

Description of the Ornamental Fishery in Puerto Rico, 1997-2005

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ABSTRACT

The Puerto Rico's Commercial Fisheries Statistics Program (CFSP) collects the landings data by species, weight and price per pound since 1968. Since 1997, the CFSP had been collecting data from ornamental fishery (OF). This activity started in Puerto Rico during the 1960's. The OF was popularized by the young surfers from USA, that visited Rincón surfing beaches, whom obtained some money for their expenses. During the late 1980's and early 1990's was observed that many persons were full time workers of OF and develop exporter companies. The OF was practiced without any Puerto Rico's government regulation, except the coral protection, life-rock protection, minimum legal size of lobster, and the three closed areas to all fishery in the west coast of Puerto Rico.

The Law 278 of November 28th, 1998, known as Puerto Rico's Fishing Law, enable the Department of Natural and Environmental Resources (DNER) to regulate the fisheries. Since March 11th, 2004, the DNER established Regulation 6768, entitled, Puerto Rico's Fishing Regulations. The mentioned document establishes many management actions to the OF workers. For example, they need a special permit from DNER, limit the number of species to be caught, they should submit all the landings data in monthly reports to this agency.

From 1997 - 2005, the CFSP recorded that a total of 285,240 organisms were caught by OF in Puerto Rico. Since 2002-2005, 71,437 organisms were reported collected by OF. A total of 189 species or groups of fish (108), invertebrates (79) and two species of green algae (*Caulerpa* and *Halimeda*) were reported. The Puerto Rico Fishing Regulation Regulation 6768 reduced the number of species to be caught from OF to only 20 fish species and eight invertebrate species. This paper will show the most caught species by individuals, the number of fishers with permit by year, the fishing areas, and socioeconomic data.

KEY WORDS: Fisheries, marine resources, ornamental organisms, Puerto Rico, fisheries statistics

Descripción de la Pesquería Ornamental en Puerto Rico, 1997-2005

El Programa de Estadísticas Pesqueras Comerciales (PEPC) de Puerto Rico, recopila datos de desembarcos por especies, peso y por precio/libra desde 1968. Desde 1997, el PEPC, ha estado recolectando datos de la pesquería ornamental (PO). Esta actividad comenzó en Puerto Rico durante los años de 1960. La PO fue popularizada por jóvenes sufistas que visitaron Rincón desde EE.UU., quienes obtenían dinero para sus gastos. Durante finales de la década 1980 y principios de 1990, fue observado que muchas personas fueron trabajadores a tiempo completo en la PO, desarrollando compañías exportadoras. La PO fue practicada sin ninguna regulación gubernamental excepto, protección a los corales, protección de "roca viva", talla mínima de langosta y cierre de tres áreas de pesca en el oeste de Puerto Rico.

La Ley 278 del 28 de Noviembre de 1998, conocida como Ley de Pesca de Puerto Rico, capacita al Departamento de Recursos Naturales y Ambientales (DRNA), a regular las pesquerías. El 11 de marzo de 2004, el DRNA estableció el Reglamento 6768, titulado Reglamento de Pesca de Puerto Rico. Dicho documento estableció muchas acciones de administración a los trabajadores de la PO. Entre otras, ellos necesitan un permiso especial del DRNA, limita el número de especies a ser capturadas y deben someter todos sus datos de desembarcos mensualmente a dicha agencia.

Desde 1997-2005, el PEPC tiene récord de que un total de 285,240 individuos fueron capturados por la PO en Puerto Rico. Desde el 2002-2005, 71,437 organismos fueron capturados por la PO. Un total de 189 especies de peces (142), de invertebrados (79) y dos especies de algas verde (*Caulerpa* y *Halimeda*) fueron reportadas. El Reglamento de Pesca de Puerto Rico 6768, redujo las especies de PO a solamente 20 especies de peces y ocho de invertebrados. Este informe mostrará las especies mayormente capturadas, el número de pescadores con permiso por año y datos socioeconómicos.

PALABRAS CLAVES: Pesquerías, recursos marinos, organismos ornamentales, Puerto Rico, estadísticas pesqueras

INTRODUCTION

Puerto Rico's Commercial Fisheries Statistics Program (CFSP) has collected commercial fisheries landings data by species, weight, and price per pound since 1968. The CFSP is a fundamental program of the Fisheries Research Laboratory of the Department of Natural and Environmental Resources (DNER). Since 1997, the CFSP had been collecting data from the ornamental fishery (OF). This activity started in Puerto Rico during the 1960s and was popularized by the young surfers from USA, which visited Rincón surfing beaches, whom obtained some money for their expenses (Sadovy 1991). During the late 1980s and early 1990s it was observed that many persons were full-time workers of OF and had developed export

companies (Sadovy 1991). Since the Law #83 of 1936, known as Puerto Rico's Fishing Law, the OF was practiced almost unregulated. For example, the fishers of the mentioned activity did not have commercial licenses and they did not have to report their catches. During the 1980s, the OF could not collect corals, live-rock, and only spiny lobster and yellowtail snapper had a minimum legal size. During the early 1990s, Sadovy (1991) mentioned that approximately 40 collectors brought catches to six exporters. After many interviews Sadovy (1991), estimated that 155 fish species and 51 invertebrates were caught by the OF.

