

## Alabama Trawl Gear Characterization

Prepared by the Alabama Marine Resources Division (AMRD)

### ***Otter Trawl***

An otter trawl is a cone shaped net made of coated nylon mesh of various mesh sizes depending on the targeted species and anticipated catch. The opening of the trawl is suspended between two planers, called doors, which serve to spread the net open as it is towed along the water bottom. The bottoms of the doors are rounded along the leading edge with a metal runner protecting the door and providing weight. A series of floats runs the length of the top line, and weights (lead spaced along the line or loops of small chain) grace the bottom line. The gear terminates in a tail bag or 'cod', where the catch is concentrated and retained during the tow.

### Gear Deployment

Trawls are deployed cod end first at a slow speed and mesh is fed out until fully expanded. Towlines are payed out until the doors contact the bottom and the lead line is skimming the bottom. The depth of deployment varies according to water depth and size and species targeted. Trawl times are unregulated but typically last 1 – 2 hours depending on season, bycatch issues, and debris. Trawls must comply with all federal Turtle Excluder Device (TED) regulations.

### Target Species

In Alabama, trawls target primarily penaeid shrimp with incidental catch of various other fish and shellfish species. Marketable species such as crabs, sheepshead, flounders, southern kingfish, and sand seatrout are retained. A live bait trawl fishery exists for Atlantic croaker (*Micropogonias undulates*) and shrimp.

### Licenses

Alabama commercial shrimp licenses vary in cost by vessel size (Table 7). The license sales reflect a general downward trend for all shrimp licenses. While extensive data exist for the commercial shrimp industry, no effort data is collected from the recreational sector; effort expended by the recreational sector varies widely but occurs mostly from June through October. With the exception of the opening of brown shrimp season, the majority of recreational activity is directed at obtaining bait for weekend fishing trips.

Table 7. All Shrimp Licenses Sold FY 1999 – 2004, by category.

Boat Size	1999	2000	2001	2002	2003	2004
< 30 ft	625	704	752	698	574	507
30 - 45 ft	186	181	178	155	143	137
> 45 ft	187	227	231	212	204	176
Total Resident						
Commercial	998	1112	1161	1065	921	820
Non-Resident			229	239	218	210

Commercial						
Resident Recreational	1738	1641	1711	1623	1350	1476
Non-Resident Recreational			102	112	94	83

Effort

Effort information is limited to licenses sold, percentage of licenses reporting landings, number of nets deployed, number of trips, and mean fishing time per trip. Precise geographical information is unavailable.

Beginning in 2001, foreign imports to the United States reduced the ex-vessel value of shrimp and placed a significant economic burden on the shrimp fishery. In a study of Texas shrimp fishermen, economic analysis showed that \$0.98 operational costs were expended for each \$1 earned. This distress was exacerbated by increased fuel cost, particularly in 2004. Numerous shrimp fishermen have left the industry completely or work only seasonally. Economics has also reduced the length of the shrimp season with vessels staying in port longer in the spring and returning earlier in the fall because of decreased economic viability in low abundance months.

Below is a review of trip tickets documenting the reduction in fleet size, trip frequency, and mean hours fished per trip (Table 8). From 2001 to 2004, a negative trend in inshore vessels reporting shrimp harvest occurred. The number of reported trips in Alabama waters during this time fell 31% and mean fishing time per trip was reduced 20%. This reduction was reflected in all months (Table 9).

Table 8. Number of Inshore Commercial Trawling Trips 2001-2004.

Year	Number of Individual Vessels Reporting	Total Number of Trips	Mean Fishing Time (hr)/ Trip
2001	342	4,519	28.7
2002	276	4,354	22.4
2003	247	4,024	22.5
2004	214	3,117	23.0

Table 9. Number of Vessels Harvesting Shrimp by Month 2001-2004.

Month	2001	2002	2003	2004
Jan	18	22	21	6
Feb	11	16	11	5
Mar	27	16	9	7
Apr	34	17	30	13
May	72	26	23	32

<b>Jun</b>	230	188	168	159
<b>Jul</b>	191	164	135	141
<b>Aug</b>	168	130	133	112
<b>Sep</b>	192	100	115	100
<b>Oct</b>	150	110	120	101
<b>Nov</b>	118	92	99	79
<b>Dec</b>	61	48	28	52

The frequency and duration of trips for inshore Alabama trawlers is listed below (Table 10). All months except May showed a reduction in trips reported. The mean annual fishing time for each trip was also reduced. Reviewed on a monthly basis, this data showed the greatest monthly variation. Trip times in October, November, December and January increased while spring and summer trip times were reduced.

Table 10. Monthly Trip Totals and Mean Hours Fished/Trip for Commercial Shrimpers in Alabama waters 2001-2004.

Month	2001		2002		2003		2004	
	Trips	Mean Fishing Time (hr)/ Trip						
Jan	43	8.6	137	11.1	79	11.7	10	15.5
Feb	29	34.7	67	9.3	52	8.1	21	14.3
Mar	68	29.9	44	8.5	72	11.0	16	11.5
Apr	75	23.2	90	12.2	128	11.9	37	17.7
May	126	27.1	70	21.5	57	23.0	127	14.8
Jun	710	35.0	675	37.8	524	33.3	555	28.1
Jul	665	28.9	654	27.0	481	30.9	570	24.5
Aug	716	32.8	682	18.7	590	26.6	559	18.7
Sep	729	31.7	590	16.2	656	18.7	344	20.2
Oct	643	22.6	734	20.4	774	19.2	499	22.7
Nov	493	21.9	421	20.6	513	17.6	273	26.4
Dec	222	19.4	190	16.0	98	14.2	106	27.2
Totals:	4,519		4,354		4,024		3,117	

Trawlers also target finfish species at certain locations and at certain times of the year. Sheepshead (*Archosargus probatocephalus*) kingfishes (*Menticirrhus* sp.) provide additional income (Table 11). Trawl-caught kingfish equaled gillnet landings from 2001 to 2004.

Table 11. Otter Trawl Trips Encountering and Landings of Selected Fishes.

	2001	2002	2003	2004
Kingfish sp. trips/pounds	135/5,693	93/3,871	179/20,190	32/10,121
Sheepshead trips/pounds	117/131,369	85/31,361	32/22,147	30/36,648

In 2004, a regulation was promulgated that prohibits shrimping in the upper portion of Mobile Bay and the Grand Bay portion of Mississippi Sound. This area is to be monitored for its effectiveness in enhancing nursery habitat, improving sea grass bed coverage, and raising harvest value.

While regional marketing campaigns may enhance the financial stability of individual vessels it is projected that fleet size will remain reduced indefinitely. This will continue an existing trend of exodus of captains and crew from the industry.

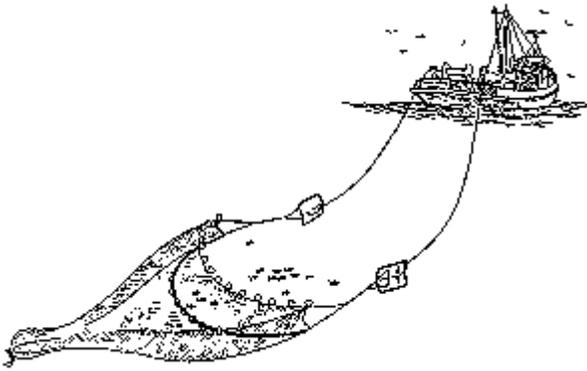
#### Sea Turtle Bycatch

Existing trawl data from AMRD's fishery independent monitoring program dates back to the fall of 1980, with several prior short term stations back to 1968. In over 17,000 16-foot trawl samples, AMRD has never caught a sea turtle. Samples were taken year-round and include Alabama's territorial sea and Gulf beach sites. Alabama trawl stations taken since 1985 as part of the Southeast Area Monitoring and Assessment Program (SEAMAP) collected one dead loggerhead in a 40' trawl east of Mobile Ship Channel Markers 1 & 2. Three additional loggerheads were caught in the EEZ and returned to the water alive. These four captures occurred out of 360 SEAMAP tows since 1986.

#### State or Local Laws and Regulations

Alabama enforces federal legislation or regulations pertaining specifically to the use of TEDs to protect sea turtles. Violation of these laws and regulations is not a significant issue within state waters.

Figure 5 Line drawing of a vessel towing a deployed otter trawl.



**Connecticut Trawl Gear Characterization**  
Prepared by the Atlantic States Marine Fisheries Commission

**1.1 TRAWLS**

**1.1.1 Beam Trawls**

*1.1.1.1 Gear Description*

The trawl net minimum mesh size in Connecticut waters is 5-1/2 inch (14-centimeter) diamond stretched or six-inch (15-centimeter) square stretched mesh in the cod end, with many exceptions depending on targeted species and time of year (CT DEP 2005b). See Connecticut regulations for detailed mesh sizes. For a general description and diagram of a beam trawl see the gear appendix.

*1.1.1.2 Targeted Species*

Fishermen cannot use trawls to take bait (CT DEP 2005b). Information on specific species caught in beam trawls is confidential due to very low participation in the fishery.

*1.1.1.3 Number of Licensed and Active Fishermen*

The CTDEP issues several types of licenses that can fish multiple gear types. One of these is the Commercial Fishing License, which allows fishermen to use beam trawls, among other gears. The number of active beam trawl fishermen is confidential.

*1.1.1.4 Effort*

Trawling is prohibited from March 1 through April 14, except for fly nets targeting sea herring (CT DEP 2005b). For areas closed to trawling, see Connecticut regulations. Geographic area fished and landings and effort by month fished is available, but confidential due to low participation in the fishery.

*1.1.1.5 Status of the Fishery*

Trends in landings and effort in the beam trawl fishery are confidential due to low participation in the fishery.

*1.1.1.6 Sea Turtle Bycatch*

There is no state-run observer program for the beam trawl fishery and no other sea turtle bycatch reports were available.

*1.1.1.7 Laws and Regulations*

The trawl net minimum mesh size in Connecticut waters is 5-1/2 inch (14-centimeter) diamond stretched or six-inch (15-centimeter) square stretched mesh in the cod end, with many exceptions depending on targeted species and time of year. Fishermen cannot use trawls to take bait (CT DEP 2005b).

## **1.1.2 Bottom Otter Trawls**

### *1.1.2.1 Gear Description*

The trawl net minimum mesh size in Connecticut waters is 5-1/2 inch (14-centimeter) diamond stretched or six-inch (15-centimeter) square stretched mesh in the cod end, with many exceptions depending on targeted species and time of year. See Connecticut regulations for detailed mesh sizes. Bottom trawls may not have rollers or cookies more than six inches (15 centimeters) in diameter (CT DEP 2005b). For a general description and diagram of a bottom otter trawl see the gear appendix.

### *1.1.2.2 Gear Deployment*

For a general description of bottom otter trawl deployment see the gear appendix.

### *1.1.2.3 Targeted Species*

Fishermen used bottom otter trawls to take winter flounder, summer flounder, scup, skates, conchs, butterfish, silver hake, loligo squid, tautog, and spiny dogfish (CT DEP 2005a). Fishermen cannot use trawls to take bait species under a marine bait license (CT DEP 2005b).

### *1.1.2.4 Number of Licensed and Active Fishermen*

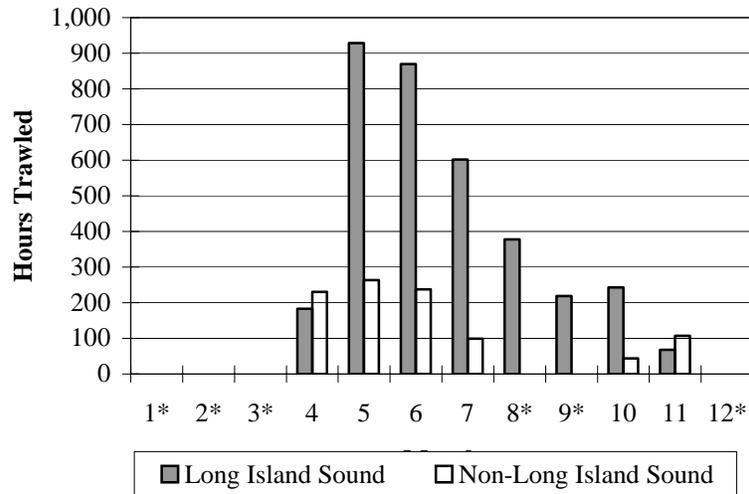
The CTDEP issues several types of licenses that can fish multiple gear types. One of these is the Commercial Fishing License, which allows fishermen to use bottom otter trawls, among other gears. From 2000 to 2003, the number of active bottom otter trawl fishermen increased from 26 to 46, then decreased to 33 in 2004 (Table 1).

**Table 1.** Active bottom otter trawl fishermen from 2000 to 2004.

Year	Active Bottom Otter Trawl Fishermen
2000	26
2001	28
2002	36
2003	46
2004	33

### *1.1.2.5 Effort*

In 2004 effort by otter trawls was highest in the late spring and early summer (Figure 1, Table 1-1) (CT DEP 2005a). Effort was highest in Long Island Sound. The depth fished was not available. Trawling is prohibited from March 1 through April 14, except for fly nets targeting sea herring (CT DEP 2005b). For areas closed to trawling, see Connecticut regulations.

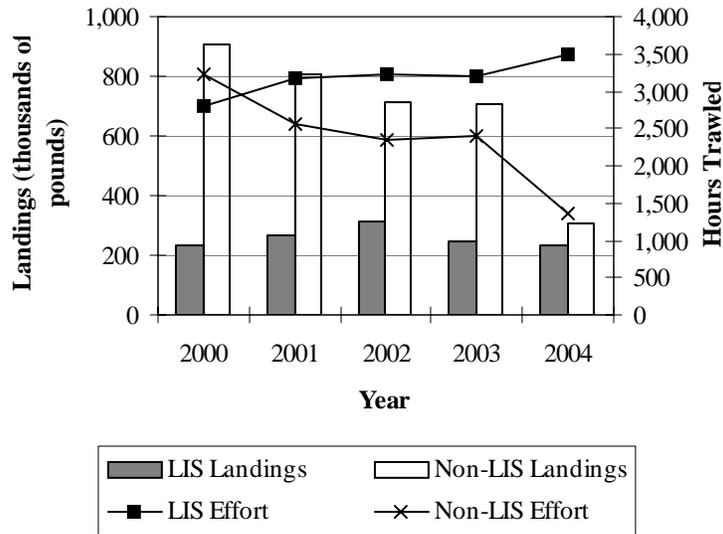


**Figure 1.** Effort by otter trawls in 2004 by month in Connecticut waters of Long Island Sound and non-federal waters outside of Long Island Sound

\*Effort in the non-Long Island Sound Connecticut waters in January, February, March, August, September, and December; and effort in Long Island Sound Connecticut waters in February and December are confidential.

#### 1.1.2.6 Status of the Fishery

From 2000 to 2004, landings in Connecticut from non-federal waters outside of Long Island Sound were greater than landings from Connecticut waters in Long Island Sound (Figure 2, Table 1-2). However, excluding 2000, hours trawled were greater in Long Island Sound. Landings declined from 2000 to 2004. From 2000 to 2004, there was also effort by otter trawl fishermen landing in Connecticut after fishing in the New York waters of Long Island Sound. This effort was 909 hours trawled in 2000, 307 hours trawled in 2001, and 37 hours trawled in 2002 (CT DEP 2005a). Effort in these waters in 2003 and 2004 and landings from these waters for all years is confidential due to the low number of fishermen trawling in the New York waters of Long Island Sound and landing their catch in Connecticut.



**Figure 2.** Landings and effort by otter trawls from 2000 to 2004 in Connecticut waters of Long Island Sound and non-federal waters outside of Long Island Sound

#### 1.1.2.7 Sea Turtle Bycatch

There are no state-run observer programs in the otter trawl fishery and no other sea turtle bycatch reports were available.

#### 1.1.2.8 Laws and Regulations

The trawl net minimum mesh size in Connecticut waters is 5-1/2 inch (14-centimeter) diamond stretched or six-inch (15-centimeter) square stretched mesh in the cod end, with many exceptions depending on targeted species and time of year. Bottom trawls may not have rollers or cookies more than six inches (15 centimeters) in diameter. Fishermen cannot use trawls to take bait species under a marine bait license (CT DEP 2005b).

### WORKS CITED

CT DEP. 2005a. Connecticut Department of Environmental Protection data. Queries provided by Mathew Gates.

CT DEP. 2005b. State of Connecticut Department of Environmental Protection. 2005 Marine Fisheries Information Circular. <http://dep.state.ct.us/burnatr/fishing/marineinfo/marinecirc05.pdf>.

Gates, M. 2005. Connecticut Department of Environmental Protection, Marine Fisheries Division. Personal Communication.

## APPENDIX 1. DATA TABLES

**Table 1-1.** Otter trawl effort in 2004 by month in Connecticut waters of Long Island Sound and non-federal waters outside of Long Island Sound

<b>Month</b>	<b>LIS Effort (hours trawled)</b>	<b>Non-LIS Effort (hours trawled)</b>
<b>1</b>	0	*
<b>2</b>	*	*
<b>3</b>	0	*
<b>4</b>	183	231
<b>5</b>	929	263
<b>6</b>	869	238
<b>7</b>	602	99
<b>8</b>	377	*
<b>9</b>	219	*
<b>10</b>	242	44
<b>11</b>	68	108
<b>12</b>	*	*

\*Data is confidential

**Table 1-2.** Otter trawl landings and effort from 2000 to 2004 in Connecticut waters of Long Island Sound and non-federal waters outside of Long Island Sound

<b>Year</b>	<b>CT LIS Landings (pounds)</b>	<b>Non-LIS Landings (pounds)</b>	<b>CT LIS Effort (hours trawled)</b>	<b>Non-LIS Effort (hours trawled)</b>
<b>2000</b>	235,985	906,019	2,800	3,233
<b>2001</b>	269,920	807,093	3,180	2,547
<b>2002</b>	312,375	710,549	3,231	2,350
<b>2003</b>	243,528	709,061	3,204	2,404
<b>2004</b>	235,773	307,759	3,503	1,372

## **Delaware Trawl Characterization**

Prepared by the Atlantic States Marine Fisheries Commission

### ***1.1 TRAWLS***

#### **1.1.1 Laws and Regulations**

Delaware regulation prohibits all trawling (7 Del.C. §927).

## **Florida (Atlantic Coast) Trawl Gear Characterization**

Prepared by the Atlantic States Marine Fisheries Commission

### ***1.1 TRAWLS***

#### **1.1.1 Shrimp Trawls**

##### *1.1.1.1 Gear Description*

Fishermen cannot use a net larger than 500 square feet (46 square meters) within one mile of Florida's coast (68B-4.0081 F.A.C.). For a general description of shrimp trawls see the gear appendix.

##### *1.1.1.2 Targeted Species*

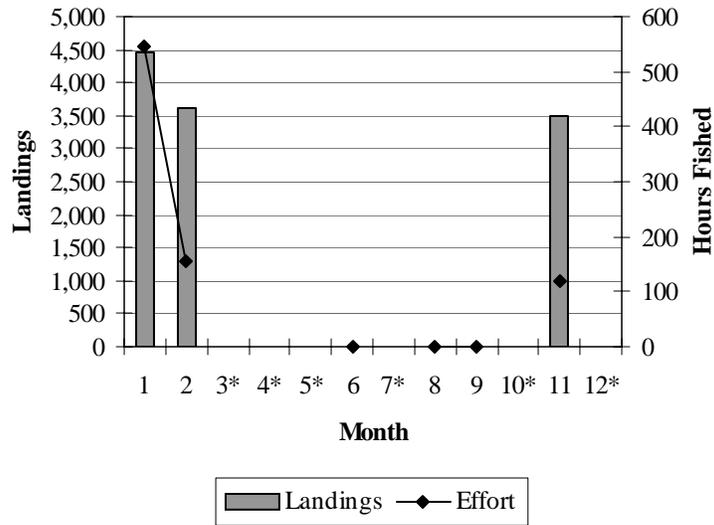
Fishermen may only use trawls to harvest shrimp and calico scallops. When allowed by rule, other species harvested as bycatch may be retained (FWC 2005b). In 2004 landings by shrimp trawls were 43% rock shrimp, 30% northern pink shrimp, 17% northern white shrimp, and 7% northern brown shrimp (ACCSP 2006).

##### *1.1.1.3 Number of Licensed and Active Fishermen*

All commercial fishermen must hold a saltwater products license (FWC 2005b). The number of saltwater products licenses issued to east coast fishermen is listed in Appendix 2. The number of active shrimp trawl fishermen in all Florida waters was 214 in 2000, 87 in 2001, 72 in 2002, 197 in 2003, and 214 in 2004 (ACCSP 2006).

##### *1.1.1.4 Effort*

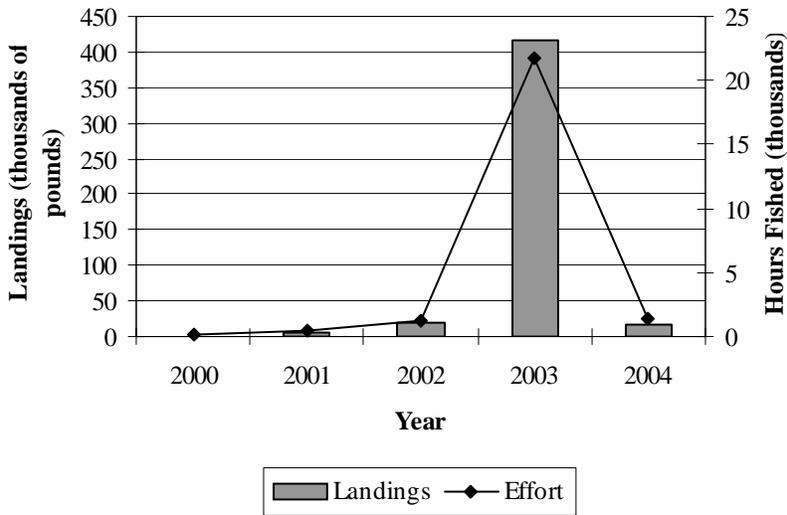
Shrimp fishermen may only fish in waters of the southeast region of the State in Dade County from November 1 to May 31 (68B-31.0135 F.A.C.). In April and May shrimp cannot be harvested in Nassau, Duval, St. Johns, Putnam, Flagler, Volusia, Seminole, Brevard, Indian River, St. Lucie, and Clay Counties (68B-31.0156 F.A.C.). Shrimp may not be harvested at night except in June, July, and August (68B-31.0157 F.A.C.) In 2004 landings and effort were highest in the winter months (Figure 1, Table 1-1). The majority of the effort took place from St. Augustine to St. Andrews Sound (ACCSP 2006). The depth fished is not known.



**Figure 1.** Shrimp trawl landings and effort in 2004 by month.  
 \*Data for March, April, May, July, October, and December are confidential.

*1.1.1.5 Status of the Fishery*

From 2000 to 2004 the highest landings and effort were in 2003 when fishermen landed 415,445 pounds in 21,725 hours fished. In 2004 landings and effort declined to near 2002 levels (Figure 2, Table 1-2).



**Figure 2.** Shrimp trawl landings and effort from 2000 to 2004.

*1.1.1.6 Sea Turtle Bycatch*

In an analysis of sea turtle interactions with shrimp trawls, Epperly et al. estimated the number of sea turtle interactions that resulted in mortality in shrimp trawls in the Gulf of Mexico and Southeast U.S. Atlantic from March to November 2001 and from December to February 2001 by subregion (latitude and longitude zones) and by depth stratum (nearshore or offshore). The number of estimated interactions that resulted in mortality (with confidence intervals given in

parentheses) in inshore waters of the south Atlantic from March to November 2001 were: less than one (zero to less than one) leatherback, 14 (eight to 19) loggerhead, eight (three to 13) Kemp's ridley, and one (zero to one) green. The number of estimated interactions that resulted in mortality in inshore waters of the south Atlantic from December to February 2001 were: less than one (zero to less than one) leatherback, six (four to nine) loggerhead, four (two to six) Kemp's ridley, and less than one (zero to less than one) green. These estimates were based on observer information from the Gulf and South Atlantic Fisheries Foundation and from aerial survey data collected in the Gulf of Mexico and U.S. Atlantic (Epperly et al. 2002). No other sea turtle bycatch information was available.

#### *1.1.1.7 Laws and Regulations*

All trawls must contain BRDs (68B-31.0045 F.A.C.) All trawls must contain TEDs, except that a single try net can be used without a TED (68B-31.004 F.A.C.). A try net used within one mile of the coast can have a headrope length no more than 10 feet (three meters) and a perimeter around the leading edge of no more than 30 feet (nine meters). A try net used beyond one mile of the coast can have a headrope length no more than 20 feet (six meters) and a perimeter around the leading edge of no more than 60 feet (18 meters) (69B-31.009 F.A.C.).

Fishermen may not use trawls with a net or bag containing more than 500 square feet (46 square meters) of mesh area in nearshore and inshore waters (all waters landward of a line one nautical mile from the Atlantic coast) (FWC 2005b). For other trawl regulations, see sections above.

### **1.1.2 Roller Trawls**

#### *1.1.2.1 Gear Description*

Fishermen cannot use a net larger than 500 square feet (46 square meters) within one mile of Florida's coast (68B-4.0081 F.A.C.). For a general description of roller trawls see the gear appendix.

#### *1.1.2.2 Targeted Species*

Fishermen may only use trawls to harvest shrimp and calico scallops. When allowed by rule, other species harvested as bycatch may be retained (FWC 2005b). In 2004 landings were 33% northern white shrimp, 30% northern pink shrimp, 27% penaeoid shrimp, and 9% northern brown shrimp (ACCSP 2006).

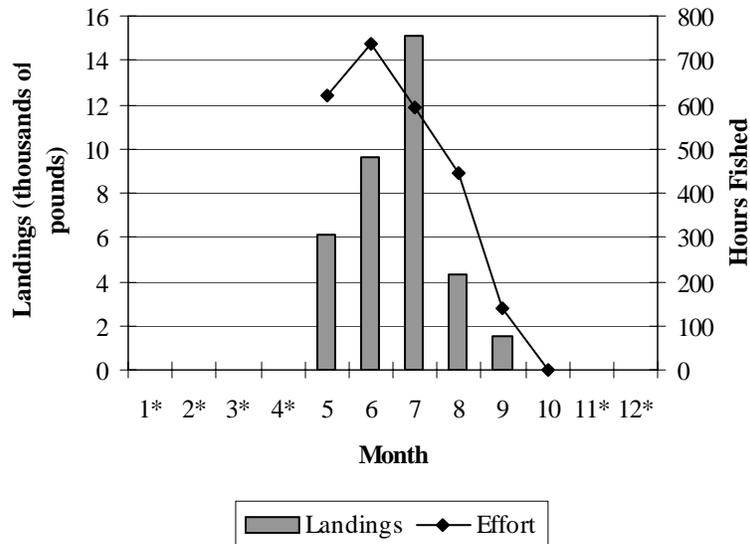
#### *1.1.2.3 Number of Licensed and Active Fishermen*

All commercial fishermen must hold a saltwater products license (FWC 2005b). The number of saltwater products licenses issued to east coast fishermen is listed in Appendix 2. The number of active roller trawl fishermen in all Florida waters was ten in 2003, and 37 in 2004. The number of active fishermen from 2000 to 2002 is confidential (ACCSP 2006).

#### *1.1.2.4 Effort*

Shrimp fishermen may only fish in waters of the southeast region in Dade County from November 1 to May 31 (68B-31.0135 F.A.C.). In April and May shrimp cannot be harvested in Nassau, Duval, St. Johns, Putnam, Flagler, Volusia, Seminole, Brevard, Indian River, St. Lucie, and Clay Counties (68B-31.0156 F.A.C.). Shrimp may not be harvested at night except in June,

July, and August (68B-31.0157 F.A.C.) In 2004 landings by roller trawls were highest in July, while effort was highest in June (Figure 3, Table 1-3). Most of the effort took place in southern Florida in the Biscayne Bay and North Florida Bay areas (ACCSP 2006). The depth fished is not known.



**Figure 3.** Roller trawl landings and effort in 2004 by month.  
 \*Data for January, February, March, April, November, and December are confidential.

*1.1.2.5 Status of the Fishery*

There was no fishing by roller trawls on Florida’s east coast from 2000 to 2002. Roller trawl fishermen fished 3,160 hours and landed 44,203 pounds in 2004 (ACCSP 20005).

*1.1.2.6 Sea Turtle Bycatch*

The Florida FWC did not provide information on sea turtle bycatch in Florida’s fisheries, and no other sea turtle bycatch information was available.

*1.1.2.7 Laws and Regulations*

All trawls must contain BRDs (68B-31.0045 F.A.C.) All trawls must contain TEDs, except that a single try net can be used without a TED (68B-31.004 F.A.C.). A try net used within one mile of the coast can have a headrope length no more than 10 feet (three meters) and a perimeter around the leading edge of no more than 30 feet (nine meters). A try net used beyond one mile of the coast can have a headrope length no more than 20 feet (six meters) and a perimeter around the leading edge of no more than 60 feet (18 meters) (69B-31.009 F.A.C.).

Fishermen may not use trawls with a net or bag containing more than 500 square feet (46 square meters) of mesh area in nearshore and inshore waters (all waters landward of a line one nautical mile from the Atlantic coast) (FWC 2005b). See sections above for additional laws and regulations regarding roller trawls.

### **1.1.3 Roller Frame Trawls**

#### *1.1.3.1 Gear Description*

Florida regulations define a roller frame trawl as a trawl with a rectangular rigid frame to keep the mouth open while being towed. The lower horizontal beam of the frame has rollers to allow the trawl to roll over the bottom and any obstructions while being towed. A grid of vertical bars shields the trawl opening, and the trawl is towed by attaching a line or towing cable to a tongue located above or at the center of the upper horizontal beam of the frame. The trawl has no doors attached to keep the mouth of the trawl open (68B-31.006 F.A.C.). Frame sizes range between ten and 16 feet (three and five meters) and the vertical opening is approximately two to 2.5 feet (61 to 76 centimeters) (Epperly et al. 2002).

When harvesting bait shrimp neither the upper nor the lower horizontal beam can be longer than 16 feet (4.9 meters) and the vertical bars shielding the opening can be spaced no more than three inches (7.6 centimeters) apart (68B-31.008 F.A.C.) Fishermen cannot use a net larger than 500 square feet (46 square meters) within one mile of Florida's coast (68B-4.0081 F.A.C.). For a general description of roller frame trawls see the gear appendix.

#### *1.1.3.2 Gear Deployment*

Most vessels haul two frames simultaneously and winches are used for gear retrieval. The average trawl time is about 25 minutes (Epperly et al. 2002).

#### *1.1.3.3 Targeted Species*

Fishermen may only use trawls to harvest shrimp and calico scallops. When allowed by rule, other species harvested as bycatch may be retained (FWC 2005b). Roller frame trawl landings in 2004 were 74% northern brown shrimp, 18% northern pink shrimp, and 7% bait shrimp (ACCSP 2006).

#### *1.1.3.4 Number of Licensed and Active Fishermen*

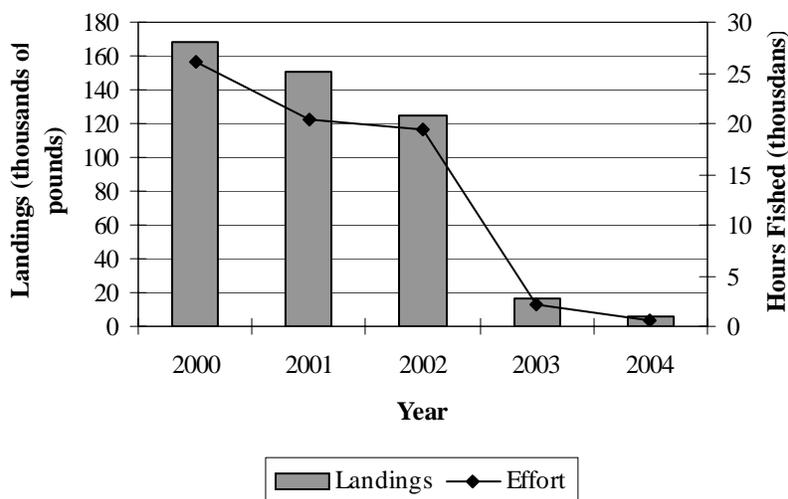
All commercial fishermen must hold a saltwater products license (FWC 2005b). The number of saltwater products licenses issued to east coast fishermen is listed in Appendix 2. The number of active roller frame trawl fishermen in all Florida waters was 69 in 2000, 83 in 2001, 88 in 2002, 72 in 2003, and 48 in 2004 (ACCSP 2006).

#### *1.1.3.5 Effort*

Fishermen use roller frame trawls in areas with seagrass and hard bottom (Epperly et al. 2002). In waters of the southeast region in Dade County shrimp fishermen may only fish from November 1 to May 31 (68B-31.0135 F.A.C.). In April and May shrimp cannot be harvested in Nassau, Duval, St. Johns, Putnam, Flagler, Volusia, Seminole, Brevard, Indian River, St. Lucie, and Clay Counties (68B-31.0156 F.A.C.). Shrimp may not be harvested at night except in June, July, and August (68B-31.0157 F.A.C.) All roller frame trawl landings and effort by month in 2004 are confidential, except that fishermen landed 2,355 pounds in 160 hours fished in February. Most of the effort took place in southern Florida in the Biscayne Bay and North Florida Bay areas (ACCSP 2006). The depth fished is not known.

### 1.1.3.6 Status of the Fishery

Roller frame trawl landings and effort declined from 168,731 pounds landed in 26,081 hours fished in 2000 to 5,978 pounds landed in 662 hours fished in 2004 (Figure 4, Table 1-4).



**Figure 4.** Roller frame trawl landings and effort from 2000 to 2004.

### 1.1.3.7 Sea Turtle Bycatch

See the section below for TED requirements in roller frame trawls. It is unlikely that a sea turtle would become entrapped within a roller frame trawl due to the required deflector bars positioned across the trawl mouth. Slow moving turtles caught in the path of the gear may become impinged against the frame for a short period and/or be overrun by the gear (Epperly et al. 2002). The Florida FWC did not provide information on sea turtle bycatch in Florida fisheries.

### 1.1.3.8 Laws and Regulations

Roller frame trawls may also be exempt from the TED requirement if the trawl meets the following four specifications: the trawl has a rectangular rigid frame to keep the mouth open with no doors attached, the lower horizontal beam of the frame has rollers to allow the trawl to roll over the bottom and any obstructions while being towed, the trawl opening is shielded by a grid of vertical bars spaced no more than three inches (7.6 centimeters) apart, and the trawl is towed by attaching a line or towing cable to a tongue located above or at the center of the upper beam of the frame (68B-31.004 F.A.C.).

Fishermen may not use trawls with a net or bag containing more than 500 square feet (46 square meters) of mesh area in nearshore and inshore waters (all waters landward of a line one nautical mile from the Atlantic coast) (FWC 2005B). See sections above for additional roller frame trawl laws and regulations.

## 1.1.4 Butterfly Nets

### 1.1.4.1 Gear Description

Fishermen cannot use a net larger than 500 square feet (46 square meters) within one mile of Florida's coast (68B-4.0081 F.A.C.). Florida regulations define a butterfly net (wing net) as a net

in the form of an elongated bag kept open by a rigid frame that is attached to either side of a vessel, and is not towed behind a vessel or dragged along the bottom (68B-31.006 F.A.C.). For a general description of butterfly/wing nets see the gear appendix.

#### 1.1.4.2 Targeted Species

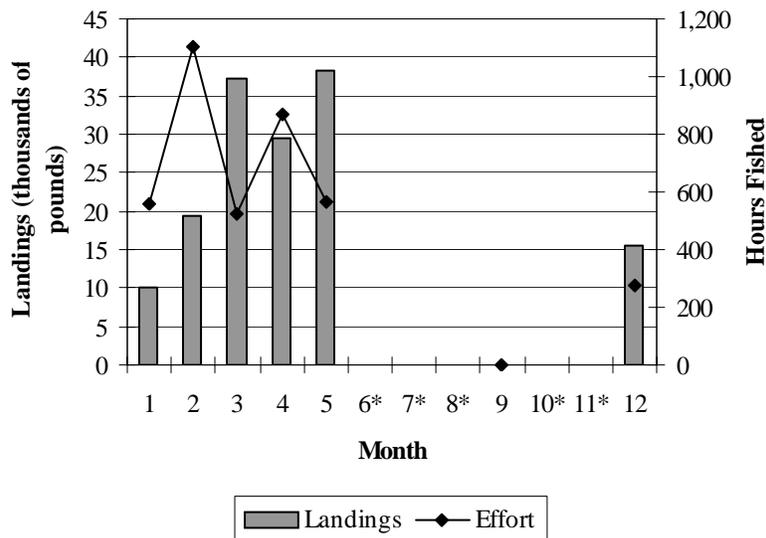
Fishermen may only use trawls to harvest shrimp and calico scallops. When allowed by rule, other species harvested as bycatch may be retained (FWC 2005b). Landings in 2004 were 77% northern pink shrimp, 13% bait shrimp, and 9% northern white shrimp (ACCSP 2006).

#### 1.1.4.3 Number of Licensed and Active Fishermen

All commercial fishermen must hold a saltwater products license (FWC 2005b). The number of saltwater products licenses issued to east coast fishermen is listed in Appendix 2. The number of active butterfly net fishermen in all Florida waters was 263 in 2000, 163 in 2001, 113 in 2002, 54 in 2003, and 103 in 2004 (ACCSP 2006).

#### 1.1.4.4 Effort

Butterfly nets are allowed for commercial shrimp harvest in Biscayne Bay and live bait harvest in inshore waters of Volusia County (Epperly et al. 2002). In April and May shrimp cannot be harvested in Nassau, Duval, St. Johns, Putnam, Flagler, Volusia, Seminole, Brevard, Indian River, St. Lucie, and Clay Counties (68B-31.0156 F.A.C.). Shrimp may not be harvested at night except in June, July, and August (68B-31.0157 F.A.C.) Butterfly net effort in 2004 was highest in February, while landings were highest in May (Figure 5, Table 1-5). Much of the effort was concentrated in southern Florida in the Biscayne Bay and North Florida Bay areas, though fishermen also fished from Daytona Beach to Melbourne Beach (ACCSP 2006). The depth fished is not known.

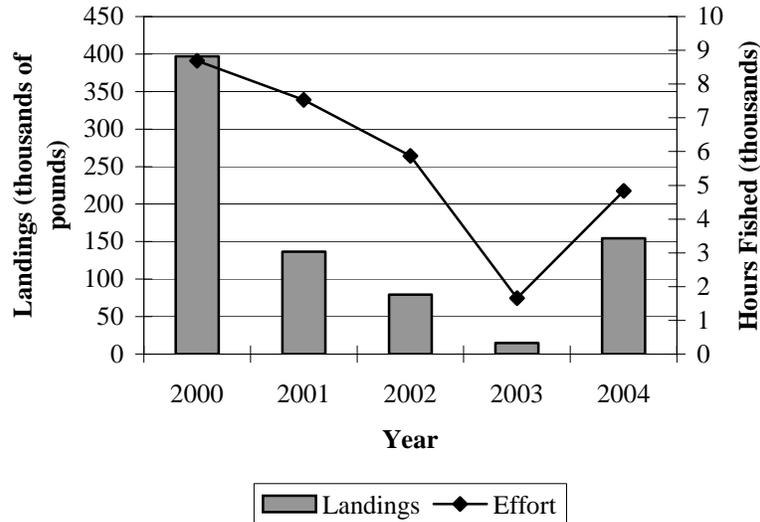


**Figure 5.** Butterfly net landings and effort in 2004 by month.

\*Data from June, July, August, October, and November are confidential.

#### 1.1.4.5 Status of the Fishery

From 2000 to 2004 landings and effort were highest in 2000 when fishermen landed 396,936 pounds in 8,686 hours fished. Landings and effort declined to a low of 14,662 pounds landed in 1,656 hours fished in 2003, then increased to 154,363 pounds landed in 4,839 hours fished in 2004 (Figure 6, Table 1-6).



**Figure 6.** Butterfly net landings and effort from 2000 to 2004.

#### 1.1.4.6 Sea Turtle Bycatch

Butterfly nets have tow time limits of 55 minutes from April 1 to October 31 and 75 minutes from November 1 to March 31, and are exempt from TED regulations (Epperly et al. 2002). The Florida FWC did not provide information on sea turtle bycatch in Florida fisheries.

#### 1.1.4.7 Laws and Regulations

Fishermen may not use trawls with a net or bag containing more than 500 square feet (46 square meters) of mesh area in nearshore and inshore waters (all waters landward of a line one nautical mile from the Atlantic coast) (FWC 2005b). See sections above for additional laws and regulations regarding butterfly/wing nets.

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## APPENDIX 1. DATA TABLES

Table 1-1. Shrimp trawl landings and effort in 2004 by month.

<b>Month</b>	<b>Landings (pounds)</b>	<b>Hours Fished</b>
<b>1</b>	4,467	544
<b>2</b>	3,609	156
<b>3</b>	*	*
<b>4</b>	*	*
<b>5</b>	*	*
<b>6</b>	0	0
<b>7</b>	*	*
<b>8</b>	0	0
<b>9</b>	0	0
<b>10</b>	*	*
<b>11</b>	3,493	120
<b>12</b>	*	*

\*Data is confidential

Table 1-2. Shrimp trawl landings and effort from 2000 to 2004.

<b>Year</b>	<b>Landings (pounds)</b>	<b>Hours Fished</b>
<b>2000</b>	1,356	122
<b>2001</b>	6,460	423
<b>2002</b>	19,520	1,279
<b>2003</b>	415,445	21,725
<b>2004</b>	17,242	1,370

Table 1-3. Roller trawl landings and effort in 2004 by month.

<b>Month</b>	<b>Landings (pounds)</b>	<b>Hours Fished</b>
<b>1</b>	*	*
<b>2</b>	*	*
<b>3</b>	*	*
<b>4</b>	*	*
<b>5</b>	6,078	620
<b>6</b>	9,641	736
<b>7</b>	15,140	594
<b>8</b>	4,340	443
<b>9</b>	1,510	138
<b>10</b>	0	0
<b>11</b>	*	*
<b>12</b>	*	*

\*Data is confidential.

Table 1-4. Roller frame trawl landings and effort from 2000 to 2004.

