means a decrease of 545 fishing vessels less in 2002 (Figure 5). 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. Obviously 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 fishing vessel. On the other hand the number of motors (889) was less that the number of fishing vessels, in 2002. It is probable that some fishers use one motor for two or more boats.

Since 1976-2002, the number of gears has been monitored by FSP (Figure 6 and 7). 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 decreased. The reduction in uses 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 it is supposed to be reduced. The number of cast net 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 decrease in 412 units, the hand line category increased in 2,579 units, the troll line increases in 328 units and the rod and reel maintain similar. Although the number of active commercial fishers decreases from 1996 to 2002, the number of fishing gear increased, thus, the fishing pressure 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. The number of diving gears increased from 1996-2002. 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 and 32,352 in 2002 (Figure 8). 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 uses more than one gear to obtain a better catch (Figure 9). 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. 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 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 most responsible, follow by overfishing and coral degradation. Commercial fishers need more information about the fishery resource status.

It is recommended to the local and federal government agencies to initiate the implementations 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 28th, 1998 to limit the fishing effort in the overfishing fishery resource of Puerto Rico.

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Matos-Caraballo, D. in press a. Status of the Fishery in Puerto Rico, 1990-1993. Proceedings of the 47th GCFI meeting

Matos-Caraballo, D. in press b. Overview of Puerto Rico's Small-Scale Fisheries Statistics 1998-2001. Proceedings of the 55th Gulf and Caribbean Fisheries Institute Meeting.

Matos- Caraballo, D. and Z. Torres Rosado. 1989. Comprehensive Census of the fishery of Puerto Rico. 1988. Technical Report. CODREMAR 1(3): 1-55

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Figure 1- Coastal Municipalities and Fishing Centers in Puerto Rico.

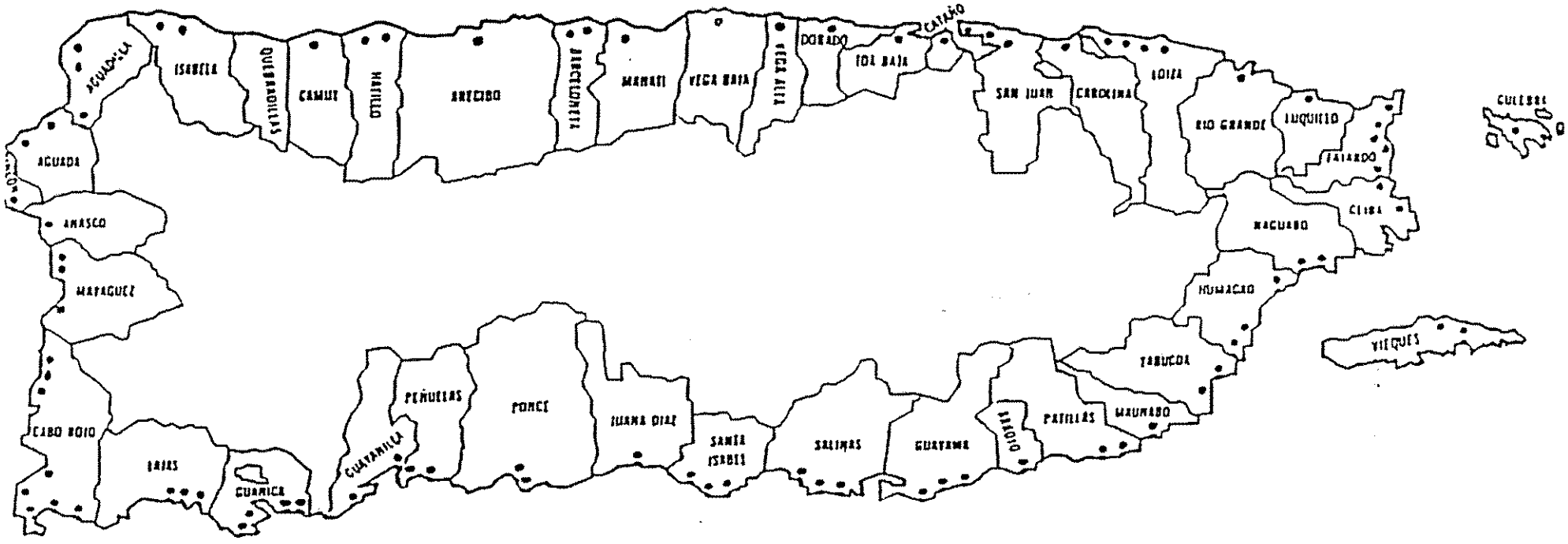

Figure 2. Puerto Rico Fishing Census 2002 Data Sheet

CENSO PESQUERO 2002

Número de entrevista _____ Fecha de entrevista _____
(Interview number) (Date)

Lugar de desembarco _____
(Fishing center)

Nombre del pescador _____
(Fisher name)

Apodo _____ Teléfono _____
(Nickname) (Phone number)

Edad _____
(Age)

Dirección postal _____
(Postal address)

Posee Licencia: Si ____ No ____ # Lic. _____
(License)

Número de Seguro Social _____-____-_____
(Social Security number)

Horas dedicadas a la pesca semanalmente _____
(Hours used for fishing activities)

Pertenece a un grupo o asociación: Si ____ No ____
(Association)

Número de embarcaciones que posee _____
(Quantity of fishing vessels)

Eslora ___ ___ (pies) Manga ___ ___ (pies) Motor ___ ___ HP
(Length) (Width)

P.O. BOX 9066600 PTA. DE TIERRA STATION, SAN JUAN, P.R 00906-6600
PHONE (787) 724-8774 FAX. 723-4255

Localización del centro de pesca
(Fishing center localization)

Orilla _____
(Shore)

Plataforma insular _____
(Continental shelf)

Talud o beril _____
(Shelf edge)

Aguas oceánicas _____
(Oceanic)

Tipo de pesca
(Fishing type)

Peces de arecife _____
(Reef fishes)

Pesca pelágica _____
(Pelagic)

Buceo_____
(SCUBA)

Carnada _____
(Bait)

Pargos de aguas profundas_____
(Deep water snappers)

Buceo a pulmón_____
(Skin diving)

Distribución de la pesca
(Fishing distribution)

Comprador _____
(Fish buyer)

Asociación _____
(Association)

Ambulante _____
(Walking)

Restaurante _____
(Restaurant)

Pescadería Propia _____
(Own business)

Manejo de pescado
(Fish handling)

Desbucha _____
(Gutted)