Since late 1980s, personnel of DNER were asking to the Puerto Rico's law makers the need of a new

fishing law, which resulted in the Law 278 of November 29th, 1998, known as Puerto Rico's Fishing Law. This new law helped the DNER to manage the fishery resources. The mentioned law identify the OF collectors as commercial fishers and required them to obtain a license, a special permit, and report their captures. Also, the new fishing law ordered DNER to produce a fishing regulation document to improve the management on the Puerto Rico's overexploited fishery resources. After many drafts and meetings with commercial and recreational fishers, finally in March 11th, 2004, was in use the Regulation 6768, known as Puerto Rico's Fishing Regulation (PRFR). The PRFR limited the number of legal species to catch to 20 fishes

and eight invertebrates (Figure 1).

During 1997 - 2001 many researchers studied and analyzed the OF in Puerto Rico (Gutiérrez, 1997, Matos-Caraballo (2000), Ojeda *et. al.* (2001), and Mote Environmental Services (2002). From 1997 - 2005, the CFSP recorded data from OF. This paper will describe the OF in Puerto Rico using the data collected by CFSP.

METHODS

DNER's Rangers at Luis Muñoz Marín International Airport, Ponce Airport, and Aguadilla Airport inspecting all ornamental fauna exported from Puerto Rico. As part of their inspection, they collected copies of the customer



Commonwealth of Puerto Rico
 Department of Natural and Environmental Resources
 Department of Fish and Wildlife
 Division of Terrestrial Resources

Monthly Report of the Species Caught and their Quantity

Name: _____ Date: _____
 Commercial Fisher Permit Number: _____
 DNER Special Permit Number: _____

Species	Size	Price	Gear Type	Quantity	
				Local	Export
<i>Acanthurus coeruleus</i>					
<i>Amblycirrhitus pinos</i> **					
<i>Apogon maculatus</i> **					
<i>Bodianus rufus</i> *					
<i>Centropyge argi</i>					
<i>Chromis cyanea</i>					
<i>Gobiosoma multifasciatum</i>					
<i>Gramma loreto</i>					
<i>Halichoeres garnoti</i>					
<i>Holacanthus tricolor</i>					
<i>Hypsoblennius exstochilus</i>					
<i>Microspathodon chrysurus</i> **					
<i>Myripristis jacobus</i> *					
<i>Ophioblennius atlanticus</i>					
<i>Opistognathus aurifrons</i>					
<i>Opistognathus whitehurstii</i>					
<i>Pomacanthus paru</i>					
<i>Serranus tigrinus</i> **					
<i>Thalassoma bifasciatum</i>					
<i>Xanthichthys ringens</i>					
Invertebrates					
<i>Alpheus armatus</i> ***					
<i>Mithrax sculptus</i> ***					
<i>Oliva reticularis</i>					
<i>Oreaster reticulatus</i> ***					
<i>Stenopus hispidus</i> ***					
<i>Stenopus scutellatus</i> ***					
<i>Stenorhynchus seticornis</i>					
<i>Thor ambionensis</i> ***					

Figure 1. Puerto Rico DNER Marine Ornamental Fishery Collector Monthly Report Sheet

bills and/or airline shipment report. The mentioned reports contains data of species caught, number of individuals by species caught, price per individual, name and address of the company or person that export, and company name and address that purchased. In 1998, the CFSP coordinated with the DNER rangers to obtain this data to be analyzed. Every three months, Héctor Y. López-Pelet, CFSP port sampler, visited the DNER Rangers office to pick up the mentioned data and brought it to the CFSP office. Unfortunately, no data was collected during 2003 - 2004. In 2004, the DNER as is required by Fishing Law and PRFR started to collect data from OF collectors. The monthly reported sheet and the species permitted are shown in Figure 1. The gap in the data for year 2003 - 2004, is originated because the OF activity was closed by DNER from June 2000 to December 2000 (Mote Environmental Services 2002). Then OF collectors and the DNER were involved in legal actions about the restrictions of that activity until 2004, when the PRFR was in use. The OF collectors did not report to DNER and the airlines shipment report did not contain the species and price information. Finally, the OF collectors submitted the 2005 data to the DNER via CFSP. All data collected was entered in computers using Microsoft Excel.

RESULTS

Since 1997 - 2001, a total of 125,603 fish individuals were exported from Puerto Rico's OF (Ojeda, *et.al.* 2001, Mote Environmental Services 2002). During this period of time eight OF dealers were active (Ojeda, *et.al.* 2001). A total of 120 species or species groups were identified. Ojeda *et. al.* (2001), only analyzed the OF for fishes. For the same period, the CFSP data shows 12 OF collectors active. That means four of them worked with invertebrates. They reported 88,200 invertebrate individuals caught by OF. Ojeda *et. al.* (2001), mentioned that the five fish families with more species reported were Serranidae (18), Labridae (10), Pomacentridae (9), Holocentridae (7) and Balistidae (6). Ojeda *et. al.* (2001) and Mote Environmental Services (2002), estimated that the total value of the OF was \$398,344 U.S. Dollar. Also, Ojeda *et. al.* (2001), reported that among fishes the Royal gramma (*Gramma loreto*), represented 42% of the total organism caught in the OF. Followed by Yellowhead jawfish (*Opistognathus aurifrons*) 9.58%, Blue chromis (*Chromis cyanea*), 4.01%, Redlip blenny (*Ophioblennius atlanticus*) 3.86, Rock beauty (*Holacanthus tricolor*), Greenbanded goby (*Gobiosoma multifasciatum*), Blue tang (*Acanthurus coeruleus*) 2.46%, Horned blenny (*Hypsoblennius exstochilus*) 2.44%, Bluehead wrass (*Thalassoma bifasciatum*) and Pygmy angelfish (*Centropyge argi*).

