A Puerto Rico Fishery Census 1995-96

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ABSTRACT

During November 1995 - October 1996, the Fisheries Statistics Program (FSP) of the Puerto Rico Department of Natural and Environmental Resources (PRDNER) conducted a fishery census in Puerto Rico. Two port agents visited the 42 coastal municipalities. A total of 1,758 commercial fishers were accounted. Seventy-two percent were full time fishers and 28% were part time fishers. The average age of Puerto Rico's fishers was 46 years old. A 74% of the fishers exploited reef fishes. The fishers used 1,501 fishing vessels and 1,218 motors with an average of 43 horsepowers. A total of 3,613 nets, 9,805 lines, 15,481 traps and 2,170 diving gears were reported active in Puerto Rico's fishery. An increase in fishing effort was observed when results were compared with the 1988 census.

KEY WORDS: Fishery census, fishing gears, Puerto Rico's fishery

INTRODUCTION

Puerto Rico's fishery is artesanal. 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 Puerto Rico have to date shown the classic signs of overfishing which include reduced total landings, declining catch per unit effort, shifts to catch smaller sized individuals and recruitment failures (Matos-Caraballo in prep).

Puerto Rico's fishing law (Law 83, 1936) did not define the terminology "commercial fishermen". This lack of definition obligates the Department of Natural and Environmental Resources (DNER) to approve approximately 5,000 commercial fishermen's licenses in 1996. On the other hand, the 1988 census developed by the Fisheries Research Laboratory (FRL), showed that the total number of commercial fishermen in Puerto Rico was approximately 1,731 (Matos-Caraballo and Torres-Rosado 1989). Due to the complexity of the fishery, occurs continuing and constant changes in the fishing communities, assessing the status of the artesanal fishery in Puerto Rico is necessary through a census.

Information on the universe of commercial fishing in Puerto Rico (number of active commercial fishermen, 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 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 management strategies. The goals of this project are:

i) Collect data to determine the total number of active commercial fishermen.
ii) Obtain socioeconomic information to classify each commercial fisherman in his corresponding category as: full time or part time.
iii) Collect data to determine the number and the length of active commercial vessels, number of motors per vessel and the motor's horsepower.
iv) Collect data to determine the number and type of active gears.

METHODS AND MATERIALS

Two port agents were contracted and trained to interview the commercial fishermen. They visited the 42 coastal municipalities and the 92 fishing centers (landing areas), to identify and interview every active commercial fisherman.

The two port agents organized commercial fishermen meetings in every fishing center. To organize the mentioned meetings, port agents received the support of the fishing associations. They interviewed all attending fishermen. The fishermen that did not attend to the meeting were identified. Later the census port agents tried to reach these fishermen at a dock or at his home. Identified commercial fishermen that did not cooperate were accounted. Port agents will try to get the information about the vessel and gears from other fishermen that know the elusive person.

Every interview included the following questions:

i) Name of the fisherman.
ii) Nickname.
iii) License number.
iv) Age.
v) Address
vi) Number of hours spent weekly fishing. Less than 40 hours was considered a part time fisherman. Forty or more hours were considered full time.
vii) Fishing association belonging to.
viii) Number of vessels used in the commercial fishery.
ix) Length of each vessel (feet).
x) Number of motors used by each commercial fisherman.
xi) Horsepower of every motor.
xii) Fishing categories (reef fish, pelagic, deep snapper, bait).
xiii) Fishing center (municipality and landing area).
xiv) Catch handling (gutted, iced, nothing).

xv) Fish marketing: sells the catch to a fishing association, private fishing enterprise, a restaurant, own business, in home.

xvi) Number and description of gear type (e.g., fish trap, trammel net, hand line).

xvii) How fishermen feel about the status of the fishery resource compared with the past (better, same, worst).

All the information was entered computer MS-DOS format, using DBASEIII+ and FoxPro for Windows 2.6. Later, the information was analyzed and compared statistically with the 1988 census (Matos-Caraballo and Torres-Rosado 1989) to note if a significant difference occurred among the two censuses in the number of fishermen, vessels and gear types. Analysis of the universe of the fishery by coast and by municipality was generated. The individual fishermen and/or business who cooperates giving information to this project is protected by Magnuson Act's confidential regulations.