Hielo _____
(Ice)

Nada _____
(None)

Artes de pesca (Fishing gear)	**Cantidad** (Quantity)	**Artes de pesca** (Fishing gear)	**Cantidad** (Quantity)
Chinchorro (Beach seine)	_____	Instrumentos de subida (Lifters)	

Mallorquín (Trammel net)	_____	Malacate (Snapper reel)	_____
Palangre (Long line)	_____	(Winch)	_____
Silga (Troll line)	_____	<u>Pesca submarina</u> (Diving)	
Nasas (Fish trap)	_____	Buceo a pulmón (Skin)	_____
Trasmallo o filete (Gill net)	_____	Fisga (Spear)	_____
Atarraya (Cast net)	_____	Lazo (Lace)	_____
Cala o cordel de mano (Hand line)	_____	Tanques (Tanks)	_____
Caña (Rod and reel)	_____	Bichero (Gaff)	_____
Cajones (Lobster trap)	_____	Canasto (Basket)	_____

Opinión del Estado de Recursos Pesqueros
(Status of the fishery resource)

Mejor _____ igual_____ peor _____ que otros años.
(Better) (same) (worst)

Razones:
(Reason)

_____Contaminación (Pollution)

_____ Destrucción del habitat (Habitat destruction)

_____ Sobrepesca (Overfishing)

_____ Otras (Especifique) _____

Figure 3. Type of fishermen reported in Puerto Rico's commercial fishery during 2002