<b>Year</b>	<b>Landings (pounds)</b>	<b>Hours Fished</b>
<b>2000</b>	168,731	26,081
<b>2001</b>	151,053	20,316
<b>2002</b>	125,289	19,315
<b>2003</b>	16,087	2,186
<b>2004</b>	5,978	662

Table 1-5. Butterfly net landings and effort in 2004 by month.

<b>Month</b>	<b>Landings (pounds)</b>	<b>Hours Fished</b>
<b>1</b>	10,061	560
<b>2</b>	19,468	1,102
<b>3</b>	37,267	522
<b>4</b>	29,539	867
<b>5</b>	38,320	568
<b>6</b>	*	*
<b>7</b>	*	*
<b>8</b>	*	*
<b>9</b>	0	0
<b>10</b>	*	*
<b>11</b>	*	*
<b>12</b>	15,431	277

\*Data is confidential.

Table 1-6. Butterfly net landings and effort from 2000 to 2004.

<b>Year</b>	<b>Landings (pounds)</b>	<b>Hours Fished</b>
<b>2000</b>	396,936	8,686
<b>2001</b>	136,511	7,528
<b>2002</b>	79,157	5,870
<b>2003</b>	14,662	1,656
<b>2004</b>	154,363	4,839

**Florida Trawl Gear Characterization**  
Prepared by Fish and Wildlife Research Institute  
Florida Fish and Wildlife Conservation Commission

### 3.1 Trawls

In state waters of Florida, a trawl or trawl net is defined as a net in the form of an elongated bag with the mouth kept open by various means and fished by being towed or dragged on the bottom. Trawl nets are usually constructed of nylon or polyethylene twine. Mesh sizes vary depending on size and design, which affects the height and width dimensions of the net opening as well as how the trawl performs along the sea bed. Mesh size is generally smaller in the cod end, which reduces net expansion and concentrates the shrimp. There are three primary sub-gear types in this category: otter trawl, skimmer trawl, and the roller frame trawl.

#### 3.1.1 Otter Trawl

The otter trawl is a towed conical net with the mouth kept open by means of boards or wooden doors on each side of the opening (appendix 4-1). Recent survey data (2005; A. McMillen-Jackson, personal communication) indicate that the net length for otter trawls ranges in size from 16 to 98 feet, and mesh sizes range from 3/4 to 2" for the body of the net, and 5/8 to 3/4" for the cod end, depending on the regulatory area. According to the gear survey data, 66% of respondents indicated that a try net was used in conjunction with an otter trawl. Try nets, used for testing areas for shrimp concentrations, may have a headrope length of 10 to 20 feet and a leading edge perimeter of 30 to 60 feet, depending on the regulatory area.

#### 3.1.2 Skimmer Trawl

The skimmer trawl has a rigid "L"-shaped or triangular metal frame with the inboard portion of the frame attached to the vessel and the outboard portion attached to a skid that runs along the seabed (appendix 4-2). The net mesh size for skimmer trawls ranges from 3/4-1 1/2" stretched mesh in the body of the net, and 5/8 to 1 1/3" for the tail bags. Survey data (A. McMillen-Jackson, personal communication) indicated net length ranged from 25 to 72 feet.

#### 3.1.3 Roller Frame

The roller frame trawl has a rectangular rigid frame, usually metal, to keep the mouth of the net open (appendix 4-3). The interior of the frame contains a grid of vertical bars shielding the net opening, while the bottom of the frame has rollers which allow the apparatus to roll over the seabed. The beam length of the frame is not more than 16 feet and the vertical bars in the frame are no more than 3 inches apart. Mesh size ranges from 3/4 to 7/8 inches for the body of the net, and 5/8 to 3/4 for the cod end. According to the survey data (A. McMillen-Jackson, personal communication), net length for roller frame trawls ranged from 20 to 94 feet.

## Gear Deployments

### 4.1 Trawls

Trawl vessels in state waters typically use from 1-4 trawl nets, depending on the regulatory area, which may include the use of a try net. State regulations specify that no more than two nets may be aboard any vessel, including a try net, and each net must be no more than 500 square feet in area when fishing from shore to 3 nautical miles out on the Gulf coast of Florida. State waters in the Gulf extend to 9 nautical miles.

#### 4.1.1 Otter Trawl

Otter trawls use wooden doors on each side of the net mouth to keep the net open when it is being towed (appendix 4-1). The top margin of the net uses a floated headrope, while a tickler chain on the bottom margin of the mouth drags along the sea floor and startles shrimp or fish into the net. As the net moves forward, the catch is forced farther back until trapped into the tail bag, or cod end of the net. Inside three nautical miles, vessels use a one or two net configuration. A single net may be towed from the stern of the vessel, where a double net would have each net attached to an outrigger from the port and starboard beam. Vessels fishing in waters outside 3 nautical miles may also use a quad rig which consists of two nets on each outrigger with a center sled in between the paired nets. According to a recent survey (A. McMillen-Jackson, personal communication) of the shrimp fishery in both state and federal waters of Florida, depths fished ranged from 10 feet to greater than fifty feet, with the majority of trips occurring in deeper water (table 1).

Table 1. Number of trips by trawl type and depth category from a survey (A. McMillen-Jackson, personal communication) of the Florida shrimp fishery.

Trawl Type	Depth Range (feet)			
	0-10	11-25	26-50	51+
	Trips			
Otter	9	49	35	103
Skimmer	6	1	0	1
Roller	40	38	5	1

#### 4.1.2 Skimmer Trawl

Skimmer trawls are primarily used in inshore waters of the Gulf, usually in less than 10 feet of water. The mouth or perimeter of the net is hung from the outer edges of the triangular frame and, as it is towed, is kept open with a weight that holds the inboard corner of the net mouth on the bottom (appendix 4-2). The 113-kg weight, which is tied to an inboard line, spreads open the bottom of the net, and a tickler chain is connected between the weight and the outer skid. As in the otter trawl, the action of the tickler

chain forces shrimp into the net, and as the net moves forward, the catch becomes trapped in the cod end.

#### 4.1.3 Roller Frame

Roller frame trawls, which usually fish in waters less than 25 feet, utilize a rectangular frame construction with vertical bars in the area of the frame (appendix 4-3). As the trawl is towed, the frame keeps the net open as it rides along the bottom on metal rollers. Because of the spacing on the vertical bars, larger animals are deflected away from the net and only small shrimp, invertebrates, and fish are captured.

Table 2. Average number of trips per year by gear type and depth category, 2000-2004.

Gear Type	Depth Category (feet)										
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	>100
Bandit Rig	21.4	8.8	4.2	9.8	2.6	1.6	1.2	4.8	2.6	3	11.2
Beach/Haul Seine	4277.6	239	17.4	11.2	1.2	0.2	0	0	0	0	0
Blue Crab Trap	19095.2	4847	346.6	24	2	0.8	0.2	0	0	0	0.2
Bully Net	173.6	7.8	27.4	0.6	0.4	0	0	0	0	0	0
Cast Net	14367	1538.4	774.4	122.2	6.6	1	0.8	0.4	0	0.4	0
Dredge	149	26.6	0.8	0.8	0.8	0	0	0	0	0	0
Fish Trap	391.8	154.6	200.2	45.2	27.6	0.4	1.2	2.4	0.4	0	1.2
Gig	862.2	27.4	38.2	26	4.2	3.2	0.4	0.2	0.2	0	0.4
Hand Gear	130	735	29.2	7.4	1.2	3	16.4	4	0.8	0.2	0
Rod & Reel	2124.8	1450.2	923.8	651.4	335.2	202.4	274.4	285.2	51.8	12.4	28.6
Lampara Net	0	0.6	19.8	3.4	0.4	0	0	0	0	0	0
Lobster Trap	252.2	799.6	1023.2	855	515.4	229.8	221.6	185	35.4	3.8	1.8
Purse Seine	115.2	60.2	46.2	60.6	8.8	78.2	17.8	0.2	0	0	0
SCUBA	496.6	755.8	964.8	202.6	33.2	10.8	5.8	4.2	0	0.2	0.6
Snorkel	418.4	36.8	4.8	3	0.2	0	0	0	0	0	0
Sponge Hook	269.6	23.2	5.8	7	0.2	0	0	0	0	0	0
Stone Crab Trap	1383.2	5517.8	4466	2005.2	404.6	23	9	1.4	0.2	0	0
Oyster Tongs	17981	16.4	1.4	0	0	0	0	0	0	0	0
Trap, Uncl.	37.4	51.2	10.4	4.4	0.2	0.2	0	0.2	0.2	0	0
Trawls	7520.4	6673.6	974	148.8	52	39	27.8	144.4	7.8	1.4	1.6
Roller Frame	2378.8	715.8	0.4	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0

## 5.0 Target Species

### 5.1 Trawls

In Florida waters of the Gulf of Mexico, trawl fishing gears target primarily shrimp. Otter trawls and skimmer trawls catch most of the food shrimp, whereas roller frame trawls primarily target bait shrimp. A small trawl fishery in Northwest Florida targets some bait and offshore bottom finfish species such as Spanish sardines, scad, and ladyfish.

## 6.2 Active Vessel Gears

The number of commercial fishing licenses actively fishing with a particular gear type in Florida's state waters of the Gulf of Mexico is shown by calendar year in table 5. The major gear types used by license holders are cast net, rod & reel, stone crab, blue crab and lobster traps, as well as trawls and oyster tongs. The number of participants using these gear types was relatively consistent from 2000 through 2004. The number of fishing licenses using cast nets averaged highest over the 5-year period at 1,227 licenses. This was followed by rod and reel, stone crab traps, trawls, blue crab traps, oyster tongs, and lobster traps at 1,159, 859, 627, 502, and 340 licenses, respectively, from 2000 through 2004. Near shore beach or haul seine gears are also used by about 297 licenses on average.

Table 5. Number of active licenses in Florida state waters of the Gulf of Mexico, by year and gear type (FWC/FWRI Trip Tickets).

License Type	2000			2001			Year 2002			2003			2004	
	Individual	Vessel	Total	Individual	Vessel	Total	Individual	Vessel	Total	Individual	Vessel	Total	Individual	Vessel
Gear Type														
Bandit Rig	17	44	61	20	20	40	16	34	50	28	34	62	28	39
Beach/Haul Seine	187	115	302	184	101	285	179	124	303	219	98	317	181	96
Bully Net (Lobster)	15	13	28	13	12	25	16	13	29	18	12	30	21	30
Cast Net	826	473	1299	830	446	1276	842	427	1269	769	408	1177	727	389
Dredge	1	2	3	0	4	4	0	3	3	2	1	3	1	2
Gig/spear	77	33	110	86	37	123	97	31	128	90	44	134	107	49
Hand Gears	38	26	64	33	18	51	23	22	45	114	32	146	140	38
Lampara Net	1	1	2	1	2	3	1	1	2	0	1	1	0	0
Oyster Tongs	538	34	572	590	39	629	470	22	492	442	24	466	336	17
Purse Seine	34	37	71	36	29	65	15	26	41	19	19	38	7	14
Rod & Reel	737	690	1427	668	583	1251	549	489	1038	570	502	1072	523	482
Scuba	107	149	256	96	161	257	95	171	266	112	185	297	57	179
Snorkel	20	21	41	17	18	35	20	18	38	10	19	29	15	32
Sponge Hook	43	26	69	69	27	96	60	20	80	68	22	90	64	29
Trap, Blue Crab	363	270	633	351	254	605	317	256	573	328	263	591	323	277
Trap, Fish	36	67	103	38	50	88	31	49	80	35	38	73	33	33
Trap, Lobster	130	229	359	131	189	320	130	249	379	124	211	335	99	206
Trap, Stone Crab	476	560	1036	402	471	873	392	476	868	351	423	774	338	408
Trap, uncl.	22	31	53	35	45	80	18	22	40	20	27	47	25	27
Trawl, uncl.	217	544	761	233	526	759	160	482	642	121	382	503	112	357
Trawl, Roller Frame	9	37	46	9	40	49	8	44	52	7	49	56	5	49

## 7.0 Effort

Five-year averages from 2000 through 2004 indicated that more trips reporting the use of blue crab traps were recorded than any other gear type (24,628 trips; figure 2). This was followed by cast nets (17,097), oyster tongs (19,074), stone crab traps (13,894), and food shrimp trawls (15,991). A significant number of rod & reel trips (6,495) and beach or haul seine trips (4,577) were reported as well. Effort by gear and area indicate that blue crab traps are used primarily between Ft. Myers and Apalachicola, while oyster tongs are limited to the Apalachicola region as this is the primary harvesting area for oysters (figures 2 and 3). The bulk of cast net trips occurred from the Ft. Myers to Crystal River fishing zones, while trips where shrimp trawls are used occurred from the Ft. Myers zone through the Panama City zone with a large spike of activity (particularly for bait shrimp with roller frame trawls) in the Crystal River zone. Trips where stone crab traps are used have a fairly wide distribution from the Key West zone to the southern end of the Apalachicola zone, while trips with lobster traps are primarily in the Key West and Tortugas fishing zones.

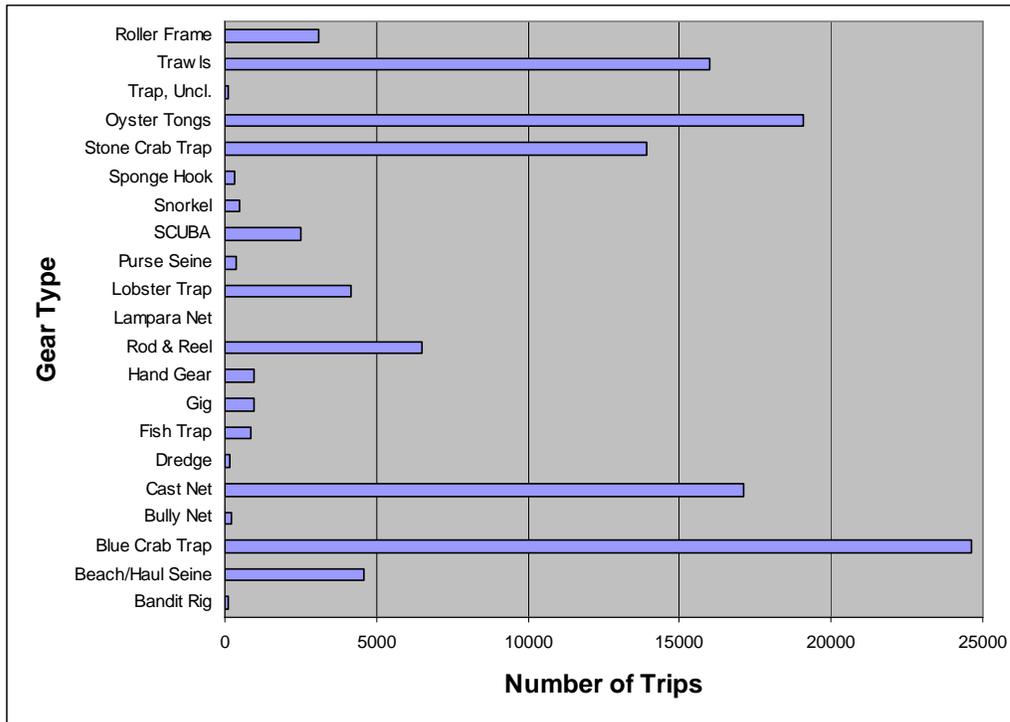


Figure 2. Average number of fishing trips by gear type from 2000-2004.

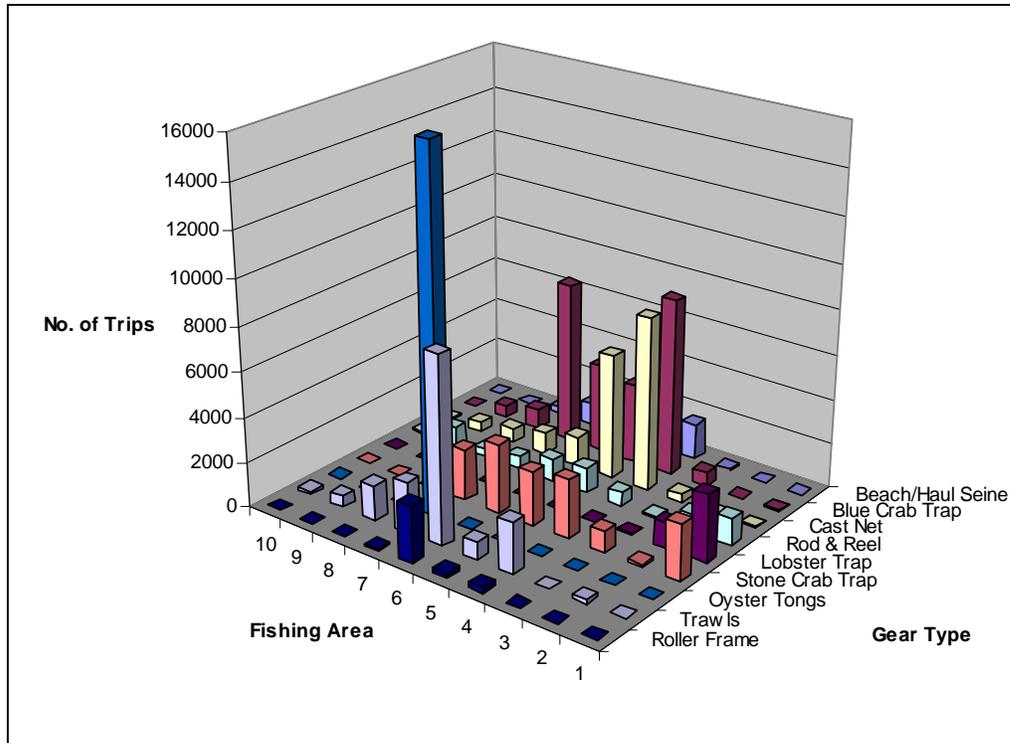


Figure 3. Average number of fishing trips by gear type and fishing area, 2000-2004.

The number of trips by month indicates that most gear types are fished year round (figure 4) with the exception of the lobster and stone crab fisheries which have regulatory seasons (Aug. 6- March 30, and Oct. 16 – May 15, respectively). Both of these fisheries experience significant activity at the beginning of the season which tapers off later in the season. In the blue crab fishery, there is more activity in the late spring and early summer months, while cast net trips increase during the winter roe mullet fishery. Trips for oysters decrease during the warmer months of summer and early fall, as do trips in the food shrimp trawl fishery.

Depths along the state-federal regulatory boundary range from 15 feet in waters off the Big Bend region (Apalachicola to Crystal River) to approximately 90 feet of water off the Western panhandle. Boundary waters can be as deep as 26 fathoms off the Dry Tortugas. The number of trips by gear and month shows the majority of trips occur in fairly shallow water with some gears like lobster and stone crab traps extending to deeper water (figure 5). Trips where haul seines, blue crab traps, oyster tongs, otter and skimmer trawls, and roller frame trawls occurred almost exclusively in waters less than 20 feet. The majority of lobster trap and rod & reel trips occurred in waters as deep as 80 feet while those for stone crab traps were in waters less than 60 feet.

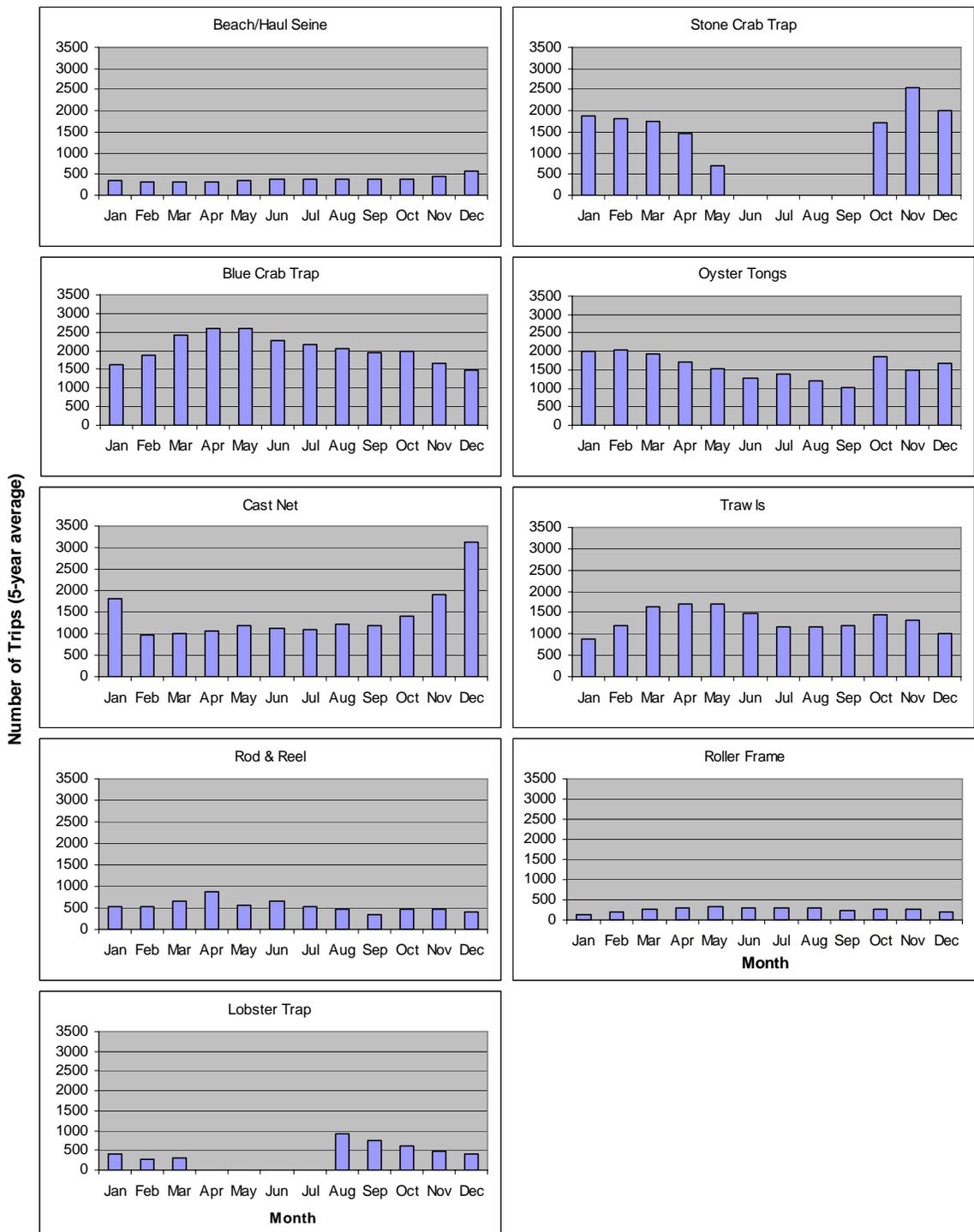


Figure 4. Average number of fishing trips by gear type and month. Averages are calculated over a 5-year period from 2000-2004.

Analysis of time fished data shows that over the 5-year period from 2000-2004, trips where otter or skimmer trawls were used averaged a total of 72,184 hours annually (figure 6). This was followed by rod & reel gears at 43,763 hours, blue crab traps at 34,493 hours, oyster tongs at 29,045 hours, stone crab traps at 25,408 hours, lobster traps at 20,594 hours, and cast net trips at 16,750 hours per year. Trips where time fished was reported in days were converted to hours.

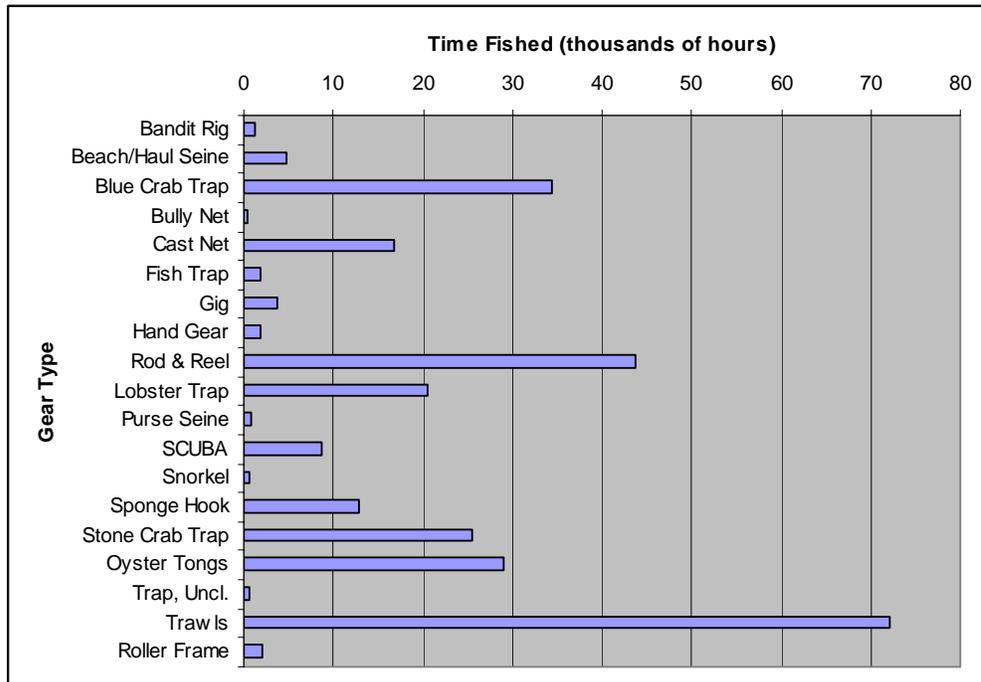


Figure 6. Average amount of time spent fishing per year by gear type from 2000-2004.

In trawl fisheries, tow times indicated that for food shrimp, otter trawls averaged between 2.7 and 4.4 hours per tow from survey zones in the Gulf, while skimmer trawls averaged from 3 to 7.5 hours per tow (tables 6 and 7). Roller frames, which are more prominent in the bait shrimp fishery, averaged from .2 to .5 hours per tow.

Table 6. Average trawl tow times, by zone, from a survey (A. McMillen-Jackson, personal communication) of the Florida shrimp fishery.

Food Shrimp	Otter Trawl				Rollerframe				Skimmer trawl			
	Average	Min	Max	n	Average	Min	Max	n	Average	Min	Max	n
Zone 1	1.8	1	3	10								
Zone 2									7.5	6	9	2
Zone 3	4.4	2.8	6	2								
Zone 4	2.9	0.8	6	32								
Zone 5					1	1	1	1	3	3	3	1
Zone 6	2.7	1	5	25	3.4	3.4	3.4	1				
Bait Shrimp	Otter Trawl				Rollerframe				Skimmer trawl			
	Average	Min	Max	n	Average	Min	Max	n	Average	Min	Max	n
Zone 1	0.5	0.5	0.5	1								
Zone 2					0.4	0.3	0.5	3				
Zone 3												
Zone 4					0.3	0.2	0.5	4				
Zone 5					0.5	0.5	0.5	1	0.5	0.5	0.5	1
Zone 6	1	1	1	1	0.2	0.03	0.3	2				
Food and Bait	Otter Trawl				Rollerframe				Skimmer trawl			
	Average	Min	Max	n	Average	Min	Max	n	Average	Min	Max	n
Zone 1	0.5	0.5	0.5	1								

Table 7. Geographic zones from a survey (A. McMillen-Jackson, personal communication) of the Florida shrimp fishery.

Zones	Counties	Geographic region
1	Nassau to Brevard	Northeast
2	Indian River to Dade	Southeast
3	Dade to Monroe	The Keys
4	Collier to Pinellas	Southwest
5	Pasco to Wakulla	Big Bend
6	Franklin to Escambia	Panhandle

## 8.0 Status of Fisheries

In 2004, trawl, trap, hook and line, cast net, and haul seine fisheries accounted for 80% of commercial fishing trips in Florida's state waters of the Gulf of Mexico. Since 2000, the number of trips by trawl gears for food shrimp dropped 31% from 18,684 trips in 2000, to 12,877 trips in 2004 (figure 7, table 8). The rise in amounts of imported shrimp in recent years, increased fuel costs, and hurricane-related impacts (particularly in 2005) on shrimping has likely contributed to this decline. By contrast, trips by roller frame increased from 2,416 trips in 2000 to 3,991 trips in 2004. For trap fisheries, blue crab trips were fairly consistent from 2000-2004, averaging around 25,000 trips per year. The number of lobster trips has fluctuated during that period from a low of 2,898 trips in 2001 to 4,918 trips in 2003. The number of lobster trips in 2004 was 4,467. Stone crab trips have gradually declined from 16,011 trips in 2000 to 12,899 trips in 2004. While historical data indicates that harvests of both the stone crab and lobster fisheries can be cyclical in nature, the implementation of trap reduction plans in these fisheries and an increased number of tropical storms and hurricanes have likely contributed to a decline in the number of trips in recent years.

The number of trips by beach or haul seine gears increased by 80% from 3,734 trips in 2000 to 6,731 trips in 2004 (figure 7, table 8). While seines target a variety of inshore species, the largest increase in use has been in the winter roe striped mullet fishery where they are used in conjunction with cast nets. On the other hand, the number of cast net trips has gradually decreased from 19,263 in 2000 to 14,459 trips in 2004. The primary target species of cast nets are striped (black) mullet, but 2003 and 2004 have seen the lowest mullet landings since 1996 which was the first full year after the ban on inshore entangling nets in Florida's state waters. (probably as a result of market conditions) Commercial hook and line activity in Gulf state waters initially decreased by 34% from 2000 to 2002, increased in 2003, then dropped back down in 2004. Hook and line activity may fluctuate between state and federal waters due to changes in market conditions, and fish movement and abundance.

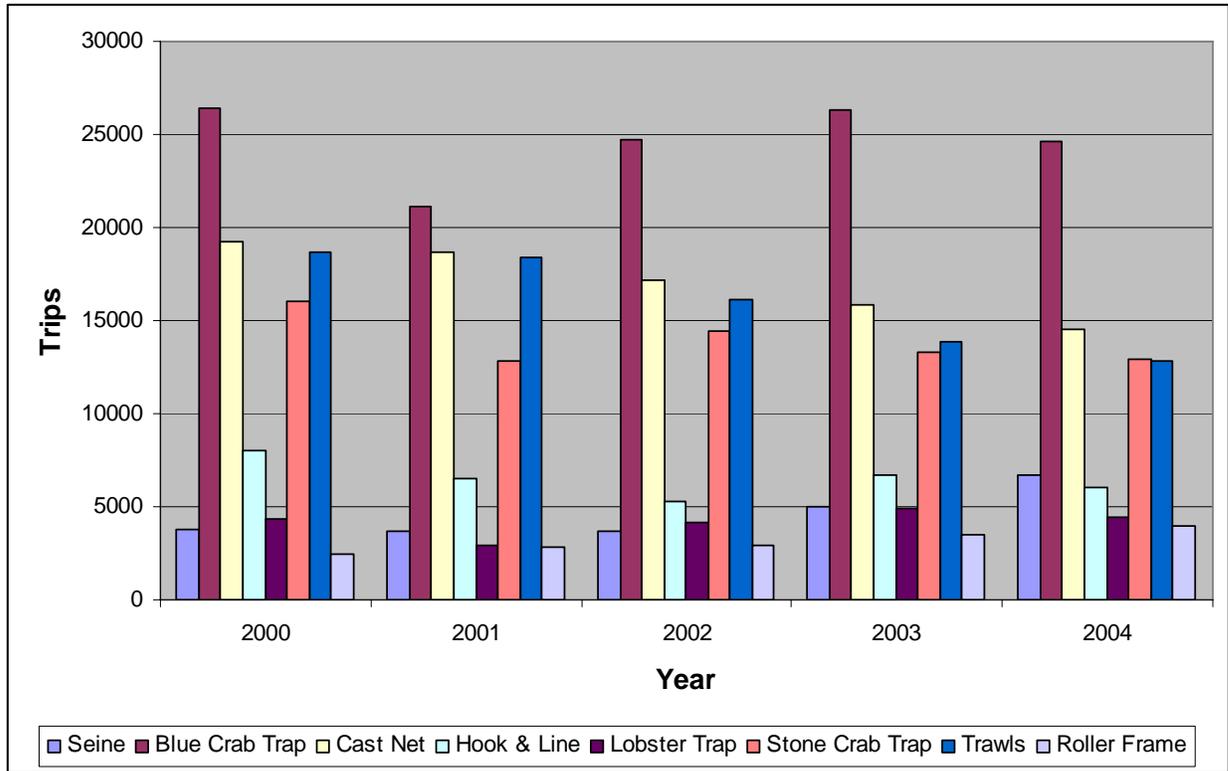


Figure 7. Number of trips by year and gear type for gears accounting for 80% of trips from 2000-2004.

Table 8. Number of trips by year and gear type from 2000-2004.

Gear Type	Year				
	2000	2001	2002	2003	2004
Bandit Rig	109	51	68	100	114
Beach/Haul Seine	3734	3705	3701	5013	6731
Blue Crab Trap	26375	21089	24672	26366	24639
Bully Net	156	137	192	311	256
Cast Net	19263	18653	17165	15858	14549
Dredge	121	210	205	246	109
Fish Trap	726	822	940	834	838
Gig	883	836	1006	1055	1134
Hand Gear	288	259	224	1562	2398
Rod & Reel	7981	6544	5272	6662	6018
Lampara Net	21	8	68	24	0
Lobster Trap	4353	2898	4126	4918	4467
Purse Seine	620	452	347	271	285
SCUBA	2316	1992	2738	2826	2697
Snorkel	388	506	427	476	549
Sponge Hook	216	341	333	362	295
Stone Crab Trap	16011	12855	14389	13316	12899
Oyster Tongs	23969	22504	18215	17415	13269
Trap, uncl.	95	143	72	99	150
Trawl, uncl.	18684	18392	16121	13880	12877
Roller Frame	2416	2784	2885	3468	3991

## **10.0 Sea Turtle Bycatch Info**

No fishery dependent or observer data is available. Some anecdotal data was acquired through the recent gear survey. One bandit rig fisher said he had never caught a turtle, but if he did, would release it alive. Another said he caught one in ten years, and it was released alive. One long line captain said he caught 24 turtles in 25 years, and that about 1/3 of them died. Another long liner said he caught four loggerhead turtles near 28 degrees 40 minutes N. latitude near a bombing range. He did not specify over what time period, but we assumed it to be in recent years because of the dates of the survey, which was based on 2003 landings, and because he remembered the location. Another long line captain said he caught and released one live loggerhead turtle over Pulley Ridge, a deep water reef west of Naples, Florida. A lobster fisher said he has had trouble with turtles on some of his buoy lines, but did not elaborate.

## **11.0 Regulations**

Since the ban on entangling nets (nets that gill a fish) from state waters was enacted in 1995 (Article X, Section 16, Florida Constitution), no entangling nets such as gill or trammel nets are allowed to be used in Florida's state waters. In addition, no non-entangling small mesh net (ex. seine, trawl) greater than 500 square feet may be used in near shore or inshore waters of the state. Near shore and inshore waters are defined as within 3 nautical miles on the Gulf coast, or within 1 nautical mile along the Atlantic coast of Florida (Florida Administrative Code (FAC) 68B-31.0035. Non-entangling nets whose net size exceeds 500 square feet must fish in state or federal waters outside of these boundaries. FAC 68B-31.004 also states that "No person shall operate or fish in any waters of the state any trawl that does not have a qualified turtle excluder device (TED) installed therein." Exceptions would be a single try net, a roller frame trawl, approved experimental gear, or trawls specifically used for harvesting of calico scallops. Provisions in this rule have also been established to prevent altering of trawl gears as to "render the TED nonfunctioning or ineffective". In addition, FAC 68A-27 (Rules Relating to Endangered or Threatened Species) specifically prohibits persons to "pursue, molest, harm, harass, capture, possess, or sell" any endangered or threatened species of marine turtle.

Rules that were not specific to turtle protection, but that may reduce impact to sea turtles are those related to the length of trap buoy lines. Rules 68B-13.008, 68B-14.005, 68B-24.006, and 68B-45.004 limit the length of buoy line floating at the surface to 15 feet for spiny lobster traps, and 5 feet for stone crab, blue crab, and black sea bass pots.

Additionally, some local laws exist that may help reduce encounters with marine turtles. FAC Chapter 68B-3.008 specifies no beach or haul seine, trawl, or traps other than for blue crab may be used in marine waters of Volusia county. Okaloosa county prohibits shrimp production in specific inland water bodies (FAC 68B-3.011). No beach or haul seine may be used by any vessel under power in waters of Hernando county (FAC 68B-3.029). In Manatee county, no seine gears are allowed in waters in and adjacent to the

Manatee River and Terra Ceia Bay (FAC 68B-3.031). Finally, FAC 68B-3.032 states that no traps other than blue crab traps may be used in marine waters of Martin county.

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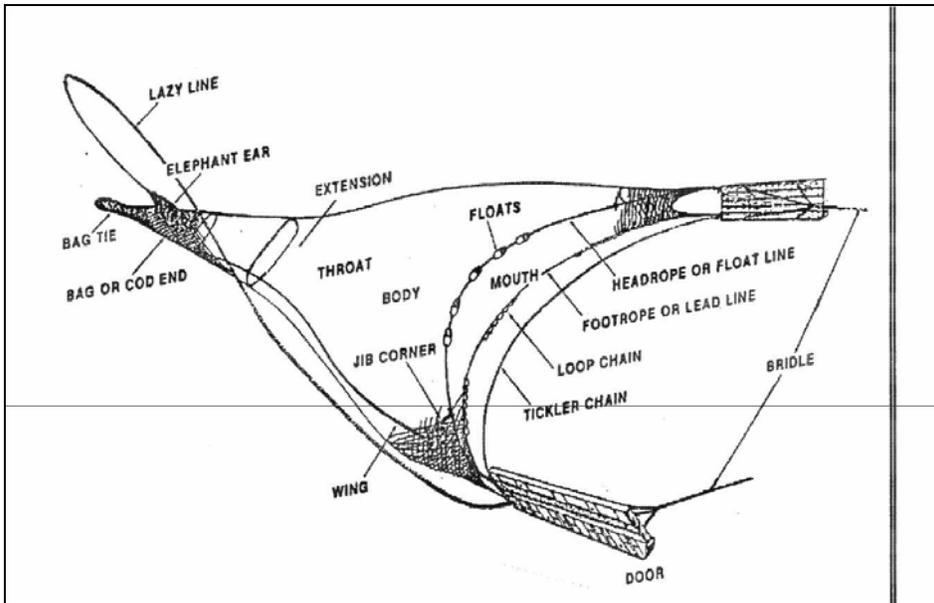
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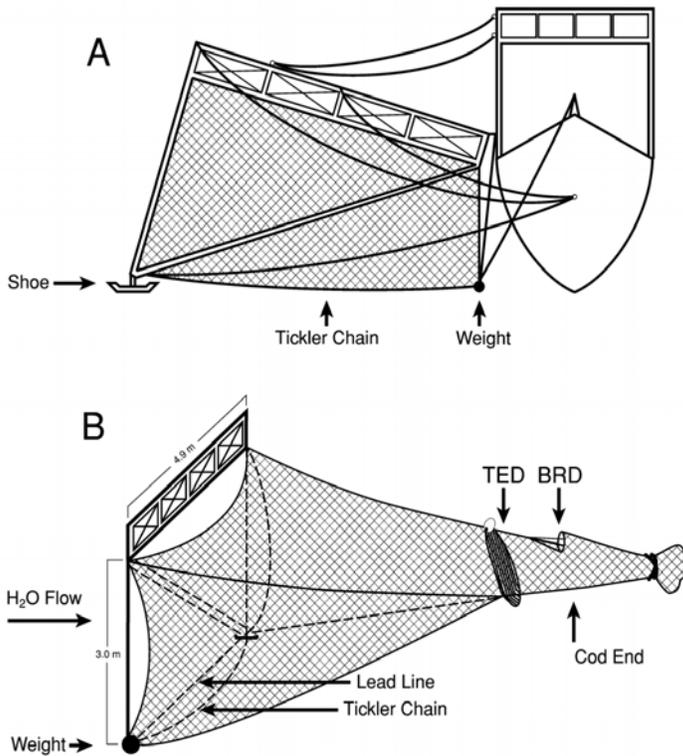
NMFS, SEFSC. September 14, 1992. 62 pp.

## APPENDIX 4. TRAWLS

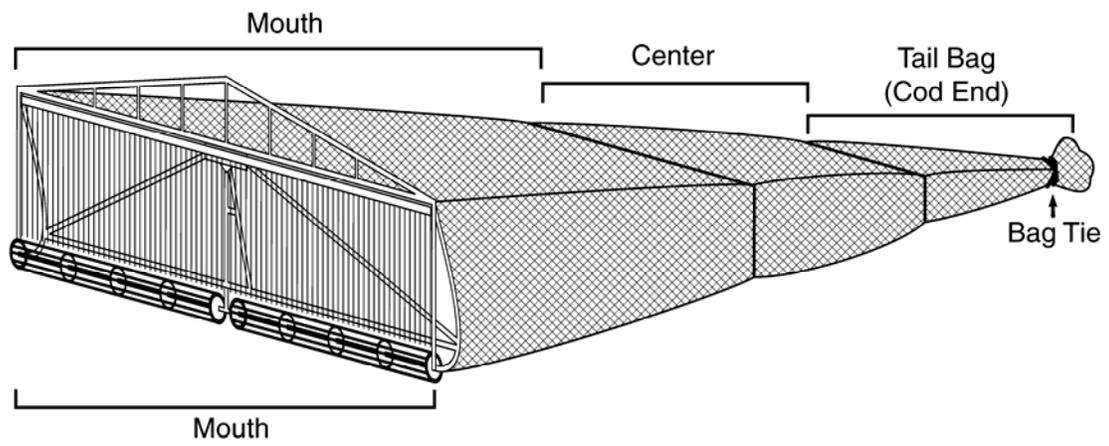
### 4-1. General otter trawl configuration (NMFS 1992).



### 4-2. Skimmer trawl



4-3. Roller frame trawl



# Georgia Trawl Gear Characterization

Prepared by the Atlantic States Marine Fisheries Commission

## 1.1 TRAWLS

### 1.1.1.1 Gear Description

The Georgia trawl fishery includes food shrimp trawls, bait shrimp trawls, whelk trawls, and jellyfish trawls.

### 1.1.1.2 Number of Licensed and Active Vessels

One license is issued for all otter trawls. The number of trawl licenses issued and the number of active trawling vessels has declined from 2002 to 2004, but the percent active vessels has remained relatively stable (Table 1).