During 2002 - 2005, a total of 71,437 individuals of fish and shellfish were reported by OF to the CFSP. Using a correction factor of 50%, it is estimated that for the four years period (2002 - 2005), the OF collected a total of 142,874 organisms and obtained a value of \$197,324. A

total of 108 fish species or species groups were reported during 2002 - 2005 (Table 1). Seventy-nine species or species groups of invertebrates and of two green algae species were reported (Table 1). The most common caught organism for this period were the Blue leg hermit crab (*Clibanarius tricolor*) 23.53%, Royal gramma (*Gramma loreto*), 12.88%, Cone snails (*Conus sp.*) 7.02%, Pink tip anemone (*Telmatactis americana*), 5.25%, Blue chromis (*Chromis cyanea*) 2.55%, Giant anemone (*Condylactis gigantea*) 2.32% Yellowhead jawfish (*Opistognathus aurifrons*) 2.31%, Flame cardinal (*Apogon maculatus*) 2.27%, Green banded goby (*Gobiosoma multifasciatum*) 2.00%, and Feather duster (*Sabellastarte magnifica*) 1.75% (Table 2).

The numbers of OF collectors by year during 1997-2005 are shown in Table 3. During 2002 - 2005 only five of collectors reported. During 2004 - 2005, the DNER gave permits to nine OF collectors, but only five reported.

DISCUSSION

Puerto Rico's marine ornamental fishery has been very dynamic since 1997 - 2005. From 1997 - 2000, OF collectors worked with few regulations. Suddenly, in August 2000, the OF was closed because of the interpretation of the Coral Conservation Law (Mote Environmental Services, 2002). Later in 2001, the court ordered to the DNER to give special permit to OF collectors. Finally, the PRFR established a limited group of species of fishes and invertebrates to be exploited by the OF. Naturally, the mentioned events provoked confrontations and conflicts between OF collectors and the DNER. As a direct result of these actions no data was available for CFSP during 2003-04. DNER rangers collected few customer bills, but only the total value was reported. No data on species, number of individual, or price was in the customer bills. Then, during the year 2005, five OF collectors reported their monthly reports to DNER as is established in the PRFR (Figure 1). However, four OF collectors that obtained the DNER permit did not report. It is unknown if this four OF collectors that did not report were active or not active.

In terms of earnings the OF seems to be a good small business. Since 2002 - 2007, every OF collectors sold an average of \$39,645. It is estimated that the net profit can be 66% of the mentioned amount, resulting in an average of \$26,047 per OF collector. Considering that the Puerto Rico per capita annual salary is \$16,306, and because OF collectors work three to four days, that is a good salary.

During 2002 - 2005, the most common specie reported caught in the OF was the blue leg hermit crab; the number of individuals caught was 16,809. This species seems to be easy to find and collect and has a very good market. However, this species is not included in the DNER permit, so this activity should be stopped immediately. Royal gramma was the second most caught species. The OF collectors mentioned that this species has a great market and is easily adapted to marine aquaria. For most OF

collectors this species is the main target. Cone snails are sold to ornamental tanks, and also many some species are sold for pharmacology research. Since 1979, many *Conus* sp. have been use in medications for Alzheimer, Parkinson's, and other neurological diseases ([www. Medicalnewstoday.com](http://www.Medicalnewstoday.com)). Also, there are internet websites where pharmacological researchers solicit purchase of *Conus* sp. Pink tip anemone and giant anemone also were heavily collected by the OF. The giant anemone is not permitted by the PRFR, however one OF collector continues to report this species. To collect those anemones, feather duster, and zoanths, it is necessary to brake mangrove roots, corals or rocks. In Puerto Rico the live rock activity has been prohibited since 1992 (DNER Earth Cortex Regulations). Zooanths anemones and scleractinean corals are pro-

tected. by Coral Conservation Law. It is very important that DNER rangers should monitor and stop the exploitation of the mentioned organisms.

In conclusion, it is necessary to continue the DNER monitoring on the OF. Most of the OF collectors are conservationist and fish very carefully. In fact, four of the five OF collectors seems to obey and follow the PRFR, Earth Cortex Regulations, and Coral Conservation Law. Unfortunately, one OF collector continues to report prohibited species and live rock. On the other hand, the activities of four OF collectors that never report is an important subject. Are they still active and do non report? It is important to know and monitor the impact of those collectors to the fishery resource. The DNER rangers should identify and enforce the PRFR to stop this destructive activity to the marine environment.

Table 1. List of Species Reported in Marine Ornamental Fishery in Puerto Rico 2002 - 2005

Fishes

Common name	Scientific name	Family
Barred Hamlet	<i>Hypoplectrus puella</i>	Serranidae
Batfish	<i>Ogcocephalus sp.</i>	Ogcocephalidae
Beau Gregory	<i>Stegastes leucostictus</i>	Pomacentridae
Bicolor Damsel	<i>Stegastes partitus</i>	Pomacentridae
Big Eye	<i>Priacanthus arenatus</i>	Priacanthidae
Black Angel	<i>Pomacanthus arcuatus</i>	Pomacanthidae
Black Bar Soldier	<i>Myripristis jacobus</i>	Holocentridae
Black Surgeon	<i>Melichthys niger</i>	Balistidae
Black Hamlet	<i>Hypoplectrus nigricans</i>	Serranidae
Black Trigger	<i>Balistes capriscus</i>	Balistidae
Blue Chromis	<i>Chromis cyanea</i>	Pomacentridae
Blue Head Wrasse	<i>Thalassoma bifasciatum</i>	Labridae
Blue Parrotfish	<i>Scarus coeruleus</i>	Scaridae
Blue Stripe Grunt	<i>Haemulon sciurus</i>	Haemulidae
Blue Tang	<i>Acanthurus coeruleus</i>	Acanthuridae
Butter Hamlet	<i>Hypoplectrus unicolor</i>	Serranidae
Cardinal Soldier	<i>Plectrypops retrospinis</i>	Holocentridae
Chain Link Moray Eel	<i>Echidna catenata</i>	Muraenidae
Chalk Bass	<i>Serranus tortugarum</i>	Serranidae
Clown Wrasse	<i>Halichoeres maculipinna</i>	Labridae
Conchfish	<i>Astrapogon stellatus</i>	Apogonidae
Coney Grouper	<i>Epinephelus fulvus</i>	Serranidae
Creole Wrasse	<i>Clepticus parrae</i>	Labridae
Doctorfish	<i>Acanthurus chirurgus</i>	Acanthuridae
Dusky Jawfish	<i>Opistognathus whitehustii</i>	Opistognathidae
Emperor Wrasse	<i>Labridae sp.</i>	Labridae
Filefish	<i>Monacanthus sp.</i>	Balistidae
Flag Blennidae	<i>Chaenopsidae sp.</i>	Chaenopsidae
Flame Cardinal	<i>Apogon maculatus</i>	Apogonidae
French Angel	<i>Pomacanthus paru</i>	Pomacanthidae