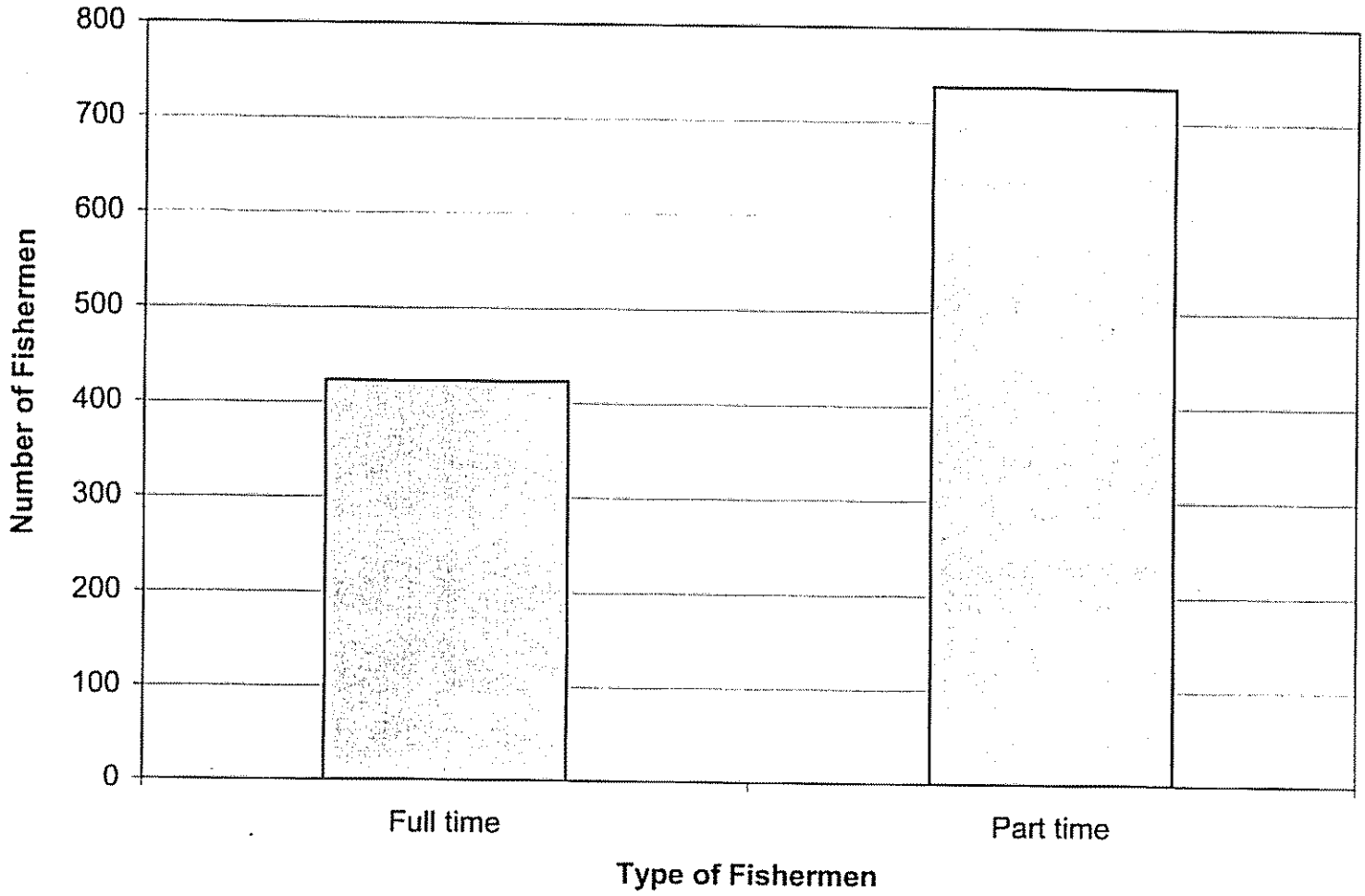

Figure 4. Number of Active Commercial Fishermen Reported in Puerto Rico in 2002

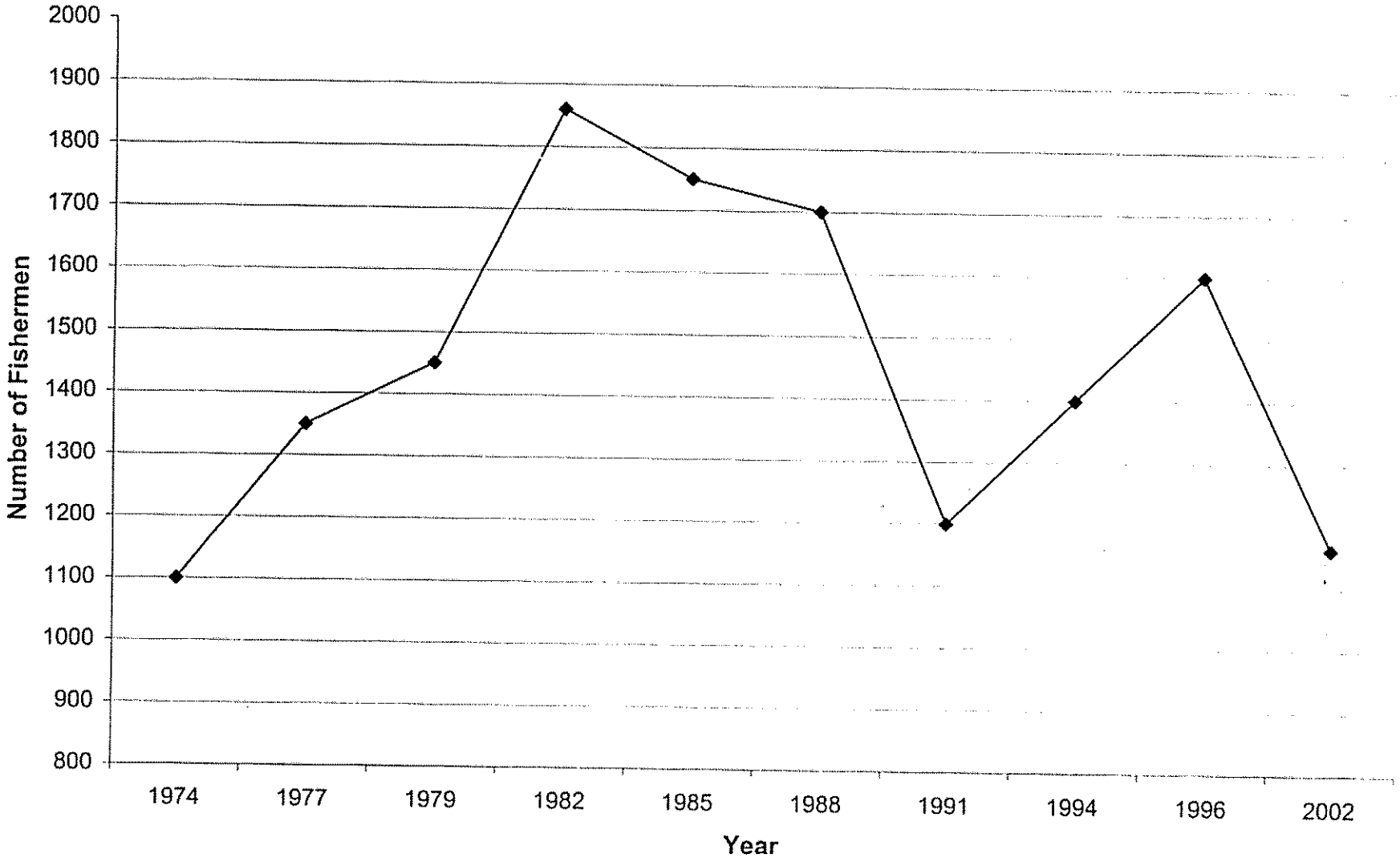

Figure 5. Number of boats between 1976 and 2002

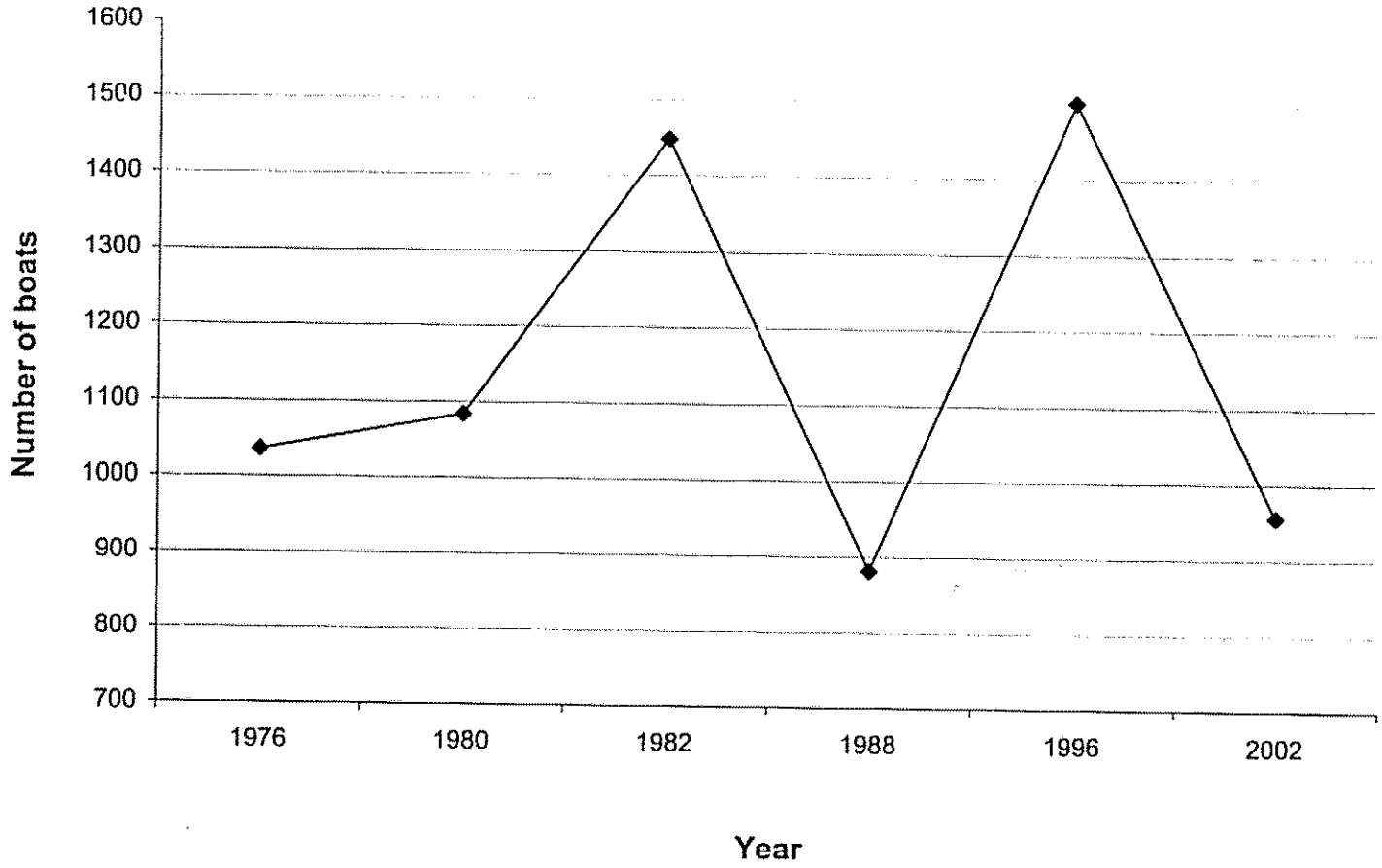

Figure 6. Total Number of Fishing Gears between 1976 and 2002

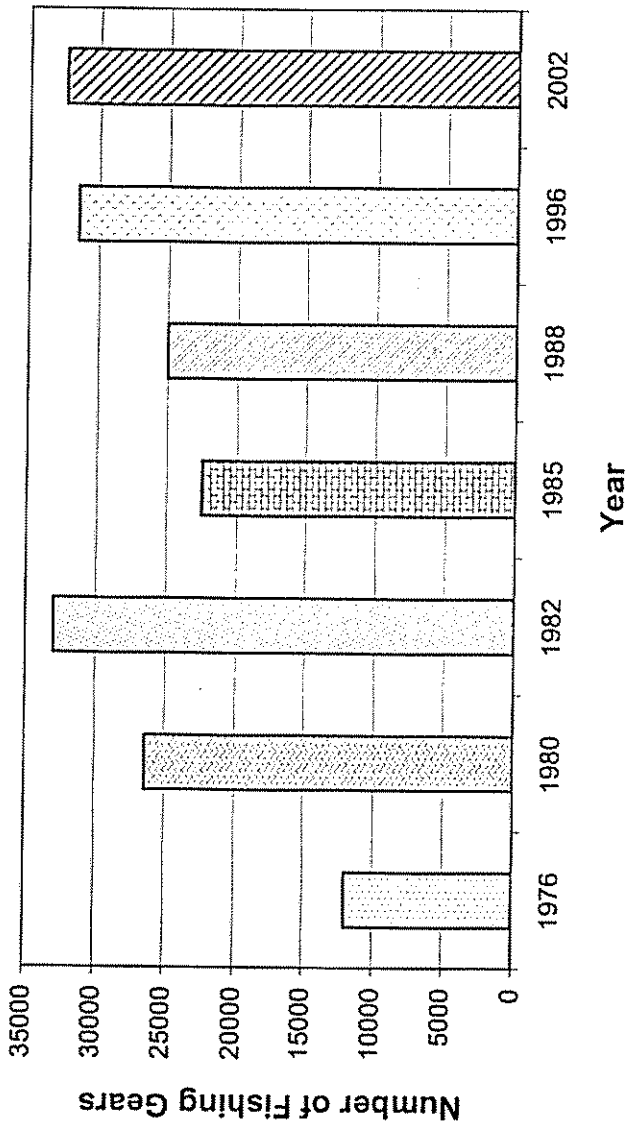

Figure 7. Number of Pots, Lines, Nets, and Scuba Gears between 1976 and 2002

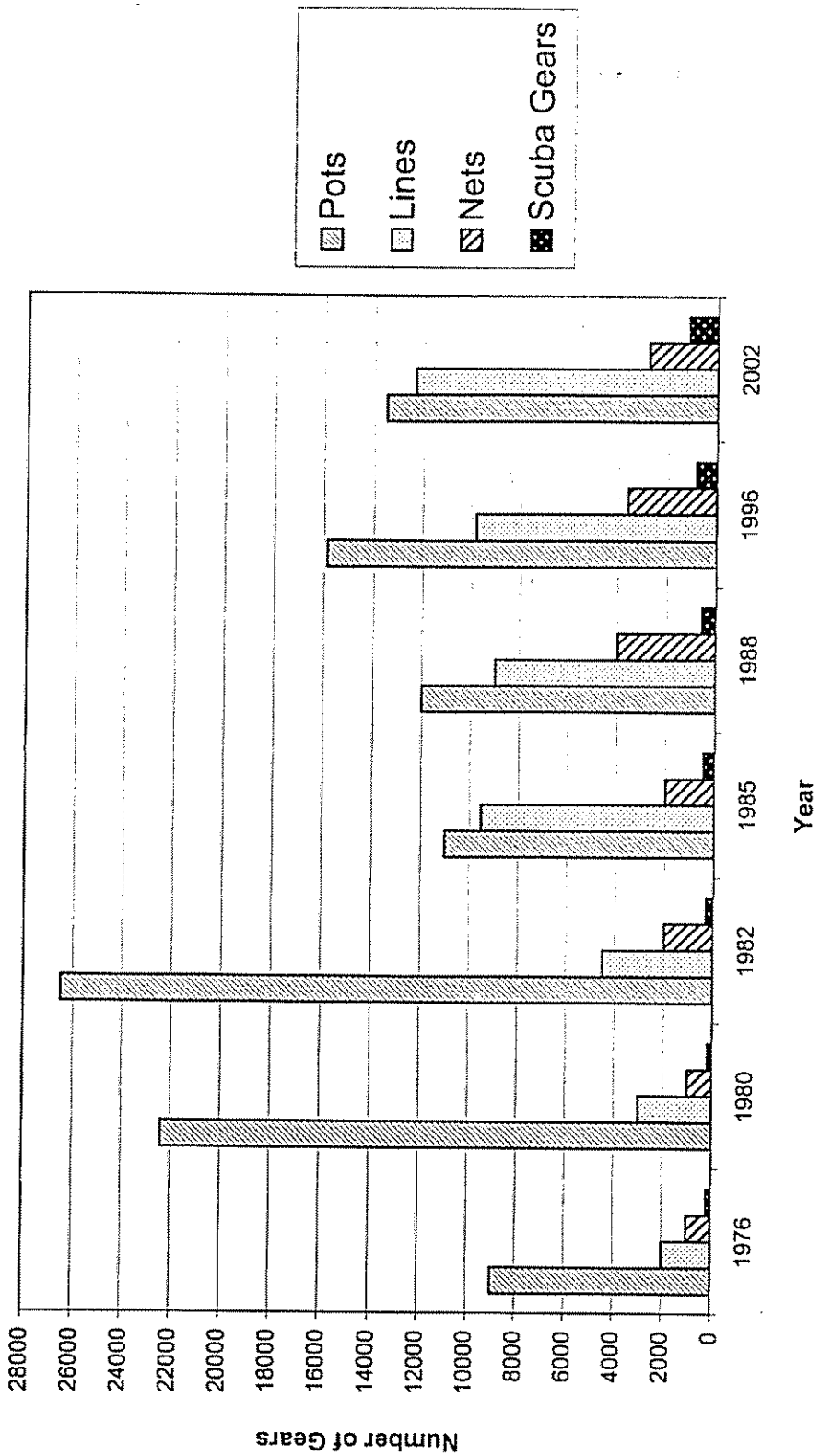

Figure 8. Total Number of Fishing Gears reported in 2002

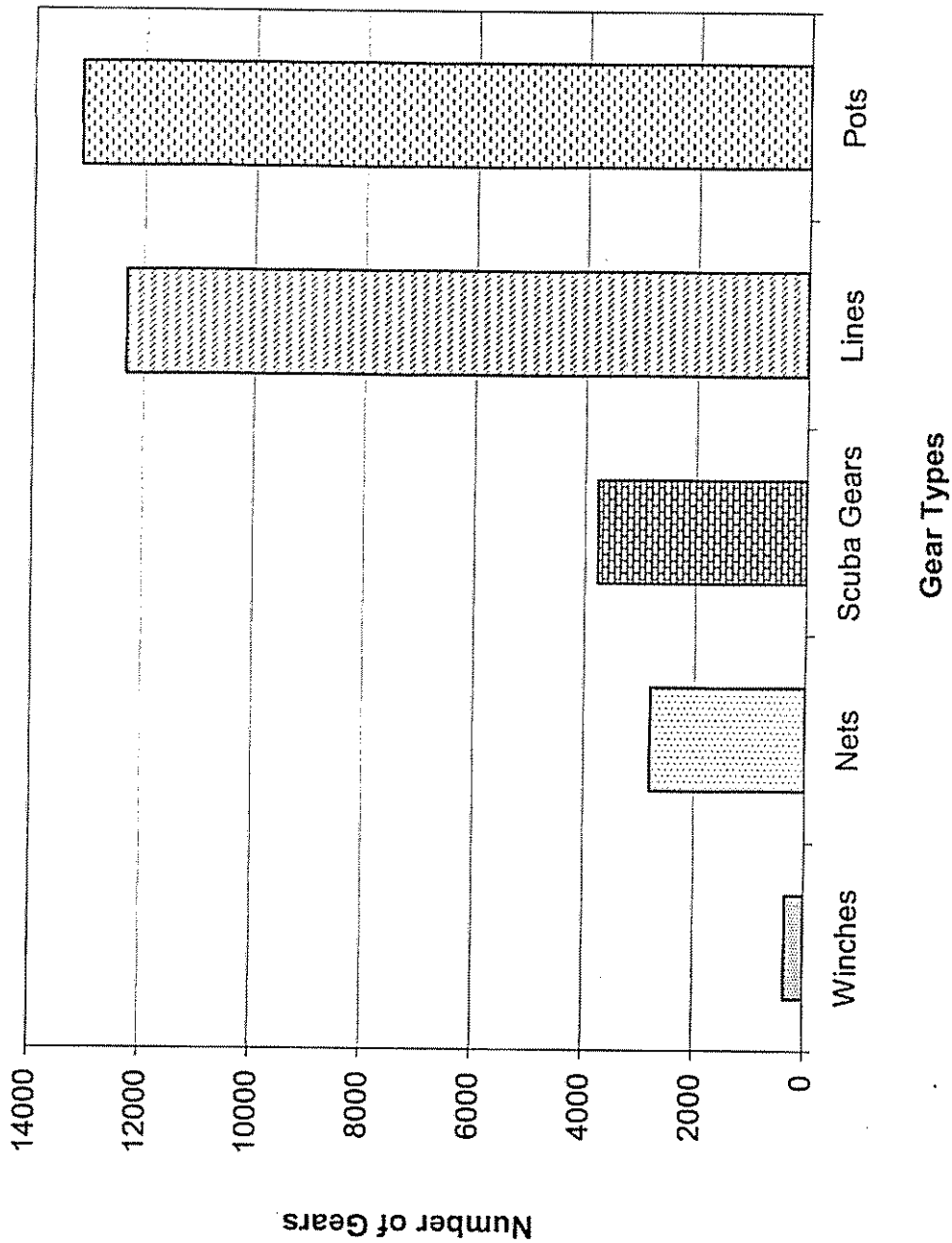

Figure 9. Percentage of fishers using different fishing gear types in 2002

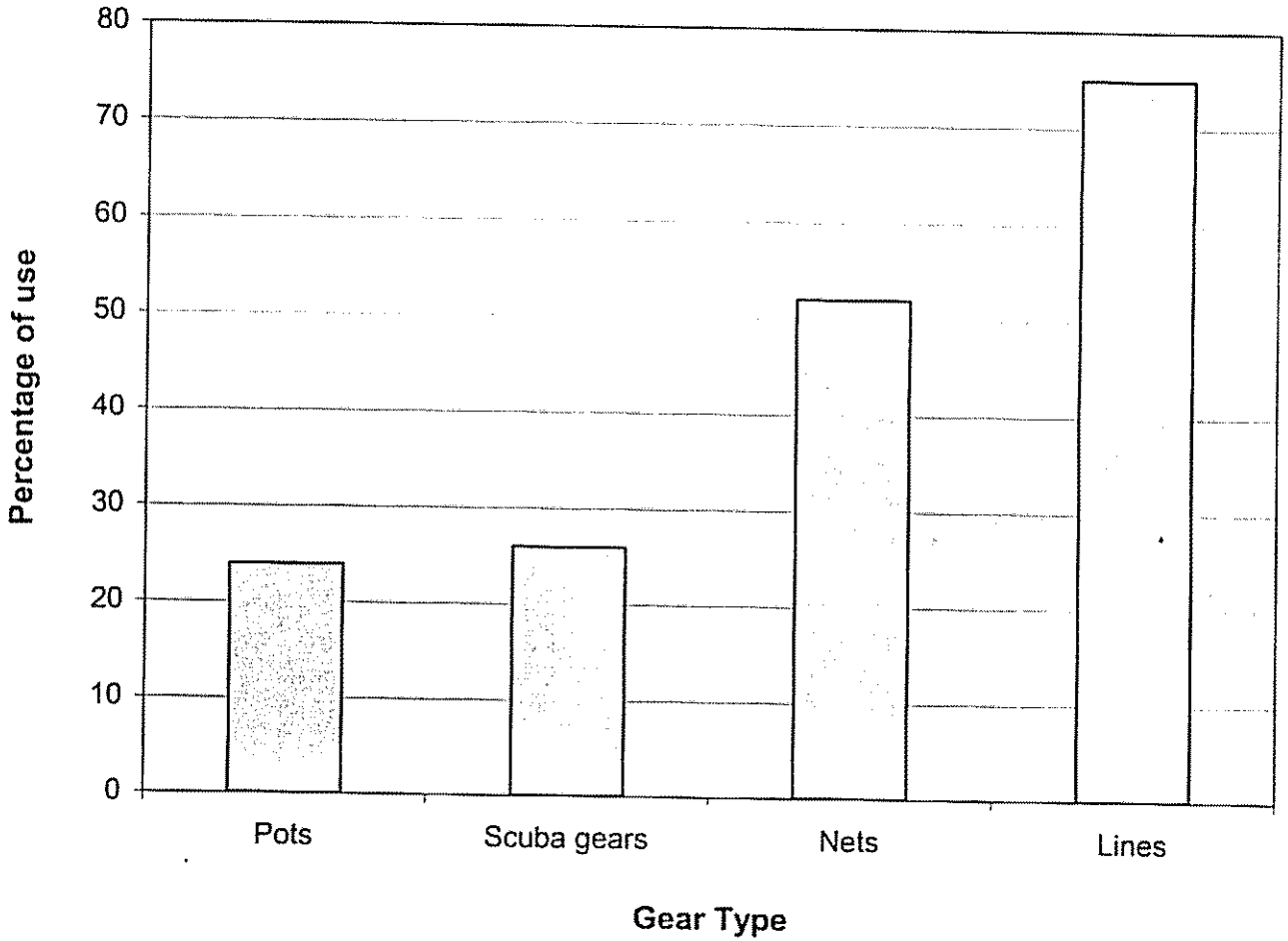

Table 1. Number and type of fishers reported in Puerto Rico's commercial fishery during 2002.

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
Loíza	6	14	20	50	19	19
Río 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 Díaz	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 2. Percentage of fishers by fishing location* and by fishery type* reported in Puerto Rico's commercial fishery during 2002.