RESULTS

A total of 1,758 fishermen was interviewed by port agents (Table 1). Approximately 72% (1,262) persons, mentioned that they were full time fishermen and 28% (496) mentioned that they were part time fishermen (Table 1). The west coast had the higher number of fishermen by coast, with 461. The municipality that reported more fishermen was Cabo Rojo, with 213 (Table 1). Approximately 81% (1,417) of the interviewed fishermen have DNER fisherman license (Table 1). Approximately 62% (1,082) of the interviewed fishermen belong to a fishing association (Table 1).

The older average age by coast was the north coast, with 49 years old (Table 1). On the other hand, the younger average age by coast was the east coast, with an average age of 44 years old (Table 1). The municipality of Manatí reported the older population of fishermen, with 63 years old and Patillas had the younger with an average of 38 years old.

Due to the multispecies and multigear fishery, it was observed that most fishermen exploit two or more fishing locations. A total of 31% of the fishermen interviewed, fished on the shore, 70% on continental shelf, 43% on shelf edge, and 46% on oceanic waters. Also the multigear and multispecies characteristics lead most puertorrican commercial fishermen to use two or more fishing categories. Reef fish (including conch and lobster) were exploited by 74% of the total fishermen, 68% exploited the pelagic, 53% exploited the deep water snapper and 23% exploited the bait. Some regional specializations in fishing categories are observed by municipality, for example 90% of Rincón commercial fishermen practice deep water snappers fishery and most fishermen of Aguada (98%) and Aguadilla (99%), practice the pelagic fishery.

Table 1. Number and type of fishermen reported in Puerto Rico's commercial fishery during 1995-1996.

MUNICIPALITY	FULL TIME	PART TIME	TOTAL	AVERAGE AGE	LICENCE OWNER	ASSOCIATE
North Coast	**211**	**217**	**428**	**49**	**343**	**299**
Isabela	18	3	21	46	19	6
Camuy	0	4	4	46	4	3
Hatillo	0	10	10	45	10	0
Arecibo	25	7	32	44	27	21
Barceloneta	17	11	28	45	18	15
Manati	2	4	6	63	5	6
Vega Baja	6	10	16	56	16	14
Vega Alta	16	6	22	47	15	19
Dorado	10	12	22	50	19	21
Cataño	22	38	60	47	39	30
San Juan	39	22	61	47	47	58
Carolina	10	26	36	49	21	28
Loiza	10	53	63	48	59	52
Rio Grande	27	5	32	48	32	23
Luquillo	9	6	15	51	12	3
East Coast	**293**	**134**	**427**	**44**	**296**	**270**
Fajardo	58	35	93	46	74	46
Ceiba	16	8	24	51	24	26
Naguabo	43	21	64	40	46	53
Humacao	72	36	108	46	38	39
Yabucoa	19	6	25	45	17	18
Maunabo	14	1	15	39	11	3
Culebra	44	19	63	40	58	56
Vieques	27	8	35	47	28	29
South Coast	**364**	**78**	**442**	**46**	**397**	**220**
Patillas	11	9	20	38	16	17
Arroyo	15	1	16	54	16	0
Guayama	30	2	32	48	32	20
Salinas	34	27	61	47	59	42
Santa Isabel	25	9	34	46	30	4
Juana Diaz	25	18	43	40	32	4
Ponce	46	2	48	43	46	46
Peñuelas	15	0	15	43	15	15
Guayanilla	34	0	34	50	33	4
Guánica	66	7	73	46	59	48
Lajas	63	3	66	49	59	20
West Coast	**394**	**67**	**461**	**46**	**373**	**293**
Cabo Rojo	159	54	213	43	147	79
Mayaguez	53	9	62	48	55	57
Añasco	40	0	40	48	37	34
Rincón	21	0	21	45	20	17
Aguada	39	2	41	44	34	38
Aguadilla	82	2	84	47	80	68
TOTAL	**1,262**	**496**	**1,758**	**46**	**1,409**	**1,082**

Most fishermen used two or more ways to market their catch. Fish marketing results shown that 33% of the fishermen sold to a fish buyer, 40% sold to an association, 41% sold walking, 10% sold to restaurants and 13% sold thru their own business. Fishermen own businesses are mostly a fish store and/or eating house. The management of the catch it considered poor, because only 51% of the interviewed fishermen gutted the catch on the sea. Less than 1 percent of the interviewed fishermen used ice to manage the catch. The fishermen did not handle their catch with ice or gutted, claimed that time passed between captured and landing is short

A total of 1,501 fishing vessels was reported. Twenty-five percent of the vessels were ≈ 15 feet, 61% were 16-21 feet, 13% were 22-29 feet and 1% were larger than 30 feet. A total of 1,218 motors was reported. The average horsepower of the mentioned motors in 1995-1996 was 43.