**Table 1.** The number of licensed and active otter trawl vessels from 2002 to 2004.

Year	Licensed Trawling Vessels	Active Trawling Vessels	Percent Active Trawling Vessels
2002	491	307	63%
2003	437	284	65%
2004	384	228	59%

## 1.1.2 Shrimp Trawls

### 1.1.2.1.1 Gear Description

The Georgia shrimp trawl fishery includes food and bait shrimp trawls. For a general description of shrimp trawls see the gear appendix.

### 1.1.2.1.2 Number of Licensed and Active Vessels

For information on all licensed and active trawling vessels, see section 4.1.1.2. The number of licensed and active shrimp trawl vessels decreased from 2002 to 2004 while the percentage of active vessels increased (Table 2). The application asks licensees to indicate the gear they plan to use, but answering these questions is voluntary (Califf 2005, pers. comm). Therefore, the number of licensed shrimp trawling vessels is approximate.

**Table 2.** Number of licensed and active shrimp trawl vessels from 2002 to 2004.

Year	Licensed Shrimp Trawling Vessels	Active Shrimp Trawling Vessels	Percent Active Shrimp Trawling Vessels
2002	490	287	57%
2003	430	266	62%
2004	360	222	62%

### 1.1.2.2 Food Shrimp Trawls

#### 1.1.2.2.1 Gear Description

Food shrimp trawls are bottom trawls. The footrope is weighted with chain spread evenly across the net and the headrope is usually equipped with floats spread out evenly. The maximum footrope length for a single trawl or combination of trawls is 220 feet (67 meters), which does

not include a try net up to 16 feet (4.9 meters) long (O.C.G.A. 27-4-133). For a general description of shrimp trawls see the gear appendix.

#### 1.1.2.2.2 Gear Deployment

Food shrimp trawls are deployed either manually or mechanically via a winch (Califf 2005, pers. comm).

#### 1.1.2.2.3 Targeted Species

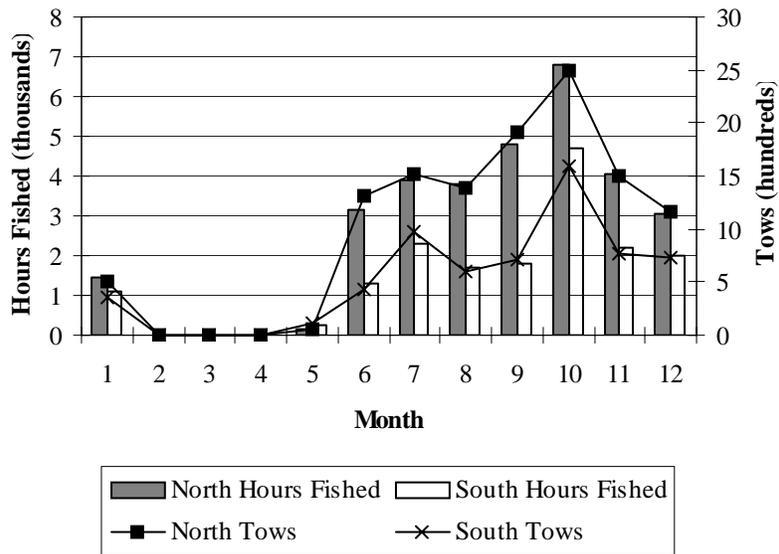
Food shrimp trawls target shrimp.

#### 1.1.2.2.4 Number of Licensed and Active Vessels

Georgia issues only two license types: trawler or non-trawler. The DNR provided the number of trawler licenses issued and the number of those licensed vessels that were active (section 4.1.1.2), and also determined the number of active shrimp trawling vessels (section 4.1.2.1.2).

#### 1.1.2.2.5 Effort

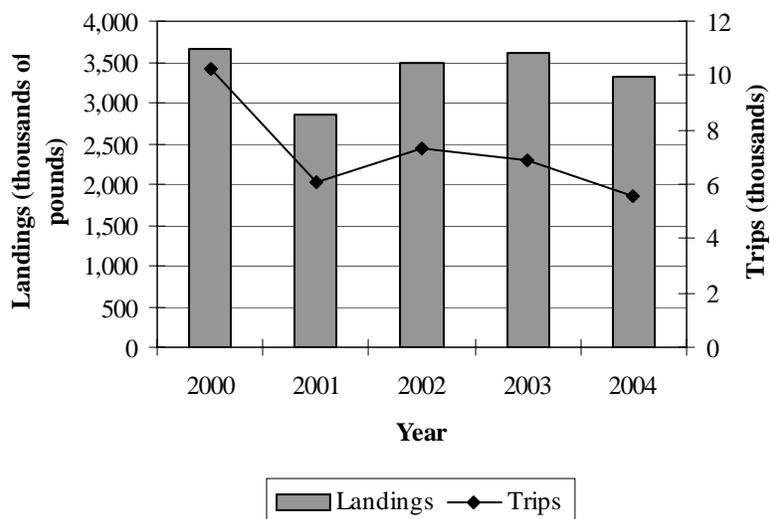
Waters seaward of Georgia sounds to the three-mile territorial limit are closed to food shrimp trawling from March 1 through May 14. During other parts of the year, the DNR Commissioner may open waters based on sound biological, environmental, economic, and social criteria set forth in state law. The sounds are currently closed to trawling for food shrimp and the DNR has no plans to open them (Califf 2005, pers. comm). Food shrimp trawling is legal only between 5:00 a.m. and 8:00 p.m. (O.C.G.A. 27-4-133). The depth fished is not known. In 2004 effort by food shrimp trawls peaked in October (Figure 1, Table 1-1). The areas with highest effort were St. Simon's Sound and Sapelo, but effort not attributed to any area was also high (Table 1-1).



**Figure 1.** Food shrimp trawl effort in 2004 by month.

#### 1.1.2.2.6 Status of the Fishery

The number of vessels participating in the food shrimp trawl fishery has been declining for the last 20 years, but has dropped sharply in the last two years. Although the fleet is shrinking through attrition, some industry stakeholders have an interest in limiting the number of food shrimp trawling licenses issued by the state (Califf 2005, pers. comm). Effort declined from 10,212 trips in 2000 to 5,539 trips in 2004, but landings did not drop as sharply (Figure 2, Table 1-2).



**Figure 2.** Food shrimp trawl landings and effort from 2000 to 2004.

#### 1.1.2.2.7 Sea Turtle Bycatch

Commercial food shrimp trawls must have a certified TED in each net. Current regulations include measures that establish Shrimp Fishery/Sea Turtle Conservation Areas where shrimping effort and sea turtle abundance are high. TEDs are not required in try nets with a headrope length 12 feet (3.7 meters) or shorter (O.C.G.A. 27-4-133).

The Georgia DNR conducts an assessment of bycatch in the large trawl commercial food shrimp trawl fishery with both fishery-dependent and fishery-independent sampling. DNR personnel record trawl times, locations, and other pertinent data, in addition to biological data on harvested species. A copy of this data is forwarded to NMFS (Califf 2005, pers. comm). GA DNR began sampling this fishery in 2001 after a long hiatus. GA DNR personnel typically conduct observation work between March and December, though some observations may be made in January and February. Trips are conducted throughout the coastal trawl waters of Georgia with exact locations dependent on fishermen participation. The observer program covers less than one percent of the fishery. One turtle has been observed in the fishery since 2001, and the observer noted that the turtle was in the mouth of the net and appeared unharmed (Page 2006, pers. comm). The net was equipped with a TED.

#### 1.1.2.2.8 Laws and Regulations

Recreational fishermen may not use food shrimp trawls. The maximum footrope length for a single trawl or combination of trawls is 220 feet (67 meters), which does not include a try net up to 16 feet (4.9 meters) long. Waters seaward of Georgia sounds to the three-mile territorial limit are closed to food shrimp trawling from March 1 through May 14. Food shrimp trawling is legal only between 5:00 a.m. and 8:00 p.m. Commercial food shrimp trawls must have a certified TED in each net. Current regulations include measures that establish Shrimp Fishery/Sea Turtle Conservation Areas where shrimping effort and sea turtle abundance are high. TEDs are not required in try nets with a headrope length 12 feet (3.7 meters) or shorter (O.C.G.A. 27-4-133).

### 1.1.2.3 Bait Shrimp Trawls

#### 1.1.2.3.1 Gear Description

Bait shrimp trawls are bottom trawls (Califf 2005, pers. comm). Commercial fishermen may not use nets more than 20 feet (6.1 meters) wide, and the mesh size must be between one and 1.375 inches (2.5 and 3.5 centimeters) stretch (O.C.G.A. 27-4-171). Recreational fishermen may not use nets more than 10 feet wide, and the same mesh restrictions apply.

#### 1.1.2.3.2 Gear Deployment

Bait shrimp trawls are deployed either manually or mechanically via a winch. The footrope is weighted with chain spread evenly across the net and the headrope is usually equipped with floats spread out evenly (Califf 2005, pers. comm).

#### 1.1.2.3.3 Targeted Species

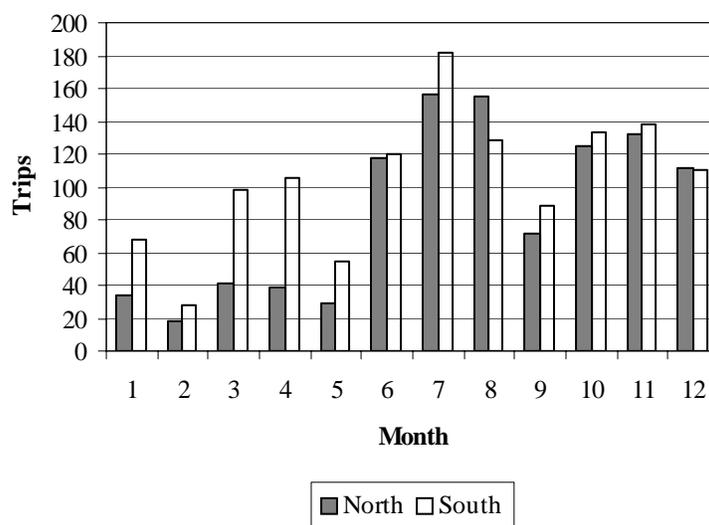
Bait shrimp trawls target shrimp.

#### 1.1.2.3.4 Number of Licensed and Active Vessels

There are approximately 35 active vessels in the commercial bait shrimp trawl fishery (Califf 2005, pers. comm). A Bait Dealer's License and a commercial fishing license are required before anyone may take and sell shrimp for live or dead bait. Recreational participation is not known.

#### 1.1.2.3.5 Effort

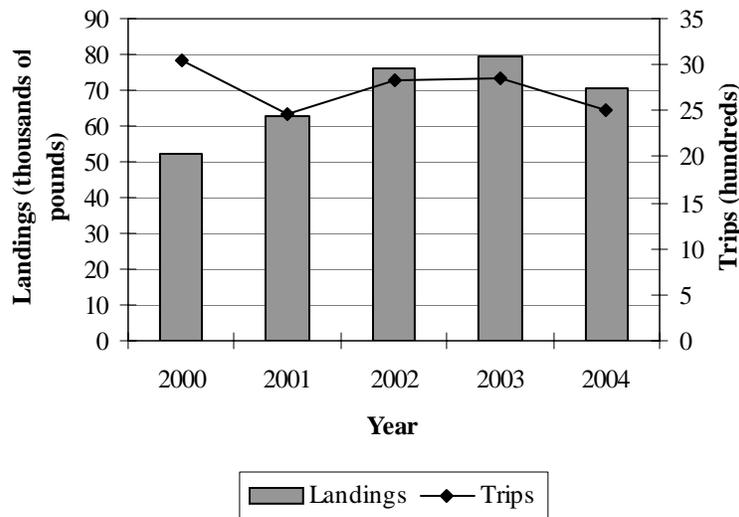
All bait shrimp trawling is restricted to designated bait zone areas. Maps of these areas are available from the Coastal Resources Division. These areas may be opened and closed at the DNR Commissioner's discretion based on criteria set in state law. Bait shrimping may only take place from one-half hour before sunrise to one-half hour after sunset (O.C.G.A. 27-4-171). Observer data indicates that tow times are approximately 17 minutes (Califf 2005, pers. comm). The number of trips taken by bait shrimp trawls in 2004 was highest in July when fishermen took 358 trips (Figure 3, Table 1-3). The number of sets is not collected from this fishery. Effort in 2004 was highest in St. Andrew's and St. Simon's Sounds (Table 1-3). The depth fished is not known.



**Figure 3.** Bait shrimp trawl effort in 2004 by month

#### 1.1.2.3.6 Status of the Fishery

The bait shrimp trawl fishery is relatively stable, and participation in the fishery is not expected to change appreciably in the future (Califf 2005, pers. comm). Effort declined from 3,052 trips in 2000 to 2,500 trips in 2004, while landings increased from 52,363 pounds in 2000 to 70,820 pounds in 2004 (Figure 4, Table 1-4).



**Figure 4.** Bait shrimp trawl landings and effort from 2000 to 2004

#### 1.1.2.3.7 Sea Turtle Bycatch

Georgia regulations state that a TEDs are not required for bait shrimp trawls because a bait trawler cannot trawl for food shrimp (O.C.G.A. 27-7-171). There is no state-run observer program for the bait shrimp trawl fishery and no other sea turtle bycatch information was available.

#### 1.1.2.3.8 Laws and Regulations

Bait shrimp trawl nets may not be more than 20 feet (6.1 meters) wide, and the mesh size must be between one and 1.375 inches (2.5 and 3.5 centimeters) stretch. All bait shrimp trawling is restricted to designated bait zone areas. Maps of these areas are available from the Coastal Resources Division. These areas may be opened and closed at the DNR Commissioner's discretion based on criteria set in state law. Bait shrimping may only take place from one-half hour before sunrise to one-half hour after sunset. Georgia regulations state that a TEDs are not required for bait shrimp trawls because a bait trawler cannot trawl for food shrimp (O.C.G.A. 27-7-171).

### 1.1.3 Whelk Trawls

#### 1.1.3.1.1 Gear Description

Whelk trawls are bottom trawls. The footrope is weighted with chain spread evenly across the net and the headrope is usually equipped with floats spread out evenly (Califf 2005, pers. comm). Georgia law requires whelk trawls have a minimum stretched mesh size of four inches (10 centimeters) (Code Section 27-4-133 (f)).

#### 1.1.3.1.2 Gear Deployment

Whelk trawls are deployed either manually or mechanically via a winch (Califf 2005, pers. comm). While collecting bycatch information for the commercial trawl fishery in 1999 CRD observers found the average tow time was 90.2 minutes (Belcher et al. 2001).

### 1.1.3.1.3 Targeted Species

Whelk trawls target whelk and crab.

### 1.1.3.1.4 Number of Licensed and Active Vessels

The number of active and percent active whelk trawling vessels declined from 2002 to 2004 (Table 3). Georgia issues only two gear-based licenses, trawling and non-trawling. See Table 1 for the total number of licensed trawling vessels.

**Table 3.** Number of active crab/whelk trawl vessels from 2002 to 2004.

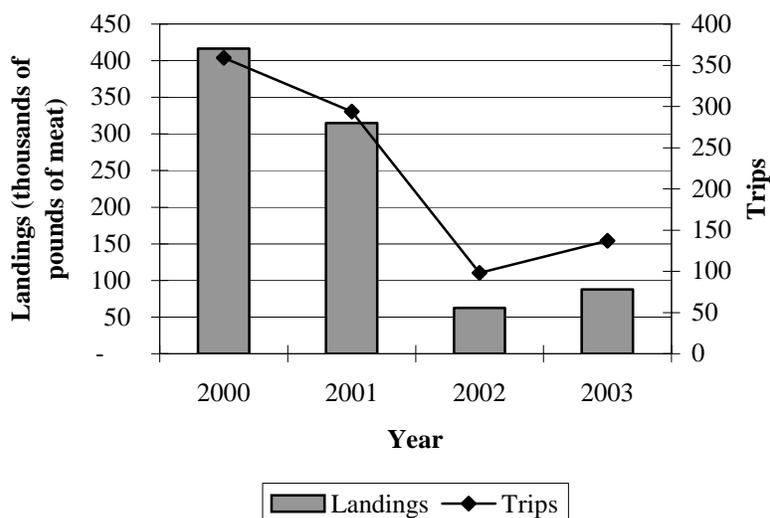
Year	Active Whelk Trawling Vessels
2002	19
2003	17
2004	5

### 1.1.3.1.5 Effort

The whelk trawl fishery is relatively small compared to other Georgia trawl fisheries. The DNR may open and close any waters seaward of the sounds at any time. The sounds are closed to whelk trawling. Whelk trawling may only occur between 5:00am and 8:00pm Monday through Saturday (GA DNR 2005a). Due to delinquent reporting, 2004 data is not available. Data on effort by geographic area fished is highly incomplete. The whelk trawl fishery provides an alternate fishery for shrimp vessels during the season when state waters are closed to shrimp trawling (Belcher et al. 2001). The fishery is generally open in February and March (GA DNR 2005a), and in 2003 fishermen took 35 trips in February, 41 trips in March, and 20 trips in April (Califf 2005, pers. comm.). Depth fished is not known.

### 1.1.3.1.6 Status of the Fishery

Landings and effort declined from 2000 to 2003 (Figure 5, Table 1-5). Participation in the whelk trawl fishery is declining due to increased operating costs and low prices for whelk. The declining trend is expected to continue (Califf 2005, pers. comm). Data from 2004 is not available due to delinquent reporting.



**Figure 5.** Whelk trawl landings and effort from 2000 to 2003.

#### 1.1.3.1.7 Sea Turtle Bycatch

Commercial whelk trawlers must have a certified TED in each net (GA DNR 2005a). The Georgia DNR conducts an assessment of bycatch in the whelk trawl commercial fishery with both fishery-dependent and fishery-independent sampling. DNR personnel record trawl times, locations, and other pertinent data, in addition to biological data on harvested species. A copy of this data is forwarded to NMFS (Califf 2005, pers. comm). GA DNR personnel conduct observation work at the conclusion of the shrimp trawl season, typically between January and April. Trips are conducted throughout the coastal trawl waters of Georgia with exact locations dependent on fishermen participation. No sea turtle interactions have been observed aboard whelk vessels since the regulatory changes initiated by the GA DNR requiring TEDs starting in the 2000/2001 whelk season (Page 2006, pers. comm).

#### 1.1.3.1.8 Laws and Regulations

Georgia law requires whelk trawls have a minimum stretched mesh size of four inches (10 centimeters) (Code Section 27-4-133 (f)). The DNR may open and close any waters seaward of the sounds at any time, and may close the waters of Cumberland, St. Simons, Sapelo, St. Andrew, Wassaw or Ossabaw sounds in January, February, and March, though the sounds have been closed to whelk trawling since 1989. Whelk trawling may only occur between 5:00am and 8:00pm Monday through Saturday. Commercial whelk trawlers must have a certified TED in each net (GA DNR 2005a).

### 1.1.4 Jellyfish Trawls

#### 1.1.4.1.1 Gear Description

Jellyfish trawls are mid-water trawls. The headrope is equipped with floats, but there is no chain on the footrope (Califf 2005, pers. comm).

#### 1.1.4.1.2 Gear Deployment

Jellyfish trawls are deployed mechanically and are designed to fish mid-water (Califf 2005, pers. comm).

#### 1.1.4.1.3 Targeted Species

Jellyfish trawls target cannonball jellyfish.

#### 1.1.4.1.4 Number of Licensed and Active Vessels

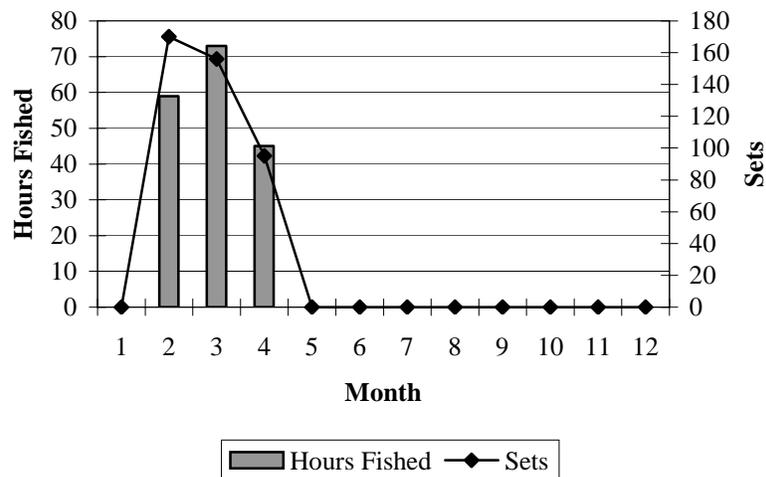
The jellyfish trawl fishery is an experimental fishery that requires a special permit. The number of permits issued has increased from three to eight from 2002 to 2004, and all permitted vessels are active (Table 4).

**Table 4.** The number of licensed and active jellyfish trawl vessels from 2002 to 2004.

Year	Permitted Vessels	Active Vessels	Percent Active Vessels
2002	3	3	100%
2003	4	4	100%
2004	8	8	100%

#### 1.1.4.1.5 Effort

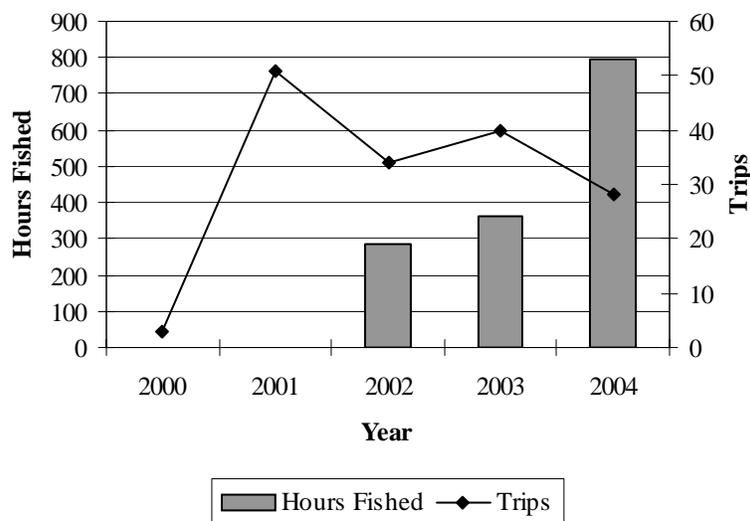
The jellyfish trawl fishery extends into federal waters, and much of the effort occurs in federal waters. Of the effort occurring in state waters, the specific location is unknown. In 2004 fishing occurred in February, March, and April. The hours fished was highest in March while the number of sets was highest in February (Figure 6, Table 1-6). The depth and time of day fished is not known. Landings are confidential.



**Figure 6.** Jellyfish trawl effort in 2004 by month

#### 1.1.4.1.6 Status of the Fishery

Landings in the jellyfish trawl fishery are confidential. Information on hours fished was not collected in 2000 and 2001. Effort by trips was lowest in 2000 when only three trips were taken. Hours fished increased from 283 in 2002 to 797 in 2004 (Figure 7, Table 1-7).



**Figure 7.** Jellyfish trawl effort from 2000 to 2004.

#### 1.1.4.1.7 Sea Turtle Bycatch

The Georgia DNR conducts an assessment of bycatch in experimental fisheries permitted by the state, including the jellyfish trawl fishery (Page 2006, pers. comm). DNR personnel record trawl times, locations, and other pertinent data, in addition to biological data on harvested species. A copy of this data is forwarded to NMFS (Califf 2005, pers. comm). GA DNR personnel conduct observation work in the winter/early spring. Trips are conducted throughout waters of the state in which the fishery is permitted to occur, with exact locations dependent on fishermen participation. Percent observer coverage in experimental fisheries such as the jellyfish trawl fishery constantly changes as the desire to participate in these small fisheries rises and falls. GA DNR personnel estimates that less than five percent of the fishery has been covered for the last several years combined. Data on the exact percentage of the fishery covered is available, but was not provided for this report. One loggerhead turtle was caught and released unharmed prior to the GA DNR implementing TEDs in this fishery. TEDs were implemented in 2002 (Page 2006, pers. comm).

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## APPENDIX 1. DATA TABLES

Table 1-1. Effort by food shrimp trawls in 2004 by month.

Area		1	2	3	4	5	6	7	8	9	10	11	12
<b>Unknown</b>	Hours Fished	110	0	0	0	180	1,764	512	945	956	1,223	1,826	1,893
	Number of Tows	31	0	0	0	56	546	166	267	255	384	482	518
<b>Altamaha Sound</b>	Hours Fished	0	0	0	0	28	174	33	0	287	246	125	52
	Number of Tows	0	0	0	0	10	60	11	0	98	88	50	13
<b>Doboy</b>	Hours Fished	299	0	0	0	0	267	332	767	677	1,426	555	678
	Number of Tows	104	0	0	0	0	94	256	284	261	545	178	240
<b>St. Andrews Sound</b>	Hours Fished	57	0	0	0	0	0	40	94	0	0	0	0
	Number of Tows	15	0	0	0	0	0	13	21	0	0	0	0
<b>St. Mary's Entrance</b>	Hours Fished	28	0	0	0	0	282	471	113	123	242	192	263
	Number of Tows	10	0	0	0	0	86	176	38	42	93	71	114
<b>St. Simons Sound</b>	Hours Fished	712	0	0	0	204	573	1,443	705	737	2,776	1,326	1,026
	Number of Tows	219	0	0	0	102	200	524	256	312	866	463	357
<b>Calibougue Sound</b>	Hours Fished	258	0	0	0	0	707	616	1,024	617	742	513	293
	Number of Tows	92	0	0	0	0	269	269	288	245	317	199	123
<b>Sapelo</b>	Hours Fished	499	0	0	0	60	1,276	1,085	1,624	1,661	2,399	1,223	1,465
	Number of Tows	212	0	0	0	24	647	529	702	785	1,118	564	618
<b>Savannah River</b>	Hours Fished	279	0	0	0	0	273	1,287	626	0	343	235	400
	Number of Tows	72	0	0	0	0	125	403	190	0	88	59	109
<b>St. Catherine's</b>	Hours Fished	14	0	0	0	20	179	359	138	524	737	489	190
	Number of Tows	3	0	0	0	10	68	152	67	189	201	164	94
<b>Wassaw and Ossabaw</b>	Hours Fished	411	0	0	0	48	710	543	385	2,004	2,581	1,566	702
	Number of Tows	129	0	0	0	16	212	173	141	687	766	516	225

**Table 1-2.** Landings and effort by food shrimp trawls from 2000 to 2004

<b>Year</b>	<b>Landings</b>	<b>Trips</b>
<b>2000</b>	3,649,087	10,212
<b>2001</b>	2,858,616	6,104
<b>2002</b>	3,489,036	7,311
<b>2003</b>	3,600,964	6,845
<b>2004</b>	3,313,843	5,539

**Table 1-3.** Bait shrimp trawl effort (in trips) in 2004 by month

<b>Area</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>Unknown</b>	11	6	19	29	10	36	20	25	12	48	21	1
<b>Altamaha Sound</b>	10	0	0	1	13	24	40	17	8	18	20	10
<b>Doboy</b>	0	0	0	11	0	0	0	0	0	0	0	0
<b>St. Andrews Sound</b>	33	17	49	47	9	44	85	70	49	77	87	56
<b>St. Mary's Entrance</b>	0	0	0	0	0	0	10	4	0	0	0	14
<b>St. Simon's Sound</b>	25	11	49	46	33	52	47	37	32	38	31	30
<b>Ossabaw</b>	3	0	15	6	2	20	46	38	27	30	58	61
<b>Sapelo</b>	1	0	3	6	1	7	30	25	5	22	16	14
<b>St. Catherine's</b>	30	18	23	27	26	46	43	42	10	41	33	28
<b>Wassaw</b>	0	0	0	0	0	44	37	50	30	32	25	9

**Table 1-4.** Bait shrimp trawl landings and effort from 2000 to 2004

<b>Year</b>	<b>Landings (pounds of tails)</b>	<b>Trips</b>
<b>2000</b>	52,363	3,052
<b>2001</b>	62,759	2,458
<b>2002</b>	76,016	2,837
<b>2003</b>	79,219	2,854
<b>2004</b>	70,820	2,500

**Table 1-5.** Whelk trawl landings and effort from 2000 to 2003.

<b>Year</b>	<b>Landings (pounds of meat)</b>	<b>Trips</b>
<b>2000</b>	416,745	359
<b>2001</b>	315,020	294
<b>2002</b>	62,441	98
<b>2003</b>	87,540	137

**Table 1-6.** Jellyfish trawl effort in 2004 by month

<b>Month</b>	<b>Hours Fished</b>	<b>Number of Sets</b>
<b>1</b>	0	0
<b>2</b>	59	170
<b>3</b>	73	156
<b>4</b>	45	95
<b>5</b>	0	0
<b>6</b>	0	0
<b>7</b>	0	0
<b>8</b>	0	0
<b>9</b>	0	0
<b>10</b>	0	0
<b>11</b>	0	0
<b>12</b>	0	0

**Table 1-7.** Jellyfish trawl effort from 2000 to 2004.

<b>Year</b>	<b>Trips</b>	<b>Hours Fished</b>
<b>2000</b>	3	-
<b>2001</b>	51	-
<b>2002</b>	34	283
<b>2003</b>	40	362
<b>2004</b>	28	797

**Louisiana Trawl Gear Characterization**  
Prepared by Louisiana Department of Wildlife and Fisheries, Marine  
Fisheries Division

(Please note: Since information in this report is provided on a per-fishery basis, information on some gears other than trawls is included below. However, this section of the report was excerpted to focus review on the trawl fisheries occurring in LA.)

## **Shrimp Fishery**

### ***Species Targeted***

The shrimp fishery is based on two species, white shrimp, *Litopenaeus setiferus* and brown shrimp, *Farfantepenaeus aztecus*. Three other species are also harvested to a much lesser degree: seabobs *Xiphopenaeus kroyeri*, pink shrimp *Farfantepenaeus duorarum* and royal red shrimp *Hymenopenaeus robustus*. Louisiana is the center of abundance of white shrimp and sea bobs; Texas is the center of abundance of brown shrimp. None of these five species are restricted to Louisiana's waters (LDWF, 1992).

Several management plans have provided detailed information about Louisiana's shrimp fishery (Christmas and Etzold, 1977; GMFMC, 1980; LWDF, 1992), including factors affecting landings and other aspects of the fishery.

White shrimp, brown shrimp, and seabobs have accounted for most of Louisiana shrimp landings since 1950. Over that period white and brown shrimp were landed in almost equal weight; seabobs accounted for 3% of total shrimp landings. About 91% of the landings reported from shrimp fishery gear over the years have been shrimp; somewhat less than 7% of landings were finfishes used as bait or animal food (Table SH1). In the database used in this report, NOAA landings did not differentiate between white and brown shrimp from 1950-1977; shrimp were categorized as "Shrimp, Marine, Other". Fifty nine other species accounted for about 2% of landings from 1950-2004 (Table SH1).

These white and brown shrimp are harvested from the state's estuarine and territorial seas, as well as similar waters of adjacent states and the adjoining federal waters of the Gulf. Seabobs spend their entire life in the Gulf of Mexico and are usually harvested in association with white shrimp (LDWF, 1992). They are primarily harvested in the Territorial Sea and are not a part of federal fishery shrimp management.

### ***Historical Gear***

Statutory law allows saltwater shrimp to be taken by trawls, butterfly nets, skimmer nets, cast nets, dip nets (bait shrimp only), bait traps (bait shrimp only), and bait seines (bait shrimp only).

NOAA has used several designations for shrimp harvesting gear since 1950, including Shrimp Otter Trawl, Unspecified Trawl, Shrimp Beam Trawl, Chopstick Beam Trawl, Butterfly Net, and Cast Net (Table SH2). In analyzing these landings, some gear (i.e. brush trap, common dip net and crab trap) were combined with Shrimp Otter Trawl because landings were so small or because they are believed to be classification errors. Landings classified as "Not Coded", primarily from 1978 to 1982, were combined with Shrimp Otter Trawl as that category accounts for the bulk of coded landings in adjacent years. Beam trawl (shrimp and chopstick), although accounting for very small landings over the period, were separated because of their historical interest.

From 1950-2004, trawls and butterfly nets were the primary gears used in harvesting Louisiana's shrimp (Table SH3). Trawls account for over 92% of Louisiana's reported shrimp landings during that period; butterfly nets caught almost 9% of shrimp landed. The Trawl accounted for the bulk of the landings of all three major species; Butterfly Net was the second most used gear for all three species (Tables Sh4, SH5, and SH6).

The "Unspecified Trawl" category was primarily utilized in the 1950's, although some landings from 2001-2004 were coded using this category (Table SH2). The bulk of landings assigned to this category were coded as "Other Marine Shrimp" (Table SH1). As the distribution of species in this category reflects that of Shrimp Otter Trawl (i.e., roughly equal landings of brown and white shrimp, minor catches of other species) it is believed this category includes primarily catches from Shrimp Otter Trawls.

Beam Trawls obviously target white shrimp; 74% of landings from shrimp beam trawls and 97% of landings from chopstick beam trawls were white shrimp (Tables SH1).

### ***Recent Gear***

From 1999-2004, about 60% of shrimp were landed with Shrimp Otter Trawls. About 37% of landings were from Skimmer nets, and 3.3% from Butterfly Nets (Table SH7). Cast nets accounted for only about 100,000 pounds of landings during this period. The distribution of effort (in trips) during this period (Table SH8) reflects landings, with less than 0.1% effort coming from cast nets. The Shrimp Otter Trawl was the primary gear for all the major species (Table SH7), accounting for the majority of landings for each species. Skimmer Nets were important in the landings of both brown and white shrimp, accounting for over 1/3 of white shrimp landings and almost 40% of brown shrimp landings.

Butterfly nets caught about 3% of landings for both brown and white shrimp (Table SH7).

## ***Shrimp Trawl***

### **Description of Gear and Fishing Method**

"Trawl" is legally defined (56:8(100)) as "any net, generally funnel-shaped, pulled through the water or along the bottom with otter boards to spread the mouth open while being fished. The term trawl also means and includes plumb staff beam trawls that do not exceed sixteen feet, that do not use otter boards but are held open laterally by a horizontal beam and vertically by two vertical beams (plumb staffs), and that are used while the vessel is under way." Statutory law specifies allowable trawl net and mesh sizes (Appendix 5-1)

Christmas and Etzold (1977) described the shrimp trawl used in the Gulf of Mexico Shrimp Fishery:

"There are three basic designs employed in the otter trawl: flat, two-seam semi-balloon and four-seam semi-balloon. The otter trawl consists of: (1) a heavy mesh bag in which the shrimp are gathered in the tail or cod end; (2) wings on each side of the bag for funneling the shrimp into it; and (3) trawl doors or otter board at the end of each wing for holding the mouth of the net open. A lead line extends from door to door on the bottom of the trawl while a cork line is similarly attached at the top of the net. With flat nets the mouths are rectangular with the lead and cork lines being close to the same length. With the semi-balloon nets, the float line forms a pronounced arch. This type of net prevents white shrimp from escaping when they jump off the bottom. The semi-balloon trawls also have a much wider throat which prevents "choke-off" so that the catch does not build up in the body.

"A chain, somewhat shorter than the lead line, is attached between the trawl doors resulting in a tickler which tows just ahead of the net. This chain is used to frighten shrimp off the bottom. The lead lines of larger nets are weighted with a ¼ to 3/8-inch loop chain attached at about 1 foot intervals with a 14- to 16- inch drop. Many larger nets are also equipped with rollers on the lead line. This keeps the lead line from digging into the mud.

The most common mesh sizes in nets range from 1 ½- to 2-inch stretch mesh, with a 3 ½- to 4-inch stretch mesh chafing gear tied around the bag for protection." (Christmas and Etzold, 1977)

### **Landings and Effort**

#### Landings

White shrimp (48.7%), brown shrimp (43.0%), and seabobs (6.0%) together made up almost 98% of the landings reported from Shrimp Trawls in recent years (Table SH9). Seventy-five (75) species composed the remaining 2+% of reported landings.

The offshore SubBasins accounted for 53.7% of 1999-2004 landings; the coastal SubBasins contributed 37.7% of landings during that period (Table SH10).

#### Effort

Annual effort averaged about 28,350 trips from 1999-2004, but showed a declining trend from 34+ thousand trips in year 1999 to less than 21

thousand trips in year 2004 (Figure SH1). Shrimp Trawls accounted for 29.5% of total shrimp fishery effort during the period (Table SH8).

Mean monthly effort averaged about 2,360 trips over the period, ranging from about 440 trips in February to almost 5,600 trips in May (Figure SH2). There were 2 pulses in effort: 36+% of effort occurred in May-June; 33+% of effort in the August-October period. Only 8.7% of effort occurred in January-April (Table SH11).

SubBasin distribution of effort differed somewhat from SubBasin distribution of catch. Relatively more effort was expended in the coastal SubBasins. Only 26+% of effort was expended in the offshore waters (Table SH12), resulting in the 53.7% of landings noted above. The 60+% of effort expended in the coastal SubBasins resulted in 37.7% of landings.

### **License and Permit Requirements**

A commercial Shrimp Trawl gear license is required for each individual net used; no license is required for test trawls when used with another trawl for which the gear fee has been paid. The fisherman must have a commercial fisherman's license. The vessel must be licensed. A valid commercial gear license may be transferred for temporary use to a person holding a valid commercial fisherman's license and having the same residency status as indicated on the license being transferred.

Special bait dealer's permits are issued for the harvest and sale of bait shrimp before the opening of the spring inshore shrimp season.

Federal permits are required for vessels shrimping in federal waters.

### **Laws Affecting Effort and Fishing Operations**

The Legislature has reserved to itself the right to determine legal gear, licenses and fees, legal sizes, and other aspects of the fishery.

Statutory law restricts size and number of Otter Trawls based on the area of use. Except for Breton-Chandeleur Sound (see "Appendix 5-2, "Breton-Chandeleur Sound Two-Trawl Area"), only a single net can be pulled in inside waters. The shrimping waters of the state are divided into inside and outside waters (see Appendix 5-2, "Inside-Outside Shrimping Waters"). Up to four trawls can be pulled at once in outside waters.

Mesh size varies based on location and season (Appendix 5-1).

Trawls may be fished day or night, except for portions of Cameron and Vermilion parishes.

Use of trawls is allowed only during the open shrimp seasons.

The Louisiana Wildlife and Fisheries Commission sets seasons for the harvest of shrimp. There are typically two inshore shrimp seasons

during the year: a spring season, lasting from mid-May to the beginning of July for the harvest of brown shrimp, and a fall season from mid-August to mid-December, to harvest white shrimp. The offshore state waters (from the coastline to 3 miles offshore) are occasionally closed for varying periods to protect shrimp too small for commercial harvest.

Federal law requires the use of Turtle Excluder devices in trawls. Louisiana does not enforce any federal law or regulation which requires any commercial or recreational fishermen to use TEDs in Louisiana waters.

## ***Skimmer Net***

### **Description of Gear and Fishing Method**

"Skimmer Net" is statutorily defined as "a net attached on two sides to a triangular frame and suspended from or attached to the sides of a boat, with one corner attached to the side of the boat and one corner resting on the waterbottom. A ski and one end of the lead line are attached to the corner of the frame that rests on the waterbottom and the other end of the lead line attached to a weight which is suspended from the bow of the boat." The statutes also include skimmer nets in the description of "stationary shrimp net" which is any net for taking shrimp that is attached to the water bottom, bank, or a fixed structure. Statutory law specifies allowable skimmer net and mesh sizes (Appendix 5-1)

Epperly et al. (2002) discussed the use of skimmer nets:

"Developed in coastal Louisiana in the early 1980's, the skimmer trawl has gained widespread popularity throughout the southeastern U.S. shrimp fishery. Skimmer trawls are pushed by the vessel rather than towed. The trawls are always fished in pairs, from the sides of the vessel. An advantage of the skimmer trawl over an otter trawl is that they are more maneuverable, especially in small bays and bayous and can fish more selectively, i.e. along channel edges. An additional advantage of the gear is that while retrieving the cod end, the frame, or mouth of the trawl, remains in a fishing configuration, thus little effort and time is required to dump the catch.

"The trawl is held open by a metal framework and is fished on the bottom. A skimmer trawl consists of an "L" shaped frame constructed from metal pipe with a shoe or skid on the outboard leg. The outboard wing edge and headrope of the trawl is attached around the frame. The inboard wing edge of the trawl is sewn to a line suspended from the frame and terminates at a weight or bullet, which, when deployed, rides slightly off the bottom. A chained footrope and tickler chain are used. When fishing, the outboard shoe rides along the bottom, allowing the trawl to rise and fall with the bottom contour. The vertical height of the skimmer trawl varies depending on the target shrimp species, and may be as much as 12-ft in overall height.

"Skimmer trawls are used exclusively in inshore waters in all states where the gear is allowed. Originally designed to catch white shrimp by fishing the entire water column, today skimmers may also be rigged with low opening nets and are used to target brown shrimp. Within the last decade, an increasing number of inshore fishermen in North Carolina, Louisiana, Mississippi and Alabama have either fully converted their vessels from otter trawls to skimmer rigs, or switch out their gear on a seasonal basis. Although the TED exemption likely has caused many Louisiana fishermen to convert their gear to skimmer trawls, Hein and Meier (1995) described the introduction of skimmer nets into the Louisiana shrimp fishery and indicated that its development and widespread adaption was in response to the prohibition on the use of "chopstick nets" as well as increased catch rates, less debris and bycatch and lower fuel consumption rates. Citing unpublished LDWF data, these authors reported that skimmer nets were outcatching trawls by a factor of 3:1 in western Terrebonne Parish in the fall of 1988.

"Skimmer trawls are exempt from TED regulations and must be fished in accordance with tow time restrictions. Skimmers were exempted from TEDs under the assumption that the trawl bags were typically retrieved at intervals that would not be fatal to sea turtles."

### **Landings and Effort**

Landings

Species distribution of landings in Skimmer Nets showed the same pattern as that of Shrimp Trawls, except that brown shrimp (49%) made up a slightly larger portion of the catch than did white shrimp (47%); seabobs made up 2+% of landings (Table SH13). Together, those 3 species accounted for almost 99% of reported landings.