Municipality	Shore	Continental shelf	Shelf edge	Oceanic	Reef fishes	Bait	Pelagic	Deep water
North Coast	**17**	**82**	**8**	**68**	**84**	**55**	**55**	**59**
Isabela	16	89	0	47	89	74	42	42
Camuy	0	100	23	66	100	100	54	62
Hatillo	50	100	50	100	100	100	75	100
Arecibo	6	91	0	72	81	34	38	63
Barceloneta	27	90	9	63	90	72	81	45
Vega Baja	5	69	5	53	69	39	42	53
Vega Alta	8	92	0	75	92	75	75	67
Dorado	0	100	0	57	100	43	57	57
Cataño	28	64	40	56	88	68	24	56
San Juan	0	85	0	73	80	61	56	68
Carolina	0	93	14	36	100	14	29	36
Loiza	50	65	10	50	55	40	20	65
Rio Grande	50	81	4	77	96	62	4	69
East Coast	**13**	**94**	**18**	**35**	**95**	**55**	**46**	**30**
Fajardo	6	96	20	32	94	48	70	38
Ceiba	0	93	0	47	93	27	40	27
Naguabo	0	100	0	41	100	34	45	31
Humacao	10	86	12	42	90	78	44	42
Yabucoa	25	83	17	67	92	83	75	67
Maunabo	30	100	40	80	100	90	50	90
Culebra	25	100	38	0	100	38	21	4
Vieques	21	98	23	24	98	54	38	25
South Coast	**7**	**92**	**19**	**30**	**92**	**33**	**22**	**28**
Patillas	0	100	10	40	100	80	20	40
Arroyo	0	95	10	48	88	38	33	43
Guayama	10	97	3	13	100	42	16	13
Salinas	15	77	8	15	73	46	35	15
Santa Isabel	9	100	0	38	100	3	34	34
Juana Diaz	0	100	0	7	93	0	13	0
Ponce	4	96	24	59	94	37	20	57