Net categories reported 3,613 units (Table 2). From the total nets, gill net was 38% (1,385 units), cast net was 31% (1,136), trammel net was 24% (861 units) and the beach seine was 7% (231 units).

Line categories reported 9,805 units (Table 3). From the total lines, the hand line was 69% (6,727 units), rod and reel was 12% (1,130), troll line was 10% (1,028 units) and long line was 9% (920 units).

Trap categories reported 15,481 units (Table 4). From the total traps, the fish trap was 72% (11,213 units), lobster trap was 28% (4,268 units), and 396 winches to lift up the traps (Table 4).

Diving categories reported 3,049 units (Table 5). From total fishermen reported (1,758), 598 practice SCUBA diving (34%) and 281practice skin diving (16%). The skin and SCUBA divers used 509 spears, 1,317 gaffs, 234 laces and 110 baskets to lift up the conchs (Table 5).

An interesting result was that 48% of the fishermen thought that the status of the fishery is the same as in the past. On the other hand, 48% percentage of the fishermen thought that the status of the fishery is worst than in the past, and 4% thought that was better. For the group of fishermen that felt the fishery resource was worst, port agents asked the reason for this situation. The port agent mentioned four choices (pollution, habitat destruction, overfishing and other). The fishermen could select one or more choices. Pollution was the most mentioned cause with 66%, followed by overfishing with 31% and habitat destruction with 18% . None mentioned other choices.

Table 2. Number of nets reported in Puerto Rico's commercial fishery during 1995-1996.

MUNICIPALITY	BEACH SEINE	GILL NET	TRAMMEL NET	CAST NET	TOTALS
North Coast	**66**	**578**	**54**	**492**	**1,190**
Isabela	3	5	0	4	12
Camuy	0	0	0	0	0
Hatillo	0	0	0	0	0
Arecibo	2	22	1	34	59
Barceloneta	12	73	11	54	150
Manatí	0	0	0	0	0
Vega Baja	0	31	4	21	56
Vega Alta	3	40	11	33	87
Dorado	0	49	0	33	82
Cataño	10	67	3	65	145
San Juan	2	41	0	105	148
Carolina	0	92	0	22	114
Loíza	16	76	10	69	171
Río Grande	16	31	5	31	83
Luquillo	2	51	9	21	83
East Coast	**47**	**338**	**417**	**291**	**1,093**
Fajardo	0	0	0	0	0
Ceiba	6	63	34	40	143
Naguabo	18	85	116	70	289
Humacao	4	43	32	77	156
Yabucoa	1	51	117	33	202
Maunabo	9	45	62	2	118
Culebra	2	16	19	29	66
Vieques	7	35	37	40	119
South Coast	**70**	**410**	**245**	**305**	**1,030**
Patillas	1	15	17	23	56
Arroyo	2	19	121	4	146
Guayama	22	63	23	62	170
Salinas	7	67	11	70	155
Santa Isabel	14	43	13	33	103
Juana Díaz	9	38	30	35	112
Ponce	9	50	0	18	77
Peñuelas	0	6	1	8	15
Guayanilla	0	24	3	20	47
Guánica	5	23	15	14	57
Lajas	1	62	11	18	92
West Coast	**48**	**59**	**145**	**48**	**300**
Cabo Rojo	2	30	67	8	107
Mayaguez	7	0	7	8	22
Añasco	3	6	59	20	88
Rincón	9	15	11	3	38
Aguada	13	5	1	2	21
Aguadilla	14	3	0	7	24
TOTAL	231	1,385	861	1,136	3,613

Table 3. Number of lines reported in Puerto Rico's commercial fishery during 1995-1996.