In contrast to Shrimp Trawls, landings by Skimmer Nets from the offshore waters made up only 4+% of total 1999-2004 landings (Table SH14). The coastal SubBasins accounted for almost 84% of landings for the period.

#### Effort

Effort with Skimmer Nets averaged about 60,750 trips per year, ranging from about 81,700 trips in year 2000 to 49,000 trips in year 2004; effort was stable from 2002-2004 (Figure SH3). Skimmer net effort accounted for over 63% of total effort with shrimp fishery gear (Table SH8).

Mean monthly effort averaged 5,000+ trips, ranging from less than 90 trips in February to 13,800+ trips in May (Figure SH4). There were 2 pulses on effort: May-June accounted for almost 42% of effort; 32+% of effort was expended from August-October. Only 3.5% of effort was expended from December-April (Table SH15).

SubBasin distribution of effort mirrored SubBasin distribution of catch: 72+% of effort occurred in the Terrebon\_S and Baratari\_S SubBasins resulting in 72+% of landings (Table SH16). Only 3+% of effort was reported from the offshore SubBasins.

#### **License and Permit Requirements**

A commercial Skimmer gear license is required for each individual net used. The fisherman must have a commercial fisherman's license. The vessel must be licensed. A valid commercial gear license may be transferred for temporary use to a person holding a valid commercial fisherman's license and having the same residency status as indicated on the license being transferred.

No federal permits are required for the use of this gear; there is little or no use of this gear in Federal waters.

#### **Laws Affecting Effort and Fishing Operations**

The Skimmer Net is primarily used on a moving fishing vessel, although it is included in the statutory definition of "stationary shrimp net"

The maximum allowable number and size of the gear is specified by law. Minimum mesh size is five-eighth inch square (Appendix 5-1).

The gear may be fished almost anywhere other shrimping gear may be used, however it may not be used over any privately leased oyster

bedding ground, as the method of fishing would damage the oysters on those grounds.

Use of this gear is allowed only during the open shrimp seasons. It may be fished day or night.

Federal law requires the use of Turtle Excluder devices in trawls. Louisiana does not enforce any federal law or regulation which requires any commercial or recreational fisherman to use TEDs or fish excluder devices by commercial fishermen in Louisiana waters.

## ***Butterfly Net***

### **Description of Gear and Fishing Method**

"Butterfly net" is statutorily defined as "a fixed, frame-mounted net, used to fish the near-surface waters, which is suspended from the side or sides of a boat, pilings, floats, rafts, or shore installation." Butterfly nets are also known as wing nets. Statutory law specifies size and configuration requirements of the net frames, as well as mesh size (Appendix 5-1).

Christmas and Etzold (1977) described the basic construction of the butterfly net:

"Butterfly nets are hung on rectangular frames and attached to the sides of a boat. Similar to trawls, these nets vary in size and are used in areas where there is a strong tidal flow. The boat anchors itself heading against the current and lowers the nets at right angles from the sides of the boat, letting the current sweep into the mouth of the net. The cod end or tail of the net is lifted, without removing the frame, through the use of a lazy line and the catch emptied on the boat and then replaced."

Epperly et al. (2002) discussed the use of butterfly nets:

"Butterfly nets, sometimes called "wing nets" consist of a square metal frame that forms the mouth of the net. Webbing is attached to the frame and tapers back to a cod end. The nets can be fished from a stationary platform or a pair of nets can be attached to either side of a vessel. The vessel is then anchored in a tidal current to capture emigrating shrimp, or the nets are pushed through the water by the vessel (Hein et al., 1995). In Louisiana, some shrimpers use them singly on a wharf or platform attached to the shore in man-made passes, bayous, or canals (Horst et al., 2002). The primary difference in fishing butterfly nets and skimmer trawls, is that the former is not fished on the bottom. Butterfly nets are typically set, or pushed so that the top of the frame, and net are exposed above the surface of the water. As with skimmer trawls, the catch may be picked up and dumped without raising the entire net out of the water. Vessels fishing with butterfly nets typically operate in the deeper parts of rivers, channels and canals, avoiding gear contact with the sloping banks.

"Butterfly nets are exempt from TED regulations and must be fished in accordance with regulated tow times. Like skimmer trawls, the gear is capable of incidental sea turtle capture. Because the gear is fished of the bottom, in deeper parts of channels, the chance of turtle interaction with this gear may be somewhat less than skimmer gear."

### **Landings and Effort**

#### Landings

White shrimp made up a higher portion of Butterfly Net landings (51.9%) than brown shrimp (45.1%). Seabobs comprised only 1% of 1999-2004 landings. Together these 3 species accounted for 98% of landings

during the period; a total of 23 other species made up the remaining 2% (Table SH17).

Over 52% of landings were reported from the coastal SubBasins; almost 28% of landings were reported from the offshore SubBasins (Table SH18).

#### Effort

Effort with Butterfly Nets averaged about 6,900 trips per year, ranging from about 9,900 trips in year 2000 to less than 5,200 trips in year 2004; effort showed a declining trend from year 1999 to year 2004 (Figure SH5). Butterfly net effort accounted for only 7+% of total effort with shrimp fishery gear (Table SH8).

Mean monthly effort averaged 575 trips, ranging from less than 6 trips in February to 1,550 trips in June (Figure SH6). There were 2 pulses on effort: May-June accounted for 44+% of effort; 34% of effort was expended from August-November. Only 2+% of effort was expended from December-April (Table SH19).

SubBasin distribution of effort mirrored SubBasin distribution of catch: 63+% of effort occurred in the Terrebon\_S and Calcasie\_S SubBasins resulting in 42+% of landings (Table SH20). Only 9% of effort was reported from the offshore SubBasins.

#### **License and Permit Requirements**

A commercial Butterfly Net gear license is required for each individual net used. The fisherman must have a commercial fisherman's license. The vessel must be licensed. A valid commercial gear license may be transferred for temporary use to a person holding a valid commercial fisherman's license and having the same residency status as indicated on the license being transferred.

No federal permits are required for the use of this gear; there is little or no use of this gear in Federal waters.

#### **Laws Affecting Effort and Fishing Operations**

The Butterfly Net may be used either as a stationary net attached to the waterbottom, bank or fixed structure; or on a moving fishing vessel. The maximum allowable size of the gear differs based on that use. Minimum mesh size is five-eight inch square (Appendix 5-1).

The gear may be fished almost anywhere other shrimping gear may be used; fixed gear is specifically prohibited in portions of Lake Pontchartrain and Lake Borgne, and in the Rigolets and Chef Menteur Passes connecting those bodies of water. All use of Butterfly Nets is prohibited in Lake Charles, Moss Lake, Prien Lake, and parts of the Calcasieu Lake and in Sabine Lake.

Use of this gear is allowed only during the open shrimp seasons. It may be fished day or night.

## **Cast Net**

### **Description of Gear and Fishing Method**

"Cast Net" is legally defined as "a light circular net of vegetable or synthetic materials and weighted around its perimeter that is thrown by hand over the water." (Appendix 5-1)

Christmas and Etzold (1977) described the basic construction and use of the cast net:

"These nets are circular, usually having a spread of 1.8 to 3.7 m (6 to 12 feet), with a lead line running around the outside edge. A cord line extends through a ring in the center of the net, and then radiates numerous small cords fastened at regular intervals to the lead line. These cast nets are usually constructed of nylon webbing with a ¼- to ¾- inch mesh. Some nets are made of monofilament. "

"The net is thrown so that it will fall in a circular pattern on the water and then sink to the bottom. After the net has settled, the cord line is pulled in, drawing the smaller lines into the center forming a bag to hold the shrimp."

### **Landings and Effort**

#### Landings

Brown shrimp made up over 56% of Cast Net landings; white shrimp were 26% of 1999-2004 landings. Three other species comprised more than 1% of landings: Gizzard shad (7%), striped mullet (4%), and menhaden (3%) (Table SH21). These are primarily bait species; much of the shrimp caught in this gear were probably also used as bait.

Over 62% of landings were reported from the Calcasie\_S and Terrebon\_S SubBasins (Table SH 22).

#### Effort

Effort with Cast Nets averaged only 85 trips per year, indicating that is it a very minor commercial gear (Figure SH7); there was no trend in the 1999-2004 period. Cast net effort accounted for only 0.09% of total effort with shrimp fishery gear (Table SH8).

Mean monthly effort averaged only 7 trips, with almost 47% of effort occurring May-June (Figure SH8, Table SH23)

Three SubBasins, Calcasie\_S, Terrebon\_S Baratari\_S accounted for 47.6% of total effort during the period (Table SH24).

### **License and Permit Requirements**

The fisherman must have a commercial fisherman's license. A fisherman with a commercial fisherman's license is allowed to use a cast net less than 8 feet 6 inches in diameter to catch minnows, shrimp and other baits allowed by law; a license is required for each individual net used.

A cast net larger than 8 feet 6 inches is allowed with the possession of the Dip/Cast Net gear license.

Federal permits are not required for the use of this gear

### **Laws Affecting Effort and Fishing Operations**

Commercial use of the Cast Net is limited to catching bait.

A Cast Net may be used in the closed shrimp season to catch bait shrimp.

### ***Status of the fishery***

The shrimp fishery is Louisiana's most valuable commercial fishery; from 1950 to 1998 it accounted for 10% of Louisiana average annual fisheries landings, and 56% of the average value of the fisheries. It is the major component of the shrimp and shellfish industry, the 1996 economic value of which has been estimated to be \$1.9 billion (LDWF, 2000). From 1950-2004, Louisiana Shrimp landings have varied from 31 million to 147 million pounds, averaging about 87.5 million pounds (Figure SH9).

The shrimp stocks of the Gulf of Mexico are not considered to be biologically overfished; however the Gulf fishery is in a state of economic decline. All sectors of the Gulf shrimp fishery, regardless of vessel size, state, or gear, have faced with economic losses since 2002. Imports resulting rapidly declining shrimp prices are the primary cause of these losses. The increase in imports resulted in the domestic industry's share of the U.S. shrimp market to decrease from 44.6% to 14.8% between 1980 and 2001 (GMFMC, 2005).

The effects of this decline are reflected in the decrease in effort for all three of the major shrimp gear (Figures SH1, SH3, and SH6). Likewise the decline of the industry is reflected in the declining number of gear licenses sold during the 1999-2004 period (Table SH25, Figure SH10). The number of resident trawl gear licenses sold for this gear decreased from 15,533 in 1989 to 4810 in 2004; the number of non-resident licenses decreased from 1,597 to 604 during the same period. (Table SH25; Figure SH10). The number of resident Butterfly Net gear licenses sold decreased from 4,059 in 1989 to 809 in 2004; the number of non-resident licenses decreased from 23 in 1991 to 5 in 2004 during the same period.

In Louisiana, federal TED and Bycatch Reduction Device (BRD) requirements may have led to decrease use of trawls and increase use of Skimmer Nets, which are a versatile gear that can be used anywhere a butterfly net is used, and in many situation where a trawl can be used (Horst and Holloway, 2002). However, as stated previously,

increased use of skimmer nets is related to increase catch and efficiency. The number of resident gear licenses sold for this gear increased from 1,836 in 1992 to 3,653 in 2004 (Prior to 1992, the Skimmer Net was licensed as a Butterfly net); the number of non-resident licenses increased from 20 to 41 during the same period. (Table SH25; Figure SH10).

The number of resident Dip/Castnet gear licenses increased from 348 in 1990 to 620 in 2004; most years no non-resident licenses are sold.

*Shrimp Fishery Figures and Tables*

Table SH1. Species Distribution In Major Shrimp Gear, 1950-2004

Species	Beam Trawls, Chopsticks	Butterfly Nets	Cast Nets	Otter Trawl Bottom, Fish	Otter Trawl Bottom, Shrimp	Trawls, Unspecified	Total
Shrimp, Marine, Other	0.000%	11.882%	0.611%	23.655%	33.703%	81.938%	40.844%
Brown Shrimp	3.172%	48.460%	24.174%	6.689%	29.600%	6.361%	24.412%
White Shrimp	96.828%	37.257%	13.781%	0.000%	29.542%	6.807%	22.981%
Finfishes, Unc Bait And Animal Food	0.000%	0.000%	0.000%	67.880%	0.520%	2.511%	6.748%
Shrimp, Seabob	0.000%	2.242%	0.031%	0.260%	4.487%	0.307%	3.089%
Blue Crab	0.000%	0.047%	0.000%	0.314%	0.424%	0.236%	0.346%
King Whiting	0.000%	0.000%	0.000%	0.198%	0.262%	0.458%	0.275%
Flatfish	0.000%	0.022%	0.000%	0.088%	0.270%	0.204%	0.221%
Sheepshead	0.000%	0.008%	0.000%	0.490%	0.232%	0.106%	0.211%
Black Drum	0.000%	0.003%	0.000%	0.220%	0.273%	0.078%	0.207%
Atlantic Croaker	0.000%	0.000%	0.000%	0.002%	0.143%	0.530%	0.198%
Shrimp, Atlantic & Gulf, Roughneck	0.000%	0.002%	0.000%	0.000%	0.182%	0.000%	0.115%
Red Snapper	0.000%	0.000%	0.000%	0.063%	0.079%	0.062%	0.068%
Sea Catfishes	0.000%	0.000%	0.000%	0.029%	0.040%	0.122%	0.052%
Sand Seatrout	0.000%	0.000%	0.000%	0.028%	0.044%	0.043%	0.039%
Finfishes, Unc General	0.000%	0.007%	59.337%	0.058%	0.027%	0.020%	0.035%
Red Drum	0.000%	0.000%	0.000%	0.000%	0.030%	0.003%	0.020%
Atlantic Cutlassfish	0.000%	0.000%	0.000%	0.000%	0.000%	0.087%	0.018%
Spanish Mackerel	0.000%	0.000%	0.000%	0.001%	0.026%	0.001%	0.017%
Shellfish	0.000%	0.043%	0.023%	0.000%	0.016%	0.000%	0.013%
Shrimp, Pink	0.000%	0.003%	0.000%	0.003%	0.019%	0.001%	0.013%
Striped Mullet	0.000%	0.000%	1.361%	0.000%	0.008%	0.028%	0.011%
Other Species	0.000%	0.023%	0.682%	0.022%	0.071%	0.095%	0.068%
Total	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%

Table SH2. Louisiana Landings of Saltwater Penaeid Shrimp by Reported Gear, 1950-2004

Year	Beam Trawls, Chopsticks	Beam Trawls, Shrimp	Brush Trap	Butterfly Nets	Cast Nets	Dip Nets, Common	Not Coded	Otter Trawl Bottom, Fish	Otter Trawl Bottom, Shrimp	Pots And Traps, Crab, Blue	Trawls, Unspecified	Total
1950											77,835,100	77,835,100
1951											85,718,200	85,718,200
1952											83,103,700	83,103,700
1953											86,941,300	86,941,300
1954											83,607,800	83,607,800
1955											71,993,600	71,993,600
1956					3,800						60,788,300	60,792,100
1957											34,102,800	34,102,800
1958											41,007,700	41,007,700
1959											57,353,000	57,353,000
1960			1,800								61,756,100	61,757,900
1961											31,027,000	31,027,000
1962			1,600					43,583,700				43,585,300
1963			11,300					80,797,400				80,808,700
1964									59,365,000			59,365,000
1965									62,578,700			62,578,700
1966				1,856,300					60,413,100			62,269,400
1967				4,570,500					70,746,600			75,317,100
1968									67,768,200			67,768,200
1969				1,379,800					81,500,800			82,880,600
1970			9,100						90,938,900			90,948,000
1971				3,272,700					89,203,500			92,476,200
1972				4,698,000					78,333,800			83,031,800
1973				3,664,700					54,981,800			58,646,500
1974				4,975,200					54,605,600			59,580,800
1975				2,019,400					51,114,200			53,133,600
1976				7,997,500					74,357,900			82,355,400
1977				10,272,200					93,772,800			104,045,000

Table SH2. Louisiana Landings of Saltwater Penaeid Shrimp by Reported Gear, 1950-2004

Year	Beam Trawls, Chopsticks	Beam Trawls, Shrimp	Brush Trap	Butterfly Nets	Cast Nets	Dip Nets, Common	Not Coded	Otter Trawl Bottom, Fish	Otter Trawl Bottom, Shrimp	Pots And Traps, Crab, Blue	Trawls, Unspecified	Total
1978							104,530,217					104,530,217
1979							78,449,456					78,449,456
1980							90,102,408					90,102,408
1981							112,254,721					112,254,721
1982							90,442,723					90,442,723
1983							77,716,868					77,716,868
1984									106,674,461			106,674,461
1985	1,919			3,736,756	9,498				112,776,289			116,524,462
1986	108,188			9,269,213	49,371				137,590,846			147,017,618
1987				11,759,309	60,732				105,907,392			117,727,433
1988				9,408,331	589				93,184,891			102,593,811
1989				6,056,982	23				94,225,257			100,282,262
1990				9,006,100	3,283				110,442,445			119,451,828
1991	2,151			8,088,391					86,995,922			95,086,464
1992	562			17,657,389	5,718				79,966,533			97,630,202
1993				16,339,113					71,354,708			87,693,821
1994				16,323,404	14,576				73,694,206			90,032,186
1995				17,430,555			10,134		80,926,998			98,367,687
1996				16,241,959					74,366,521			90,608,480
1997				17,337,218	6,151				75,891,027			93,234,396
1998	1,718			23,580,616	16,697				88,396,576			111,995,607
1999		1,388		31,107,503	1,617				89,881,013			120,991,521
2000				55,394,477	10,611	145	16,473		89,962,827			145,384,533
2001				50,233,054		16			74,579,700			124,812,770
2002	105	2,660		3,592,860	5,586		173,675		68,281,035		35,739,000	107,794,921
2003				4,045,944	44,621		228,673		78,288,579		43,122,343	125,730,160
2004				4,346,793	7,165	65	140,011		81,149,338	390	48,646,351	134,290,113

Source: NOAA Fisheries Web Site; January, 2006

Gear	%
Otter Trawl Bottom, Shrimp	67.119%
Trawls, Unspecified	21.154%
Butterfly Nets	8.803%
Otter Trawl Bottom, Fish	2.915%
Cast Nets	0.006%
Beam Trawls, Chopsticks	0.003%
4 Other Gears	0.001%
Source: NOAA Fisheries Web Site; January, 2006	

Gear	%
Otter Trawls	84.0%
Butterfly Nets	16.0%
1 Minor Gears	>0.1%
Total	100.00%
Source: NOAA Fisheries Web Site; January, 2006	

Gear	%
Otter Trawls	87.0%
Butterfly Nets	13.1%
3 Minor Gears	0.02%
Total	100.00%
Source: NOAA Fisheries Web Site; January, 2006	

Gear	%
Otter Trawls	94.1%
Butterfly Nets	5.9%
2 Minor Gear	>0.1%
Total	100.00%
Source: NOAA Fisheries Web Site; January, 2006	

Gear	Brown Shrimp	Pink Shrimp	Rock Shrimp	Royal Red	Seabob	Trachy-Penaeus	White Shrimp	All Species
Shrimp Otter Trawl	56.7%	89.0%	99.3%	90.5%	78.5%	99.7%	60.7%	59.7%
Skimmer Nets	39.9%	10.2%	0.7%	9.5%	20.7%	0.3%	35.7%	36.9%
Butterfly Nets	3.2%	0.7%	0.0%	0.0%	0.7%	0.0%	3.5%	3.2%
Other Gear	0.2%	0.1%	0.0%	0.0%	0.2%	0.0%	0.1%	0.1%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Source: LDWF Trip Ticket Data								

Gear	Total
Skimmer Nets	63.23%
Shrimp Otter Trawl	29.50%
Butterfly Nets	7.18%
Cast Nets	0.09%
Total	100.00%
Source: LDWF Trip Ticket Data	

Species	%
White Shrimp	48.7%
Brown Shrimp	43.0%
Seabob	6.0%
75 Species	2.3%
Total	100.0%

Source: LDWF Trip Ticket Data

Figure SH1. Annual Shrimp Trawl Effort, 1999-2004

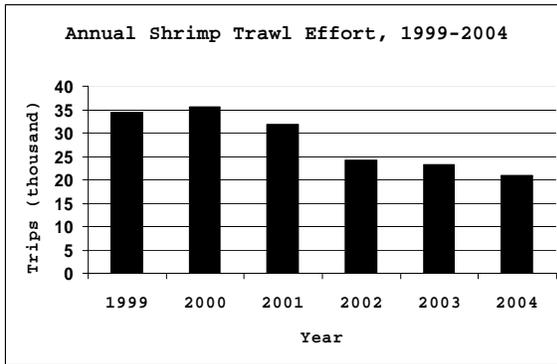
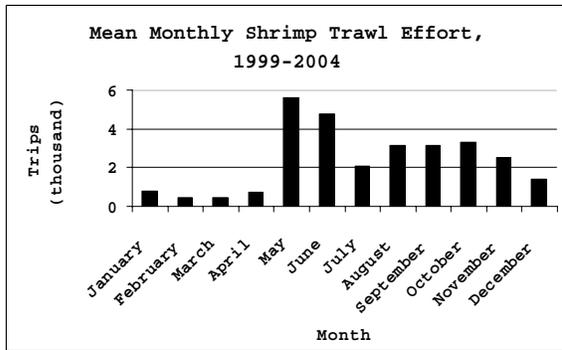


Figure SH2. Mean Monthly Shrimp Trawl Effort, 1999-2004



SubBasin	Total
Offshore14	15.0%
Offshore15	15.0%
Offshore13	13.0%
Terrebon_S	12.9%
Baratari_S	12.2%
Offshore16	7.4%
Pontchar_S	5.6%
Offshore17	3.3%
Calcasie_S	2.5%
Vermtech_I	1.9%
Mississi_S	1.9%
Atchafal_I	1.8%
Vermtech_S	1.3%
Mermenta_S	1.3%
38 SubBasins	4.9%
Total	100.0%

Source: LDWF Trip Ticket Data

Month	Effort
January	2.8%
February	1.6%
March	1.7%
April	2.6%
May	19.7%
June	16.9%
July	7.4%
August	11.0%
September	11.0%
October	11.6%
November	8.9%
December	4.9%

Source: LDWF Trip Ticket data

SubBasin	Effort
Baratari_S	18.8%
Terrebon_S	17.5%
Calcasie_S	11.1%
Pontchar_S	7.6%
Offshore15	7.3%
Offshore13	6.8%
Offshore14	6.7%
Vermtech_I	4.7%
Pontchar_I	3.4%
Offshore16	3.1%
Mississi_S	2.4%
Offshore17	2.4%
Mermenta_S	1.7%
Vermtech_S	1.2%
Baratari_I	1.2%
Atchafal_I	1.2%
34 SubBasins	3.2%
Total	100.0%

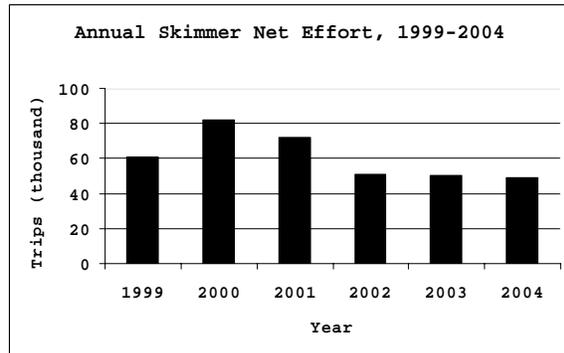
Source: LDWF Trip Ticket Data

**Table SH13. Species Distribution Of Skimmer Net Landings, 1999-2004**

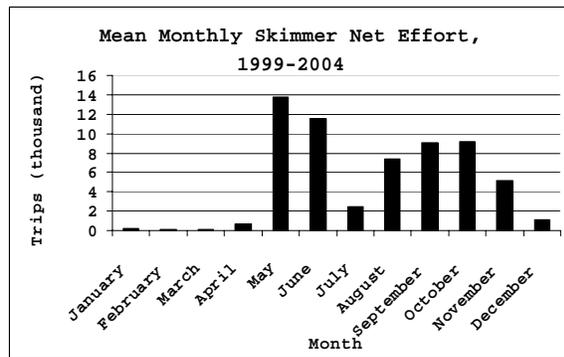
Species	%
Brown Shrimp	49.4%
White Shrimp	46.9%
Seabob	2.6%
67 Species	1.1%
Total	100.0%

Source: LDWF Trip Ticket Data

**Figure SH3. Annual Skimmer Net Effort, 1999-2004**



**Figure SH4. Mean Monthly Skimmer Net Effort, 1999-2004**



**Table SH14. SubBasin Distribution Of Skimmer Net Landings, 1999-2004**

SubBasin	Total
Baratari_S	37.9%
Terrebon_S	34.2%
Mississi_S	6.0%
Pontchar_S	5.8%
Pontchar_I	2.5%
Offshore13	2.2%
Baratari_I	2.2%
Offshore14	2.2%
Mississi_I	1.6%
Terrebon_I	1.1%
41 SubBasins	4.2%

Source: LDWF Trip Ticket Data

**Table SH15 Monthly Distribution Of Skimmer Net Effort, 1999-2004**

Month	Effort
January	0.3%
February	0.1%
March	0.2%
April	1.1%
May	22.7%
June	19.0%
July	4.0%
August	12.2%
September	14.9%
October	15.1%
November	8.5%
December	1.9%

Source: LDWF Trip ticket data

**Table SH16. SubBasin Distribution Of Skimmer Net Effort, 1999-2004**

SubBasin	Effort
Terrebon_S	38.4%
Baratari_S	33.9%
Mississi_S	5.4%
Pontchar_S	4.6%
Pontchar_I	4.4%
Baratari_I	3.0%
Offshore13	1.7%
Terrebon_I	1.6%
Offshore14	1.6%
Mississi_I	1.3%
Vermtech_I	1.0%
38 SubBasins	3.1%
Total	100.0%

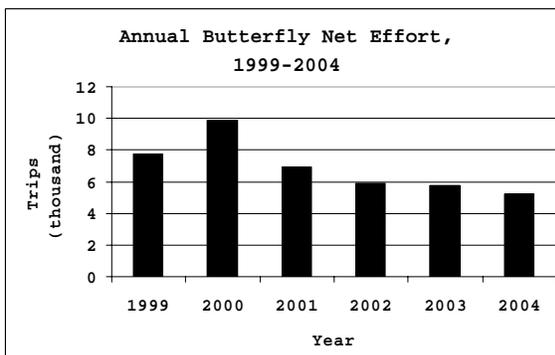
Source: LDWF Trip Ticket Data

**Table SH17. Species Distribution Of Butterfly Net Landings, 1999-2004**

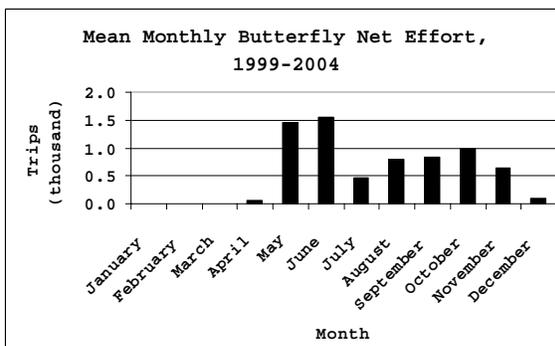
Species	%
White Shrimp	51.9%
Brown Shrimp	45.1%
Seabob	1.0%
23 Species	2.0%
Total	100.00%

Source: LDWF Trip Ticket Data

**Figure SH5. Annual Butterfly Net Effort, 1999-2004**



**Figure SH6. Mean Monthly Butterfly Net Effort, 1999-2004**



**Table SH18. SubBasin Distribution of Butterfly Net Landings, 1999-2004**

SubBasin	Total
Terrebon_S	24.7%
Calcasie_S	17.5%
Offshore14	17.3%
Vermtech_I	9.9%
Offshore13	8.1%
Baratari_S	4.6%
Pontchar_I	4.5%
Vermtech_S	3.6%
Offshore15	2.3%
Pontchar_S	1.7%
32 SubBasins	5.9%
Total	100.0%

Source: LDWF Trip Ticket Data

**Table SH19. Monthly Distribution of Butterfly Net Effort, 1999-2004**

Month	Effort
January	0.1%
February	0.0%
March	0.1%
April	0.9%
May	21.1%
June	22.5%
July	6.9%
August	11.5%
September	12.0%
October	14.2%
November	9.4%
December	1.3%

Source: LDWF Trip ticket data

**Table SH20. SubBasin Distribution Of Butterfly Net Effort, 1999-2004**

SubBasin	Effort
Terrebon_S	35.3%
Calcasie_S	27.9%
Pontchar_I	6.7%
Offshore14	6.2%
Baratari_S	4.7%
Vermtech_I	4.0%
Offshore13	3.0%
Pontchar_S	2.2%
Mermenta_I	2.0%
Vermtech_S	1.2%
Terrebon_I	1.2%
Baratari_I	1.0%
29 SubBasins	4.6%
Total	100.0%

Source: LDWF Trip Ticket Data

Table SH21. Species Distribution Of Cast Net Landings, 1999-2004	
Species	%
Brown Shrimp	56.2%
White Shrimp	26.2%
Gizzard Shad	7.3%
Striped Mullet	4.5%
Menhaden	3.2%
9 Species	2.6%
Total	100.0%

Figure SH7. Annual Cast Net Effort, 1999-2004

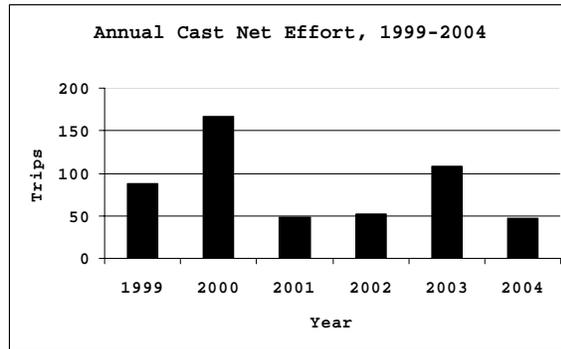


Table SH22. SubBasin Distribution of Cast Net Landings, 1999-2004	
SubBasin	Total
Calcasie_S	41.0%
Terrebon_S	21.6%
Atchafal_F	8.0%
Baratari_S	7.1%
Mermenta_I	4.2%
Pontchar_F	3.2%
Terrebon_I	3.2%
Mermenta_S	2.9%
Pontchar_S	2.5%
Offshore17	1.7%
11 SubBasins	4.6%
Total	100.0%
Source: LDWF Trip Ticket Data	

Figure SH8. Mean Monthly Cast Net Effort, 1999-2004

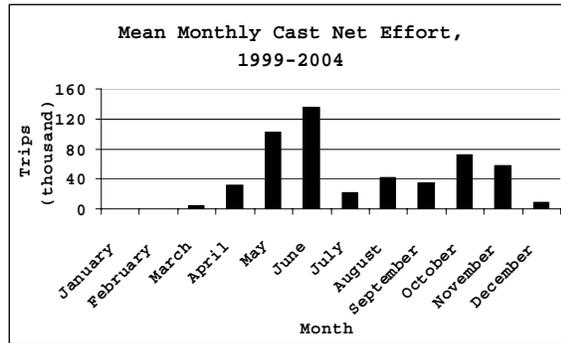


Table SH23. Monthly Distribution Of Cast Net Effort, 1999-2004	
Month	Effort
January	0.0%
February	0.0%
March	0.8%
April	6.1%
May	20.0%
June	26.7%
July	4.3%
August	8.2%
September	6.7%
October	14.1%
November	11.4%
December	1.8%
Source: LDWF Trip ticket data	

Table SH24. SubBasin Distribution Of Cast Net Effort, 1999-2004	
SubBasin	Effort
Calcasie_S	34.5%
Terrebon_S	28.5%
Baratari_S	10.5%
Mermenta_I	5.4%
Mermenta_S	5.0%
Pontchar_I	3.2%
Baratari_I	3.0%
Atchafal_F	2.4%
Terrebon_I	1.8%
Pontchar_S	1.2%
Offshore17	1.2%
9 SubBasins%	3.3%
Total	100.0%
Source: LDWF Trip Ticket Data	

Table SH25. Louisiana Shrimp Fishery Gear Licenses, 1989-2004.

Year	Resident Shrimp Trawl	Non-Resident Shrimp Trawl	Resident Butterfly Net	Non-Resident Butterfly Net	Resident Skimmer Net	Non-Resident Skimmer Net	Resident Dip/Cast Net	Non-Resident Dip/Cast Net license
1989	15,533	1,597	4,059	16	0	0	10	0
1990	13,742	1,527	3,981	16	0	0	348	0
1991	11,987	1,329	3,887	23	0	0	325	1
1992	10,969	1,189	2,385	14	1,836	20	347	0
1993	8,712	1,072	1,924	10	2,248	25	341	1
1994	7,734	1,033	1,640	18	2,386	24	340	1
1995	7,465	1,070	1,521	18	2,655	32	373	1
1996	7,266	1,079	1,419	10	2,768	52	428	1
1997	6,588	970	1,226	1	2,639	34	472	0
1998	6,830	901	1,263	2	2,818	22	533	1
1999	7,100	888	1,270	3	3,181	19	631	0
2000	7,371	816	1,337	5	3,655	27	577	0
2001	6,957	885	1,229	20	4,119	56	554	1
2002	6,459	798	1,051	7	4,126	50	568	1
2003	5,601	724	912	5	3,948	42	592	0
2004	4,810	604	809	5	3,653	41	620	0

Source: Herb Holloway, LDWF

Figure SH9. Louisiana Shrimp Landings, 1950-2004

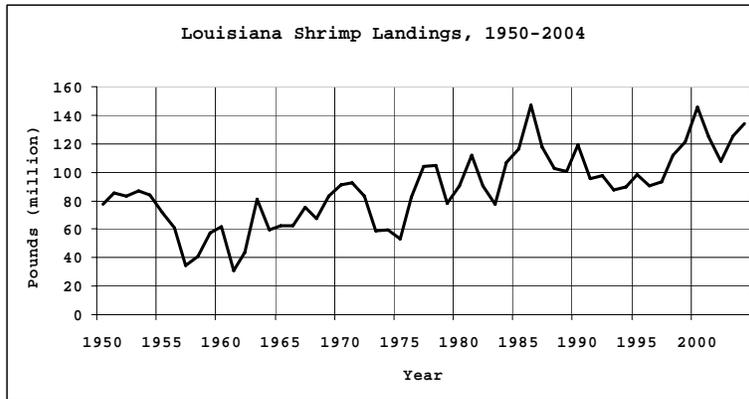
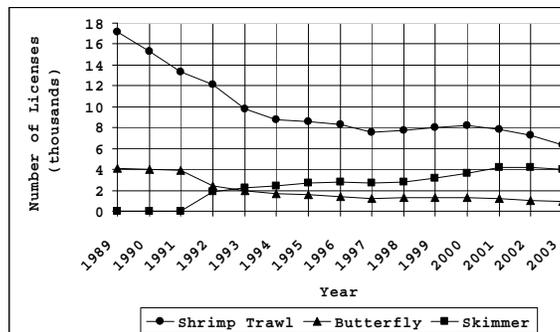


Figure SH10. Louisiana Shrimp Fishery Major Gear Licenses



## **Blue Crab Fishery**

### ***Species Targeted***

The management plan for the Gulf of Mexico blue crab fishery (Guillory et. al., 2001) presents information on this fishery. The blue crab, *Callinectes sapidus*, is the target species of this fishery. Blue crabs are estuarine-dependant. Mating occurs in the brackish waters of the coastal estuaries; spawning occurs in the higher salinity nearshore waters. Larval forms drift back into the estuaries, where juveniles grow into adults. The blue crab fishery in Louisiana occurs primarily in state waters. Little landings are from the Federal EEZ waters.

Almost 99% of blue crabs are landed in the hard shell stage; a little over 1% of landings are in the soft and peeler category (Table BC1).

### ***Historical Gear***

In Louisiana, crabs may be taken legally with Crab Traps, Crab Dropnets, Trawls, Trotlines, Handlines, Bushlines, Dip nets, and Cast nets. Blue Crabs landings from 1950-2004 have been reported from a wide variety of gears (Table BC2), however Crab Traps, Trot Lines, Dip Nets, Trawls, and Bush Traps are the only gears of significance (Table BC3). Traps were used for 56% of historical landings; the almost 30% of landings listed under "Other Gear" are primarily composed of "Not Coded" and "Combined Gears" categories. During the 1990's, the database used for this report allocated most of Blue Crab landings to those two categories (Table BC5).

Trot lines have been decreasing in influence over the years (Figure BC1; Table BC5) to the point that no landings were reported during the 1970's and '80's; with the advent of the Trip Ticket system, Blue Crabs have been reported with this gear, but only about 27 thousand pounds per year from 2000-2004. Likewise, since the mid 1970's, trawls, bush traps and dipnets have been minor gears in the Blue Crab fishery (Figure BC2; Table BC5).

From 1999-2004, in excess of 99% of Blue Crabs commercially harvested in Louisiana waters were caught in crab traps (Table BC4). According to Guillory et al (2001), during the 1980's and 1990's, crab traps accounted for 99-100% of the commercial blue crab landings in the Gulf of Mexico.

### ***Recent Gear***

## **Crab Trap**

### **Description of Gear and Fishing Method**

The construction of crab traps is described in Guillory et al (2001):

"Crab traps consist of the following: a floor and ceiling; two to four tapered conical entrance funnels located one mesh above the floor; an arched or gull wing shaped apron, which separates the inner and outer chambers and serve as an effective means of crab retention; and an inner cylindrical shaped bait chamber fastened to the center of the floor and containing an exterior door. Bait chambers are usually constructed of smaller 0.5" by 1.0" vinyl-coated mesh. Trap size, number of funnels, size of inner chamber relative to outer chamber and bait chamber (presence or absence) varies to yield a wide variety of trap sizes and configurations. The number of entrance funnels may range from two to four. Although dimensions may vary from less than 24" to more than 36" in length and width, most traps average 24" wide and deep and 14.5" high. The inner chamber may occupy the entire floor of the trap, half of the floor, or even be absent in some traps. Traps are usually constructed of 1.5" hexagonal, black vinyl-coated mesh, although 1.5" square mesh and different colors (green, orange, red) have become increasingly popular. Some blue crab fishermen weight their traps by attaching 0.5" - 0.75" diameter reinforcing iron bars (re-bar) or bricks to the trap base. Lines of varying length, depending upon water depth, are attached to the top corner of the trap and lead to a buoy generally made of polystyrene or plastic. Traps are usually set in a line and baited with fish; the preferred bait is gulf menhaden (*Brevoortia patronus*) or striped mullet (*Mugil cephalus*)."

"Crab Trap" is defined in Louisiana statutory Law as "a cube-shaped device which is constructed of wire and is no larger than thirty inches on any side with entrance funnels extending no further than seven inches into the inside of the trap and either a bait box or materials providing cover or shelter for peeler crabs, which is used for the sole purpose of taking crabs or stone crabs. This device shall be fished in a stationary, passive manner with the openings to the entrance funnels such that the horizontal diameter of each opening on the vertical wall of the trap is at least one and one-half times the vertical diameter of the opening." 56:8(28)

### **Landings and Effort**

#### Landings

There is little reported bycatch from crab traps. From 1999-2004, over 99% of the harvest from these traps was blue crabs (Table BC6).

No significant landings were reported from the offshore SubBasins. The coastal SubBasins accounted for 53% of landings between 1999-2004; 38 % of landings for that period were reported from the intermediate SubBasins. The SubBasins with the highest percentage of catch was Terrebon\_S (26.0%), followed by Baratari\_S (13.7%), and Pontchar\_I (12.2%) (Table BC7).

#### Effort

There was no trend in effort from 1999-2004 (Figure BC3). Effort averaged about 133 thousand trips per year.

Mean monthly effort averaged about 11 thousand trips per month, ranging from a minimum of 5600 trips in February to over 17 thousand trips in July (Figure BC4). July accounted for 13% of total effort, February for 4.2%. (Table BC8).

Distribution of effort by SubBasin mirrored distribution of landings. Terrebon\_S SubBasin reported 29.0% of total annual effort, followed by Baratari\_S (14.7%) and Pontchar\_I (12.1%) (Table BC9). About 56% of effort was expended in the coastal SubBasins; 36% was expended in the intermediate SubBasins.

### **License and Permit Requirements**

Horst and Holloway (2002) discussed the licensing requirements of the blue crab fishery. Permits are not required for the use of Crab Traps, however crab fishermen must have a commercial fisherman's license; the vessel must be licensed. There are two types of license, crab trap gear licenses which allow the user to fish an unlimited number of traps, and crab trap on trotline licenses, which cost \$1 per trap to a maximum cost of 25\$, which allows the user to fish an unlimited number of traps. As a license entitles the holder to fish an unlimited number of traps the number of license holders is an imperfect measure of effort; likewise the number of trips is an imperfect estimate of effort as it is unknown how many traps the fisherman worked during the trip.

A valid commercial gear license may be transferred for temporary use to a person holding a valid commercial fisherman's license and having the same residency status as indicated on the license being transferred.

### **Laws Affecting Effort and Fishing Operations**

A summary of the statutes and regulations affecting crab traps is presented in Appendix 5-1.

There is no limitation on the number of crab traps which may be used by a commercial fisherman.

There is no season for the use of crab traps, although between February 1 and March 31, areas of the coast may be closed to remove damaged or unusable traps. Most of the coastal waters are open to the use of crab traps.

At times during the year the traps must possess escape rings to release undersized crabs. Crab traps cannot be set in navigable channels or entrances to streams. Crab traps cannot be tended at night.

### ***Status of the fishery***

Gulfwide, the blue crab population seems to be biologically stable. In Louisiana there has been a significant increase in mortality rates, a significant decline in CPUE of crabs fully recruited to the fishery, and a decrease in average size over time; however increases in landings since 1966 (Figure BC9), and frequency of occurrence in samples indicate no significant trend over time. (Guillory et al, 2001).

The number of commercial fishermen harvesting blue crabs increased dramatically from 1980 to 1991. This led to economic capitalization, increased number of traps, and a decline in catch per effort (Guillory et al, 2001). Participation has continued to increase since that time. The number of Crab Trap licenses sold has increased from about 2,750 in the early 1990's to about 3,400 in the early 2000's; non-resident licensed have varied from 17-65 during the period. Resident Trot-line licenses have varied from 14-48 from 1989-2004 (Table BC10).