Peñuelas	0	100	10	14	95	0	5	19
Guayanilla	10	75	25	30	75	30	15	45
Guánica	3	94	34	22	94	41	37	19
Lajas	11	85	39	21	94	40	16	18
West Coast	**15**	**69**	**30**	**42**	**78**	**35**	**26**	**43**
Cabo Rojo	10	91	12	12	97	17	3	12
Mayagüez	6	56	58	27	81	21	23	35
Añasco	21	18	56	65	56	41	24	68
Rincón	17	26	17	84	34	40	23	77
Aguada	46	87	17	88	88	67	71	83
Aguadilla	15	78	37	58	73	63	59	61
Percentage	**17**	**83**	**19**	**48**	**87**	**56**	**36**	**37**

*Due to the fact that most fishermen used two or more types of fishing locations and/or fishery types, the sum of the reported percentage are not equal to 100%.

Table 3. Percentage of fishing handling* and management of the catch, reported in Puerto Rico's commercial fishery.

	Fishery Marketing					Handling of the catch		
Municipality	Fish Buyer	Association	Walking	Restaurant	Own Business	Gutted	Ice	None
North Coast	**28**	**60**	**42**	**5**	**2**	**22**	**69**	**12**
Isabela	47	32	53	26	0	89	26	5
Camuy	0	0	93	8	0	100	100	0
Hatillo	50	0	100	0	0	0	100	0
Arecibo	94	97	9	0	0	6	31	47
Barceloneta	27	0	54	9	18	18	27	18
Vega Baja	8	56	11	8	3	19	58	14
Vega Alta	0	75	25	0	0	8	75	16
Dorado	0	57	86	0	0	0	100	0