MUNICIPALITY	LONG LINE	HAND LINE	TROLL LINE	ROD AND REEL	TOTAL
North Coast	**273**	**2,426**	**330**	**614**	**3,643**
Isabela	5	70	2	0	77
Camuy	0	0	0	0	0
Hatillo	0	4	0	0	4
Arecibo	56	136	62	55	309
Barceloneta	23	163	57	90	333
Manatí	0	0	0	0	0
Vega Baja	15	54	32	55	156
Vega Alta	18	108	21	67	214
Dorado	11	142	12	46	211
Cataño	37	298	23	75	433
San Juan	50	611	38	89	788
Carolina	13	254	7	45	319
Loíza	13	263	29	46	351
Río Grande	25	230	38	31	324
Luquillo	7	93	9	15	124
East Coast	**236**	**1,463**	**184**	**233**	**2,116**
Fajardo	0	0	0	0	0
Ceiba	23	219	30	26	298
Naguabo	22	386	28	43	479
Humacao	30	344	30	61	465
Yabucoa	41	129	7	15	192
Maunabo	4	25	3	7	39
Culebra	47	181	52	46	326
Vieques	69	179	34	35	317
South Coast	**198**	**1,713**	**303**	**247**	**2,461**
Patillas	6	107	6	13	132
Arroyo	5	57	20	17	99
Guayama	30	305	28	51	414
Salinas	30	529	60	88	707
Santa Isabel	37	244	32	40	353
Juana Díaz	5	200	4	20	229
Ponce	38	52	42	7	139
Peñuelas	0	7	5	2	14
Guayanilla	2	30	9	0	41
Guánica	6	30	25	2	63
Lajas	39	152	72	7	270
West Coast	**213**	**1,125**	**211**	**36**	**1,585**
Cabo Rojo	4	101	65	1	171
Mayaguez	58	70	9	21	158
Añasco	3	251	52	14	320
Rincón	13	70	52	0	135
Aguada	4	422	8	0	434
Aguadilla	131	211	25	0	367
TOTAL	**920**	**6,727**	**1,028**	**1,130**	**9,805**

Table 4. Number of traps and winches reported in Puerto Rico's commercial fishery during 1995-1996.

MUNICIPALITY	FISH TRAP	LOBSTER TRAP	WINCH	TOTAL
North Coast	**1,224**	**178**	**131**	**1,533**
Isabela	15	0	0	15
Camuy	0	0	0	0
Hatillo	139	160	2	301
Arecibo	152	0	16	168
Barceloneta	51	1	10	62
Manatí	0	0	0	0
Vega Baja	64	0	8	72
Vega Alta	29	4	4	37
Dorado	67	0	5	72
Cataño	239	0	14	253
San Juan	172	3	31	206
Carolina	119	0	30	149
Loíza	107	0	7	114
Río Grande	67	10	4	81
Luquillo	3	0	0	3
East Coast	**4,242**	**2,240**	**136**	**6,618**
Fajardo	0	0	0	0
Ceiba	418	217	12	647
Naguabo	813	374	32	1,219
Humacao	503	230	23	756
Yabucoa	360	75	11	446
Maunabo	59	26	1	86
Culebra	937	629	26	1,592
Vieques	1,152	689	31	1,872
South Coast	**4,144**	**1,850**	**44**	**6,038**
Patillas	105	70	4	179
Arroyo	234	28	0	262
Guayama	897	252	17	1,166
Salinas	444	188	11	643
Santa Isabel	130	423	3	556
Juana Díaz	767	886	4	1,657
Ponce	87	3	1	91
Peñuelas	41	0	0	41
Guayanilla	27	0	0	27
Guánica	447	0	3	450
Lajas	965	0	1	966
West Coast	**1,603**	**0**	**85**	**1,688**
Cabo Rojo	1,365	0	31	1,396
Mayaguez	100	0	5	105
Añasco	25	0	37	62
Rincón	15	0	9	24
Aguada	28	0	2	30
Aguadilla	70	0	1	71
TOTAL	**11,213**	**4,268**	**396**	**15,877**

Table 5. Number of diving type and gears reported in Puerto Rico's commercial fishery during 1995-1996.