*Blue Crab Figures and Tables*

Species	%
Blue Crab	98.94%
Blue Crab, Soft And Peeler	0.87%
Blue Crab, Peeler	0.16%
Blue Crab, Soft	0.02%
Florida Stone Crab, Claws	0.01%
Total	100.00%
Source: NOAA Fisheries Web Site. January, 2006	

Gear	%
Pots And Traps, Crab, Blue	55.8%
Combined Gears	18.6%
Not Coded	11.2%
Lines Trot With Baits	10.6%
Dip Nets, Common	1.5%
Otter Trawl Bottom, Shrimp	0.9%
Dip Nets, Drop	0.5%
Brush Trap	0.4%
Trawls, Unspecified	0.2%
Pots, Unclassified	0.2%
Otter Trawl Bottom, Fish	0.1%
Pots And Traps, Fish	0.0%
Haul Seines, Beach	0.0%
Butterfly Nets	0.0%
Pots And Traps, Crab, Other	0.0%
Pots And Traps, Cmb	0.0%
Fyke And Hoop Nets, Fish	0.0%
Tongs and Grabs, Other	0.0%
Trammel Nets	0.0%
Pots And Traps, Crayfish	0.0%
Gill Nets, Stake	0.0%
Total	100.0%
Source: NOAA Fisheries Web Site. January, 2006	

Gear	%
Traps	56.0%
Trot Lines	10.6%
Dip Nets	2.1%
Trawls	1.2%
Bush Traps	0.4%
Other Gear	29.8%
Total	100.0%
Source: NOAA Fisheries Web Site. January, 2006	

Gear	%
Crab Trap	99.3%
25 Gears	0.7%
Total	100.0%
Source: LDWF Trip Ticket Data	

Figure BC1. Blue Crab Landings with Trot Lines, 1950-2004

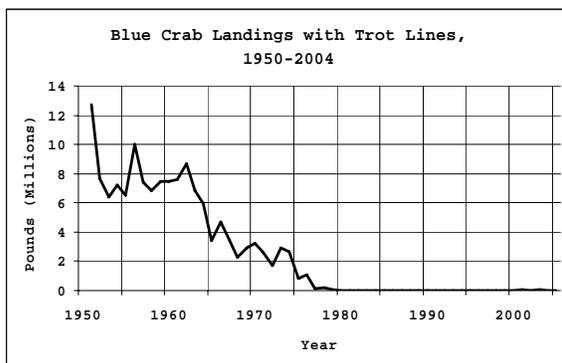


Figure BC2. Blue Crab Landings with Minor Gear, 1950-2004

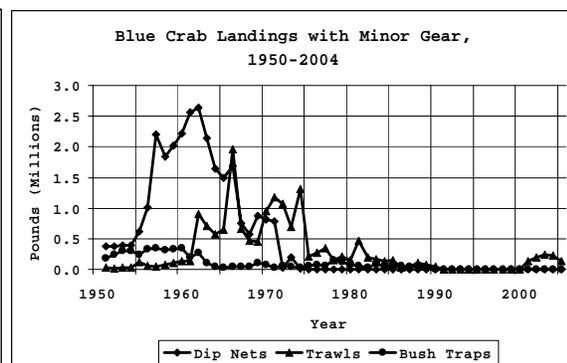


Table BC5. Louisiana Blue Crab Landings by Major Gear, 1950-2004

Year	Traps	Trot Lines	Dip Nets	Trawls	Bush Traps	Other Gear	Total
1950	60,000	12,738,600	383,600	25,500	187,600	74,200	13,469,500
1951	749,700	7,653,700	371,000	20,700	242,900	22,000	9,060,000
1952	624,600	6,402,000	395,700	37,000	298,900	23,700	7,781,900
1953	625,500	7,243,000	389,800	33,500	296,200	31,000	8,619,000
1954		6,525,100	617,100	119,600	247,100	31,600	7,540,500
1955		10,007,200	1,002,600	54,700	327,300		11,391,800
1956		7,423,200	2,195,200	40,500	343,300		10,002,200
1957	16,800	6,862,100	1,841,900	73,100	316,800		9,110,700
1958	12,700	7,449,600	2,014,600	98,400	337,500		9,912,800
1959	19,300	7,470,200	2,209,700	136,600	339,700		10,175,500
1960	37,600	7,615,600	2,570,300	139,800	200,000		10,563,300
1961	38,400	8,681,600	2,632,500	903,900	273,800		12,530,200
1962	56,600	6,857,100	2,137,700	708,700	106,700		9,866,800
1963	81,600	5,965,500	1,643,800	568,100	51,600		8,310,600
1964	320,200	3,408,700	1,489,700	648,900	24,100		5,891,600
1965	1,132,400	4,675,000	1,687,700	1,952,900	39,800		9,487,800
1966	3,145,200	3,508,300	752,900	669,000	37,900		8,113,300
1967	4,331,700	2,283,000	575,000	463,800	51,500		7,705,000
1968	5,501,600	2,908,200	870,200	448,600	106,200		9,834,800
1969	6,747,300	3,218,300	809,900	945,100	77,900		11,798,500
1970	5,763,100	2,572,900	789,300	1,181,400	37,100		10,343,800
1971	9,416,000	1,734,000	35,800	1,070,300	56,500		12,312,600
1972	11,330,000	2,916,500	200,000	694,600	43,700		15,184,800
1973	19,207,800	2,629,600	15,100	1,309,700	37,400		23,199,600
1974	19,631,600	832,900	5,500	208,200	57,300		20,735,500
1975	15,816,800	1,089,200	2,500	268,400	77,400		17,254,300
1976	14,738,400	129,900	6,200	354,000	56,500		15,299,200
1977	15,862,500	201,700	3,400	152,700	153,000		16,379,000

Table BC5. Louisiana Blue Crab Landings by Major Gear, 1950-2004

Year	Traps	Trot Lines	Dip Nets	Trawls	Bush Traps	Other Gear	Total
1978	14,829,499	37,803		214,602	125,345		15,207,249
1979	21,253,842			148,148	75,890		21,477,880
1980	17,763,555			473,800	62,342		18,299,697
1981	16,085,474			203,153	37,430		16,326,057
1982	17,124,748			159,695	97,360		17,381,803
1983	19,486,293			130,497	49,858		19,666,648
1984	29,479,119			146,964	52,222		29,678,305
1985	29,845,761			29,739	55,090		29,930,590
1986	31,602,171			43,051	45,050		31,690,272
1987	52,332,727			99,143	61,762		52,493,632
1988	53,613,349			82,153	26,535		53,722,037
1989	33,506,299			45,915	6,873		33,559,087
1990	38,886,408					249,325	39,135,733
1991						51,287,672	51,287,672
1992						51,984,138	51,984,138
1993						45,945,372	45,945,372
1994						36,764,750	36,764,750
1995						36,966,523	36,966,523
1996						40,001,240	40,001,240
1997						43,534,029	43,534,029
1998						43,659,071	43,659,071
1999						46,678,276	46,678,276
2000	51,843,683	64,696		141,892		38,672	52,088,943
2001	41,562,681	30,836		194,102		28,807	41,816,426
2002	49,784,502	31,960		243,583		46,705	50,106,750
2003	47,795,371	18,945		231,030		41,612	48,086,958
2004	44,231,241	7,432		128,158		30,978	44,397,809

Source: NOAA Fisheries Web Site. January, 2006

## ***Fish Otter Trawl***

### **Description of Gear and Fishing Method**

Fish Otter Trawls are constructed and utilized in the same manner as Shrimp Otter Trawls. Webbing sizes may differ between fish and shrimp trawls.

### **Landings and Effort**

#### Landings

The major component of landings reported with Fish Otter Trawls in the 1960's and 1970's were finfish used for bait and processed for animal food. Sheepshead, Black Drum and King Whiting were important components of the catch (Table CF3).

Sheepshead (65.4%) and Black Drum (25%) accounted for over 90% of landings reported from Fish Otter Trawls in recent years (Table CF14). Shrimp made up significant bycatch (6.4%) reported with this gear. Over 60% of the Sheepshead landed in recent years was caught with otter trawls (Table CF19); some years more Sheepshead are caught in Fish Otter Trawls; other years more is caught in Shrimp Otter Trawls (Figure CF11). Almost 27% of Black Drum was landed with otter trawls (Table CF18); usually more are caught in Shrimp Otter Trawls than in Fish Otter Trawls (Figure (CF10)).

The Pontchartrain and Mississippi River SubBasins accounted for 74% of reported landings with this gear from 1999-2004. The rest of landings were primarily from the Barataria and Terrebonne coastal and offshore waters (Table CF15).

#### Effort

Annual effort reported with this gear varied widely from the over 1300 trips reported in year 1999 to the 200+ trips reported in year 2002. Average annual effort for 2000-2004 was 541 trips, although the large effort in year 1999 distorts the average value (Figure CF5).

Mean monthly effort ranged from 12 trips in April to 70 trips in March (Figure CF6, Table CF16). Major effort occurred from December-March (48% of total annual effort), with a major drop in effort from April-May, rising to 10.6% of total effort in August. This pattern reflects a change in targeted species, with the same gear which was categorized as a shrimp trawl in the open shrimp season, being designated as a Fish Otter Trawl and used to harvest finfish during the closed shrimp season.

Effort tracked landings, with over 82% of effort occurring in the Pontchartrain and Mississippi River SubBasins (Table CF17).

### **License and Permit Requirements**

Fish otter trawls are licensed as shrimp Otter Trawls; there are no special license or permit requirements for the use of fish otter trawls. A gear license is required for each individual net used. The fisherman must have a commercial fisherman's license. The vessel must be licensed. A valid commercial gear license may be transferred for temporary use to a person holding a valid commercial fisherman's license and having the same residency status as indicated on the license being transferred.

### **Laws Affecting Effort and Fishing Operations**

Fish trawls may be used anywhere shrimp otter trawls are used; additionally they may be used to take finfish in outside waters during the closed shrimp season.

Table CF3. Species Distribution in Fish Otter Trawls, 1950-1989		
Species	%	% without Finfish, Unc. and Shrimp
Finfishes, Unc Bait and Animal	68.1%	--
Shrimp, Marine, Other	23.7%	--
Brown Shrimp	6.7%	--
Sheepshead	0.5%	33.5%
Shrimp, Seabob	0.3%	17.8%
Black Drum	0.2%	15.0%
King Whiting	0.2%	13.5%
Flatfish	0.1%	6.0%
Red Snapper	0.1%	4.3%
Finfishes, Unc General	0.1%	4.0%
Sea Catfishes	0.0%	2.0%
Sand Seatrout	0.0%	1.9%
21 Other species%	0.0%	1.9%
Total	100.0%	100.0%
Source: NOAA Fisheries Web Site. January, 2006		

**Table CF5. Annual Landings with Trot Lines  
and Fish Otter Trawls**

Year	Trot Lines	Fish Otter Trawls
1950	12,738,600	
1951	7,653,700	
1952	6,402,000	
1953	7,243,000	
1954	6,525,100	
1955	10,007,200	
1956	7,423,200	
1957	6,862,100	
1958	7,449,600	
1959	7,470,200	
1960	7,615,600	
1961	8,681,600	
1962	6,857,100	47,568,000
1963	5,965,500	89,065,200
1964	3,408,700	8,166,000
1965	4,675,000	13,165,000
1966	3,508,300	224,500
1967	2,283,000	26,105,100
1968	2,908,200	31,262,400
1969	3,218,300	29,895,900
1970	2,572,900	26,068,800
1971	1,734,000	21,137,600
1972	2,916,500	19,662,200
1973	2,629,600	18,744,400
1974	832,900	32,984,700
1975	1,089,200	19,875,300
1976	129,900	12,381,000
1977	201,700	7,007,400
1978	37,803	
1984	13,762	
1986		111,552
1988		66,761
1989		

Table CF14. Species Distribution In Fish Otter Trawl, 1999-2004	
Species	%
Sheepshead	65.4%
Black Drum	25.0%
Brown Shrimp	3.3%
White Shrimp	3.1%
36 Species	3.2%
Total	100.0%
Source: LDWF Trip Ticket Data	

Figure CF5. Annual Fish Otter Trawl Effort, 1999-2004

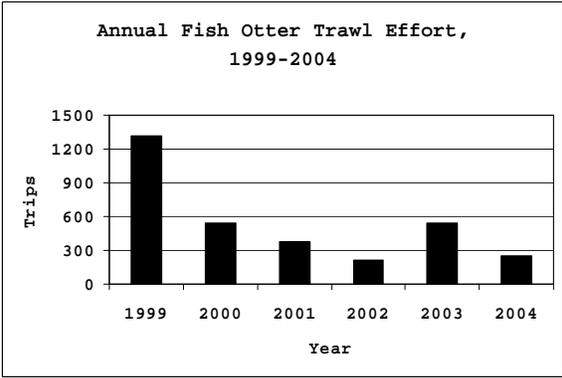


Figure CF6. Mean Monthly Fish Otter Trawl effort, 1999-2004

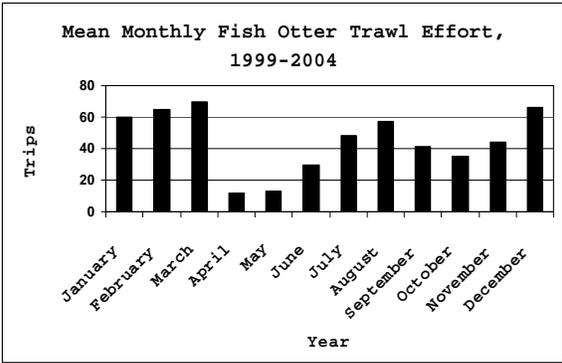


Table CF15. SubBasin Distribution Of Fish Otter Trawl Landings, 1999-2004	
SubBasin	%
Pontchar_I	29.9%
Pontchar_S	22.0%
Mississi_S	20.5%
Baratari_S	6.4%
Terrebon_S	5.8%
Offshore14	3.9%
Offshore13	3.3%
Baratari_I	2.4%
Mississi_I	1.6%
20 SubBasins	4.2%
Total	100.0%
Source: LDWF Trip Ticket Data	

Table CF16. Monthly Distribution Of Fish Otter Trawl Effort, 1999-2004	
Month	%
January	11.0%
February	11.9%
March	12.9%
April	2.2%
May	2.4%
June	5.5%
July	8.9%
August	10.6%
September	7.6%
October	6.5%
November	8.2%
December	12.2%
Source: LDWF Trip Ticket Data	

Table CF17. SubBasin Distribution Of Fish Otter Trawl Effort, 1999-2004	
SubBasin	%
Pontchar_I	38.0%
Pontchar_S	29.1%
Mississi_S	15.0%
Terrebon_S	5.8%
Baratari_S	4.0%
Offshore14	1.6%
Offshore13	1.2%
21 SubBasins	5.3%
Total	100.0%
Source: LDWF Trip Ticket Data	

Table CF18. Distribution of Black Drum Landings by Gear, 1999-2004	
Gear	%
Trot Lines	58.4%
Otter Trawl, Shrimp	19.8%
Hand Lines	7.4%
Otter Trawl, Fish	7.0%
Skimmer Nets	4.2%
Rod & Reel	1.1%
14 Other Gears	2.1%
	100.0%
Source: LDWF Trip Ticket Data	

Table CF19. Distribution of Sheepshead Landings by Gear, 1999-2004	
Otter Trawl, Shrimp	32.9%
Otter Trawl, Fish	27.7%
Hand Lines	26.4%
Skimmer Nets	7.7%
Trot Lines	3.3%
16 Other Gears	2.1%
Total	100.0%
Source: LDWF Trip Ticket Data	

Table CF20. Distribution of Mullet Landings by Gear, 1999-2004	
Gillnets, Strike	97.5%
Skimmer Nets	1.1%
16 Other Gears	1.4%
Total	7.7%
Source: LDWF Trip Ticket Data	

Table CF21. Distribution of Florida Pompano Landings by Gear, 1999-2004	
Gillnets, Strike	58.7%
Hand Lines	15.5%
Trammel Nets	6.4%
Manual Reel	5.4%
Rod & Reel	4.5%
Gillnets, Stake	4.4%
Electric / Hydraulic Reel	3.6%
11 Other Gears	1.5%
Total	100.0%
Source: LDWF Trip Ticket Data	

Figure CF10. Black Drum Landings in Otter Trawls, 1999-2004

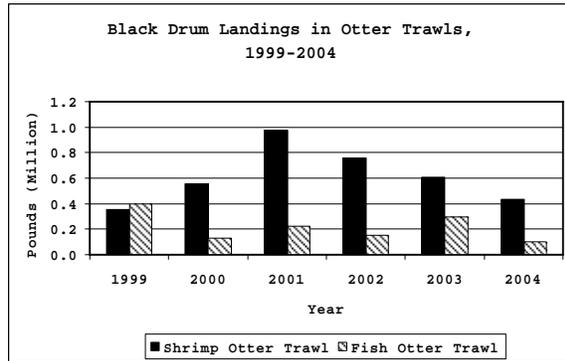
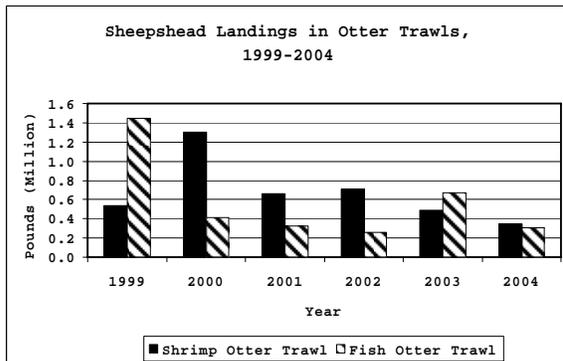


Figure CF11. Sheepshead Landings in Otter Trawls, 1999-2004



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# Section 1 - Louisiana's Coastal Recreational Fisheries

## *Chapter 3-1 Introduction*

Recreational fishing is an important component of Louisiana's economy. Total economic impacts generated from marine recreational fishing expenditures in Louisiana in 1999 were estimated to be about \$738,000,000, with \$708,000,000 of that amount being produced by residents (Steinback et al, 2004). About 77.5% of economic impacts are generated by fishing from private boats, 17.5% from shore fishing and 5% from charter boat fishing (Gentner et al, 2001). The total economic effect of saltwater fishing in 2003 was almost \$800,000,000, with about \$700,000,000 of that being produced by Louisiana residents, and the remainder by non-residents (Southwick Associates, 2005).

## *Chapter 3-2 Data and Methods*

A major source of information on Louisiana's recreational fisheries is the Marine Recreational Fishery Statistics Survey (MRFSS) which has been conducted by the National Marine Fisheries Service since 1979. This survey provides information on participation and effort of fishermen and numbers and size distribution of each fish species caught in the fishery.

A complete description of MRFSS procedures is presented in the MRFSS Data User's Manual (NOAA Fisheries Web Site: <http://www.st.nmfs.gov/st1/recreational/overview/overview.html#preface>). MRFSS includes of two independent surveys: a telephone survey of households and an intercept survey of anglers at fishing access sites. Data from the two independent surveys are combined to produce estimates of:

- participation (the number of participants in recreational fishing activities);
- effort (the number of fishing trips taken by individual anglers);
- catch (the number and weight of finfish caught, and either landed or released alive).

The telephone survey is used to collect data on number of trips made in the previous two months, locations fished, and dates on which those trips were made. This survey is aimed at households located in parishes extending within 25 miles of the coastline, including major bays or estuaries. Sampling effort during May through October is expanded to include households in parishes within 50 miles of the coast.

Estimates of **Participation** in saltwater angling are derived from the intercept data and the estimated total fishing effort by coastal parish residents. Estimates of participation are made annually on a state

basis. Estimates of participation are also produced in bimonthly and annual forms, however bimonthly estimates are not additive in producing annual estimates. Only annual estimates of participation are used in this report.

The intercept survey gathers information on the actual catch such as species identity, number, and weights and lengths of fish caught. The resulting information is stratified by fishing mode, fishing area, and bimonthly period. The intercept survey gathers information on type of gear used (e.g., dip net, cast net gill net, seine, trawl, trap, spear, hand); however recreational fishermen using gear other than rod & reel are encountered so infrequently in the survey that insufficient data is available breakdown results by gear. The intercept survey also records Parish and water area fished (e.g., sound, river, bay, specific estuary), however that information was not analyzed in this report.

The intercept survey consists of on-site interviews which gather catch and demographic data from marine recreational anglers in three fishing

**Modes:**

- charter boat
- private/rental boat
- shore based (e.g., man-made structures, i.e. piers, docks, jetties, bridges; beaches; and banks).

Catch and effort information is divided into three **Fishing Areas:**

- inland coastal waters;
- state territorial seas, or inshore ocean waters less than or equal to three miles from shore;
- offshore ocean waters greater than three miles from shore.

The survey distinguishes between several catch types:

- fish brought ashore in whole form which are available for inspection by the interviewer (Type A Catch)
- fish not brought ashore in whole form (Type B Catch)
  - o bait, filleted, or discarded dead (Type B1 Catch)
  - o released alive (Type B2 Catch)

Total harvest is defined as Type A plus B1 catches; Total Catch is defined as Type A plus B1 plus B2 catches. This report uses Total Catch.

Estimates of catch and effort are produced in bi-monthly **Waves** which are additive to produce annual estimates; The Waves are identified in this report as:

WAVE NUMBER	MONTHS
1	January-February
2	March-April
3	May-June
4	July-August
5	September-October
6	November-December

The database used in this report combined some like types of fish into groups, e.g., "Other Flounders" or "Other Snappers". For this report these groups of fish are included in the designation of **Species**.

## **Chapter 3-3 Results and Discussion**

### **Gear**

Louisiana requires a Saltwater Angler's License in order to fish in the Saltwater areas of the state. This license allows the fisherman to use the following gear:

- Rod and reel
- Bow and arrow
- A barbed or barbless spear
- Scuba Gear
- Hook & line (trot line)
- Cast net with a radius not to exceed 8 ft. 6 in.
- Frog gig/catcher

Use of other types of recreational gear in the saltwater areas is allowed with purchase of the appropriate recreational gear license:

- Crab Traps (limit 10 traps, fished singly or on trot line)
- Slat Traps (limit 5 traps)
- Trawls (up to 16 feet)
- Trawls (over 16 feet, up to 25 feet)
- Oyster Tong
- Crawfish Traps (limit 35 traps)
- Pipes/Drums (limit 5)
- Cans/Buckets (limit 5)

The number of gear licenses sold for the three major saltwater gears is shown in Table RF2. In the last 6 years, about 5,000 Trawl Licenses, 4,800 Crab Trap Licenses, and 70 Oyster Tong Licenses were sold per year. These numbers are a relatively small percentage of the estimated number of resident saltwater participants: 0.73%, 0.04%, and 0.01%, for trawls, crab trap, and oyster tongs, respectively.

It is therefore understandable that recreational gear other than hook and line is encountered infrequently in MRFSS surveys. This is apparent in Table RF1 which shows that 99.2% of MRFSS intercepts are with fishermen using Hook and Line. Only 0.4% was using a trawl; even fewer using other gear.

Therefore the information presented in this Section essentially pertains only to hook and line; there were too few intercepts with other gear to justify separate analysis.

### **Participation**

In addition to the annual Saltwater Angler's License, a number of other types of recreational license are sold which allow the fishermen to fish in the saltwater areas of the state. These include, but are not

limited to Senior Fish/Hunt Licenses (for fishermen older than 60 years old), Disabled Fishing Licenses (for disabled fishermen), Special Active Military Licenses, and Lifetime Fishing Licenses. As a result participation in saltwater fishing based on all license sales is greater than the number of saltwater angling licenses sold each year (Table RF2). Additionally, fishermen younger than 16 years of age and residents who have reached 60 years of age prior to June 1, 2000 and have lived in the state for two years prior to application are not required to obtain licenses. For these reasons participation figures based on license sales are less than those based on the MRFSS survey, which includes all fishermen regardless of age or license status.

MRFSS estimates of participation in Louisiana's recreational fisheries increased from about 500,000 in the early 80's to about 900,000 in the early 2000's (Figure RF1). Trend analysis indicates that this increase is statistically significant (Figure RF2) with an annual increase of about 14,700 participants. This increase has occurred in all three classes of participants identified by MRFSS: Coastal (Figure RF3), Noncoastal (Figure RF4), and Nonresident (Figure RF5). Over the period, the three classes increased an average of about 6,700, 2,400, and 5,600 per year, respectively.

In both Coastal and Non-coastal participation there was a rapid increase to a peak in the mid 80's, and then a slight reduction in participation to the relatively steady 90's, followed by a strong increase in the early 2000's. Participation of Non-residents also increased strongly in the early 2000's.

Milon (2000) has projected that the number of marine recreational fishing participants in Louisiana will increase from 530,000 in the year 2000 to 566,000 in the year 2025, at a rate of about 1,440 per year (Figure RF6).

MRFSS gathers information on all recreational gear used, however data collected on gear other than Rod & Reel is so sparse that no conclusions could be drawn on those gear. The analyses presented essentially refer only to the use of Rod & Reel.

## **Effort**

### ***Annual Effort***

Recreational fishing effort has increased from an annual average of about 2 million in the early 80's to an annual average of about 4 million in the early 2000's. Trend analysis indicated that the increase in annual effort is statistically significant (Figure RF7) with an average increase of about 79,000 trips per year over the period.

### ***Effort by Fishing Area***

MRFSS partitions fishing effort into three Fishing Areas: Inland, Territorial Sea, and Offshore. Inland Area is waters are those which

primarily lie north of Louisiana's coastline; Territorial Sea Area is waters are those which extend from the coastline out three miles into Gulf of Mexico waters; Offshore Area is waters extending from three miles out to 200 miles from Louisiana's coastline. The Offshore Area corresponds to the federal Fishery Conservation Management Zone. Over the 1981-2004 periods, about 75% of fish trips were made in the Inland Area, about 19% of trips were made in the Territorial Sea Area, and the remaining 6% in the Offshore Area.

In the early 2000's, the majority of fishing effort occurred in Inland Area (Figure RF8). This area is the only fishing area in which fishing effort increased during the 1981-2004 period (Figure RF11). During this period, effort in Inland Area increased steadily from about 1.2 million trips per year in the early 1980's to about 3.5 million trips per year in the early 2000's.

Fishing effort decreased in both the Territorial Sea Area and the Offshore Area from 1981-2004 (Figures RF9, RF10). In the Territorial Sea Area, fishing effort averaged about 300,000 trips per year in the early 2000's, down from about 700,000 trips per year in the early 1980's. In the Offshore Area, fishing effort decreased from an average of about 275,000 trips per year in the early 1980's to about 100,000 trips per year in the early 2000's.

### ***Effort by Mode***

MRFSS records recreational fishing data in three different Modes: Private, Charter, and Shore. Private Mode includes fishing which takes place from a private or rental boat, Charter Mode fishing occurs from a charter boat; Shore Mode fishing takes place from a man-made structure or watercourse bank. Over the 1981-2004 period, about 74% of total trips were in the Private Mode, 24% were in the Shore Mode, and 2% were in the Charter Mode (Figure RF12). All three Modes show a strong increase in effort from 1981-2004. The rate increase was highest in the Private Mode, with Shore Mode and Charter Mode showing smaller, but still significant increases (Figures RF13, RF14, RF15, and RF16).

Effort in the Private Mode increased from an average of about 1.7 million trips per year in the early 1980's to an average of about 2.9 million trips per year in the early 2000's, an average increase of about 57,000 trips per year over the period.

Effort in the Shore Mode increased from an average of about 400,000 trips per year in the early 1980's to an average of about 900,000 trips per year in the early 2000's, an average increase of about 20,000 trips per year over the period.

Effort in the Charter Mode increased from an average of about 66,000 trips per year in the early 1980's to an average of about 110,000 trips per year in the early 2000's, an average increase of about 2,400 trips per year over the period.

### ***Effort by Wave***

Over the 1981-2004 period effort increased significantly in Waves 1-4 (January-August) (Figures RF17, RF18, RF19, and RF20). Increase in effort in Wave 5 (September-October) was strong but not statistically significant at the 5% level (Figure RF21). Effort in Wave 6 (November-December) did not increase during the period (Figure RF-22).

## **Catch**

### ***Annual Catch***

Sixty (60) species or species groups have been reported from Louisiana in the MRFSS Survey (Table RF3). Total Catch of all species has averaged about 31.4 million fish per year. Trend analysis indicates that this number has remained stable over the 1981-2004 period (Figure RF23). However, catch trends for each species have varied (Table RF4, independent variable=year; dependent variable=number of fish in millions). Annual catch for some have increased over the years (Gray Snapper, Kingfishes, Red Drum, Spotted Seatrout, Sheepshead, etc.). Annual catch for others have decreased (Atlantic Croaker, Bluefish, Red Snapper, Saltwater Catfishes, etc.). Some show a stable annual catch pattern over the period (Black Sea Bass, Crevalle Jack, Florida Pompano, Red Porgy, etc.).

### ***Catch by Fishing Area***

Table RF5 lists the 1981-2004 Total Catch broken down by Fishing Area for each species. The Inland Area accounted for almost 66% of the Total Catch by number (Figure RF24); 27% were caught in the Territorial Sea Area, and 7% in the offshore Area.

There are 24 species in which more than 50% of the Total Catch occurred in Inland fishing area (Table RF6). For 9 species, 80% or more of the catch was Inland: Other Temperate Basses, Striped Bass, Freshwater Catfishes, Other Wrasses, Skates/Rays, Red Drum, Black Drum, Sheepshead, Eels.

For 7 species, 50% or more of the Total Catch was in the Territorial Sea Area, and for 22 species 50% or more of the catch was in the Offshore Area (Table RF6).

### ***Catch by Mode***

Almost 82% of the Total Catch (1981-2004) was taken in the Private Mode (Figure RF25). Shore Mode accounted for almost 5% of the catch; Charter Mode for over 3%.

There were 56 species (or species groups) in which more than 50% of the total 1981-2004 catch occurred in the PRIVATE Mode (Table RF7). Species in which more than 50% of the catch occurred in SHORE Mode are Kingfishes, Mulletts, Pinfishes and White Grunt. Species in which more than 50% of the catch reported was in CHARTER Mode are Other Cods/Hakes, Red Porgy, White Perch, and Yellowtail Snapper (Table RF7).

The distribution of Total Catch by Mode for individual species is given in Table RF8.

### ***Catch by Wave***

Total Catch by Wave is shown in Figure RF26. The Wave with largest catch was Wave 4 (July-August), followed closely by Wave 5 (September-October). The smallest catch occurred in Wave 1 (January-February). Catch distribution by Wave for all species is shown in Table RF9.

#### WAVE 1 (January-February)

There were no species for which at least 33% of Total Catch was taken in Wave 1. The Lane snapper is the species with the highest proportion of Total Catch in Wave 1 (27.6%). Species for which at least 10% of the catch occurs in wave 1 are Lane Snapper, Other Porgies, Gulf Flounder, Triggerfishes, Sheepshead, Little Tunny/Atlantic Bonito, Red Snapper, Black Drum, Florida Pompano, Bluefish, and Vermilion Snapper.

#### WAVE 2 (March-April)

There are no species for which the highest proportion of catch occurs in Wave 2 or for which at least 33% of Total Catch was taken in this Wave. The species with the highest proportion of catch in this Wave were Other Sea Basses (19.5%) and Mycteroperca Groupers (20.5%).

#### WAVE 3 (May-June)

For 11 species, the highest proportion of catch occurred in Wave 3: White Grunt; Silver Perch; Dogfish Sharks; Dolphins; Red Porgy; Summer Flounder; Spot; Kingfishes; Puffers; Mycteroperca Groupers, and Skates/Rays. For these species 30-100% of Total Catch occurs in this WAVE. For 10 species, at least 33% of Total Catch occurred in this Wave (Table RF10).

#### WAVE 4 (July-August)

For 30 species the highest proportion of catch occurred in Wave 4. For 25 species, at least 33% of the Total Catch occurred in this Wave. (Table RF10).

#### WAVE 5 (September-October)

Fifteen (15) species have major catches in Wave 5: Sand Seatrout, Southern Flounder, Pinfishes, Red Drum, Toadfishes, Herrings, Freshwater Catfishes, Other Sea Basses, Other Tunas/Mackerels, Other Temperate Basses, Black Drum, Striped Bass, Other Flounders, Other Porgies, and Black Sea Bass. For these species 26-96% of annual catch occurs in Wave 5. For 12 species, at least 33% of Total Catch occurred in this Wave (Table RF10).

#### WAVE 6

For only Eels and Sheepshead is Wave 6 the Wave of maximum catch; 24.5% and 36.5% respectively of annual catch of each species occurs in this Wave. Other species with a high proportion of catch in this Wave are: Striped Bass (35.5%), Black Drum (23.0%), Spotted Seatrout (22.8%), and Red Drum (22.7%).

### ***Major Species***

Figures detailing annual catch trend, distribution by Fishing Area, by Mode, and by Wave are shown for the 10 major species. These 10 species account for over 89% of all fish landed from 1981-2004.

Annual catch of Spotted Seatrout has increased over the 1981-2004 period (Figure RF27). Spotted Seatrout are primarily caught in the Private Mode (Figure RF28) and Inland Fishing Area (Figure RF29). Wave 4 has the most catch; however Waves 3, 5, and 6 also show strong catches (Figure RF30).

Annual catch of Saltwater Catfishes has decreased over the 1981-2004 period (Figure RF31). Saltwater Catfishes are primarily caught in the Private Mode (Figure RF32) and Inland Fishing Area (Figure RF33). Wave 4 has the most catch; however Waves 3 and 5 also show strong catches (Figure RF34).

Annual catch of Red Drum has increased over the 1981-2004 period (Figure RF35). Red Drum are primarily caught in the Private Mode (Figure RF36) and Inland Fishing Area (Figure RF37). Wave 5 has the most catch; however Waves 4 and 6 also show strong catches (Figure RF38).

Annual catch of Atlantic Croaker has decreased over the 1981-2004 period (Figure RF39). Atlantic Croaker are primarily caught in the Private Mode (Figure RF40) and Inland Fishing Area (Figure RF41), although over 1/3 are caught in the Territorial Sea. Wave 4 has the most catch; however Waves 3 and 5 also show strong catches (Figure RF42).

Annual catch of Sand Seatrout has decreased over the 1981-2004 period (Figure RF43). Sand Seatrout are primarily caught in the Private Mode (Figure RF44), with about 90% of the catch split between the Inland and Territorial Sea Fishing Areas (Figure RF45). Wave 5 has the most catch, with catch building up from Wave 3 to Wave 5 (Figure RF46).

Annual catch of Herrings has decreased over the 1981-2004 period (Figure RF47). Herrings are primarily caught in the Private Mode with a strong component in the Shore Mode (Figure RF48); almost 2/3 of the catch is from the Inland Fishing Area, with the remaining third from the Territorial Sea (Figure RF49). Wave 5 has over 50% of the catch (Figure RF50).

Annual catch of Black Drum has increased over the 1981-2004 period (Figure RF51). Black Drum are primarily caught in the Private Mode (Figure RF52) and Inland Fishing Area (Figure RF53). Wave 5 has the

most catch; however catch is well distributed among all Waves (Figure RF54).

Annual catch of Sheepshead has increased over the 1981-2004 period (Figure RF55). Sheepshead are primarily caught in the Private Mode (Figure RF56) and Inland Fishing Area (Figure RF57). Over 1/3 of the catch is in Wave 6, with the rest of the catch distributed fairly uniformly among the other Waves (Figure RF58).

Annual catch of Southern Flounder has decreased over the 1981-2004 period (Figure RF59). Southern Flounder are primarily caught in the Private Mode (Figure RF60); about 2/3 of the catch is in the Inland Fishing Area, and about 1/3 is in the Territorial Sea (Figure RF61). Wave 5 has about 1/3 of the catch; with Waves 3 and 4 also show strong catches (Figure RF62).

Annual catch of Red Snapper has decreased over the 1981-2004 period (Figure RF63). About 2/3 of Red Snapper are caught in the Private Mode and 1/3 are caught in the Charter Mode (Figure RF64); almost 92% are caught in the Offshore Fishing Area (Figure RF65). Although Wave 4 has the most catch, all Waves except Wave 6 show strong catches (Figure RF66).

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## **Section 2 - Gear-Sea Turtle Interactions**

### ***Chapter 4-1 Introduction***

Encounters between the public and marine sea turtles are rare enough to warrant the occasional newspaper article or web site picture. Less is known about the frequency and result of encounters between commercial fishermen and sea turtles. The LDWF has in the past surveyed sections of the coast and reported the results to NMFS Sea Turtle Stranding and Salvage Network. Most of the sea turtles encountered by the LDWF were dead on the beach, and the incident resulting in the death of the turtles could only be inferred.

### ***Chapter 4-2 Data and Methods***

To determine if there is a compilation of undocumented interactions between sea turtles and fishing activities in Louisiana, inquiries (Exhibit 1) were sent to 76 individuals who might have such information, including LDWF biologists, NMFS Port Agents, LSU extension agents, university personnel, heads of commercial fishing and recreational fishing organizations, and other interested persons (Exhibit 2). These individuals were asked to describe any interaction they have had with sea turtles and to provide contact information for any other individuals who may have information on sea turtles in Louisiana (Exhibit 3).

### ***Chapter 4-3 Results and Discussion***

There were 26 responses to the survey; three inquiries were returned because of bad address. Seventeen (17) replies had no information; seven (8) gave general statements which yielded no useful information. One respondent reported sighting a sea turtle in Lake Borgne during August, 2004, but apparently had no contact with it. The other respondents gave general information as to sea turtle encounters, but no information given was specific enough to allow determination of time, location, and consequence of the encounter.

Hurricanes Katrina and Rita severely impacted most of Louisiana's coast. This affected individuals who might be expected to provide information concerning interactions with sea turtles; the three surveys returned for bad address were Houma and LaRose zip codes, areas which were severely impacted by the hurricanes.

Although all those surveyed had close ties to coastal Louisiana and/or the coastal fisheries most do not keep detailed records on sea turtle/gear interactions and provided information based on their recollections.

Commercial fishermen have no incentive to report interactions with sea turtles as they expect adverse impacts from providing such information.

One fisherman at a 2006 GMFMC Reef Fish Amendment Scoping meeting did state that he had been fishing for 47 years and had caught only 15 turtles, all of which were released alive.

A recreational fisherman reported catching a sea turtle in Pointe au Chene during June, 2005; the turtle was released alive.

**Massachusetts Trawl Gear Characterization**  
Prepared by the Atlantic States Marine Fisheries Commission

## ***1.1 TRAWLS***

### *1.1.1.1 Gear Description*

The Massachusetts trawl fishery consists of otter and beam trawls, including mid-water trawls, and bottom pair trawls.

### **1.1.2 Otter and Beam Trawls**

#### *1.1.2.1 Gear Description*

For general descriptions and diagrams of otter and beam trawls see the gear appendix.

Massachusetts' regulations on gear parameters for trawlers are generally consistent with or more restrictive than federal plans (McKiernan 2006, pers. comm.). Trawl nets have a minimum mesh size of 6.5 inches (17 centimeters) throughout the cod-end and six inches (15 centimeters) throughout the remainder of the net. Nets cannot have disks, rollers, or rockhoppers greater than 12 inches (30 centimeters) in diameter (322 CMR 8.11).

Trawls operating under a north shore mobile gear endorsement have a maximum footrope length of 80 feet (23 meters) and no rollers may be used (MA DMF 2005d).

From September 1 through November 20 trawlers with a small-mesh endorsement for whiting may fish with a minimum mesh size of 2.5 inches (6.4 centimeters). With this endorsement, the headrope must be rigged with floats at least eight inches (20 centimeters) in diameter and must be attached along the entire length of the headrope with a maximum spacing of four feet (1.2 meters). The total length of the ground cables must not be greater than 40 fathoms (73 meters) from the doors to the wing ends. The footrope must be longer than the headrope, but not more than 20 feet (6.1 meters) longer, and rigged so that it does not contact the bottom while fishing. The raised footrope trawl may be used with or without a chain sweep (322 CMR 8.14).

From April 23 through June 9 trawlers are allowed to use small-mesh nets to fish for squid with a small-mesh permit (322 CMR 8.07). The net rollers for these trawls must be 12 inches (30 centimeters) in diameter (MA DMF 2005d).

#### *1.1.2.2 Gear Deployment*

For general information on how otter and beam trawls are deployed see the gear appendix.

#### *1.1.2.3 Targeted Species*

Trawls primarily target groundfish north of the Cape. South of the Cape, there is a fishery for summer flounder and squid (McKiernan 2006, pers. comm.). Trawl fishermen holding a small-mesh endorsement for whiting target whiting, and those holding a small-mesh permit for squid target squid (MA DMF 2005d).

#### *1.1.2.4 Number of Permitted and Active Fishermen*

Commercial fishermen are required to have either a boat or individual permit and a regulated fishery endorsement. The types of endorsements applicable to trawlers include inshore net, mobile gear coastal access, north shore mobile gear coastal access, small-mesh fishing for whiting, and small-mesh fishing for squid. Species-specific endorsements are sometimes required for summer flounder, scup, sea herring, sea bass, and dogfish, if applicable (MA DMF 2005d). For descriptions of the permits and number of permits and endorsements issued in 2004, see Appendix 2, Tables 2-1 and 2-3. Except for summer flounder, none of these endorsements requires a catch report, and no other catch and effort data was available.

In 2004, 417 permit applicants indicated that otter/beam trawls would be the primary gear, while 25 indicated that mid-water trawls would be the primary gear (Appendix 2, Table 2-2). Many of those permit applicants that indicated that otter/beam trawls would be the primary gear fish in federal waters. In 2004, 359 vessels were authorized to fish in state waters with mobile gear (Coastal Access Permits). There is a 72-foot (23-meter) length limit for vessels with a Coastal Access Permit; no vessel longer than 72 feet (23 meters) can fish in state waters (McKiernan 2006, pers. comm.).