Cataño	20	60	44	4	4	16	68	12
San Juan	10	73	39	0	0	10	93	2
Carolina	86	7	29	0	0	0	86	7
Loíza	15	70	15	0	5	0	80	5
Río Grande	4	96	96	4	0	27	96	0
East Coast	**37**	**54**	**14**	**6**	**2**	**11**	**71**	**17**
Fajardo	26	58	6	0	2	16	90	2
Ceiba	6	87	6	0	0	0	87	20
Naguabo	21	52	14	10	0	14	79	17
Humacao	6	70	24	6	0	6	64	34
Yabucoa	0	83	8	0	0	33	75	17
Maunabo	20	60	40	10	10	50	90	0
Culebra	4	83	4	0	12	8	29	33
Vieques	87	4	13	13	0	2	79	8
South Coast	**20**	**35**	**36**	**8**	**4**	**50**	**55**	**25**
Patillas	0	90	10	50	0	100	100	0
Arroyo	48	48	5	5	5	57	48	43
Guayama	23	0	65	13	10	68	81	6
Salinas	0	19	42	4	0	23	54	8
Santa Isabel	3	0	93	0	0	0	63	38
Juana Díaz	87	0	7	7	0	7	13	80
Ponce	2	91	7	0	0	54	72	17
Peñuelas	0	100	10	0	0	81	0	14
Guayanilla	35	0	60	0	0	35	50	50
Guánica	28	34	16	16	13	50	41	28
Lajas	23	37	42	10	6	71	60	18
West Coast	**36**	**31**	**21**	**10**	**3**	**66**	**46**	**24**
Cabo Rojo	49	9	2	22	3	67	31	16
Mayagüez	13	35	48	2	8	65	69	2
Añasco	6	74	24	3	0	88	79	9
Rincón	77	9	14	14	9	71	77	83
Aguada	29	71	13	0	0	75	67	8
Aguadilla	24	64	10	0	0	44	8	22
PERCENTAGE	**30**	**47**	**28**	**7**	**3**	**40**	**60**	**20**