MUNICIPALITY	SKIN	SCUBA	SPEAR	GAFF	LACE	BASKET	TOTAL
North Coast	**85**	**73**	**63**	**626**	**71**	**4**	**922**
Isabela	0	8	0	0	0	0	8
Camuy	0	0	0	0	0	0	0
Hatillo	0	0	0	0	0	0	0
Arecibo	3	3	0	154	11	0	171
Barceloneta	8	2	3	48	0	0	61
Manatí	0	0	0	0	0	0	0
Vega Baja	4	2	9	31	2	0	48
Vega Alta	11	3	7	42	1	0	64
Dorado	15	11	4	38	4	0	72
Cataño	4	3	7	59	2	0	75
San Juan	13	13	15	113	3	2	159
Carolina	4	4	4	40	6	0	58
Loíza	13	10	7	57	24	2	113
Río Grande	5	11	6	30	14	0	66
Luquillo	5	3	1	14	4	0	27
East Coast	**106**	**143**	**147**	**377**	**117**	**72**	**962**
Fajardo	0	8	10	0	0	0	18
Ceiba	7	7	5	49	5	0	73
Naguabo	26	37	41	96	21	8	229
Humacao	14	18	17	90	7	20	166
Yabucoa	7	2	2	39	2	3	55
Maunabo	6	2	9	17	2	2	38
Culebra	31	47	38	53	54	25	248
Vieques	15	22	25	33	26	14	135
South Coast	**70**	**178**	**96**	**291**	**37**	**28**	**700**
Patillas	13	8	6	28	9	8	72
Arroyo	7	5	9	41	0	0	62
Guayama	3	4	6	50	3	2	68
Salinas	18	13	15	77	7	5	135
Santa Isabel	13	10	9	39	8	2	81
Juana Díaz	16	11	4	49	9	11	100
Ponce	0	9	0	0	0	0	9
Peñuelas	0	37	0	0	0	0	37
Guayanilla	0	15	0	0	0	0	15
Guánica	0	33	45	6	0	0	84
Lajas	0	33	2	1	1	0	37
West Coast	**20**	**204**	**203**	**23**	**9**	**6**	**465**
Cabo Rojo	14	178	175	15	9	4	395
Mayaguez	5	23	25	5	0	2	60
Añasco	0	1	1	1	0	0	3
Rincón	1	0	1	0	0	0	2
Aguada	0	2	1	0	0	0	3
Aguadilla	0	0	0	2	0	0	2
TOTAL	**281**	**598**	**509**	**1,317**	**234**	**110**	**3,049**

DISCUSSION

In 1931, a total of 1,403 active commercial fishermen was reported in Puerto Rico (Jarvis 1932). Fisheries Research Laboratory data showed that since 1974, the number of active commercial fishermen in Puerto Rico has not change drastically (Figure 1). The percentage of full time fishermen increased from 51% in 1988, to 74% in 1995-1996. For the same period the part time fishermen increased from 18% to 28%. The west coast and the municipality of Cabo Rojo continued being the most active coast and municipality, respectively. The number of active commercial fishermen in the 1988 census (1,731) and in the 1995-1996 census (1,758) were very similar. During the 1988 census, 64% of the fishermen had DNER license, and for 1995-1996, 81% had it. Unfortunately, approximately 5,000 people have DNER commercial fishermen licenses. A new and improved fishing law is urgent to correct this problem. On the other hand, 40% ofthe fishermen belongied to an association in 1988, and in 1995-1996 that percentage increased to 62%. This increase probably means that the fishermen learned to be unified to obtain more fishing and social benefits. More studies about this trend should be done in the future.

Average ages per coast and per municipality shows that the distribution of active commercial fishermen varies from 38 - 63 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.

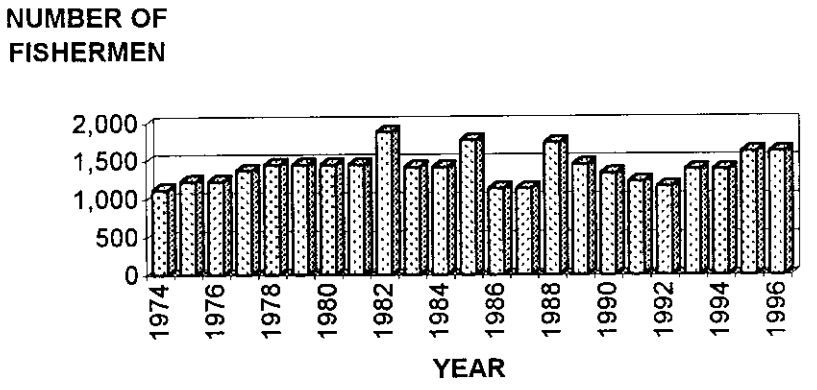

Figure 1. Number of active commercial fishermen reported in Puerto Rico by year from 1974-1996. (Historical data from Fisheries Research Library)

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 fishermen in Puerto Rico use two or more fishing locations and two or more fishing gears. Geographical locations influence the fishing location and fishing resources. For example, Aguada and Aguadilla have a small continental shelf, the oceanic waters are close to the coast, thus the fishermen from those municipalities practice more pelagic fisheries (tunas, mackerels and dolphinfish). The north coast has approximately six months of strong surges that make fishing trips difficult, thus fishermen practice more shore fishing. The continental shelf was the most exploited fishing location and the reef fish (including conch and lobster) were the most exploited fishing resources in Puerto Rico. The activity in every fishing location in 1995-1996 increased compared with the 1988 census. The use of the continental shelf increased from 24% in 1988 to 70% in 1995-1996. Activity on the shelf edge increased from 26% in 1988 to 43% in 1995-1996. Oceanic fishing increased from 17% in 1988 to 46% in 1995-1996. The use of the shore increased from 11% in 1988 to 31% in 1995-1996. These data indicate that the fishermen are more aggressive and prepared to find the overfished resources of Puerto Rico (Matos-Caraballo, in prep) in 1995-1996, than they were in 1988.