Table 1 continued. List of Species Reported in Marine Ornamental Fishery in Puerto Rico 2002 - 2005

Frillfin Goby	<i>Unspecified sp.</i>	Gobiidae
Glasseye Snapper	<i>Priacanthus cruentatus</i>	Priacanthidae
Goatfish	<i>Mulloidichthys martinicus</i>	Mullidae
Gold Gobies	<i>Gnatholepis thompsoni</i>	Gobiidae
Gold Spotted Eel	<i>Myrichthys ocellatus</i>	Ophichthidae
Gold Tail Moray	<i>Gymnothorax miliaris</i>	Muraenidae
Green Banded Goby	<i>Gobiosoma multifasciatum</i>	Gobiidae
Green Moray Eel	<i>Gymnothorax funebris</i>	Muraenidae
Green Razorfish	<i>Hemipteronotus splendens</i>	Labridae
Harlequin Bass	<i>Serranus tigrinus</i>	Serranidae
High Hat	<i>Equetus acuminatus</i>	Sciaenidae
Horned Blenny	<i>Hypsoblennius exstochilus</i>	Blenniidae
Hoverin Goby	<i>loglossus helenae</i>	Gobiidae
Jacknife	<i>Equetus lanceolatus</i>	Sciaenidae
Jawfish	<i>Opistognathus sp.</i>	Opistognathidae
Jewel Damsel	<i>Microspathodon chrysurus</i>	Pomacentridae
Lantern Bass	<i>Serranus baldwini</i>	Serranidae
Lightning Wrasse	<i>Halichoeres cyanocephalus</i>	Labridae
Long Spine Squirrelfish	<i>Holocentrus rufus</i>	Holocentridae
Longfin Damsel	<i>Stegastes diencaeus</i>	Pomacentridae
Longlure Frogfish	<i>Antennarius multiocellatus</i>	Antennariidae
Masked Goby	<i>Coryphopterus personatus</i>	Gobiidae
Mushroom Scorpionfish	<i>Scorpaena inermis</i>	Scorpaenidae
Neon Goby	<i>Gobiosoma oceanops</i>	Gobiidae
Neon Wrasse	<i>Halichoeres garnoti</i>	Labridae
Orange Damsel	<i>Stegastes planifrons</i>	Pomacentridae
Orange Spotted File	<i>Cantherhines pullus</i>	Balistidae
Painted Parrotfish	<i>Scaridae sp.</i>	Scaridae
Peacock Flounder	<i>Bothus lunatus</i>	Bothidae
Pearly Razor	<i>Hemipteronotus novacula</i>	Labridae
Peppermint Goby	<i>Coryphopterus lipernes</i>	Gobiidae
Porcupinefish	<i>Diodon hystrix</i>	Tetraodontidae
Porkfish	<i>Anisotremus virginicus</i>	Haemulidae
Princess Parrotfish	<i>Scarus taeniopterus</i>	Scaridae
Puddingwife Wrasse	<i>Halichoeres radiatus</i>	Labridae
Pygmy Angel	<i>Centropyge argi</i>	Pomacanthidae
Queen Angel	<i>Holacanthus ciliaris</i>	Pomacanthidae
Queen Trigger	<i>Balistes vetula</i>	Balistidae
Rainbow Parrotfish	<i>Scarus guacamaia</i>	Scaridae
Red Banded Parrotfish	<i>Sparisoma aurofrenatum</i>	Scaridae
Red Lip Blenny	<i>Ophioblennius atlanticus</i>	Blenniidae
Red Spotted Hawkfish	<i>Amblycirrhitus pinos</i>	Cirrhitidae
Reef Butterflyfish	<i>Chaetodon sedentarius</i>	Chaetodontidae
Ringed Blenny	<i>Starksia hassi</i>	Clinidae
Rock Beauty	<i>Holacanthus tricolor</i>	Pomacanthidae
Royal Gramma	<i>Gramma loreto</i>	Grammatidae
Sadled Blenny	<i>Malacoctenus triangulatus</i>	Clinidae
Sailfin Blenny	<i>Emblemaria pandionis</i>	Clinidae

Table 1 continued. List of Species Reported in Marine Ornamental Fishery in Puerto Rico 2002 - 2005