#### *1.1.2.5 Effort*

Areas closed to mobile gear include Inshore Net Areas (estuaries and harbors including Buzzards and Mt Hope Bays), Fish Weir Buffer Zone within the area marked by anchor buoys, North Shore state waters (Broad Sound to New Hampshire except for Areas 5 and 6 where Regulated fishery endorsement is required), and other areas based on time of year. For specific details on areas closed to mobile gear, see 322 CMR 3.04, 4.02, 4.04, 8.09, and 8.12. Areas closed to lobster harvest include the Fish Weir Buffer Zone within the area marked by anchor buoys, Greater New Bedford Harbor north of a line from Ricketson's Point (Dartmouth) to Wilbur Point (Fairhaven). The eastern portion of the Uppder Cape Cod Bay Whiting Area is closed from October 1 to November 20. For specific descriptions of areas closed to lobster harvest, see 322 CMR 6.29. Trawling at night is prohibited (322 CMR 8.03). Except for summer flounder, none of the endorsements applicable to trawling requires a catch report, and no other catch and effort data was available. The depth and time of day fished is not available.

#### *1.1.2.6 Status of the Fishery*

Except for summer flounder, none of the other endorsements applicable to trawling requires a catch report, and no other catch and effort data was available. Five-year trends for catch and effort in the otter and beam trawl fisheries are not available.

#### *1.1.2.7 Sea Turtle Bycatch*

As part of a 2001 stock assessment of loggerhead and leatherback sea turtles, Braun-McNeill and Witzell summarized observed and estimated incidental take levels for permitted and non-permitted activities impacting sea turtles. They received personal communication from the Wellfleet Bay Wildlife Sanctuary that during bottom trawling in state waters, there was one observed take of an immature loggerhead sea turtle (NMFS SEFSC 2001).

There is no state-run observer program for sea turtle bycatch in the otter and beam trawl fishery. The Division of Marine Fisheries conducts fisheries dependent investigations, including an

industry-based survey for Gulf of Maine cod. From April 1 through September 30, a DMF employee spent seven days at sea on commercially active fishing vessels using standardized net, door, meshsize, and pre-picked tow locations. This represents less than one percent coverage of the beam and otter trawl fishery. Two sea turtle interactions have been observed through this program. In November 1993 an inshore trawler targeting winter flounder in four to six fathoms (seven to eleven meters) in Cape Cod Bay caught a Kemp's ridley. In July of 1999 an inshore trawler targeting summer flounder in four to six fathoms (seven to eleven meters) caught a small loggerhead. Both turtles were released alive (McKiernan 2006, pers. comm.).

#### *1.1.2.8 Laws and Regulations*

Nets cannot have disks, rollers, or rockhoppers greater than 12 inches (30 centimeters) in diameter (322 CMR 8.11). Trawls operating under a north shore mobile gear endorsement have a maximum footrope length of 80 feet (23 meters) and no rollers may be used (MA DMF 2005d). For areas closed to mobile gear, see 322 CMR 3.04. Spawning areas are closed to commercial finfish fishing from February 1 to May 31. For descriptions of these areas, see 322 CMR 8.09. For groundfish closure areas, see 322 CMR 8.12.

### **1.1.3 Bottom Pair Trawls**

#### *1.1.3.1 Gear Description*

For a general description of bottom pair trawls see the gear appendix, and for more information on trawling in Massachusetts see section 4.1.2.1.

#### *1.1.3.2 Targeted Species*

Trawl fishermen holding a small-mesh endorsement for whiting target whiting, and those holding a small-mesh permit for squid target squid. Fishermen may not catch striped bass, shad, smelt, tuna, and billfish with bottom pair trawlers (MA DMF 2005d).

#### *1.1.3.3 Number of Permitted and Active Fishermen*

Commercial fishermen are required to have either a boat or individual permit and a regulated fishery endorsement. The types of endorsements applicable to trawlers include inshore net, coastal access, north shore mobile gear coastal access, small-mesh fishing for whiting, and small-mesh fishing for squid. Species-specific endorsements are sometimes required for summer flounder, scup, sea herring, sea bass, and dogfish, if applicable (MA DMF 2005d). For descriptions of the permits and number of permits and endorsements issued in 2004, see Appendix 2, Tables 2-1 and 2-3. Except for summer flounder, none of these endorsements requires a catch report, and no other catch and effort data was available.

In 2004, four permit applicants indicated that pair trawls would be the primary gear (Appendix 2, Table 2-2).

#### *1.1.3.4 Effort*

Areas closed to mobile gear include Inshore Net Areas (estuaries and harbors including Buzzards and Mt Hope Bays), Fish Weir Buffer Zone within the area marked by anchor buoys, North Shore state waters (Broad Sound to New Hampshire except for Areas 5 and 6 where Regulated fishery endorsement is required), and other areas based on time of year. For specific details on

areas closed to mobile gear, see 322 CMR 3.04, 4.02, 4.04, 8.09, and 8.12. Trawling at night is prohibited (322 CMR 8.03). None of the endorsements applicable to trawling requires a catch report, and no other catch and effort data was available. The depth and time of day fished is not available.

#### *1.1.3.5 Status of the Fishery*

None of the endorsements applicable to bottom pair trawling requires a catch report, and no other catch and effort data was available. Five-year trends for catch and effort in the bottom pair trawl fishery is not available.

#### *1.1.3.6 Sea Turtle Bycatch*

There is no state-run observer program for the bottom pair trawl fishery, and no other bycatch reports were available.

#### *1.1.3.7 Laws and Regulations*

Nets cannot have disks, rollers, or rockhoppers greater than 12 inches (30 centimeters) in diameter (322 CMR 8.11). Areas closed to mobile gear include Inshore Net Areas (estuaries and harbors including Buzzards and Mt Hope Bays), Fish Weir Buffer Zone within the area marked by anchor buoys, North Shore state waters (Broad Sound to New Hampshire except for Areas 5 and 6 where Regulated fishery endorsement is required), and other areas based on time of year. For specific details on areas closed to mobile gear, see 322 CMR 3.04, 4.02, 4.04, 8.09, and 8.12. Spawning areas are closed to commercial finfish fishing from February 1 to May 31. For descriptions of these areas, see 322 CMR 8.09. For groundfish closure areas, see 322 CMR 8.12.

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## APPENDIX 1. MAP DEPICTING MASSACHUSETTS REPORTING AREAS

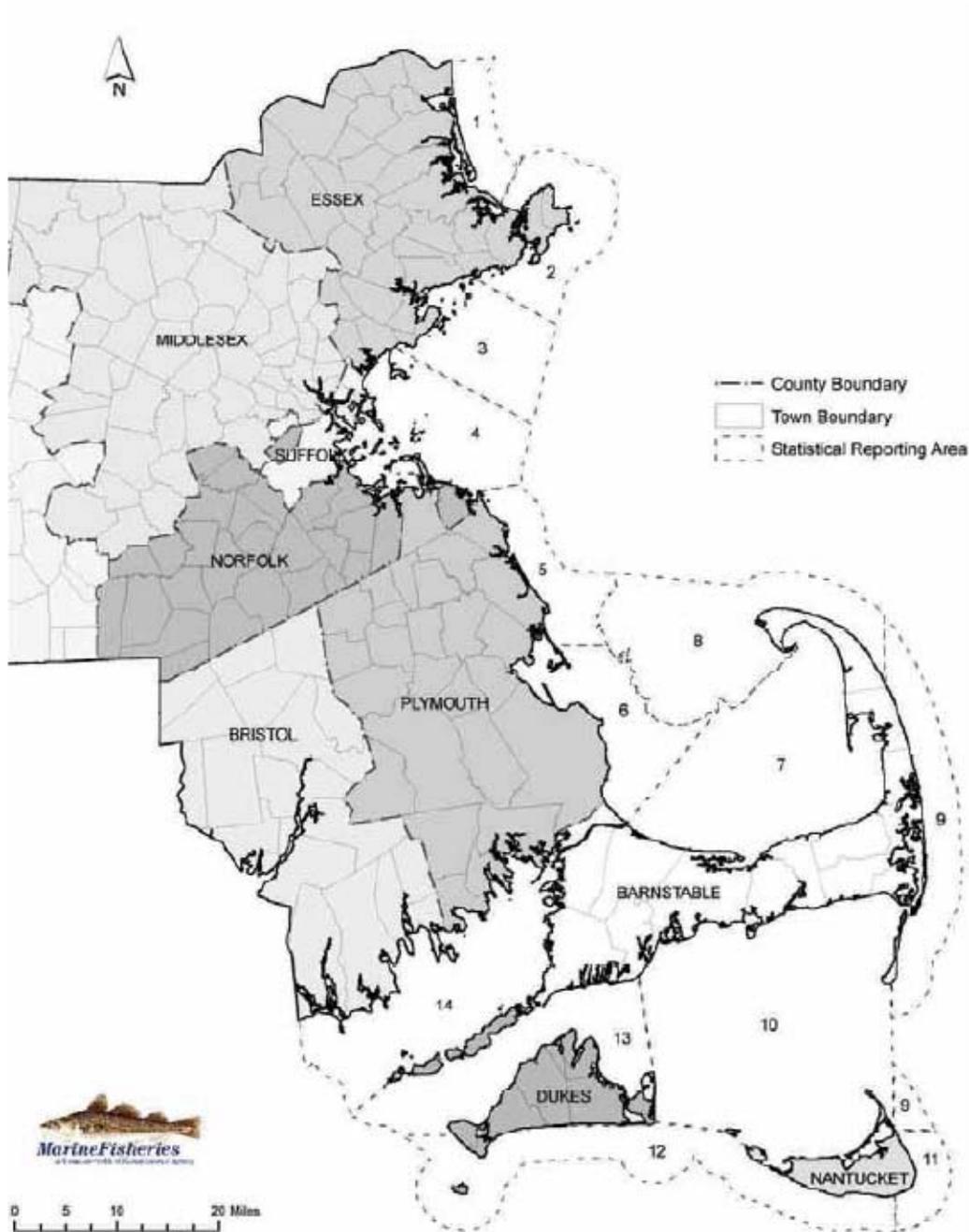


Figure 1-1. Map of coastal Massachusetts showing county boundaries and statistical reporting areas

For purposes of this report, areas one through eight make up areas in the north, and areas nine through 14 make up areas in the south. Map taken from Dean et al. 2005

## APPENDIX 2. PERMITS AND ENDORSEMENTS

All persons who land and sell finfish, shellfish, lobsters, edible crabs or other living marine resources in Massachusetts must have a commercial fisherman permit from the DMF, and must sell only to licensed Massachusetts dealers. Commercial permits may be endorsed for access to the many regulated fisheries. Regulated fisheries include most gear types (other than hook fishing), and species that are restricted by quota. All commercial permits except Rod & Reel and Seasonal Lobster may be endorsed for shellfish at no additional cost (MA DMF 2005b).

There are three Boat Permits, depending on the size of the vessel, and allow the taking, landing, and sale of fish (to a licensed dealer). They may be endorsed for shellfish, though no lobsters may be taken. The permits cover everyone aboard the vessel (MA DMF 2005b).

The Coastal Lobster permit allows the taking, landings, and sale of lobsters (to a licensed dealer) harvested within the coastal waters of Massachusetts. There is a maximum of 800 lobster pots per vessel that may be set in state waters. The permit may be endorsed to take and sell shellfish and finfish (MA DMF 2005b).

The Seasonal Lobster permit is issued to full-time students only and allows the licensee only to take and sell lobsters (to a licensed dealer) from June 15 through September 15. A maximum of 25 pots may be used. The sale of fish and/or shellfish is not permitted (MA DMF 2005b).

The Individual permit allows the holder only to take, land, and sell fish (to a licensed dealer) and may be endorsed for shellfish, though no lobster may be taken (MA DMF 2005b).

The Rod & Reel permit allows the holder only to catch and sell finfish (to a licensed dealer) caught by rod and reel only. No other gear types may be used (MA DMF 2005b).

The Shellfish permit allows an individual to take, land, and sell (to a licensed dealer) shellfish and seaworms. A shellfish ID card, from the DMF, and a town permit are also required (MA DMF 2005b).

Table 2-1. Number of permits issued and the number and percent with reported activity in 2004.

<b>Permit Type</b>	<b>Number Issued</b>	<b>Number Reported Fishing</b>	<b>% Active Permits</b>
Boat 0 to 59 Feet	2,830	1,158	41%
Boat 60 to 99 Feet	146	3	2%
Boat 99+ Feet	43	0	0%
Coastal Lobster	1,464	1,022	70%
Seasonal Lobster	100	37	37%
Endorsement Only	291	1	0%
Individual	581	194	33%
Rod & Reel	1,529	508	33%
Shellfish and Rod & Reel	590	207	35%
Shellfish and Seaworms	859	211	25%

Data from MA DMF 2005a

Fishermen indicate on their permit application the gear types that they primarily use.

Table 2-2. The number of permits issued by primary gear type in 2004.

<b>Primary Gear</b>	<b>Number of Permits</b>
Gill Net	108
Longline	98
Mid-water Trawl	25
Otter/Beam Trawl	417
Pair Trawl	4
Pots and Traps	1,655
Purse Seine	10
Rod and Reel	4,355
Shellfish Dredges	482

Data from MA DMF 2005a

Fishermen may opt to obtain none, one, or several endorsements to their permit, which enables them to participate in certain fisheries. Some of these fisheries/endorsements have reporting requirements and are the sources of the catch and effort data in this report.

Table 2-3. The number of endorsements issued in 2004.

<b>Endorsement Type</b>	<b>Number Issued</b>	<b>Catch Report Required?</b>
Inshore Net	274	No
Bluefin Tuna Seine	5	No
Bluefish Gill Net	1	Yes
Dogfish Gill Net	11	Yes
Gill Net	135	Yes
Coastal Access Permit (CAP)	44	No
CAP North Shore Mobile Gear	94	No
CAP Sea Herring	36	No
CAP Sea Scallop Dredge	13	No
CAP Squid	146	No
CAP Whiting	35	No
Quahog Dredge	64	Yes
Sea Urchin Dredge	179	No
Fish Pot - Conch	166	Yes
Fish Pot - Scup	171	Yes
Fish Pot - Sea Bass	66	Yes
Fish Weir	7	Yes
Fluke (Summer Flounder)	1,130	Yes
American Eel	86	Yes
Dogfish	549	No
Horseshoe Crab	230	Yes
Ocean Quahog	34	Yes
Scup	1,417	No
Sea Bass	1,329	No

Sea Herring	143	No
Shellfish Endorsement	3,557	Yes
Striped Bass	4,370	Yes
Surf Clam	41	Yes
Charter Boat	549	No
Guide Boat	15	No
Head Boat	51	No

Data from MA DMF 2005a

## **Maryland Trawl Gear Characterization**

Prepared by the Atlantic States Marine Fisheries Commission

### **1.1 TRAWLS**

#### *1.1.1.1 Gear Description*

Bottom otter trawls and occasional use of beam trawls make up the Maryland trawl fishery. For a general description of trawls and more information on how sea turtles may be affected by trawls see the gear appendix.

#### **1.1.2 Beam Trawls**

##### *1.1.2.1 Gear Description*

For a general description and diagram of a beam trawl see the gear appendix.

##### *1.1.2.2 Effort*

Beam trawls are only occasionally used in or outside the Maryland waters of the Atlantic Ocean (Casey 1999). Commercial trawling is prohibited in the Chesapeake Bay and within Maryland waters up to one mile from the coast. However, trawling is allowed in state waters beyond one mile (COMAR 08.02.05.03 D).

##### *1.1.2.3 Sea Turtle Bycatch*

There are no state-run observer programs in the beam trawl fishery and no other bycatch reports were available.

##### *1.1.2.4 Laws and Regulations*

Commercial trawling is prohibited in the Chesapeake Bay and within Maryland waters up to one mile from the coast. However, trawling is allowed in state waters beyond one mile (COMAR 08.02.05.03 D).

#### **1.1.3 Otter Trawls**

##### *1.1.3.1.1 Gear Description*

The Maryland otter trawl fishery consists only of bottom otter trawls. For a general description of otter trawls see the gear appendix.

##### *1.1.3.2 Bottom Otter Trawls*

###### *1.1.3.2.1 Gear Description*

For a general description and diagram of bottom otter trawls see the gear appendix. Depending on the targeted species, trawls have minimum mesh sizes ranging from 3-3/8 inches (nine centimeters) square or 3-3/4 inches (ten centimeters) diamond to six inches (15 centimeters) square or 5.5 inches (14 centimeters) diamond (COMAR08.02.05).

###### *1.1.3.2.2 Targeted Species*

In 2001, the landings were 34% horseshoe crab, 14% Atlantic croaker, 14% summer flounder, 8% skates, 7% weakfish, and 7% striped bass (ACCSP 2004).

#### 1.1.3.2.3 Number of Licensed and Active Fishermen

There were 17 active otter trawl fishermen in 2003, and 23 active fishermen in 2004 (MDNR 2005). For a description of licenses and the number of licenses issued, see Appendix 3.

#### 1.1.3.2.4 Effort

Commercial trawling is prohibited in the Chesapeake Bay and within Maryland waters up to one mile from the coast. However, trawling is allowed in state waters beyond one mile (COMAR 08.02.05.03 D). Though bottom otter trawls are not permitted in the Chesapeake Bay, fisheries personnel use this gear extensively in state waters to carry out resource assessment of both finfish and blue crabs (Casey 1999). Information on the depth fished, the time of day fished, and the amount of gear fished is not known. In 2002, the highest landings and effort were in July and August (Figure 1, Table 4-1) (MDNR 2004c).

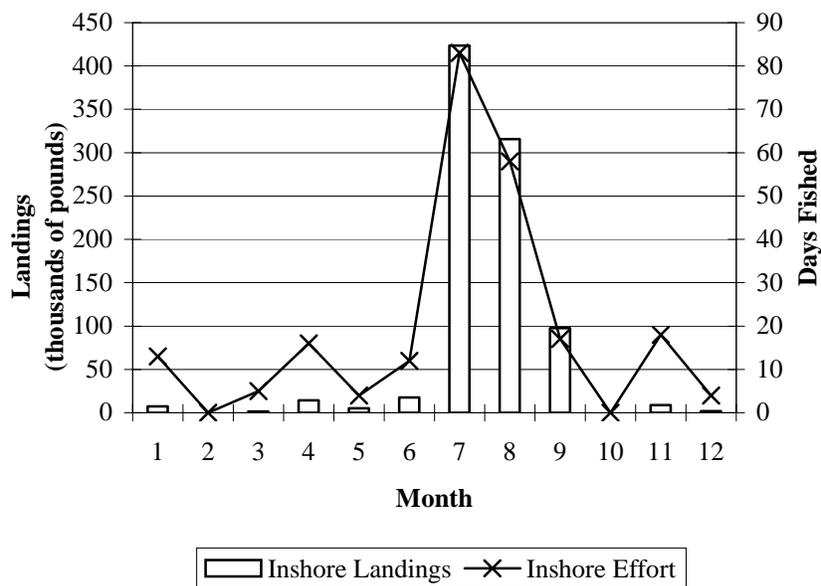


Figure 1. Landings and effort by otter trawl in 2002 by month.

#### 1.1.3.2.5 Status of the Fishery

Between 1998 and 2002, the highest landings by bottom otter trawl were in 2002 with 893,976 pounds (406 metric tons). The highest effort was in 1999 with 244 days fished, but effort was similar in 1998 and 2002 (Figure 2, Table 4-2).

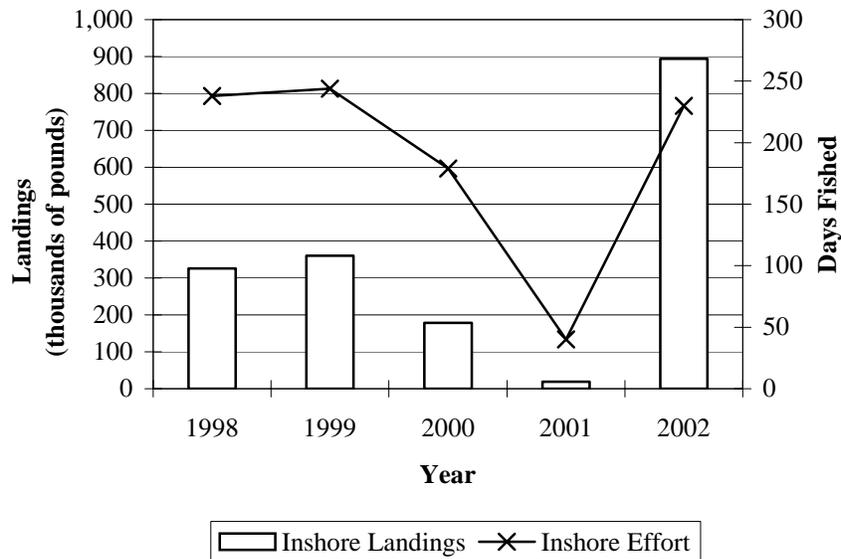


Figure 2. Landings and effort by otter trawl from 1998 to 2002.

#### 1.1.3.2.6 Sea Turtle Bycatch

There are no state-run observer programs for the bottom otter trawl fishery, and no other bycatch reports were available.

#### 1.1.3.2.7 Laws and Regulations

Depending on the targeted species, trawls have minimum mesh sizes ranging from 3-3/8 inches (nine centimeters) square or 3-3/4 inches (ten centimeters) diamond to six inches (15 centimeters) square or 5.5 inches (14 centimeters) diamond (COMAR08.02.05). Commercial trawling is prohibited in the Chesapeake Bay and within Maryland waters up to one mile from the coast. However, trawling is allowed in state waters beyond one mile (COMAR 08.02.05.03 D).

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Applicable Appendices:

### APPENDIX 3. COMMERCIAL FISHERIES LICENSING

The MDNR issues a variety of commercial license types depending on the type and number of gear that will be used. One of the most commonly issued licenses is a tidal fish license. The TFL is a consolidated license for harvesting finfish and shellfish, including blue crabs with trotlines and up to 300 crab pots. A TFL authorizes a licensee to guide fishing parties; catch fish for commercial purposes; and buy, sell, process, transport, export, or otherwise deal in fish that were caught in Maryland. A TFL allows a licensee to engage in each activity indicated on the license and for catching crabs, to utilize the number of crewmembers indicated on the license. The license year for every TFL is 12 months from September 1 through August 31 of the following year and a licensee and crewmembers may engage only in those activities for which the annual fees for that license year have been paid. The MDNR cannot issue more than one authorization to a person to engage in each activity specified in the license during a license year (Kimmel 2003).

Table 3-1. Commercial fisheries license types and number of licenses issued from 1998 to 2002.

<b>Commercial License Category</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004*</b>
Unlimited Tidal Fish	1,837	2,017	1,988	1,992	2,001	2,000	1,995
Finfish Harvester	355	326	311	306	298	293	276
Clam Harvester	62	33	26	18	16	15	16
Oyster Dredge Boat	3	3	2	3	2	2	2
Oyster Harvester	896	834	823	808	791	767	721
Conch, Turtles, and Lobster Harvester	19	12	12	12	14	11	12
Limited Crab Catcher	4,659	4,271	4,082	3,992	3,924	3,855	3,785
Crab Harvester (up to 300 pots)	242	261	246	244	245	242	241
Crab Harvester (up to 600 pots)	232	234	234	232	233	231	226
Crab Harvester (up to 900 pots)	416	419	411	411	412	410	410
Finfish (Hook and Line)	343	330	321	306	293	287	276
Fishing Guide Resident	550	519	495	484	468	459	458
Fishing Guide Non-resident	62	56	56	52	53	53	55
Master Guide	16	19	15	15	18	18	18

\*Data from 2004 is preliminary and not certified as complete.

## APPENDIX 4. DATA TABLES

Table 4-1. Landings and effort by otter trawl in 2002 by month.

<b>Month</b>	<b>Inshore Landings (Pounds)</b>	<b>Inshore Effort (Days Fished)</b>
<b>1</b>	7,495	13
<b>2</b>	0	0
<b>3</b>	1,523	5
<b>4</b>	14,416	16
<b>5</b>	5,223	4
<b>6</b>	17,708	12
<b>7</b>	423,494	83
<b>8</b>	315,517	58
<b>9</b>	97,771	17
<b>10</b>	0	0
<b>11</b>	8,921	18
<b>12</b>	1,909	4

Table 4-2. Landings and effort by otter trawl from 1998 to 2002.

<b>Year</b>	<b>Inshore Landings (Pounds)</b>	<b>Inshore Effort (Days Fished)</b>
<b>1998</b>	325,722	238
<b>1999</b>	360,449	244
<b>2000</b>	178,220	179
<b>2001</b>	18,537	40
<b>2002</b>	893,976	230

## **Maine Trawl Gear Characterization**

Prepared by the Atlantic States Marine Fisheries Commission

### ***1.1 TRAWLS***

It is unlawful to use otter trawls, beam trawls, pair trawls, or midwater trawls to fish for herring within the territorial waters of Maine (DMRR 36.01).

#### **1.1.1 Shrimp Otter Trawls**

##### *1.1.1.1 Gear Description*

Trawl nets targeting Northern shrimp have a minimum mesh size of 1.75 inches (4.4 centimeters), and the maximum length of the bottom legs of the bridle cannot be longer than 15 fathoms (27 meters). The trawls must have a finfish excluder device (commonly referred to as the Nordmore Grate System). Maine regulations define the Nordmore Grate System as a rigid or semi-rigid planar device consisting of parallel bars attached to a frame with spacing between bars of not more than one inch (2.5 centimeters). The parallel bars of the grate shall be oriented up and down and the grate itself shall be tilted at approximately a 45-degree angle from the vertical plane. The frame of the grate shall be secured to the extension piece of the trawl net in such a manner that prevents the passage of fish between the frame of the grate and the webbing of the extension into the cod end. The fish outlet is a triangular opening in the webbing of the extension of the trawl. This outlet may be located on the top or bottom of the extension, which allows the escape of fish too large to pass between the bars of the grate. The triangular base of the fish outlet is aligned with the apex of the opening forward and is attached to the portion of the tilted grate closest to the cod end so that no lip or protruding edge of webbing is present to impede the escape of finfish. The base of the triangular opening shall not be less than 19 inches (48 centimeters) long. The sides of the triangular outlet shall taper to a forward (toward the mouth of the trawl) apex and shall be cut “all bars” to achieve the triangular shaped opening. A webbing funnel located in the extension in front of the grate is optional (DMRR 45.10).

##### *1.1.1.2 Gear Deployment*

Fishermen deploy shrimp otter trawls off the stern of the boat. Shrimp otter trawls are bottom trawls. The footrope of the trawl is weighted down with rockhoppers while the top of the trawl is lifted by the addition of cans (Mercer 2005, pers. comm).

##### *1.1.1.3 Targeted Species*

Shrimp otter trawls target northern shrimp.

##### *1.1.1.4 Number of Licensed and Active Fishermen*

There were 415 fishermen licensed to take shrimp in 2004. In January 142 fishermen were active, in February 147 fishermen were active, and in March 96 fishermen were active. These fishermen fished both shrimp otter trawls and shrimp traps (Mercer 2005, pers. comm).

##### *1.1.1.5 Effort*

The 2004 shrimp season went from January 19 to March 12. Fishermen took 639 trips in January, 1,105 trips in February, and 433 trips in March. These trips include those taken with both shrimp otter trawls and shrimp traps. The MDMR does not determine which gear fishermen

used in taking these trips. However, they do conduct shrimp port sampling. In 2004 the average minimum depth fished of fishermen sampled was 43 fathoms (79 meters) and the average maximum depth fished was 48 fathoms (88 meters). The average total hours trawled of fishermen sampled was eight, and the average number of tows was four (Mercer 2005, pers. comm). The geographic area and time of day fished was not provided for this report.

#### *1.1.1.6 Status of the Fishery*

In the last five years the total amount of northern shrimp landed in Maine decreased from 2000 to 2002, then increased in 2003 and 2004 (Table 1) (DMR 2006).

Table 1. Total amount of northern shrimp landed in Maine from 2000 to 2004.

<b>Year</b>	<b>Tons Landed</b>
<b>2000</b>	2,087
<b>2001</b>	902
<b>2002</b>	384
<b>2003</b>	972
<b>2004</b>	1,084

#### *1.1.1.7 Sea Turtle Bycatch*

Based on anecdotal information, Maine Department of Marine Resources personnel indicate that there have been no reports of sea turtle bycatch in northern shrimp otter trawls.

#### *1.1.1.8 Laws and Regulations*

The season for taking Northern shrimp is a 70-day season running sometime between December 19 and March 25 (DMRR 45.05). Trawl nets targeting Northern shrimp have a minimum mesh size of 1.75 inches (4.4 centimeters), and the trawls must have a finfish excluder device (commonly referred to as the Nordmore Grate System). The maximum length of the bottom legs of the bridle cannot be longer than 15 fathoms (27 meters) (DMRR 45.10).

### **1.1.2 Groundfish Trawls**

#### *1.1.2.1 Gear Description*

The minimum mesh size for any otter or beam trawl is six inches (15 centimeters) diamond or 6.5 inches (17 centimeters) square mesh in the body and wings, and 6.5 inches (17 centimeters) diamond or square mesh in the cod end, except from January 1 to March 31 when targeting shrimp (DMRR 34.10). When targeting shrimp from January 1 to March 31 the minimum mesh size is 1.75 inches (4.4 centimeters) (DMRR 45.10). For a general description and diagram of a groundfish trawl see the gear appendix.

#### *1.1.2.2 Gear Deployment*

For a general description of how fishermen deploy groundfish trawls see the gear appendix.

#### *1.1.2.3 Number of Licensed and Active Fishermen*

Maine issues a commercial harvesters license to commercial fishermen, but does not license individuals or vessels by gear type. The number of licenses issued was not provided for this

report. Maine DMR personnel indicated that, for Maine-based vessels, groundfishing takes place almost entirely in federal waters. Only an extremely limited amount of groundfishing activity takes place within the state's waters.

#### *1.1.2.4 Targeted Species*

Groundfish species include Atlantic cod, haddock, yellowtail flounder, American plaice, witch flounder, winter flounder, Acadian redfish, white hake, pollock, windowpane flounder, ocean pout, and Atlantic halibut.

#### *1.1.2.5 Effort*

Groundfishing takes place almost entirely in federal waters. Only an extremely limited amount of groundfishing takes place in state waters and is not quantified, as fishermen in state waters are not required to report where their fishing activity took place (Mercer 2005, pers. comm). The State of Maine prohibits groundfishing in its territorial waters during April through June. From May 1 through June 30 fishermen may not fish for groundfish in the groundfish spawning closure in Boothbay and Sheepscot Bay, described in Department of Marine Resources Regulations 34.05. The depth, time of day, and geographical area fished was not provided for this report.

#### *1.1.2.6 Status of the Fishery*

Trends in effort and landings were not provided for this report, and no other information on trends in the Maine groundfish trawl fishery were available.

#### *1.1.2.7 Sea Turtle Bycatch*

There are no state-run observer programs in the groundfish fishery to evaluate sea turtle bycatch, and no other state-run observer program is conducted for the groundfish fishery in Maine. No other sea turtle bycatch information was available.

#### *1.1.2.8 Laws and Regulations*

Fishermen may not fish for whiting using any grate raised footrope trawl net. The minimum mesh size for any otter or beam trawl is six inches (15 centimeters) diamond or 6.5 inches (17 centimeters) square mesh in the body and wings, and 6.5 inches (17 centimeters) diamond or square mesh in the cod end, except from January 1 to March 31 when targeting shrimp (DMRR 34.10). When targeting shrimp from January 1 to March 31 the minimum mesh size is 1.75 inches (4.4 centimeters) (DMRR 45.10). The State of Maine prohibits groundfishing in its territorial waters during April through June. From May 1 through June 30 fishermen may not fish for groundfish in the groundfish spawning closure in Boothbay and Sheepscot Bay, described in Department of marine Resources Regulations 34.05.

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## Mississippi Trawl Gear Characterization

Prepared by Office of Marine Fisheries, Mississippi Department of Marine Resources, 1141 Bayview Avenue, Biloxi, MS 39530

### Shrimp Fishery Characterization

#### Gear Types

Shrimp are caught in Mississippi waters using the following gear types, all of which may have some potential for interaction with marine turtles.

##### Trawls

- a. Otter Trawl- bottom shrimp
- b. Skimmer Trawl

##### Trawls

- a. Otter Trawl – Bottom Shrimp

The basic otter trawl (Figure 3) is the most common type of trawl used in Mississippi waters to harvest shrimp. The otter trawl is constructed of twine webbing that when fully deployed makes a cone shape. Floats on the head-rope (top line) and chains on the foot rope (bottom line) of are used to open the mouth of the trawl vertically. To spread the mouth of the trawl open as large as possible, each side (wing) is attached to trawl doors

that have chains attached to the tow cable and then to the vessel.

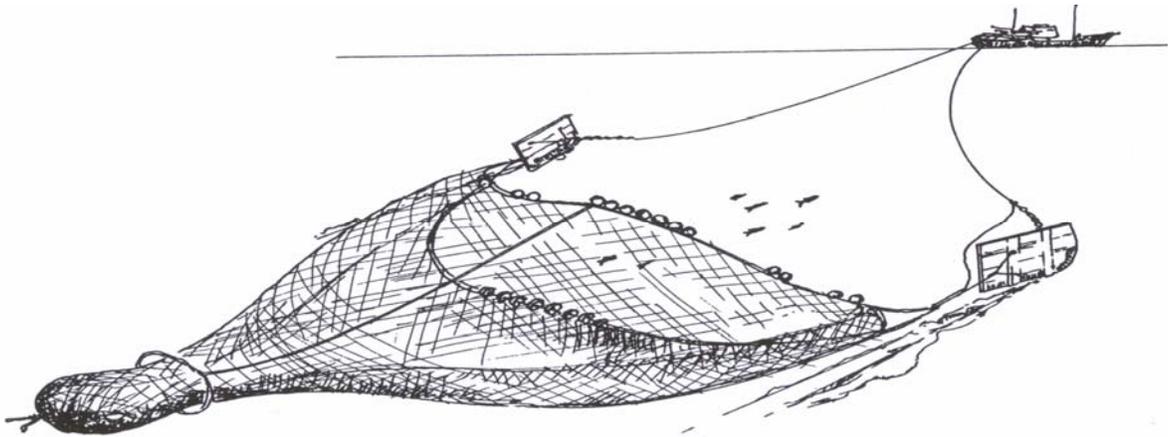


Figure 3 Otter Trawl

The otter trawl is deployed overboard followed by the tickler chain and set of doors. Water resistance forces the doors to spread and open the webbing. Tow lines are then released until the desired length (depth of water) is achieved. This process must then be reversed to retrieve the trawl.

Among the various types of fisheries and associated gear types that are commonly used in Mississippi waters, the trawl fishery is the most likely to interact with and have an impact on sea turtles. With the exception of the butterfish trawl fishery, trawls are almost exclusively employed for the catching of various species of shrimp.

Finfish bycatch in the otter trawl fishery primarily consists of whiting (*Menticirrhus sp.*), flounder (*Paralichthys sp.*) and a variety of ground fish which are harvested and sold as bycatch product of the shrimp industry (Figure 4). These vessels are required to have both a shrimp vessel license and a fishing boat license in order to sell the finfish they catch while trawling for shrimp.

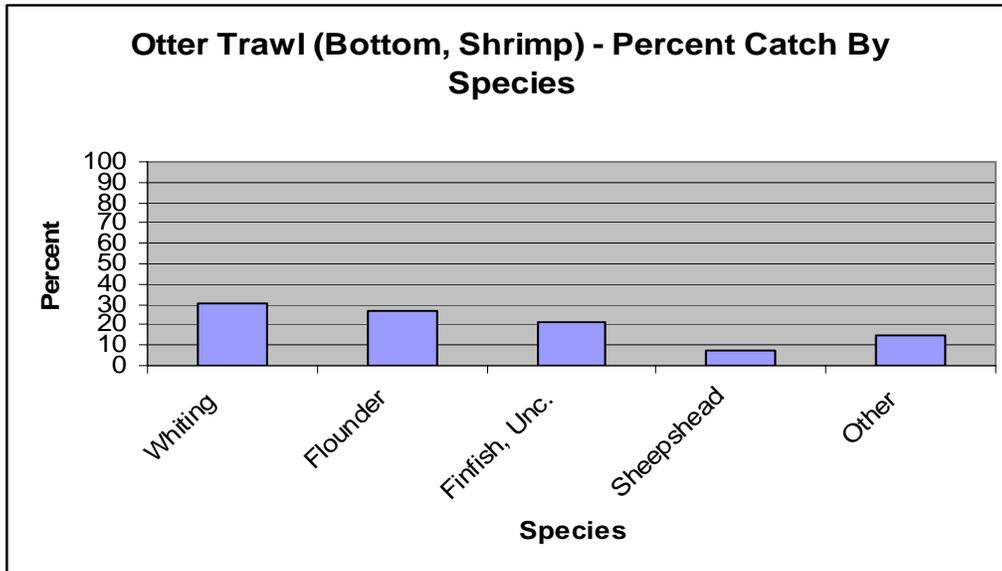


Figure 4 Otter Trawl Percent Catch by Species 1999-2003 (NMFS)

b. Skimmer Trawl – Bottom Shrimp

The use of the skimmer trawl (Figure 5) has gained in popularity over the last ten years as it is an effective gear type in the relatively shallow waters of the Mississippi Sound. A skimmer trawl extends from the outrigger of a vessel with a cable and a lead weight which hold the trawl mouth open instead of floats and chains. “Skimmers”, as they are called locally, are only used in shallow waters because of the way they are constructed.

The skimmer trawl is held in place by the frame on three sides and mounted on the vessel just behind the behind the bow. The skimmer trawls are pushed through the water instead of towed behind the vessel like otter trawls. The frame is rigid enough to keep the net on the bottom but flexible enough to glide over obstacles along the bottom. This allows the skimmer vessel to continue to move while the cod end of the trawls is retrieved and emptied. This may be done as often as every 30 minutes. The NMFS does not require skimmer a trawl to have a TED because the nets can be emptied frequently while continuing to fish this reduces the chance of drowning a captured sea turtle. Otter trawls are required

to use a TED because they are generally towed for several hours before the nets is emptied this increase the chance of drowning a captured sea turtle.

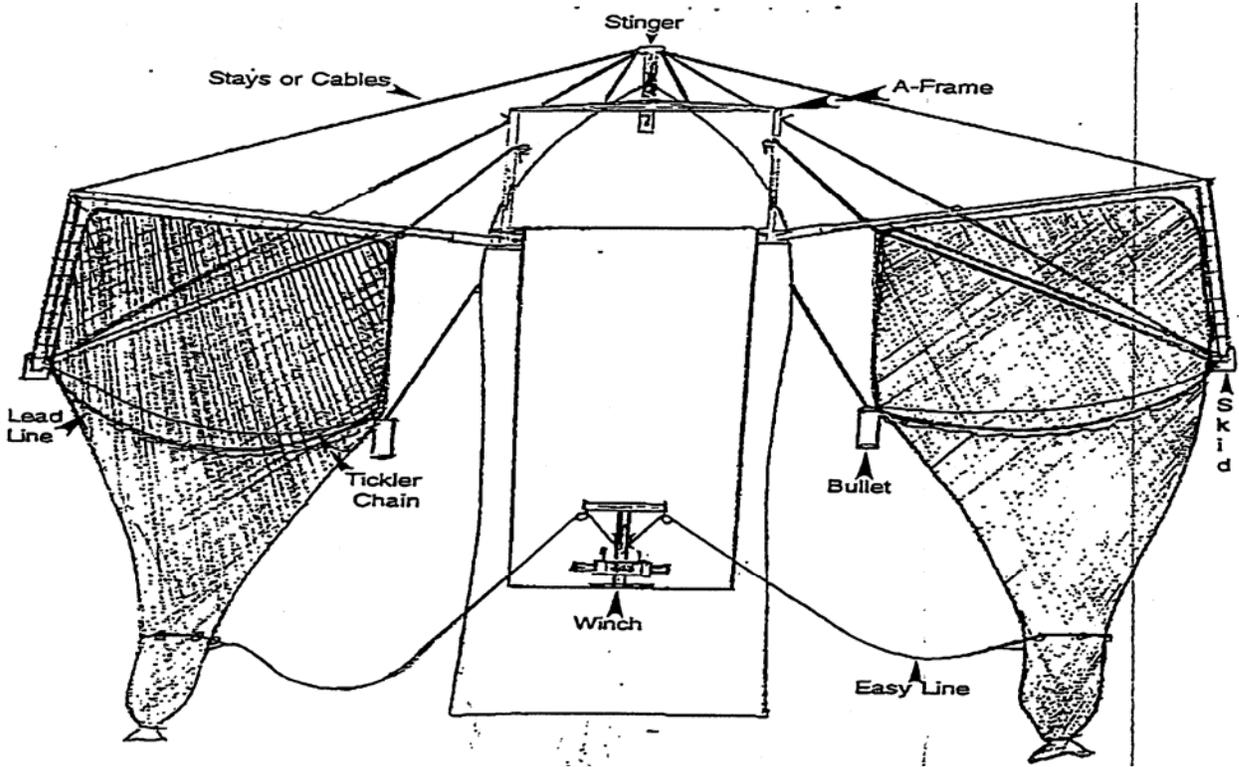


Figure 5 Skimmer Trawl

## Management

### Ordinance 2 - regulations for the shrimp fishery in Mississippi

#### Section 1.

**Footrope** shall mean lead line, foot line, ground rope or that lower part of the trawl that the webbing is first attached, that also provides for the weighing down of the trawl by means of lead weights, chain or other means.

**Headrope** shall mean cork line, headline, float line or that upper part of the trawl that the webbing is first attached, that also provides flotation by means of corks, floats or other means.

**Saltbox** shall mean any container or similar device in which the salinity is greater than one hundred (100) parts per thousand and is used to aid in separating the shrimp from the bycatch.

**Skimmer Trawl** shall mean a trawl that extends from the outrigger of a vessel with a cable and a lead weight holding the trawl mouth open.

#### Section 3.

Except for a test or try trawl, it shall be unlawful for any boat or vessel to use more than two (2) trawls provided that when two (2) trawls are used such trawls shall not exceed a length of twenty-five (25) feet on the headrope and thirty-two (32) feet on the footrope for each trawl and the trawl doors shall not exceed six (6) feet in length and thirty-four (34") inches in height when employed in the waters under the territorial jurisdiction of the State of Mississippi (Figure 7).

#### Section 4.

It shall be unlawful for any person, firm, or corporation to use any single trawl for the catching or taking of shrimp in the waters under the territorial jurisdiction of the State of Mississippi with a measurement of more than fifty (50) feet along the headrope or more than sixty (60) feet along the footrope, continuous

measurement. Mississippi does not have a mesh size requirement for otter trawls.