Data collected during this census compared with the 1988 census, suggests that fishermen learn to market better their catch. Most fish buyers mentioned to FRL port agents how difficult is to keep fishermen selling constantly to the same fish buyer. The problem is that one fish buyer increases the then price and the fishermen immediately sell the catch to this person. Also most fishermen use two or more marketing strategies to increase their income. The percentage of fishermen selling by walking decreased from 44% in 1988 to 41% in 1995-1996. The percentage of fishermen selling to a fish buyer increased from 29% in 1988, to 33% in 1995-1996. The percentage of fishermen selling to an association increased from 21% in 1988, to 40% in 1995-1996. These results probably suggest that fishermen are better organized in 1995-1996. The percentage of fishermen using their catch to their own business increased from 4% in 1988, to 13% in 1995-1996. This is another fact that shows that fishermen are learning to marketing their catch more efficiently. The percentage of fishermen selling their catch to a restaurant increased from 2% in 1988, to 10% in 1995-1996.

The number of active fishing vessels in 1988 was 1,107, which means an increase of 394 fishing vessels more in 1995-1996 (1,501). The data show that more fishermen 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 fish marketing observed in 1995-1996, helped many fishermen to obtain their own first fishing

vessel or a second fishing vessel. On the other hand, the number of motors (1,218) was less than the number of fishing vessels, in 1995-1996. Probably some fishermen use one motor for two or more boats.

A total of 1,181 more nets units were reported in 1995-1996 than in 1988. Nets showed a trend to increase the percentages of landings since 1983 (Matos-Caraballo, in prep).

A total of 1,875 more lines units were reported in 1995-1996 than in 1988. The long line category increased 156%, the hand line category 320% and the rod and reel 400%. On the other hand, the troll line category decreased 166%. Probably many fishermen trolling used rod and reel, instead the traditional troll line.

A total of 1,973 more trap units was reported in 1995-1996 than in 1988. The fish trap category decreased 497 units (4%) from 1988. On the other hand, the lobster trap category increased 2,470 units (87%).

The divers (skin and SCUBA) were 18% in 1988, and in 1995-1996 increase to 36% of the total fishermen. Due to the decrease in the fishery resource, the fishermen 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 unit gears increased from 1,103 in 1988 to 2,170 unit gears in 1995-1996.

The total of fishing gear units increased from 1988 to 1995-1996. On the other hand, the number of fishermen was comparable, 1,731 fishermen in 1988, and 1,758 in 1995-1996. Probably the overexploited and scarce fishery resources of Puerto Rico are more difficult to catch. Consequently, fishermen had to increase fishing effort (e.g., number of gears, number of fishing vessels) to be successful in this business.

CONCLUSION

The number of fishermen in Puerto Rico did not show a significant change since 1974. However, an increase of fishing effort (number of gears and vessels) was observed in a 1995-1996 census when compared with 1988 census.

The Fisheries Statistics Program has shown strong evidence that supports the overfishing problem in Puerto Rico. Evidence of habitat degradation and pollution are also responsible for the decreased fishery resource (NOAA's Plan Development Team 1990).

The 48% of commercial fishermen in Puerto Rico mentioned that the fishery resource is worst than in the past. They mentioned that pollution is the most important factor, follow by overfishing and habitat degradation. The 48% of fishermen mentioned that the fishery resource still the same. Commercial fishermen 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 resources and stop habitat degradation. Also, it is recommended the development of management plans to limit the fishing effort in the overfished fishery resource of Puerto Rico.

ACKNOWLEDGEMENTS

I want to thank PRDNER and NOAA/NMFS Saltonstall-Kennedy which provided the funds for this project. Also I want thanks the census port agents, Héctor Y. López Pelet and Damaris Rodríguez-Vendrell for their work interviewed the Puerto Rico's commercial fishermen. Also, I want to acknowledge statistics port agents, Walter Irizarry, Jesús León and Luis A. Rivera for their support and help to the census port agents. Special gratitude to Pedro Javier Fontánez, who gave me a valuable help with the report's tables. Thanks to Miguel Figuerola and Aida Rosario, who edited the final report. Finally, I want to thank all the commercial fishermen who gave the information that has made possible this survey.

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