Sargassum Triggerfish	<i>Xanthichthys ringens</i>	Balistidae
Sargassumfish	<i>Histrio histrio</i>	Antennariidae
Scooter Blenny	<i>Blenniidae sp.</i>	Blenniidae
Scorpionfish	<i>Scorpaenodes caribbaeus</i>	Scorpaenidae
Sea Bass	<i>Serranidae sp.</i>	Serranidae
Sergeant Major	<i>Abudefduf saxatilis</i>	Pomacentridae
Sharpnose Puffer	<i>Canthigaster rostrata</i>	Tetraodontidae
Shortstripe Goby	<i>Gobiosoma chancei</i>	Gobiidae
Shy Hamlet	<i>Hypoplectrus guttavarius</i>	Serranidae
Slippery Dick	<i>Halichoeres bivittatus</i>	Labridae
Spanish Hogfish	<i>Bodianus rufus</i>	Labridae
Spotted Drum	<i>Equetus punctatus</i>	Sciaenidae
Spotted Moray	<i>Gymnothorax moringa</i>	Muraenidae
Squirrelfish	<i>Holocentrus adscensionis</i>	Holocentridae
Stonefish	<i>Synanceia sp.</i>	Scorpaenidae
Stoplight Parrotfish	<i>Sparisoma viride</i>	Scaridae
Sunshine Damselfish	<i>Chromis insolata</i>	Pomacentridae
Swiss Guard	<i>Liopropoma rubre</i>	Serranidae
Tiger Jawfish	<i>Opistognathus sp.</i>	Opistognathidae
Tobaccofish	<i>Serranus tabacarius</i>	Serranidae
Triggerfish	<i>Canthidermis sufflamen</i>	Balistidae
Tropical Founder	<i>Paralichthys tropicus</i>	Bothidae
Trumpetfish	<i>Aulostomus maculatus</i>	Aulostomidae
White Mullet	<i>Mugil curema</i>	Mugilidae
White Spotted Filefish	<i>Cantherhines macrocerus</i>	Balistidae
Yellow Edge Chromis	<i>Chromis multilineata</i>	Pomacentridae
Yellow Head Jawfish	<i>Opistognathus aurifrons</i>	Opistognathidae
Yellow Stripe Goby	<i>Gobiosoma horsti</i>	Gobiidae
Yellow Tail Hamlet	<i>Hypoplectrus chlorurus</i>	Serranidae
Yellow Tang	<i>Acanthurus bahianus</i>	Acanthuridae
Invertebrates		
Antillean Fileclam	<i>Lima pellucida</i>	Limidae
Arrow Crab	<i>Stenorhynchus seticornis</i>	Majidae
Banded Coral Shrimp	<i>Stenopus hispidus</i>	Stenopodidae
Basket Starfish	<i>Astrophyton muricatum</i>	Ophiuroidea
Batwing Coral Crab	<i>Carpilius corallinus</i>	Xanthidae
Black Ball Sponge	<i>Ircinia strobilina</i>	Demospongiae
Black Spotted Nudibranch	<i>Phyllidiopsis papilligera</i>	Phyllidiidae
Bleeding Tooth Snail	<i>Nerita peloronta</i>	Sea Snails
Blue Leg Hermit Crab	<i>Clibanarius tricolor</i>	Diogenidae
Branching Anemone	<i>Lebrunia danae</i>	Actinaria
Branching Tube Sponge	<i>Pseudoceratina crassa</i>	Demospongiae
Brittle Starfish	<i>Ophiocoma echinata</i>	Ophiuroidea
Brown Speckled Doris	<i>Aphelodoris antillensis</i>	Asteronitidae
Burgundy Starfish	<i>Echinaster sp.</i>	Asteroidea
Calcified Tube Worm	<i>Unknown</i>	Serpullidae
Cluster Duster	<i>Bispira brunnea</i>	Sabellidae
Cone Snail	<i>Conus sp.</i>	Sea Snails
Corkscrew Anemone	<i>Bartholomea annulata</i>	Actinaria

Table 1 continued. List of Species Reported in Marine Ornamental Fishery in Puerto Rico 2002 - 2005