Section 5.

It shall be unlawful for any person, firm or corporation to use skimmer trawls, wing nets (butterfly nets), Siamese trawls or any like contrivance which is in excess of twenty-five (25) feet on the headrope and thirty-two (32) feet on the footrope for each trawl when employed in the waters under the territorial jurisdiction of the State of Mississippi. Mississippi does not have a mesh size requirement for skimmer trawls.

Section 8.

It shall be unlawful for any person, firm or corporation to use any test or try trawl for the catching or taking of shrimp in the waters under the territorial jurisdiction of the State of Mississippi with a measurement of more than twelve (12) feet along the headrope or more than fifteen (15) feet along the footrope, or used with boards or doors more than thirty (30) inches in length.

Section 10.

It shall be unlawful for any person, firm, or corporation to wash, drag, or pull a trawl or try net on top of the water or under the water with the bag tied or untied in any area of the territorial waters of the State of Mississippi which are closed to shrimping.

Further, it shall be unlawful for any person, firm, or corporation to wash, drag, or pull double or multiple rigs on top of the water or under the water with the bags tied or untied in any area of the territorial waters of the State of Mississippi which are closed to the use of double rigs, or in waters which are closed to the use of that size, type or number of rigs.

§ 49-15-96

Licensed shrimp vessels may keep in whole, for personal consumption only the following types of fish which are caught in the shrimp nets or trawls of the vessel: white trout; croaker, black drum, and ground mullet (Family Sciaenidae); sheepshead (Family Sparidae); gafftopsail catfish (Family Ariidae); and flounder (Family Bothidae and Family Pleuronectidae). The cumulative total of fish shall not exceed twenty-five (25) pounds. In addition, a vessel may keep three (3) dozen blue crabs (portunidae family). This exemption for personal consumption does not apply to fish or crabs that are otherwise illegal to possess or catch.

Mississippi's shrimp fishery has long played an integral role in the State's seafood industry (Figure 6). With a combination of influences including dockside gaming, an increase in the coastal population and associated increased demands for waterfront properties and fresh seafood, the shrimping industry has had to adjust to many regulatory changes in order to survive, but it remains today



as the most valuable of all the state's marine fisheries. All waters one-half mile due South of the shoreline are permanently closed to commercial and recreational shrimp trawl harvest (Figure 7).

From 1999-2003 annual shrimp harvest in Mississippi averaged approximately 16 million pounds (heads-on) with a dockside value of 31 million dollars

Figure 6 Workers Process Shrimp in a Local Plant

(Figure 8). Brown shrimp comprise roughly 70% of the total shrimp landings in the state.

The Mississippi shrimp industry employs many people in the coastal counties including harvesters, dealers, processors, shippers and related businesses. Some 1,602 commercial and recreational shrimp licenses (Figure 9) were sold during the 2003-2004 (May 1 – April 30) license year to harvesters and an

additional 100 licenses or so are sold annually to seafood dealers and/or processors.

Mississippi does not have shrimp effort data consequently there cannot be evaluations made of the otter trawl fishery compared to the skimmer trawl fishery. The commercial shrimp fishery ranks first in total dockside value and second in total landings among all seafood harvested in Mississippi (Figure 10).

There is no state sponsored sea turtle observer program for this fishery.

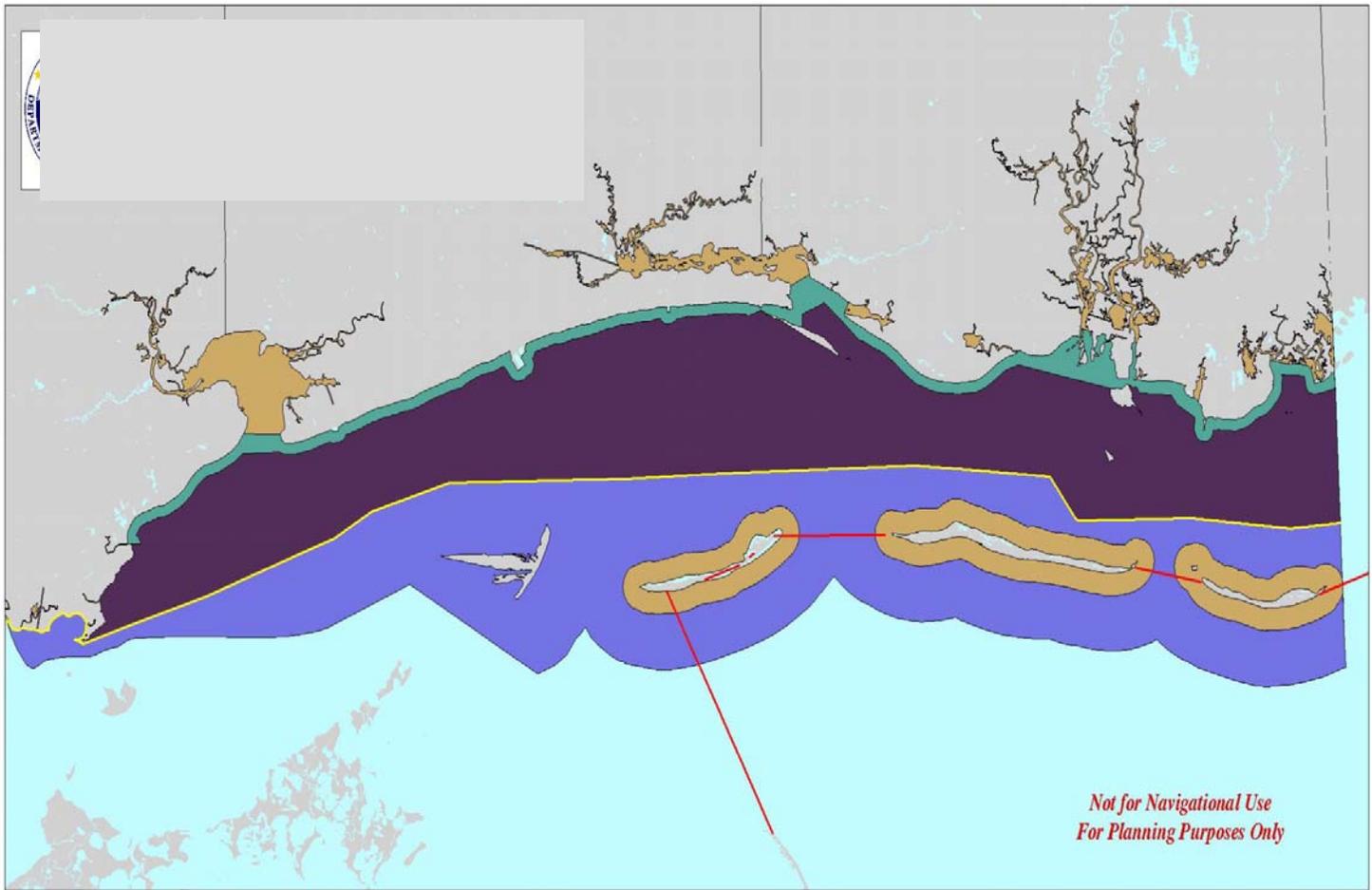


Figure 7 Mississippi Near shore and Territorial Sea Shrimping Grounds

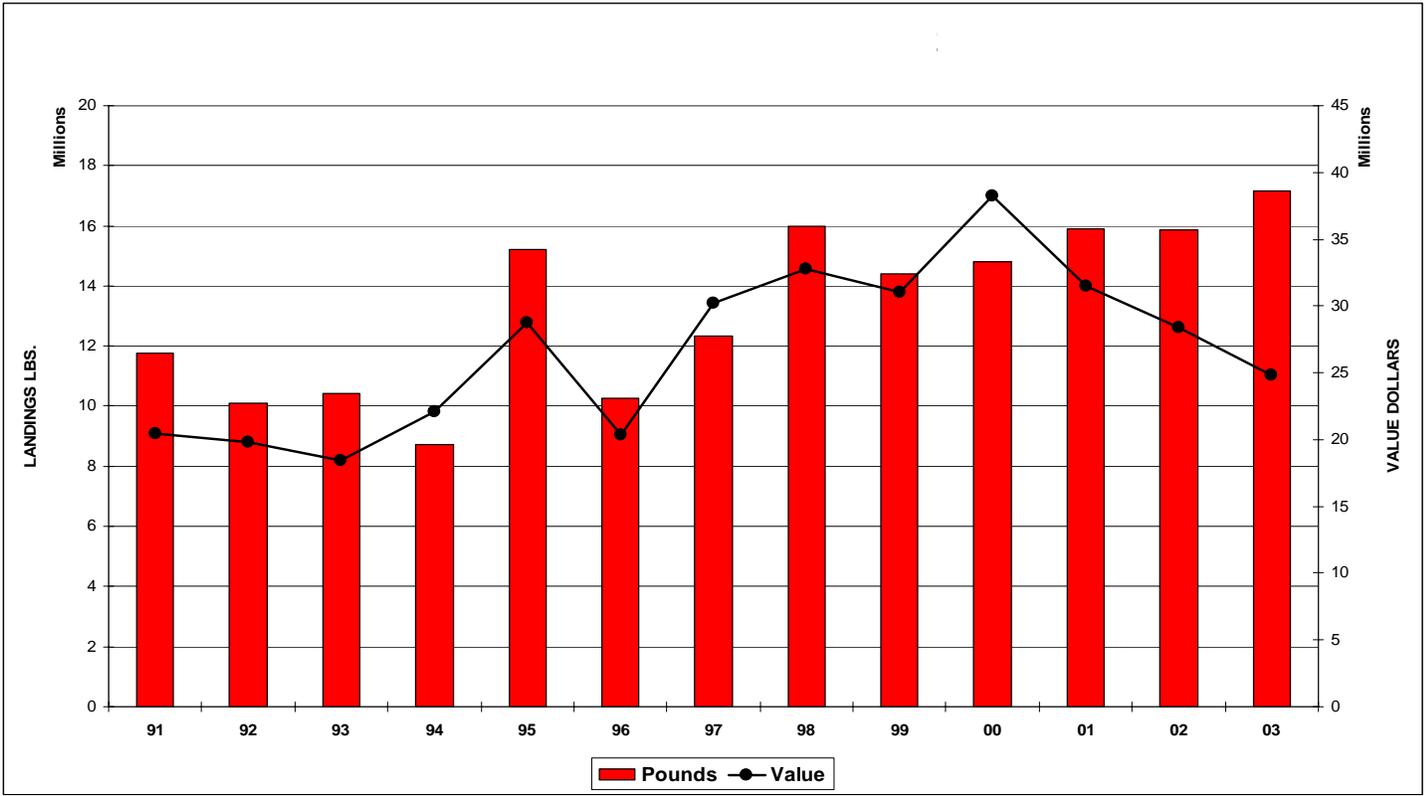


Figure 8 Mississippi Shrimp Landings and Value (NMFS)

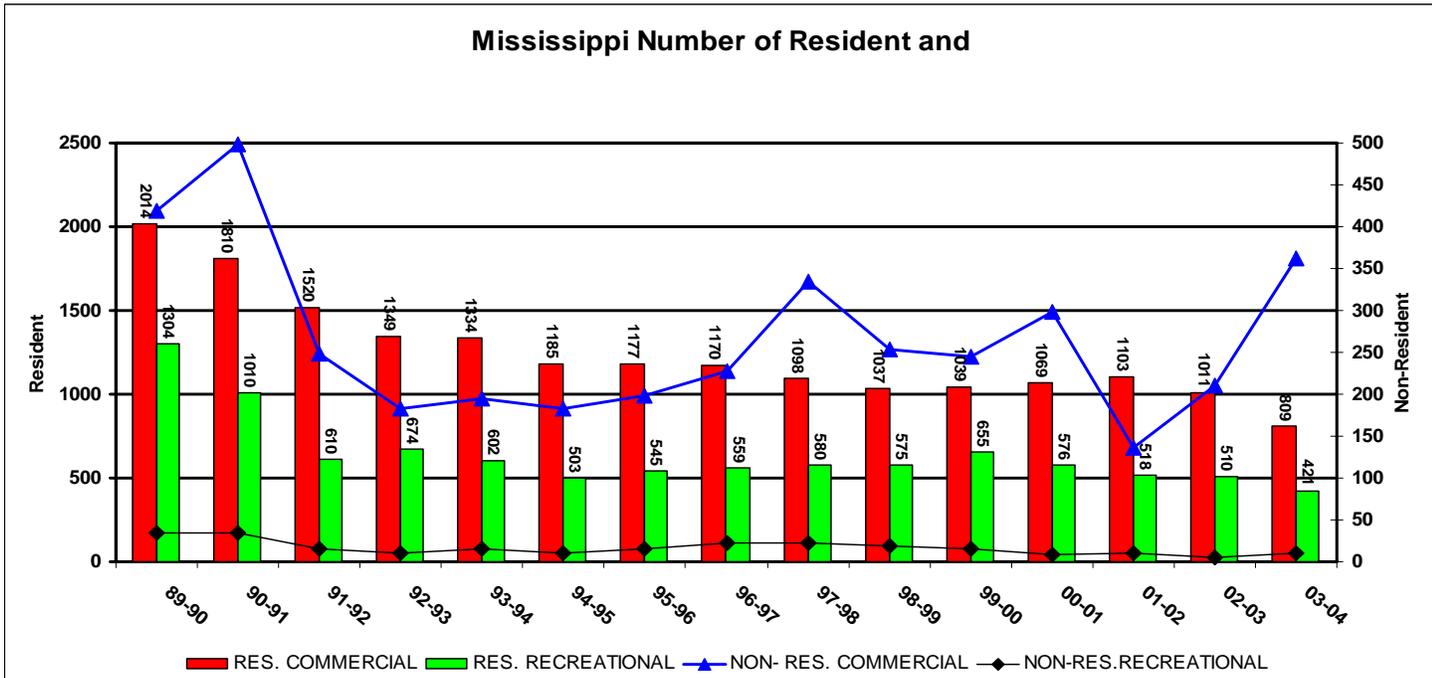


Figure 9 Mississippi Resident and Non-Resident Shrimp Licenses (MDMR)

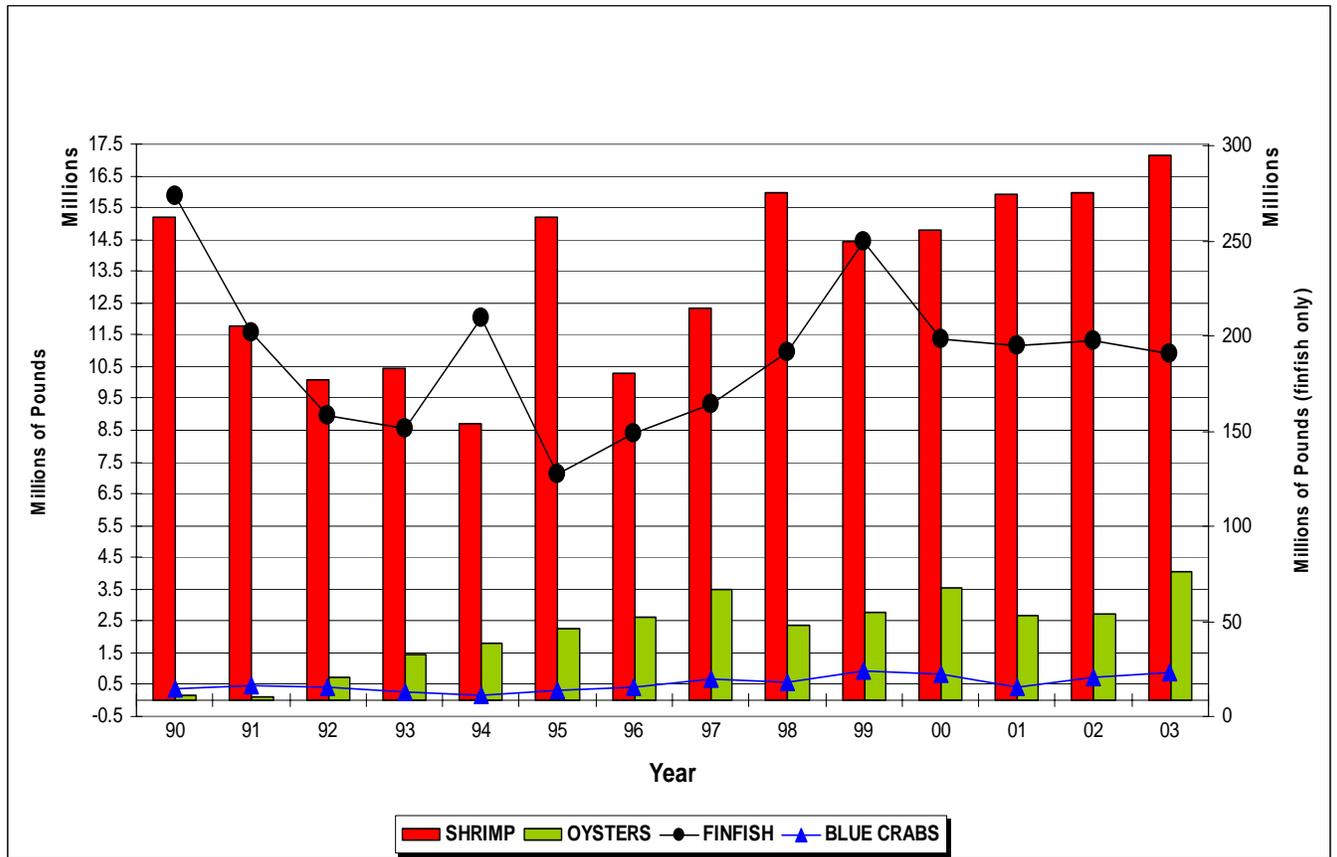


Figure 10 Mississippi Seafood Landings (NMFS)

### Turtle Excluder Devices

A Turtle Excluder Device (TED) is a piece of equipment sewn into a shrimp trawl to allow sea turtles to escape from the fishing gear (Figure 11). On June 27, 1987 TED's were required to be used by all shrimp trawlers fishing in the EEZ and later became mandatory in each states territorial shrimping waters on December 4, 1992. Additionally, in 1989 the "shrimp-turtle law" was passed requiring all countries exporting shrimp to the United States to use TED's. In 2003 NMFS increased the size of the TED opening's to allow for larger adult turtles to escape. Mississippi requires all trawlers using any mechanical method

of retrieval to use TEDs. Shrimp trawler means any vessel that is equipped with one or more trawl nets and is capable of, or used for, fishing for shrimp, or whose on-board or landed catch of shrimp is more than 1 percent, by weight, of all fish comprising its on-board catch or landed catch. Any vessel trawling for species other than shrimp are not required to use a TED in Mississippi waters.

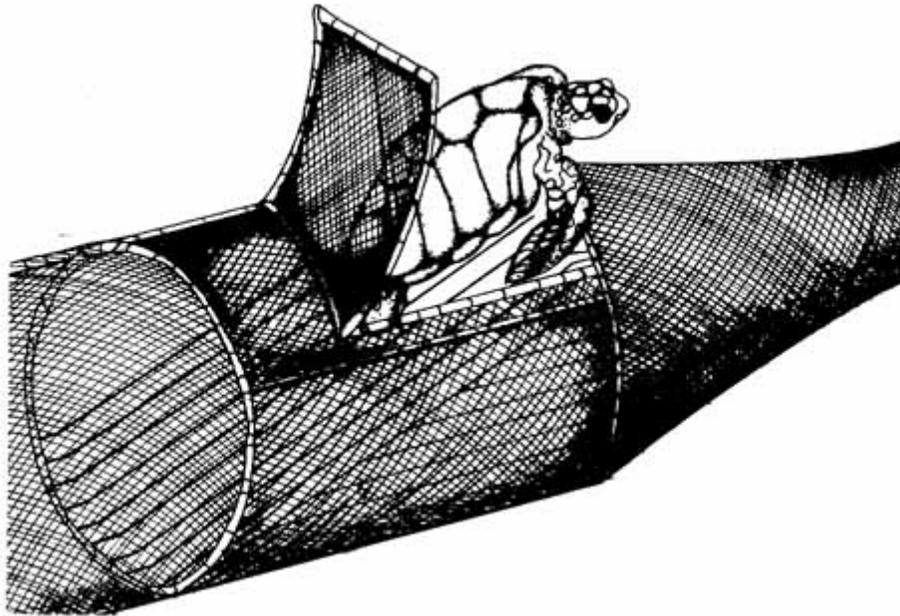


Figure 11 Turtle Excluder Device (TED) with Escaping Sea Turtle

Bycatch is generally defined to include all species of marine life which are captured in a shrimp trawl other than shrimp. Because of the significant numbers of species taken incidental to the shrimp fishery, the bycatch issue has become very controversial in recent years particularly with respect to threatened and endangered sea turtles and juvenile red snapper (*Lutjanus campechanus*). The incidental catch of these two species has prompted some major changes in the way that the traditional shrimp fishery has been conducted in the United States.

## Blue Crab Fishery Characterization

Blue crabs are also harvested in Mississippi waters using trawl gear, in addition to crab pots. The below discussion only includes information on the trawl portion of the fishery.



Figure 12 Blue Crabs

### Trawls

#### 1. Otter Trawl- bottom shrimp

The otter trawl is constructed of twine webbing so that when fully deployed makes a cone shape. Floats on the head-rope (top line) and chains on the foot rope (bottom line) of are used to vertically open the mouth of the trawl. There is a maximum length of 50 feet on the head-rope for vessels using a single trawl and a maximum head-rope length of 25 feet for vessels using two trawls. To spread the mouth of the trawl open as large as possible, each side (wing) is attached to a trawl doors that have chains attached to the tow cable and then to the vessel. The otter trawl is deployed overboard followed by the tickler chain and set of doors. Water resistance forces the doors to spread and open the trawl mouth.

Tow lines are released until the desired length (depth of water) is achieved. This process must then be reversed to retrieve the trawl. The otter trawl can be used to harvest blue crabs in addition to the target species of shrimp. Mississippi does not have a mesh size requirement for otter trawls. These trawls are required to use TED's.

## 2. Otter Trawl – bottom blue crabs

The blue crab trawl fishery is conducted only in the winter months around Cat Island, a barrier island located in the western Mississippi Sound. The fishers are targeting primarily female blue crabs that over-winter during the cold months in this area. The otter trawl is constructed of twine webbing so that when fully deployed makes a cone shape. Floats on the head-rope (top line) and chains on the foot rope (bottom line) of are used to open the mouth of the trawl vertically. There is a maximum length of 50 feet on the head-rope for vessels using a single trawl and a maximum head-rope length of 25 feet for vessels using two trawls. To spread the mouth of the trawl open as large as possible, each side (wing) is attached to a trawl door that has chains attached to the tow cable and then to the vessel. Otter trawls used for the blue crab trawl fishery are modified by using a heavier a tickler chain and heavier sets of doors than are used in the shrimp fishery. Water resistance forces the doors to spread and open the webbing. Tow lines are then released until the desired length (depth of water) is achieved. This process must then be reversed to retrieve the trawl. The TED requirement does not apply to these trawls because the catch is less than 1% shrimp.

## Management

The Blue Crab, *Callinectes sapidus*, is distributed throughout the shallower waters of the Gulf of Mexico; and in Mississippi waters throughout Mississippi Sound and adjacent bays and bayous.

The Mississippi Department of Marine Resources (MDMR) is charged with the responsibility of managing the blue crab fishery in its jurisdiction. Mississippi does not have an observer program for the blue crab fishery.

In the past, management decisions issued by the MDMR have focused on the protection of sponge crabs (gravid female blue crabs). The harvesting of sponge crabs from Mississippi waters was totally banned from 1963 to 1974. Between 1974 and 1981 selected areas were opened or closed to sponge crab harvest. In 1979 a sponge crab sanctuary area was designated in the eastern part of the Mississippi Sound. Currently, fishermen may not harvest sponge crabs in Mississippi waters or any crab smaller than five inches. Entry into the blue crab fishery is regulated by the MDMR through the issuance of commercial crabbing licenses. Before 1979 only those crabbers using pots had to purchase a crabbing license. Both trawlers and crab-pot fishermen must obtain a harvest license. Beginning in the 02-03 license year recreational crab trap fishers were required to purchase a license, prior to that recreational crab fishers were not required to have a license.

Mississippi crab license sales have increased only slightly in recent years as shown in (Figure 14)..

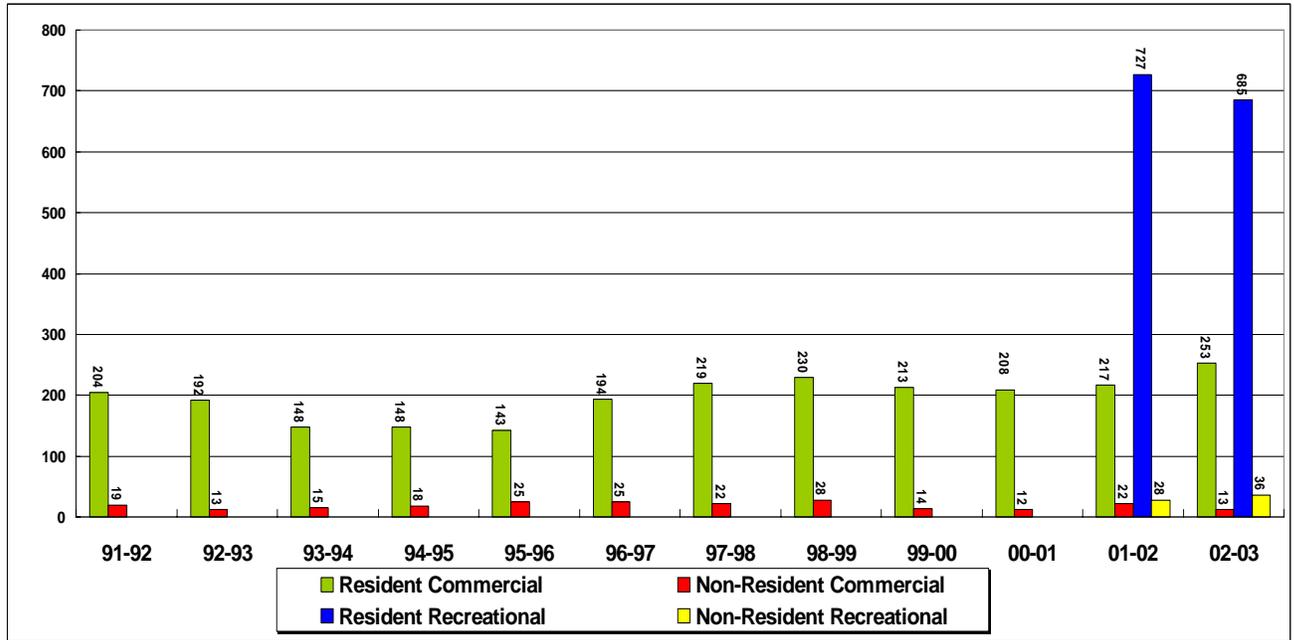


Figure 14 Mississippi Blue Crab License Sales

Mississippi does not have effort data for the blue crab fishery. Landings rebounded from a low of 433,000 pounds to almost 870,000 pounds in 2003 (Figure 15).

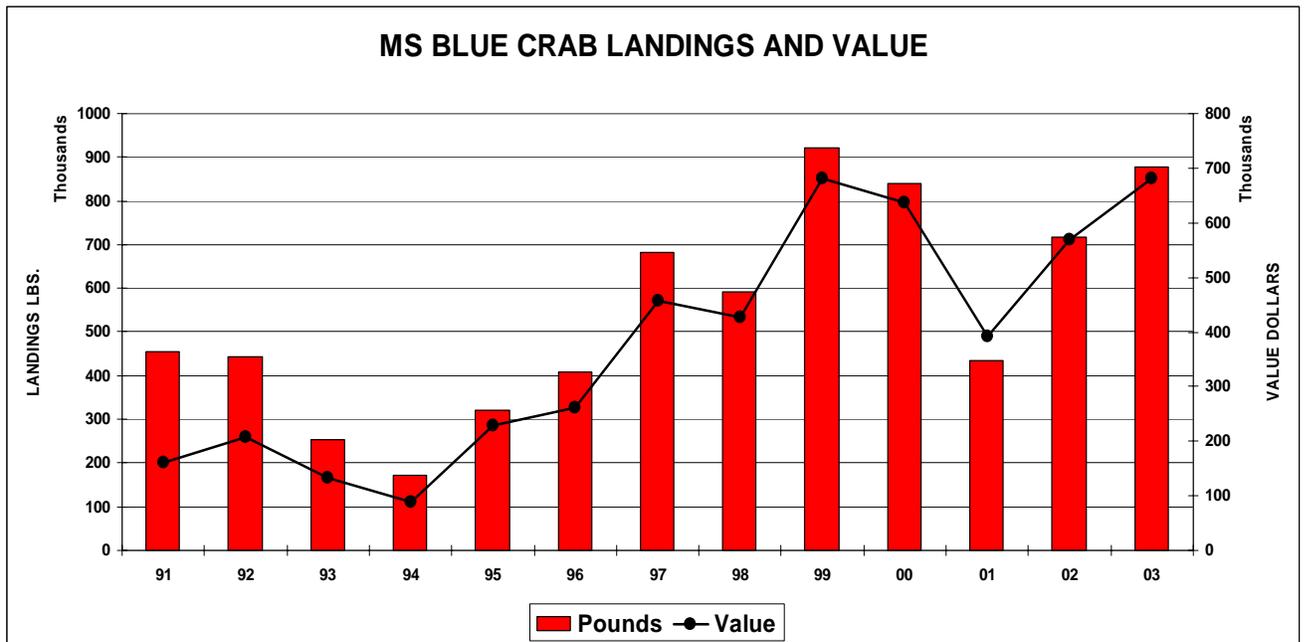


Figure 15 Mississippi Blue Crab Landings and Value (NMFS)

Crabs can be caught year round in Mississippi, but become less active when water temperature dips below 50°-55° F. As the water temperatures begin to rise in March and April, catch rates increase rapidly. The best time of year to harvest large crabs is usually from October to December. Mature females prefer the higher salinity waters found around Mississippi barrier islands, but large males prefer the lower salinity waters of the rivers and bayous.

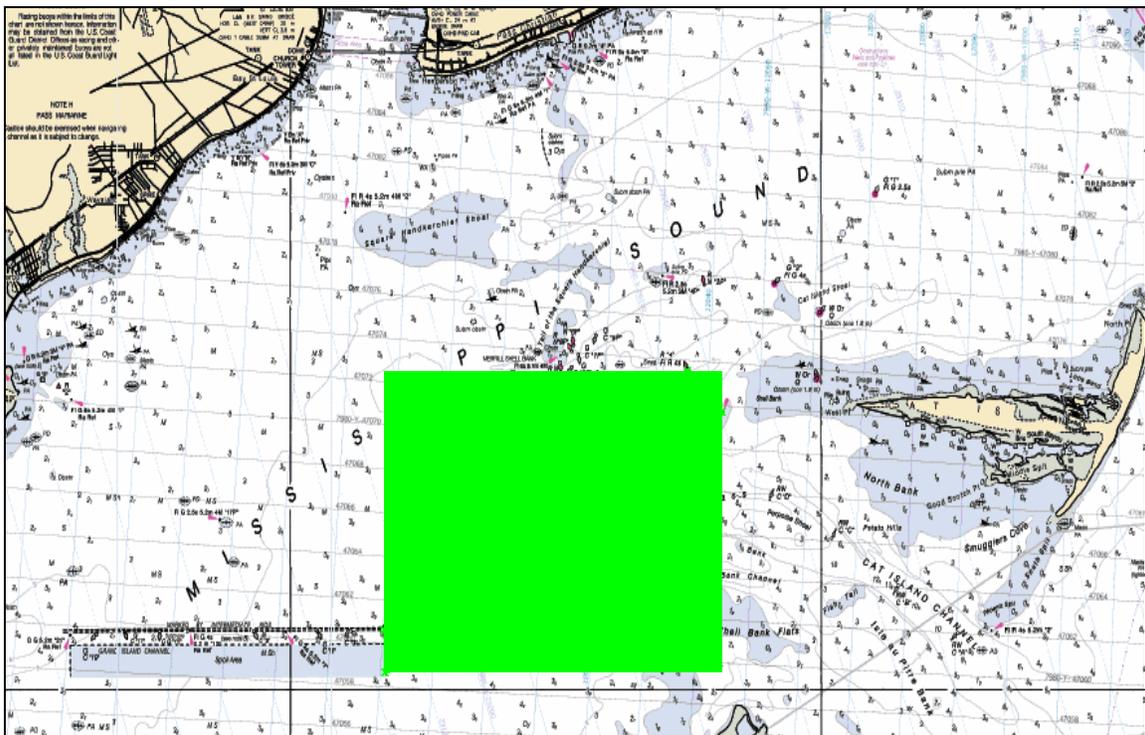


Figure 16 BlueCrab Sanctuary

## Finfish Fishery Characterization

Finfish in Mississippi are targeted with several gear types (e.g., seines, entanglement gear) but the following discussion only includes information on trawl fisheries for finfish. The State of Mississippi does not license specific gear types for the harvest of finfish except for menhaden purse seines. Fishermen using seines, trawls, gill and trammel nets, and cast nets have to buy a Fishing Boat License. These licenses do not differentiate the gear the fishermen uses to catch the seafood. Most coastal states are collecting effort information through a trip-ticket program. The oyster fishery is the only fishery with effort data collected by the State of Mississippi. This data is collected through a state sponsored trip-ticket program.

### Trawls

#### 1. Trawl bottom, fish

Offshore fish trawls as large as ninety feet are utilized in the butterfish (*Peprilus burti*) industry. These trawls are fished offshore in the EEZ (Exclusive Economic Zone) in water depths of 20 to 50 fathoms. No effort information for this gear is available. Because only one dealer is involved information about catch is confidential.

#### 2. Trawl bottom, paired

Paired trawls (large trawls pulled between two separate vessels) were used primarily in the mullet fishery and have not been utilized since 2000-2001. Although paired trawls are not prohibited in state waters, the individual who was instrumental in employing this gear moved into another fishery. No effort information for this gear is available. Because only one dealer is involved information about catch is confidential.

There is no state sponsored sea turtle observation program for trawls in the State of Mississippi.

## Summary

In general, participation in Mississippi's commercial fisheries, based on numbers of licenses sold, has not grown in proportion to the general population growth experienced along the Mississippi Gulf Coast. The numbers of licensed recreational fishermen, on the other hand, have increased by a proportionately greater percentage. Still, the overall effects of these fisheries, both recreational and commercial, on populations of marine turtles in Mississippi waters as judged by the numbers of reported sea turtle strandings have remained relatively stable following a sharp drop from 66 in 1998 to 33 in 1999.

As a result of this study and a review of the Sea Turtle Strandings Network in Mississippi has revealed a number of opportunities for significant improvement in both reporting and documentation of sea turtle strandings in this state. The Department of Marine Resources intends to further identify specific potential enhancements to this program, develop a plan for implementing them and seek out and pursue federal and state funding to initiate these changes.

## **North Carolina Gear Characterization**

Prepared by the Atlantic States Marine Fisheries Commission

### ***1.1 TRAWLS***

#### **1.1.1.1.1 Gear Description**

The North Carolina trawl fishery includes crab trawls, flounder trawls, scallop trawls, shrimp trawls, clam kicking, skimmer trawls, wing nets, and flynets. For a general description of trawls see the gear appendix.

### **1.1.2 Bottom Otter Trawls**

#### **1.1.2.1.1 Gear Description**

The North Carolina bottom otter trawl fishery includes crab trawls, flounder trawls, scallop trawls, and shrimp trawls. All bottom otter trawls function in basically the same way, but are altered slightly to target fish species, crab, shrimp, or scallops. For a general description and diagram of a bottom otter trawl see the gear appendix.

#### ***1.1.2.2 Bottom Otter Trawls, Crab (Crab Trawls)***

##### **1.1.2.2.1 Gear Description**

The North Carolina crab trawl fishery is composed primarily of 30 to 50 foot (9 to 15 meter) shrimp trawling vessels that convert to crab trawling during non-shrimping seasons. The majority of vessels are double-rigged, pulling nets ranging from 28 to 32 feet (8.5 to 9.8 meters) in headrope length. There are also some four-barreled rigs. The Core Sound crab trawl fishery is composed primarily of single-rigged vessels under 30 feet (9.1 meters) with 30-foot (9.1-meter) nets. If the vessels are double-rigged, they pull 35-foot (10.7-meter) nets (Cunningham et al. 1992).

Peeler crab trawls are generally smaller trawls, approximately 16 to 20 feet (4.9 to 6.1 meters) in head rope length, that are pulled with small skiffs in shallow areas such as creeks and grass beds (Cunningham et al. 1992).

Mesh length on crab trawls must be at least three inches (7.6 centimeters) for taking hard crabs (Rule 15A NCAC 03L .0202). For taking peeler crabs, a mesh length of no less than two inches (five centimeters) and a corkline exceeding 25 feet (7.6 meters) in length is required (Rule 15A NCAC 03L .0202).

##### **1.1.2.2.2 Targeted Species**

In 2002, 93% of the landings by crab trawls in North Carolina were hard crabs (NCDMF 2004d).

##### **1.1.2.2.3 Number of Active Vessels**

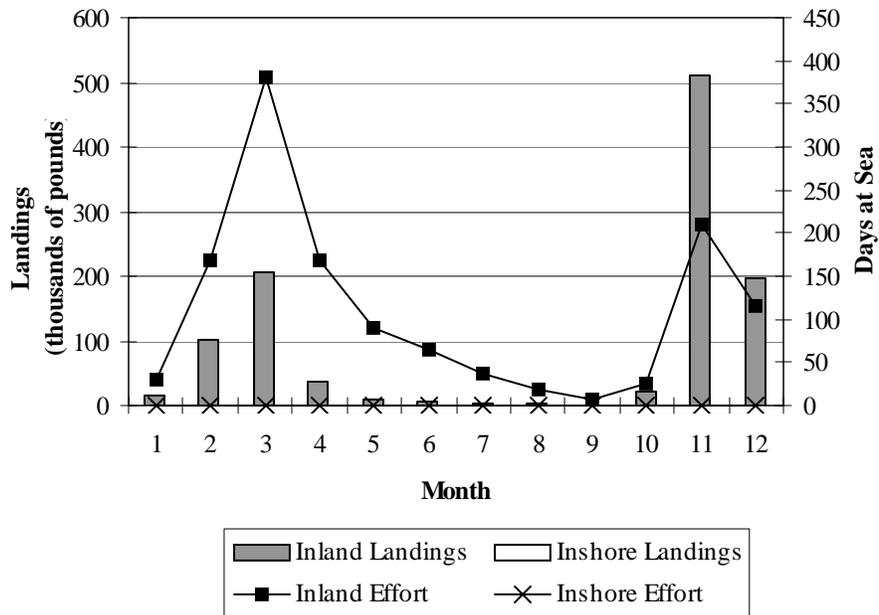
The number of vessels fishing crab trawls from 2000 to 2002 fluctuated with the highest number fishing in 2001 (Table 1).

**Table 1.** Number of vessels fishing crab trawls from 2000 to 2002

Year	Active Inland Vessels	Active Inshore Vessels
2000	191	0
2001	230	0
2002	147	0

1.1.2.2.4 Effort

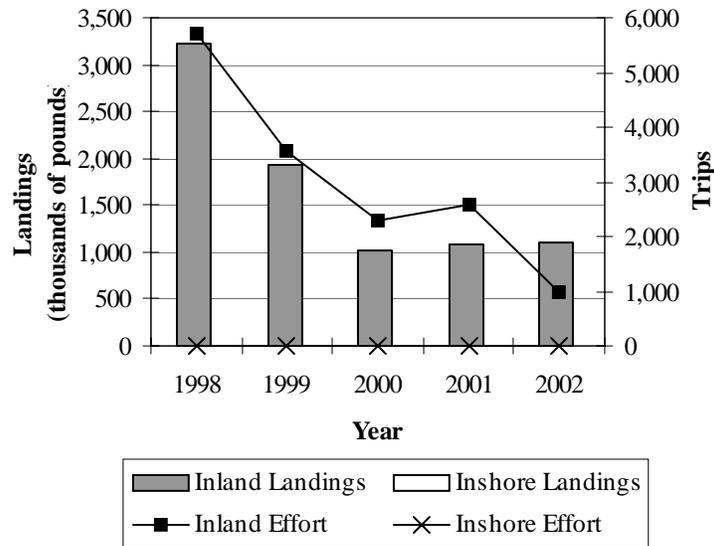
All effort by crab trawls is in inland waters. Crab trawling occurs primarily in Croatan, Roanoke and Pamlico sounds; the Pamlico, Pungo, Bay and Neuse rivers; and in Core Back and Bogue sounds including the White Oak, Newport and North rivers (Cunningham et al. 1992). See the NCAC for areas closed to trawling. While the landings for 2002 were highest in November, effort was highest in March (Figure 1, Table 1-1). The depth fished and time of day fished are not known.



**Figure 1.** Crab trawl landings and effort in 2002 by month.

1.1.2.2.5 Status of the Fishery

Landings and trips were highest in 1998 with over three million pounds landed during 5,709 trips, and declined steadily to 2002 levels (Figure 2, Table 1-2). Along with this use in inland water between 1999-2002, there was one day at sea in inshore waters during 1998.



**Figure 2.** Landings and effort by crab trawls from 1998 to 2002.

#### 1.1.2.2.6 Sea Turtle Bycatch

There is no state-run observer program in this fishery, and no other sea turtle bycatch reports were available. From June 1 to August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population.

#### 1.1.2.2.7 Laws and Regulations

Mesh length on crab trawls must be at least three inches (7.6 centimeters) for taking hard crabs (Rule 15A NCAC 03L .0202). For taking peeler crabs, a mesh length of no less than two inches (five centimeters) and a corkline exceeding 25 feet (7.6 meters) in length is required (Rule 15A NCAC 03L .0202). For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03. From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population.

### 1.1.2.3 Bottom Otter Trawls, Fish (Flounder Trawls)

#### 1.1.2.3.1 Gear Description

In North Carolina, fish bottom otter trawls are referred to as flounder trawls. A variation on the flounder trawl is the combination net. Fishermen record combination nets as either flounder trawls or flynets in the DMF Trip Ticket Program (Burns 2004, pers. comm.). For a general description and diagram of a fish bottom otter (flounder) trawl see the gear appendix.