* Due to the fact that most fishermen used two or more kinds of fishing marketing types, the sum of the reported percentage are not equal to 100%.

Table 4. Number of fishing vessels and motors 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 5. Number of nets reported in Puerto Rico's commercial fishery during 2002.

Municipality	Beach Seine	Gill net	Trammel net	Cast net	Total
North Coast	**22**	**320**	**31**	**313**	**686**
Isabela	0	2	3	5	10
Camuy	1	1	0	8	10
Hatillo	0	4	0	4	8
Arecibo	2	12	0	15	29
Barceloneta	5	20	8	24	57
Vega Baja	1	38	5	42	86
Vega Alta	2	46	9	26	83
Dorado	1	9	0	15	25
Cataño	2	44	1	30	77
San Juan	0	29	0	68	97
Carolina	0	43	1	10	54
Loíza	2	34	2	18	56
Río Grande	6	38	2	48	94
East Coast	**25**	**224**	**96**	**377**	**722**
Fajardo	6	27	1	76	110
Ceiba	0	11	3	10	24
Naguabo	1	62	2	39	104
Humacao	14	61	22	96	193
Yabucoa	2	10	26	25	63
Maunabo	0	17	42	8	67
Culebra	0	0	0	38	38
Vieques	2	36	0	85	123
South Coast	**34**	**377**	**153**	**395**	**959**
Patillas	5	5	0	5	15
Arroyo	0	16	72	16	104
Guayama	4	62	0	56	122
Salinas	3	40	9	26	78
Santa Isabel	2	41	1	22	66
Juana Díaz	2	5	10	3	20
Ponce	4	29	0	59	92
Peñuelas	0	0	0	6	6
Guayanilla	0	34	6	38	78
Guánica	2	20	9	85	116
Lajas	12	125	46	79	262
West Coast	**66**	**72**	**111**	**182**	**425**
Cabo Rojo	8	28	65	46	141
Mayagüez	8	5	2	35	50
Añasco	16	17	27	17	77
Rincón	8	9	14	23	54
Aguada	10	6	3	24	43
Aguadilla	16	7	0	37	60
Total	**147**	**993**	**391**	**1267**	**2,792**

Table 6. Number of lines reported in Puerto Rico's commercial fishery during 2002.

Municipality	Long line	Hand line	Troll line	Rod and reel	Total
North Coast	**160**	**2,178**	**335**	**495**	**3,164**
Isabela	13	86	12	27	128
Camuy	1	174	13	24	212
Hatillo	0	10	3	0	13
Arecibo	14	92	73	6	185
Barceloneta	25	84	18	40	167
Vega Baja	27	100	56	76	259
Vega Alta	16	89	20	47	168
Dorado	7	62	17	36	122
Cataño	8	243	18	56	325
San Juan	13	717	33	78	841
Carolina	18	177	2	46	243
Loíza	11	210	39	15	275
Río Grande	7	134	31	44	216
East Coast	**76**	**2,272**	**401**	**142**	**2,891**
Fajardo	18	675	93	49	835
Ceiba	0	72	20	6	98
Naguabo	16	201	50	1	268
Humacao	13	541	94	17	665
Yabucoa	1	146	44	12	203
Maunabo	3	68	25	13	109
Culebra	15	204	50	4	273
Vieques	10	365	25	40	440
South Coast	**115**	**2,720**	**313**	**384**	**3,532**
Patillas	2	108	112	7	130
Arroyo	2	110	20	18	150
Guayama	5	430	38	43	516
Salinas	20	248	13	43	324
Santa Isabel	24	180	22	17	243
Juana Díaz	3	33	2	1	39
Ponce	39	392	57	88	576
Peñuelas	1	59	7	13	80
Guayanilla	6	168	4	6	184
Guánica	2	378	23	53	456
Lajas	11	614	115	94	834
West Coast	**157**	**2,136**	**307**	**123**	**2,723**
Cabo Rojo	5	356	11	33	405
Mayagüez	81	725	15	22	843
Añasco	6	179	54	6	245
Rincón	10	189	71	25	295
Aguada	17	246	51	25	339
Aguadilla	38	441	105	12	596
Total	**508**	**9,306**	**1,356**	**1,144**	**12,310**

Table 7. Number of traps and lifter gears reported in Puerto Rico's coomercial fishery during 2002.