Corky Sea Fingers	<i>Briareum asbestinum</i>	Briareidae
Cowries	<i>Cypraea sp.</i>	Cypraeidae
Cryptic Teardrop Crab	<i>Pelia mutica</i>	Majidae
Decorator Crab	<i>Microphrys bicornuta</i>	Majidae
Erect Rope Sponge	<i>Amphimedon compressa</i>	Demospongiae
Feather Duster	<i>Sabellastarte magnifica</i>	Sabellidae
Feather Hydroid	<i>Gymnangium longicauda</i>	Hydroidae
Feather Starfish	<i>Crinoidea sp.</i>	Crinoidea
Flamingo Tongue	<i>Cyphoma gibbosum</i>	Sea Snails
Fuzzy Chiton	<i>Acanthopleura granulata</i>	Amphineura
Giant Anemone	<i>Condylactis gigantea</i>	Actinaria
Gold Banded Coral Shrimp	<i>Stenopus scutellatus</i>	Stenopodidae
Green Clinging Crab	<i>Mithrax sculptus</i>	Majidae
Green Mantis	<i>Gonodactylus curacaoensis</i>	Squillidae
Harlequin Serpent Starfish	<i>Ophioderma sp.</i>	Ophiuroidea
Hermit Crab	<i>Paguristes sp.</i>	Diogenidae
Hydroid Zoanthid	<i>Parazoanthus tunicans</i>	Zoanthidea
Knobby Anemone	<i>Bartholomea lucida</i>	Actinaria
Long Spine Urchin	<i>Diadema antillarum</i>	Echinoidea
Octopus	<i>Octopus sp.</i>	Octopoda
Orange Icing Sponge	<i>Mycale laevis</i>	Demospongiae
Orange Tunicates	<i>Ecteinascidia turbinata</i>	Ascidiacea
Pederson Shrimp	<i>Periclimenes pedersoni</i>	Palaemonidae
Pencil Urchin	<i>Eucidaris tribuloides</i>	Echinoidea
Peppermint Shrimp	<i>Lysmata wurdemanni</i>	Hippolytidae
Pin Shell	<i>Pinna sp.</i>	Pinnidae
Pink Tip Anemone	<i>Telmatactis americana</i>	Actinaria
Porcelain Crab	<i>Porcellana sayana</i>	Porcellanidae
Pygmy Octopus	<i>Octopus joubini</i>	Octopus
Red Bahama Starfish	<i>Oreaster reticulatus</i>	Asteroidea
Red Banded Hermit Crab	<i>Paguristes erythropis</i>	Diogenidae
Red Encrusting Sponge	<i>Monanchora barbadensis</i>	Demospongiae
Red Rock Urchin	<i>Echinometra lucunter</i>	Echinoidea
Red Serpent Starfish	<i>Ophioderma squamosis</i>	Ophiuroidea
Red Snapping Shrimp	<i>Alpheus armatus</i>	Alpheidae
Red Starfish	<i>Porania regularis</i>	Asteroidea
Rough Fileclam	<i>Lima scabra</i>	Limidae
Ruby Starfish	<i>Ophioderma rubicundum</i>	Ophiuroidea
Scaly Tailed Mantis	<i>Lysiosquilla scabricauda</i>	Squillidae
Scarlet Lady Shrimp	<i>Lysmata grabhami</i>	Hippolytidae
Sculptured Slipper Lobster	<i>Parribacus antarcticus</i>	Scyllaridae
Sea Cucumber	<i>Holothuria sp.</i>	Holothuroidea
Shrimp	<i>Stenopodidae sp.</i>	Stenopodidae
Slipper Lobster	<i>Arctides guineensis</i>	Scyllaridae
Spanish Dancer Nudibranch	<i>Hexabranchnus morsomus</i>	Hexabranchnidae
Spanish Spotted Lobster	<i>Scyllarides aequinoctialis</i>	Scyllaridae
Spotted Spiny Lobster	<i>Panulirus guttatus</i>	Palinuridae
Squat Anemone Shrimp	<i>Thor amboinensis</i>	Hippolytidae
Sun Anemone	<i>Stichodactyla helianthus</i>	Actinaria
Swimming Crinoid	<i>Analcidometra armata</i>	Crinoidea

Table 1 continued. List of Species Reported in Marine Ornamental Fishery in Puerto Rico 2002 - 2005

Tassled Nudilbranch	<i>Bornella calcarata</i>	Bornellidae
Thorny Oyster	<i>Spondylus americanus</i>	Oyster
Two Claw Shrimp	<i>Brachycarpus biunguiculatus</i>	Palaemonidae
Upside Down Jelly	<i>Cassiopea frondosa</i>	Scyphozoa
Variegated Urchin	<i>Lytechinus variegatus</i>	Echinoidea
West Indian Starsnail	<i>Lithopoma tectum</i>	Prosobranchia
White Speckled Hermit	<i>Paguristes puncticeps</i>	Diogenidae
White Speckled Nudilbranch	<i>Paleo jubatus</i>	Facelinidae
White Tunicates	<i>Eudistoma sp.</i>	Asciacea
Green Algae		
Caulerpa	<i>Caulerpa sp.</i>	Udoteceae
Halimeda	<i>Halimeda sp.</i>	Udoteceae

Table 2. List of Marine Ornamental Fishes Most Caught In Puerto Rico During 2002 - 2005

Rank	Common name	Scientific name	# of Specimens	Percentage	Avg/Price/Specimen	Value U.S. Dollar
1	Blue Leg Hermit Crab	<i>Clibanarius tricolor</i>	16,809	23.53	1.00	16,809.00
2	Royal Gramma	<i>Gramma loreto</i>	9,202	12.88	1.50	13,803.00
3	Cone Snail	<i>Conus sp.</i>	5,018	7.02	2.00	10,036.00
4	Pink Tip Anemone	<i>Telmatactis americana</i>	3,754	5.25	3.00	11,262.00
5	Blue Chromis	<i>Chromis cyanea</i>	1,819	2.55	0.94	1,709.86
6	Giant Anemone	<i>Condylactis gigantea</i>	1,657	2.32	3.00	4,971.00
7	Yellow Head Jawfish	<i>Opistognathus aurifrons</i>	1,649	2.31	0.52	857.48
8	Flame Cardinal	<i>Apogon maculatus</i>	1,623	2.27	0.31	503.13
9	Green Banded Goby	<i>Gobiosoma multifasciatum</i>	1,428	2.00	0.31	442.68
10	Feather Duster	<i>Sabellastarte magnifica</i>	1,425	1.99	0.88	1,254.00
11	Red Serpent Starfish	<i>Ophioderma squamosis</i>	1,249	1.75	3.00	3,747.00
12	Green Clinging Crab	<i>Mithrax sculptus</i>	1,210	1.69	0.54	653.40
13	Blue Head Wrasse	<i>Thalassoma bifasciatum</i>	1,155	1.62	1.13	1,305.15
14	Red Lip Blenny	<i>Ophioblennius atlanticus</i>	979	1.37	1.07	1,047.53
15	Sea Cucumber	<i>Holothuria sp.</i>	877	1.23	0.25	219.25
16	Horned Blenny	<i>Hypsoblennius exstochilus</i>	828	1.16	0.57	471.96
17	Neon Wrasse	<i>Halichoeres garnoti</i>	823	1.15	0.55	452.65
18	Arrow Crab	<i>Stenorhynchus seticornis</i>	819	1.15	0.16	131.04
19	Blue Tang	<i>Acanthurus coeruleus</i>	815	1.14	1.76	1,434.40
20	Black Bar Soldier	<i>Myripristis jacobus</i>	753	1.05	1.06	798.18
21	Swimming Crinoid	<i>Analcidometra armata</i>	724	1.01	0.50	362.00
22	Two Claw Shrimp	<i>Brachycarpus biunguiculatus</i>	711	1.00	0.31	220.41
23	Knobby Anemone	<i>Actinaria sp.</i>	682	0.95	1.00	682.00
24	Rock Beauty	<i>Holacanthus tricolor</i>	645	0.90	2.13	1,373.85
25	Banded Coral Shrimp	<i>Stenopus hispidus</i>	572	0.80	0.96	549.12
26	French Angel	<i>Pomacanthus paru</i>	523	0.73	4.96	2,594.08
27	Jewel Damsel	<i>Microspathodon chrysurus</i>	498	0.70	0.29	144.42
28	Scaly Tailed Mantis	<i>Lysiosquilla scabricauda</i>	451	0.63	1.00	451.00
29	Hydroid Zoanthid	<i>Parazoanthus tunicans</i>	445	0.62	0.50	222.50
30	Corkscrew Anemone	<i>Bartholomea annulata</i>	437	0.61	1.00	437.00

Table 2 continued. List of Marine Ornamental Fishes Most Caught In Puerto Rico During 2002 - 2005

31	Pencil Urchin	<i>Eucidaris tribuloides</i>	406	0.57	0.50	203.00
32	Red Spotted Hawkfish	<i>Amblycirrhitus pinos</i>	391	0.55	0.88	344.08
33	Burgundy Starfish	<i>Echinaster sp.</i>	385	0.54	1.00	385.00
34	Harlequin Bass	<i>Serranus tigrinus</i>	371	0.52	1.08	400.68
35	White Speckled Nudibranch	<i>Paleo jubatus</i>	355	0.50	1.00	355.00
36	Sun Anemone	<i>Stichodactyla helianthus</i>	352	0.49	1.00	352.00
37	Branching Tube Sponge	<i>Pseudoceratina crassa</i>	327	0.46	1.00	327.00
38	West Indian Starsnail	<i>Lithopoma tectum</i>	309	0.43	1.00	309.00
39	Dusky Jawfish	<i>Opistognathus whitehustii</i>	303	0.42	1.59	481.77
40	Peppermint Shrimp	<i>Lysmata wurdemanni</i>	296	0.41	0.63	186.48
41	Spanish Hogfish	<i>Bodianus rufus</i>	296	0.41	1.89	559.44
42	Branching Anemone	<i>Lebrunia danae</i>	291	0.41	1.00	291.00
43	Brittle Starfish	<i>Ophiocoma echinata</i>	267	0.37	1.00	267.00
44	Red Banded Hermit Crab	<i>Paguristes erythropros</i>	255	0.36	0.30	76.50
45	Red Bahama Starfish	<i>Oreaster reticulatus</i>	235	0.33	0.93	218.55
46	Orange Damsel	<i>Stegastes planifrons</i>	224	0.31	1.00	224.00
47	Cardinal Soldier	<i>Plectrypops retrospinis</i>	220	0.31	1.00	220.00
48	High Hat	<i>Equetus acuminatus</i>	216	0.30	1.00	216.00
49	Sargassum Triggerfish	<i>Xanthichthys ringens</i>	215	0.30	2.89	621.35
50	Puddingwife Wrasse	<i>Halichoeres radiatus</i>	213	0.30	1.00	213.00
51	Basket Starfish	<i>Astrophyton muricatum</i>	202	0.28	3.00	606.00
52	Yellow Tang	<i>Acanthurus bahianus</i>	179	0.25	0.88	157.52
53	Lantern Bass	<i>Serranus baldwini</i>	177	0.25	0.63	111.51
54	Shortstripe Goby	<i>Gobiosoma chancei</i>	177	0.25	1.00	177.00
55	Halimeda	<i>Halimeda sp.</i>	319	0.45	1.00	319.00
56	Red Encrusting Sponge	<i>Monanchora barbadosis</i>	175	0.24	1.00	175.00
57	Beau Gregory	<i>Stegastes leucostictus</i>	164	0.23	2.00	328.00
58	Long Spine Squirrelfish	<i>Holocentrus rufus</i>	158	0.22	1.00	158.00
59	Black Angel	<i>Pomacanthus arcuatus</i>	149	0.21	2.50	372.50
60	Neon Goby	<i>Gobiosoma oceanops</i>	129	0.18	1.00	129.00
61	Corky Sea Fingers	<i>Briareum asbestinum</i>	128	0.18	1.25	160.00
62	Sharpnose Puffer	<i>Canthigaster rostrata</i>	128	0.18	1.38	176.64
63	Feather Starfish	<i>Crinoidea sp.</i>	126	0.18	2.00	252.00
64	Sea Bass	<i>Serranidae sp.</i>	124	0.17	1.00	124.00
65	Long Spine Urchin	<i>Diadema antillarum</i>	122	0.17	1.00	122.00
66	Queen Angel	<i>Holacanthus ciliaris</i>	113	0.16	3.00	339.00
67	Pederson Shrimp	<i>Periclimenes pedersoni</i>	111	0.16	1.00	111.00
68	Tobaccofish	<i>Serranus tabacarius</i>	107	0.15	0.63	67.41
69	Scarlet Lady Shrimp	<i>Lysmata grabhami</i>	103	0.14	1.00	103.00
70	Frillfin Goby	<i>Unspecified sp.</i>	101	0.14	1.00	101.00
71	Pygmy Angel	<i>Centropyge argi</i>	93	0.13	1.30	120.90
72	Chain Link Moray Eel	<i>Echidna catenata</i>	85	0.12	1.00	85.00
73	Gold Banded Coral Shrimp	<i>Stenopus scutellatus</i>	85	0.12	1.50	127.50
74	Porcelain Crab	<i>Porcellana sayana</i>	83	0.12	1.00	83.00
75	Ruby Starfish	<i>Ophioderma rubicundum</i>	83	0.12	2.00	166.00
76	Black Trigger	<i>Balistes capriscus</i>	82	0.11	1.00	82.00