	Traps			Lifters		
Municipality	Fish trap	Lobster trap	Total	Winch	Snapper reel	Total
North Coast	**627**	**105**	**732**	**71**	**27**	**98**
Isabela	30	1	31	1	2	3
Camuy	0	0	0	5	0	5
Hatillo	0	0	0	0	0	0
Arecibo	122	0	122	13	0	13
Barceloneta	73	23	96	3	6	9
Vega Baja	80	20	100	18	1	19
Vega Alta	10	0	10	6	0	6
Dorado	42	6	48	3	3	6
Cataño	28	0	28	2	5	7
San Juan	48	12	60	11	2	13
Carolina	2	0	2	6	0	6
Loíza	117	43	160	0	1	1
Río Grande	75	0	75	3	7	10
East Coast	**4,269**	**1,378**	**5,647**	**32**	**34**	**66**
Fajardo	617	5	632	3	10	13
Ceiba	370	218	588	2	2	4
Naguabo	988	245	1,233	9	0	9
Humacao	997	0	997	6	10	16
Yabucoa	30	0	30	1	2	3
Maunabo	163	0	163	1	3	4
Culebra	159	80	239	3	1	4
Vieques	945	830	1,775	7	6	13
South Coast	**3,568**	**1,191**	**4,759**	**27**	**30**	**64**
Patillas	129	6	135	2	1	3
Arroyo	225	104	329	6	0	6
Guayama	1,790	317	2,107	3	0	3
Salinas	204	296	500	3	3	6
Santa Isabel	87	24	111	0	0	0
Juana Díaz	275	412	687	0	0	0
Ponce	70	0	70	2	14	16
Peñuelas	30	0	30	0	0	0
Guayanilla	40	26	66	1	0	1
Guánica	23	0	23	5	2	7
Lajas	695	6	701	5	10	15
West Coast	**1,908**	**100**	**2,008**	**33**	**92**	**125**
Cabo Rojo	1,555	100	1,655	22	14	36
Mayagüez	727	0	727	4	6	10
Añasco	92	0	92	3	45	48
Rincón	96	0	96	2	11	13
Aguada	17	0	17	1	10	11
Aguadilla	21	0	21	1	6	7
TOTAL	**10,372**	**2,774**	**13,146**	**163**	**183**	**346**

Table 8. Number of SCUBA and skin divers and number of diving type and gears reported in Puerto Rico's commercial fishery during 2002

Municipality	SCUBA	Skin	Total	# Tanks	Spear	Gaff	Lace	Basket	Total
North Coast	**38**	**36**	**74**	**149**	**148**	**423**	**142**	**12**	**874**
Isabela	6	5	11	33	9	17	16	0	75
Camuy	0	0	0	0	0	28	0	0	28
Hatillo	0	0	0	0	0	4	0	0	4
Arecibo	2	0	2	10	5	54	4	0	73
Barceloneta	1	1	2	5	5	24	4	0	38
Vega Baja	7	3	10	35	21	46	9	0	111
Vega Alta	0	2	2	0	9	31	2	0	42
Dorado	0	3	3	0	7	12	3	0	22
Cataño	7	5	12	24	44	53	67	0	188
San Juan	3	3	6	12	10	68	4	0	94
Carolina	1	4	5	0	10	31	10	0	51
Loíza	2	1	3	14	6	21	3	10	54
Rio Grande	9	9	18	16	22	34	20	2	94
East Coast	**65**	**33**	**98**	**303**	**174**	**397**	**187**	**11**	**1,072**
Fajardo	11	5	16	24	28	84	38	0	174
Ceiba	5	4	9	31	20	21	16	1	89
Naguabo	5	0	5	28	14	54	21	0	117
Humacao	9	5	14	47	26	116	28	1	218
Yabucoa	0	2	2	0	0	29	5	0	34
Maunabo	3	6	9	12	12	19	4	0	47
Culebra	8	2	10	40	17	11	18	7	93
Vieques	24	9	33	121	57	63	57	2	300
South Coast	**64**	**76**	**140**	**272**	**200**	**540**	**88**	**13**	**1,113**
Patillas	8	2	10	47	36	27	9	2	121
Arroyo	12	8	20	16	14	37	4	2	73
Guayama	0	7	7	0	8	59	0	0	67
Salinas	6	6	12	35	20	35	10	0	100
Santa Isabel	6	9	15	22	10	39	4	0	75
Juana Díaz	2	2	4	3	4	21	0	0	28
Ponce	8	12	20	5	12	79	1	0	97
Peñuelas	10	7	17	58	28	26	0	0	112
Guayanilla	1	2	3	1	3	24	0	0	28
Guánica	11	10	21	52	26	89	34	0	201
Lajas	0	11	11	33	39	104	26	9	211
West Coast	**58**	**15**	**73**	**205**	**96**	**311**	**85**	**2**	**699**
Cabo Rojo	40	6	46	135	69	44	58	1	307
Mayagüez	8	0	8	25	13	35	19	0	92
Añasco	1	0	1	0	1	41	0	0	42
Rincón	6	3	9	43	7	29	5	1	85
Aguada	0	0	0	1	3	56	0	0	60
Aguadilla	3	6	9	1	3	106	3	0	113
Total	**225**	**160**	**385**	**929**	**618**	**1,671**	**502**	**38**	**3,758**

Table 9. Percentage of how commercial fishermen feel about the status of the fishery resource.

Municipality	Status			Reasons of worst status		
	Better	Same	Worst	Pollution	Habitat Destruccion	Overfishing
North Coast	**6**	**23**	**87**	**59**	**34**	**10**
Isabela	11	47	42	84	84	37
Camuy	0	38	42	32	32	0
Hatillo	0	0	100	50	0	0
Arecibo	0	6	91	86	84	0
Barceloneta	0	27	72	54	27	27
Vega Baja	8	8	50	36	8	3
Vega Alta	8	33	58	42	8	8
Dorado	0	29	71	57	0	43
Cataño	36	12	44	40	16	20
San Juan	0	37	61	49	12	7
Carolina	0	36	64	57	29	14
Loíza	0	40	55	60	5	0
Río Grande	0	0	96	88	69	4
East Coast	**1**	**42**	**49**	**22**	**38**	**15**
Fajardo	2	34	56	28	14	12
Ceiba	0	60	40	7	0	20
Naguabo	0	48	52	24	10	17
Humacao	2	80	18	10	8	6
Yabucoa	0	25	50	33	8	8
Maunabo	0	20	80	50	20	10
Culebra	0	8	54	4	0	50
Vieques	2	27	65	33	38	12
South Coast	**1**	**26**	**69**	**43**	**20**	**15**
Patillas	0	60	40	10	0	10
Arroyo	0	67	33	29	5	10
Guayama	0	32	65	48	19	10
Salinas	4	12	77	69	31	8
Santa Isabel	0	22	78	75	66	3
Juana Díaz	0	60	40	40	20	0
Ponce	0	6	85	74	4	11
Peñuelas	0	19	81	52	38	19
Guayanilla	0	20	80	45	20	10
Guánica	0	31	56	17	6	28
Lajas	3	21	74	13	11	31
West Coast	**4**	**23**	**64**	**35**	**11**	**22**
Cabo Rojo	4	22	65	16	14	26
Mayagüez	2	12	85	40	15	27
Añasco	0	32	68	50	18	20
Rincón	11	34	54	31	6	23
Aguada	4	29	67	17	13	28
Aguadilla	2	22	47	8	3	14
Percentage	**3**	**30**	**67**	**50**	**28**	**22**