Table 2 continued. List of Marine Ornamental Fishes Most Caught In Puerto Rico During 2002 - 2005

77	Longfin Damsel	<i>Stegastes diencaeus</i>	77	0.11	1.00	77.00
78	Red Snapping Shrimp	<i>Alpheus armatus</i>	76	0.11	2.00	152.00
79	White Speckled Hermit	<i>Paguristes puncticeps</i>	71	0.10	0.30	21.30
80	Queen Trigger	<i>Balistes vetula</i>	68	0.10	1.00	68.00
81	Thorny Oyster	<i>Spondylus americanus</i>	67	0.09	1.00	67.00
82	Sergeant Major	<i>Abudefduf saxatilis</i>	65	0.09	1.00	65.00
83	Orange Icing Sponge	<i>Mycale laevis</i>	63	0.09	1.00	63.00
84	Red Starfish	<i>Porania regularis</i>	58	0.08	2.00	116.00
85	Variiegated Urchin	<i>Lytechinus variegatus</i>	56	0.08	1.00	56.00
86	Yellow Edge Chromis	<i>Chromis multilineata</i>	56	0.08	1.00	56.00
87	Conchfish	<i>Astrapogon stellatus</i>	54	0.08	1.00	54.00
88	Spanish Dancer Nudilbranch	<i>Hexabranchus morso-mus</i>	52	0.07	1.00	52.00
89	Black Ball Sponge	<i>Ircinia strobilina</i>	51	0.07	1.00	51.00
90	Hermit Crab	<i>Paguristes cadenati</i>	50	0.07	0.30	15.00
91	Upside Down Jelly	<i>Cassiopea frondosa</i>	50	0.07	1.00	50.00
92	Black Spotted Nudilbranch	<i>Phyllidiopsis papilligera</i>	49	0.07	1.00	49.00
93	Gold Gobies	<i>Gnatholepis thompsoni</i>	48	0.07	1.00	48.00
94	Sunshine Damsel	<i>Chromis insolata</i>	48	0.07	1.00	48.00
95	Squirrelfish	<i>Holocentrus adscensionis</i>	47	0.07	1.00	47.00
96	Gold Tail Moray	<i>Gymnothorax miliaris</i>	45	0.06	1.00	45.00
97	Green Razorfish	<i>Hemipteronotus splendens</i>	44	0.06	2.00	88.00
98	Tiger Jawfish	<i>Opistognathus sp.</i>	41	0.06	1.00	41.00
99	Chalk Bass	<i>Serranus tortugarum</i>	40	0.06	1.00	40.00
100	Decorator Crab	<i>Microphrys bicornuta</i>	40	0.06	1.00	40.00
101	Harlequin Serpent Starfish	<i>Asteroidea sp.</i>	40	0.06	3.00	120.00
102	Cowries	<i>Cypraeidae sp.</i>	39	0.05	1.00	39.00
103	Porcupinefish	<i>Diodon hystrix</i>	39	0.05	1.00	39.00
104	Tassled Nudilbranch	<i>Bornella calcarata</i>	38	0.05	1.00	38.00
105	Goatfish	<i>Mulloidichthys martinicus</i>	34	0.05	1.00	34.00
106	Bicolor Damsel	<i>Stegastes partitus</i>	31	0.04	1.00	31.00
107	Cluster Duster	<i>Bispira brunnea</i>	30	0.04	1.00	30.00
108	Flag Blennidae	<i>Chaenopsidae sp.</i>	29	0.04	1.00	29.00
109	Octopus	<i>Octopus briareus</i>	29	0.04	1.00	29.00
110	Black Durgeon	<i>Melichthys niger</i>	27	0.04	1.00	27.00
111	Butter Hamlet	<i>Hypoplectrus unicolor</i>	27	0.04	1.00	27.00
112	Cryptic Teardrop Crab	<i>Pelia mutica</i>	27	0.04	1.00	27.00
113	Spotted Drum	<i>Equetus punctatus</i>	27	0.04	1.00	27.00
114	Creole Wrasse	<i>Clepticus parrae</i>	26	0.04	1.00	26.00
115	Red Rock Urchin	<i>Echinometra lucunter</i>	26	0.04	1.00	26.00
116	Trumpetfish	<i>Aulostomus maculatus</i>	25	0.03	1.50	37.50
117	Flamingo Tongue	<i>Cyphoma gibbosum</i>	24	0.03	1.00	24.00
118	Green Moray Eel	<i>Gymnothorax funebris</i>	23	0.03	1.00	23.00
119	Pearly Razor	<i>Hemipteronotus novacula</i>	23	0.03	1.00	23.00
120	Filefish	<i>Monacanthus sp.</i>	22	0.03	1.00	22.00
121	Stoplight Parrotfish	<i>Sparisoma viride</i>	20	0.03	1.00	20.00
122	Yellow Stripe Goby	<i>Gobiosoma horsti</i>	19	0.03	1.00	19.00

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