Fishermen use flounder trawls almost entirely for the summer flounder fishery (Bianchi 2004, pers. comm.). Under the ASMFC Summer Flounder Fishery Management Plan, trawls targeting summer flounder cannot have mesh sizes smaller than 5.5 inches (14 centimeters) diamond hung,

and 6.0 inches (15 centimeters) square hung in the codend. Flounder trawls have from a 15.2 to 19.8 meter (50 to 65 feet) headrope with 10.2 to 15.2 centimeter mesh (4 to 6 inch) in the wings and body. Long groundlines, which include up to 91.4 meters (300 feet) of stranded-wire cable with cookies (rubber disks), 22.9 meters (75 feet) of chain, and 30.5 meters (100 feet) of cable, act as leads directing fish into the relatively small net (NCDMF 2004a).

Combination nets are higher profile nets than flounder trawls, with larger mesh in the wings (20 to 25 centimeter (8 to 10 inch)) (NCDMF 2004a).

#### 1.1.2.3.2 Targeted Species

Fishermen use flounder trawls almost entirely for the summer flounder fishery (Bianchi 2004, pers. comm.). Fishermen use combination nets when seeking summer flounder as well as weakfish, butterfish, and squid (*Loligo pealii*) (NCDMF 2004a). In 2002, the landings by North Carolina flounder trawls were comprised 9% of croaker and 81% of flounder (NCDMF 2004d).

#### 1.1.2.3.3 Number of Active Vessels

The number of vessels fishing flounder trawls in inshore waters remained relatively constant from 2000-2002 and there was no fishing in inland waters with this gear type during this time period (Table 2).

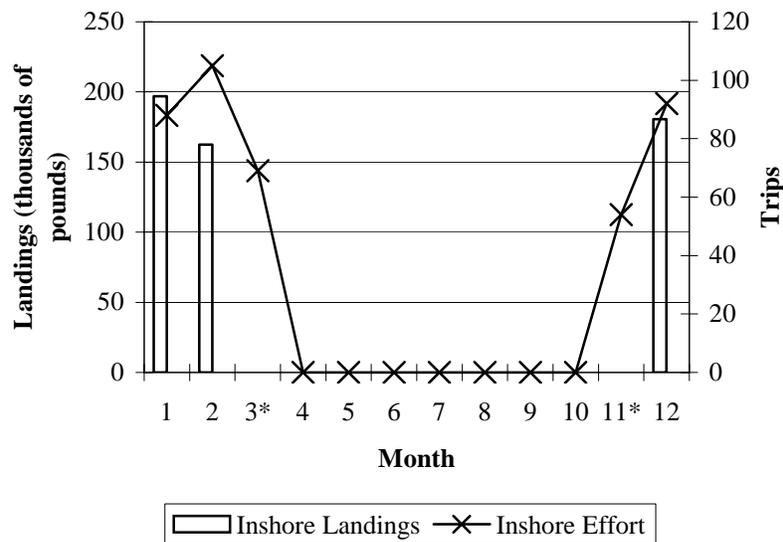
**Table 2.** Number of vessels fishing flounder trawls from 2000 to 2002.

Year	Active Inland Vessels	Active Inshore Vessels
2000	0	41
2001	0	48
2002	0	45

1.1.2.3.4 Effort

Fishermen use flounder trawls and combination nets from Cape Lookout up to, and beyond the Virginia border in depths of 5 to 90 fathoms (9 to 165 meters). See the NCAC for areas closed to trawling. In recent years, almost all of the fishing effort by flounder trawls has occurred in federal and inshore waters. One fishing trip did occur in inland waters in 1998 but the landings data are confidential. In 2002, fishermen took 142 trips in inshore waters landing 782,325 pounds (355 metric tons) (Figure 3 and Table 1-3).

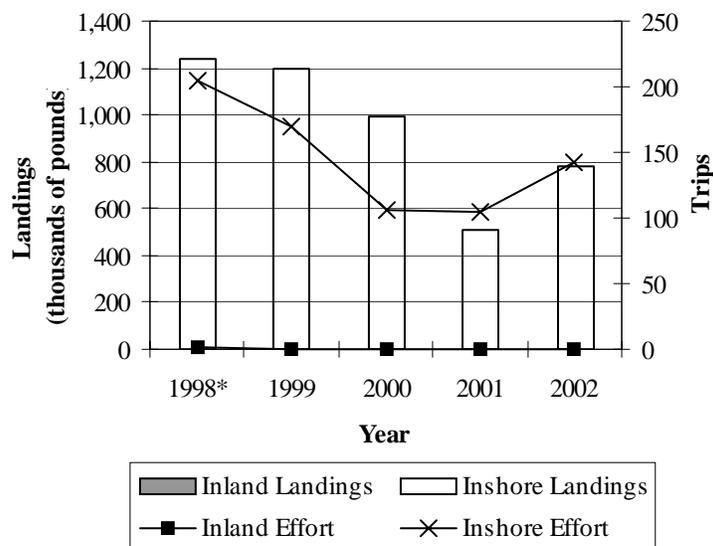
In 2002, most landings and effort occurred during the winter (Figure 3, Table 1-4). The quota on summer flounder causes the seasonal variation of the flounder trawl fishery. The NMFS, the MAFMC, and the ASMFC share oversight of summer flounder. In 2002, they allocated 14.58 million pounds (6,613 metric tons) of summer flounder to North Carolina fishermen. The state allowed fishermen to harvest 70% of the quota in the winter months, and 30% in the fall. When the quota is reached, the fishery is closed. In 2002, the winter season closed on March 28, and was not opened again until the late fall (NCDMF 2004g).



**Figure 3.** Landings and effort by flounder trawl in 2002 by month. Inshore landings for March and November are Confidential.

### 1.1.2.3.5 Status of the Fishery

Both effort and landings in this fishery decrease from 1998 until 2001, followed by a slight rebound in 2002 (Figure 4, Table 1-4).



**Figure 4.** Landings and effort by flounder trawl from 1998 to 2002. There was a small amount of fishing in inland waters in 1998 but the landings data are confidential.

### 1.1.2.3.6 Sea Turtle Bycatch

There is no state-run observer program in this fishery, and no other sea turtle bycatch reports were available. From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

### 1.1.2.3.7 Laws and Regulations

From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

## 1.1.2.4 Bottom Otter Trawls, Shrimp (Shrimp Trawls)

### 1.1.2.4.1 Gear Description

Shrimp otter trawls are funnel-shaped and constructed of twine webbing that, by regulation, is at least 1.5 inches (3.8 centimeters) (Rule 15A NCAC 03L .0103). The mouth of the net is held open by floats and weights, and can be 20 to 90 feet (6 to 20 meters) wide (Cunningham et al. 1992). Otter boards attached to each wing spread the mouth open. Cables from the vessel attach

to the otter door and the resistance of the water against the doors during towing keeps the mouth of the net open. Both finfish excluder devices (FEDs) and TEDs are required. For a general description of a shrimp trawl see the gear appendix.

The average sized recreational shrimp trawl had a headrope length of 15 feet (4.6 meters) (NCDMF 2003b). The maximum headrope size for shrimp trawls authorized by the RCGL is 26 feet (7.9 meters) and the minimum mesh size is 1.5 inch (3.8 centimeters) stretched mesh. Shrimp trawls must be equipped with a bycatch reduction device. Mechanical methods cannot be used to retrieve the trawl net.

#### 1.1.2.4.2 Targeted Species

In 2002, the landings by commercial shrimp trawls in North Carolina were 63% brown shrimp, 18% white shrimp, 9% pink shrimp, and 6% unclassified shrimp (NCDMF 2004d).

Shrimp accounted for 101,154 pounds (45.9 metric tons) of the 118,468 pounds (53.7 metric tons) captured with shrimp recreational trawls. Blue crab and flounder were the only other species contributing greater than 1,000 pounds (0.45 metric tons) to the overall recreational shrimp trawl harvest (NCDMF 2003b).

#### 1.1.2.4.3 Number of Active Vessels

The number of active vessels fishing shrimp trawls decreased in both inland and inshore waters during the period of 2000 to 2003 (Table 3).

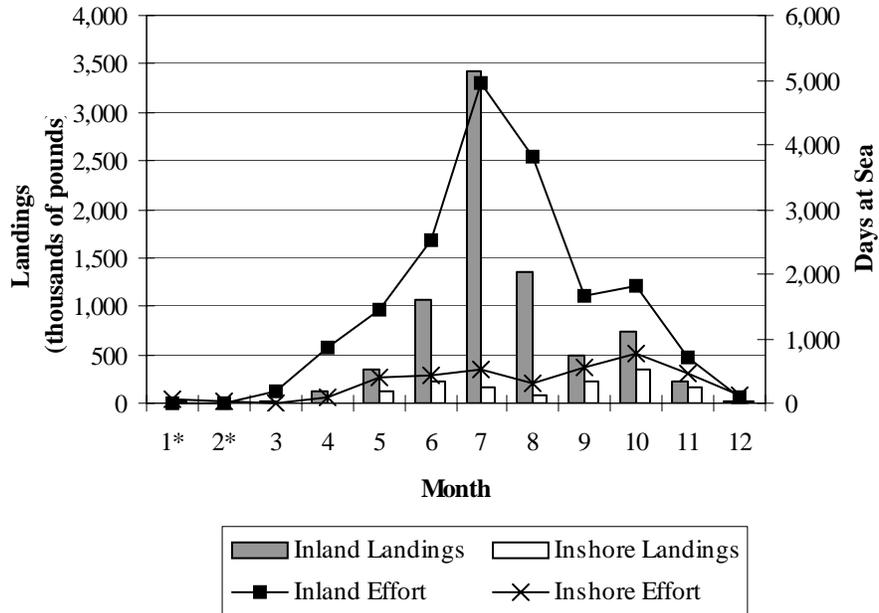
**Table 3.** Number of vessels fishing shrimp trawls from 2000 to 2002

<b>Year</b>	<b>Active Inland Vessels</b>	<b>Active Inshore Vessels</b>
<b>2000</b>	976	223
<b>2001</b>	649	161
<b>2002</b>	709	157

#### 1.1.2.4.4 Effort

Both commercial and recreational fishermen in North Carolina use shrimp trawls. Shrimp can be taken all week by bottom otter trawl except between 9:00 P.M. on any Friday and 5:00 P.M. on the following Sunday. The inshore waters are opened all week except when occasionally closed by proclamation (Rule 15A NCAC 03L .0102). See the NCAC for areas closed to trawling. The majority of brown and pink shrimp are caught in flat trawls, while white shrimp are captured using four-seam semi-balloon nets or tongue trawls (Cunningham et al. 1992). Habits of white, pink, and brown shrimp and differences in the fishing grounds dictate what fishing strategy fishermen will use. Trawling for pink shrimp is done primarily at night, brown shrimp are fished around the clock, and white shrimp are generally fished during daylight (Cunningham et al. 1992). The commercial effort occurs in inland, inshore, and federal waters, with the greatest amount in inland waters. In 2002, the most activity occurred in the summer and fall months (Figure 5, Table 1-5).

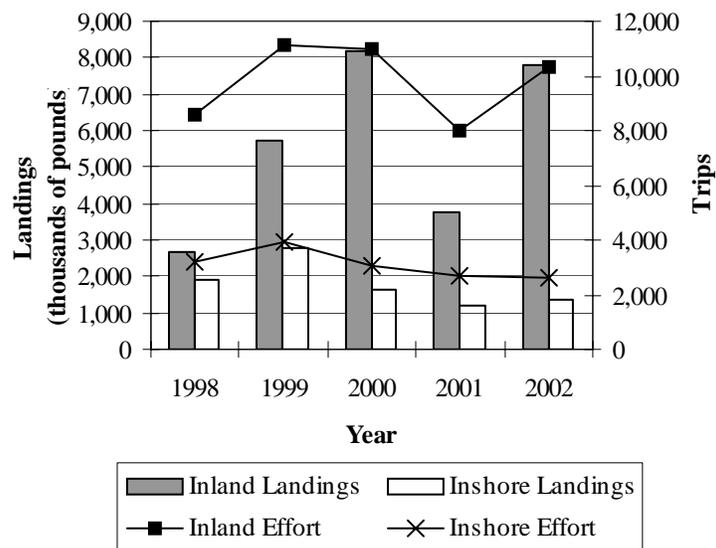
Along with this commercial use, North Carolina also allows recreational fishermen with RCGL licenses to use shrimp trawls. The DMF estimated Recreational Commercial Gear License (RCGL) holders took 5,373 trips using shrimp trawls in 2002 (NCDMF 2003b). Preliminary data from 2003 showed RCGL holders took 2,646 trips using shrimp trawls. For a breakdown of 2003 RCGL trips by geographic region and gear type, see Appendix 2.



**Figure 5.** Landings and effort by shrimp trawls during 2002 by month. January and February landings from inland waters are confidential.

1.1.2.4.5 Status of the Fishery

Landings and effort by shrimp trawls fluctuated over the years of 1998-2002 (Figure 6, Table 1-6).



**Figure 6.** Landings and effort by shrimp trawl from 1998 to 2002

Trips taken under the RCGL were slightly lower in 2003 than 2002, possibly due to a decline in RCGL sales during 2003, Hurricane Isabel hitting during a desirable fishing period, and a downturn in the economy (Wilson 2004, pers. comm.).

#### 1.1.2.4.6 Sea Turtle Bycatch

Shrimp trawls have been acknowledged as a source of sea turtle mortality for several decades. Fishermen are now required to use Turtle Excluder Devices (TEDs) in shrimp trawls with very few exceptions.

Incidental Take Permit No. 1325 issued to the State of North Carolina under Section 10 of the Endangered Species Act allows for one such exception. It permits shrimping in a small inshore area utilizing restricted tow times in lieu of TEDs. These measures were put in place to allow shrimping to continue during times of the shrimp season when heavy concentrations of algae render TEDs inoperable.

This TED exemption area is from Brown's Inlet to Rich's Inlet and offshore one mile. Anyone wishing to utilize this exemption from TEDs must obtain a permit from the DMF prior to shrimping in the exemption area. When the DMF issues a permit, the permittee receives information on the tow time restrictions and resuscitation procedures for sea turtles. The permittees must take observers, if requested, and complete logbooks to document their activities. As a requirement of the permit, the DMF provides observer coverage on 5% of the trips taken by the fleet in the exemption area.

The Division issued 22 tow time permits in 2003. Nineteen permittees reported activity by way of logbooks. Eight of these made trawls without TEDs, under tow time restrictions based on logbook reports. These eight vessels made 182 trips and conducted 726 tows without TEDs during the tow time period based on information contained in their logbooks. Observers made 11 trips during the period and reported one capture of a sea turtle during the 46 observed tows. The one turtle was observed in the wing of the net but escaped in good condition as the net was being retrieved. Fishermen reported seven sea turtle takes consisting of five loggerhead turtles and two green turtles. All of these turtles were reported as being released alive and unharmed (NCDMF 2003c).

#### 1.1.2.4.7 Laws and Regulations

Shrimp can be taken all week by bottom otter trawl except between 9:00 P.M. on any Friday and 5:00 P.M. on the following Sunday. The inshore waters are opened all week except when occasionally closed by proclamation (Rule 15A NCAC 03L .0102).

Shrimp otter trawls are funnel-shaped and constructed of twine webbing that, by regulation, is at least 1.5 inches (3.8 centimeters) (Rule 15A NCAC 03L .0103). Both finfish excluder devices (FEDs) and TEDs are required. For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population.

### **1.1.3 Other Trawls**

#### *1.1.3.1 Clam Kicking*

##### 1.1.3.1.1 Gear Description

For a general description and diagram of a clam trawl see the gear appendix.

In clam kicking, clams are dislodged by prop wash directed downward into the bottom sediment. A heavily chained trawl towed 15 feet (4.6 meters) behind the boat then gathers clams. The trawl cage replaces the tailbag, and is a 2-foot (61-centimeter) by 3-foot (91-centimeter) rectangular box made of 3/8-inch (0.95-centimeter) steel rod spaced 7/8-inch (2.2-centimeter) apart with sled runners underneath. The optimal position for the propeller is 12 to 15 inches (30 to 38 centimeters) above the bottom (Cunningham et al. 1992).

Kick boats are generally 20 to 30 feet (six to nine meters) long (NCDMF 2001b).

Trawl board and net size vary with the size of the kicking boat and depths of water fished. Trawl boards for a 10 to 12 foot (3.1 to 3.7 meter) vessel are five feet (1.5 meters) by two feet (0.6 meters) while boards on a 20-foot (six-meter) vessel may be up to nine feet by 3.5 feet (2.7 by 1.1 meters) (Cunningham et al. 1992).

The typical clam trawl designed for a 21-foot (6.4-meter) boat is 10 to 12 feet (3.1 to 3.7 meters) long and is hung on 0.5-inch (1.3-centimeter) polydacron rope with 72 to 84-strand nylon twine. Twine size in the trawl body varies from 42- to 84-strand nylon (rolled or braided). Mesh size varies from 1-1/4-inch (3.2-centimeter) bar in the bottom to 3-inch (7.6 centimeter) bar in the body. The same twine and mesh size are used in the larger trawls. The net is usually pulled with one or two 2-5/16 inch (5.9-centimeter) tickler chains 12 inches (30.5 centimeters) ahead of three chains attached to the bottom of the net as a lead line. The three chains (1/2-inch (1.3-centimeter) diameter) are hooked together by a series of S-hooks attached directly to the net. A 25-mesh square in the bottom and top of the cod end of the net is usually cut out and replaced by 1-1/4-inch (3.2-centimeter) diameter metal rings also held together by S-hooks. A single towing line that runs from the winch through a block on the lower mast is bridled to the trawl boards that keep the mouth of the net open during towing. A lazy line around the cod end of the trawl net runs through a block high on the mast, enabling the whole trawl net to be lifted out of the water for dumping the catch (Cunningham et al. 1992).

##### 1.1.3.1.2 Gear Deployment

The trawl cage is retrieved periodically to empty the catch into the culling tray on the boat. This method can only be used on shallow sand shoals and produces trenches in the sand that impact benthic organisms (Cunningham et al. 1992). One to three people normally operate a clam kicking boat, depending on the size of the vessel (NCDMF 2001b).

1.1.3.1.3 Targeted Species

In 2002, the landings by clam kicking trawls in North Carolina were 97% hard clam (NCDMF 2004d).

1.1.3.1.4 Number of Active Vessels

Clam kicking only occurs in the inland waters of North Carolina. From 2000 to 2002 the number of active vessels fishing by clam kicking remained relatively stable (Table 4).

**Table 4.** Number of vessels clam kicking from 2000 to 2002.

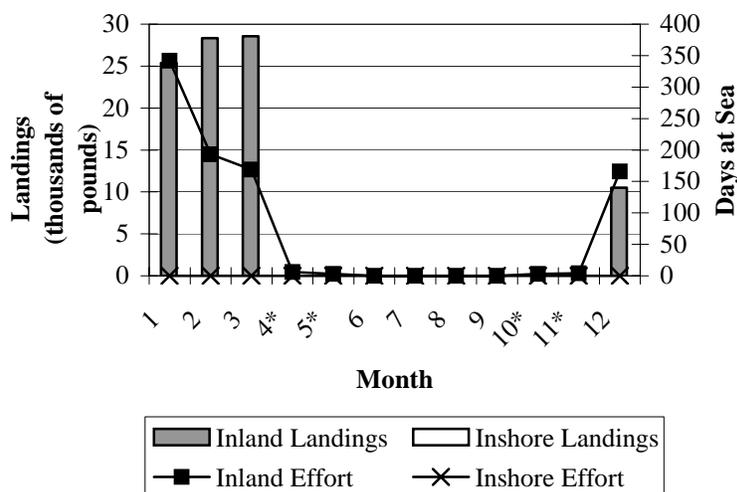
Year	Active Inland Vessels	Active Inshore Vessels
2000	86	0
2001	80	0
2002	73	0

1.1.3.1.5 Effort

Kick boats can operate in depths from three to ten feet (0.9 to three meters) (NCDMF 2001b).

Mechanical clam harvest methods, such as clam kicking, are allowed during daylight hours on Monday through Wednesday of each week from approximately the first Monday in December through the last week of March. Harvest areas are located in New River, White Oak River, Bogue Sound, Newport River, North River, Core Sound, and a portion of southeastern Pamlico Sound (NCDMF 2001b). See Appendix 3 for maps of areas open to clam kicking.

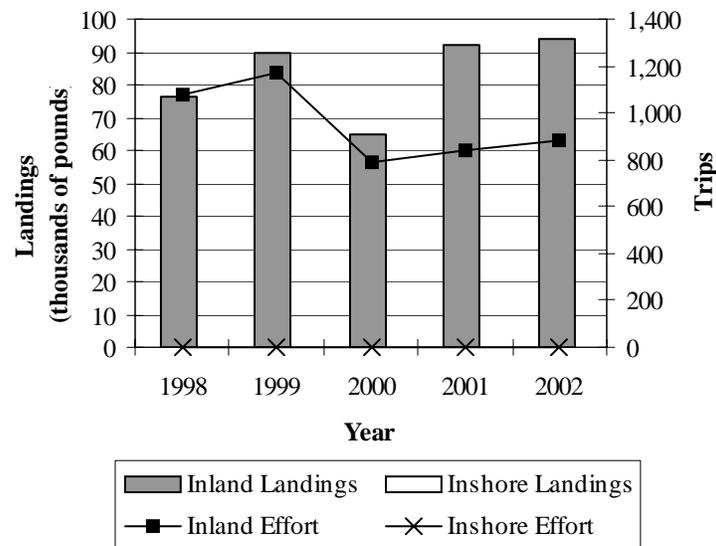
Between 1998 and 2002, clam kicking only occurred in inland waters. Landings and effort were highest in the winter months in 2002 (Figure 7, Table 1-7).



**Figure 7.** Landings and effort by clam kicking during 2002 by month. Inland landings data for April, May, October, and November are confidential.

### 1.1.3.1.6 Status of the Fishery

Between 1998 and 2002 landings fluctuated between 64,809 pounds (29 metric tons) and 94,211 pounds (43 metric tons) (Figure 8, Table 1-8).



**Figure 8.** Landings and effort by clam kicking from 1998 to 2002.

### 1.1.3.1.7 Sea Turtle Bycatch

There is no state-run observer program in this fishery, and no other sea turtle bycatch reports were available. From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

### 1.1.3.1.8 Laws and Regulations

From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

## 1.1.3.2 Skimmer Trawls

### 1.1.3.2.1 Gear Description

For a general description and diagram of a skimmer trawl see the gear appendix.

### 1.1.3.2.2 Targeted Species

Skimmers are used most often for white shrimp during mid-summer to fall in Pamlico and Core sounds, south to New River Inlet (Epperly et al. 2002). In 2002, the landings by skimmer trawls in North Carolina were 84% white shrimp and 13% brown shrimp (NCDMF 2004d).

### 1.1.3.2.3 Number of Active Vessels

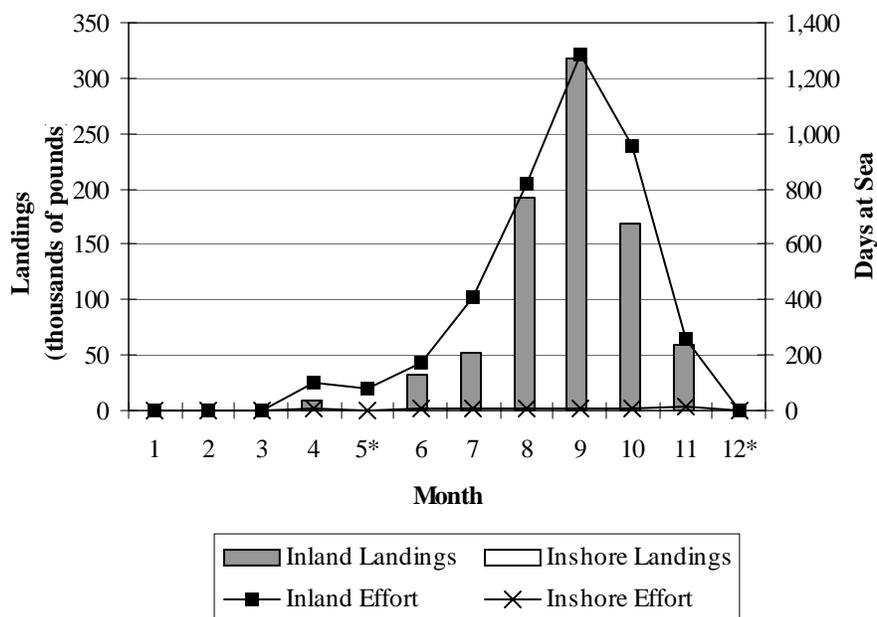
There were no vessels fishing in inshore waters with skimmer trawls from 2000 to 2002. There were 211, 157 and 173 vessels fishing in inland waters during 2000, 2001 and 2002, respectively (Table 5).

**Table 5.** Number of vessels fishing skimmer trawls from 2000 to 2002

Year	Active Inland Vessels	Active Inshore Vessels
2000	211	0
2001	157	0
2002	173	0

### 1.1.3.2.4 Effort

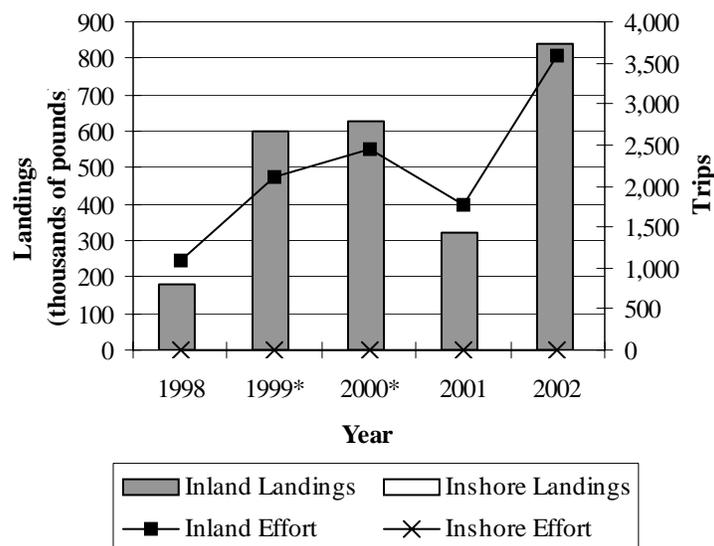
Skimmers are used most often for white shrimp during mid-summer to fall in Pamlico and Core sounds, south to New River Inlet. It is reported that as many as 30 to 40% of vessels fishing in these waters are using skimmer trawls. Skimmer trawl use in Core Sound may be as high as 90% (Epperly et al. 2002). See the NCAC for areas closed to trawling. In 2002, the highest landings and effort occurred in the fall (Figure 9, Table 1-9).



**Figure 9.** Landings and effort by skimmer trawls during 2002 by month. Inland landings data for May and December are confidential.

#### 1.1.3.2.5 Status of the Fishery

Skimmer trawls were first introduced in the early 1990s (Hines et al. 1993). Within the last decade, an increasing number of inland fishermen in North Carolina either fully converted their vessels from otter trawls to skimmer rigs, or switch out their gear on a seasonal basis (Epperly et al. 2002). With the exception of 2001, the landings and effort by skimmer trawl in inland waters increased annually over the 5-year period of 1998-2002 (Figure 10, Table 10).



**Figure 10.** Landings and effort by skimmer trawls from 1998 to 2002. Inshore landings from 1999 and 2000 are confidential.

#### 1.1.3.2.6 Sea Turtle Bycatch

Skimmer trawls are exempt from TED regulations under the assumption that the trawl bags are typically retrieved at intervals that would not be fatal to sea turtles. The ability of skimmer trawls to take loggerhead sea turtles was documented in a study conducted to compare bycatch and catch rates in skimmer and otter trawls (Coale et al. 1994). Skimmers are typically rigged to fish higher in the water column, thus the potential for turtle capture may actually be greater than a lower opening otter trawl (Epperly et al. 2002). There are records of eleven turtles incidentally taken by North Carolina skimmer trawls that have been brought to the NOAA Fisheries Service Center for Coastal Fisheries and Habitat Research in Beaufort, North Carolina to be tagged, measured, and released alive (Braun-McNeill 2004). There are documented cases of incidental takes in North Carolina skimmer trawls but sea turtles have good chances of being released alive due to short tow times. From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. For areas closed to trawling, see 15A NCAC 03J .0202. There is no state-run observer program in this fishery.

#### 1.1.3.2.7 Laws and Regulations

From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. For areas

closed to trawling, see 15A NCAC 03J .0202. For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

### *1.1.3.3 Butterfly Nets (Wing Nets)*

#### 1.1.3.3.1 Gear Description

For a general description and diagram of a butterfly net see the gear appendix. Butterfly nets are very similar to skimmer trawls in that they are both used primarily in inland waters to catch shrimp, and are held open by a frame (Mitchell 2004). North Carolina regulations prohibit the use of butterfly nets with mesh lengths less than 1.25 inches (3.2 centimeters) (Rule 15A NCAC 03L .0103).

#### 1.1.3.3.2 Gear Deployment

Unlike skimmer trawls, butterfly nets do not fish on the bottom. They are typically fished with one net on each side of the boat, and pushed (rather than towed) into outgoing tides to catch shrimp (Mitchell 2004).

#### 1.1.3.3.3 Targeted Species

In recent years, North Carolina fishermen have used butterfly nets to catch shrimp (Mitchell 2004). From 1998 to 2001, 100% of the landings by butterfly nets in North Carolina were shrimp (ACCSP data).

#### 1.1.3.3.4 Number of Active Vessels

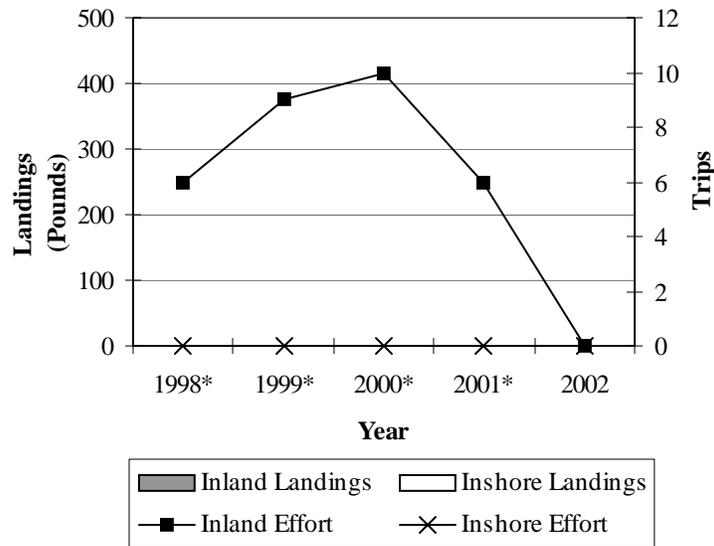
In inland waters, there were three vessels fishing in 2000 and 2001 but none in 2002. There were no vessels fishing butterfly nets in inshore waters.

#### 1.1.3.3.5 Effort

Between 1998 and 2001, there was a small amount of fishing by butterfly net in inland waters. See the NCAC for areas closed to trawling. There was no fishing by butterfly net in 2002 (Figure 11, Table 1-11).

#### 1.1.3.3.6 Status of the Fishery

Butterfly net use is minimal in North Carolina (Mitchell 2004). Over the span of 1998-2002, there was no fishing by butterfly net in inshore waters. There was a small amount of effort in inland waters from 1998-2001 but the data is confidential and there was no fishing by butterfly net in 2002 (Figure 11, Table 1-11).



**Figure 11.** Landings and effort by butterfly nets from 1998 to 2002.

#### 1.1.3.3.7 Sea Turtle Bycatch

This gear is capable of incidental sea turtle capture (Epperly et al. 2002). Butterfly nets are fished off the bottom and in deeper parts of channels; therefore chance of turtle interaction with this gear may be somewhat less than in a skimmer trawl. Butterfly nets are exempt from TED regulations (Epperly et al. 2002). From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population. There is no state-run observer program in this fishery, and no other sea turtle bycatch reports were available.

#### 1.1.3.3.8 Laws and Regulations

North Carolina regulations prohibit the use of butterfly nets with mesh lengths less than 1-1/4 inches (3.2 centimeters) (Rule 15A NCAC 03L .0103). For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03. From June 1 through August 31 it is unlawful to use any commercial fishing equipment in the sea turtle sanctuary, which is described in 15A NCAC 3R .0101. The Fisheries Director may, by proclamation, modify the sanctuary for the protection of the sea turtle population.

### 1.1.3.4 Flynets

#### 1.1.3.4.1 Gear Description

Flynets are high profile trawls used just off the bottom and range from 24.4 to 36.6 meters (80 to 120 feet) across, with wing mesh sizes of 41 to 163 centimeters (16 to 64 inches). Tailbag mesh sizes used in flynets are 8.9 centimeters (3-1/2 inches) square hung or 9.5 centimeters (3-3/4 inches) diamond hung (NCDMF 2004a).

Fishermen may record combination nets as flynets in the DMF Trip Ticket Program (Burns 2004, pers. comm.). For a general description and diagram of combination nets see the gear appendix.

#### 1.1.3.4.2 Gear Deployment

Flynets are similar to bottom otter trawls, except that they do not fish on the bottom (Mitchell 2004).

#### 1.1.3.4.3 Targeted Species

Flynets typically target demersal fish such as croaker, weakfish, and butterfish (Mitchell 2004). In 2002, the landings by flynet in North Carolina were 86% croaker and 7% weakfish (NCDMF 2004d).

#### 1.1.3.4.4 Number of Active Vessels

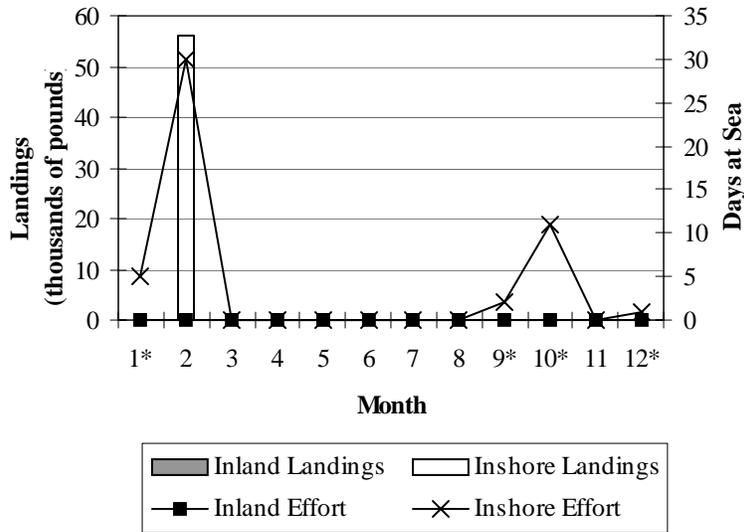
The number of active flynet vessels rose from nine in 2000 to 35 in 2001 and then dropped to 21 in 2002 (Table 6).

**Table 6.** Number of active vessels fishing flynets from 2000 to 2002

<b>Year</b>	<b>Active Inland Vessels</b>	<b>Active Inshore Vessels</b>
<b>2000</b>	0	9
<b>2001</b>	0	35
<b>2002</b>	0	21

#### 1.1.3.4.5 Effort

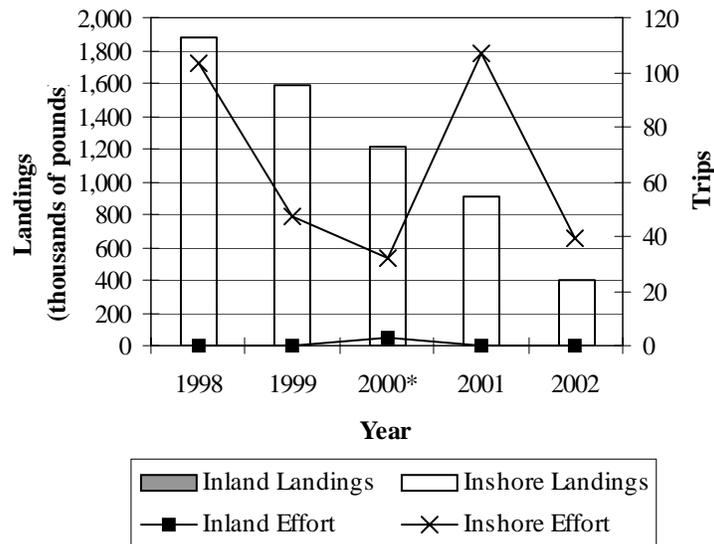
Flynet fishing generally takes place in depths less than 36 meters (118 feet) from Oregon Inlet to Cape Hatteras from October through April (NCDMF 2004a). Flynets are no longer allowed south of Cape Hatteras in order to protect weakfish stocks (Bianchi 2004, pers. comm.). This fishing occurs in both federal and inshore waters, but the majority is in federal waters. See the NCAC for areas closed to trawling. In 2002, most of the effort was in the winter months (Figure 12, Table 1-12).



**Figure 12.** Landings and Effort by flynets during 2002 by month. There were no inland landings in 2002. Inshore landings in January, September, October and December are confidential.

1.1.3.4.6 Status of the Fishery

There was an increase in the number of trips and vessels fishing flynets in inshore waters in 2001, then a decrease in 2002 closer to 2000 levels (Figure 13, Table 1-13). Three trips were taken in inland waters during 2000, but landings data are confidential.



**Figure 13.** Landings and effort by flynet from 1998 to 2002. The data from fishing in inland waters, which only occurred in 2000, are confidential.

#### 1.1.3.4.7 Sea Turtle Bycatch

There is no state-run observer program in this fishery, and no other sea turtle bycatch reports were available.

#### 1.1.3.4.8 Laws and Regulations

Flynets are no longer allowed south of Cape Hatteras in order to protect weakfish stocks (Bianchi 2004, pers. comm.). For descriptions of areas closed to this fishing gear and gear restrictions limited to specific times or areas see 15A NCAC 03.

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**APPENDIX 1. DATA TABLES**

**Table 1-1.** Landings and effort by crab trawls in 2002 by month

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (Days at Sea)</b>	<b>Inshore Effort (Days at Sea)</b>
<b>1</b>	14,954	0	30	0
<b>2</b>	103,026	0	169	0
<b>3</b>	205,303	0	381	0
<b>4</b>	36,836	0	168	0
<b>5</b>	9,113	0	89	0
<b>6</b>	7,444	0	65	0
<b>7</b>	3,984	0	36	0
<b>8</b>	1,693	0	19	0
<b>9</b>	731	0	7	0
<b>10</b>	20,395	0	25	0
<b>11</b>	511,108	0	210	0
<b>12</b>	197,006	0	116	0

**Table 1-2.** Landings and effort by crab trawls from 1998 to 2002.

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	3,226,629	0	5709	0
<b>1999</b>	1,925,483	0	3569	0
<b>2000</b>	1,023,489	0	2301	0
<b>2001</b>	1,091,793	0	2598	0
<b>2002</b>	1,111,591	0	986	0

**Table 1-3.** Landings and effort by flounder trawl in 2002 by month. (\*Data is confidential)

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (Days at Sea)</b>	<b>Inshore Effort (Days at Sea)</b>
<b>1</b>	0	196,941	0	88
<b>2</b>	0	162,467	0	105
<b>3</b>	0	*	0	69
<b>4</b>	0	0	0	0
<b>5</b>	0	0	0	0
<b>6</b>	0	0	0	0
<b>7</b>	0	0	0	0
<b>8</b>	0	0	0	0
<b>9</b>	0	0	0	0
<b>10</b>	0	0	0	0
<b>11</b>	0	*	0	54
<b>12</b>	0	180,635	0	92

**Table 1-4.** Landings and effort by flounder trawl from 1998 to 2002. (\*Data is confidential)

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	*	1,240,303	1	204
<b>1999</b>	0	1,197,666	0	169
<b>2000</b>	0	990,350	0	106
<b>2001</b>	0	509,308	0	104
<b>2002</b>	0	782,325	0	142

**Table 1-5.** Landings and effort by shrimp trawl in 2002 by month. (\*Data is confidential.)

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (Days at Sea)</b>	<b>Inshore Effort (Days at Sea)</b>
<b>1</b>	*	12,132	3	58
<b>2</b>	*	1,606	6	18
<b>3</b>	20,845	1,593	170	14
<b>4</b>	118,927	9,606	853	82
<b>5</b>	339,080	133,061	1,437	414
<b>6</b>	1,063,285	216,437	2,511	437
<b>7</b>	3,423,545	169,364	4,944	519
<b>8</b>	1,345,464	81,586	3,816	317
<b>9</b>	498,405	231,769	1,669	554
<b>10</b>	743,062	341,872	1,812	784
<b>11</b>	229,247	157,963	723	459
<b>12</b>	18,642	23,740	83	126

**Table 1-6.** Landings and effort by shrimp trawl from 1998 to 2002.

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	2,654,772	1,934,025	8,596	3,212
<b>1999</b>	5,707,088	2,805,752	11,152	3,955
<b>2000</b>	8,190,835	1,634,127	10,965	3,037
<b>2001</b>	3,754,233	1,208,103	8,018	2,671
<b>2002</b>	7,800,999	1,380,729	10,315	2,600

**Table 1-7.** Landings and effort clam kicking in 2002 by month. (\* Data is confidential.)

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (Days at Sea)</b>	<b>Inshore Effort (Days at Sea)</b>
<b>1</b>	25,370	0	342	0
<b>2</b>	28,323	0	193	0
<b>3</b>	28,540	0	169	0
<b>4</b>	*	0	6	0
<b>5</b>	*	0	3	0
<b>6</b>	0	0	0	0
<b>7</b>	0	0	0	0
<b>8</b>	0	0	0	0
<b>9</b>	0	0	0	0
<b>10</b>	*	0	3	0
<b>11</b>	*	0	4	0
<b>12</b>	10,513	0	166	0

**Table 1-8.** Landings and effort by clam kicking from 1998 to 2002.

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	76,148	0	1,081	0
<b>1999</b>	89,847	0	1,175	0
<b>2000</b>	64,809	0	793	0
<b>2001</b>	92,348	0	839	0
<b>2002</b>	94,211	0	879	0

**Table 1-9.** Landings and effort by skimmer trawl in 2002 by month. (\* Data is confidential.)

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (Days at Sea)</b>	<b>Inshore Effort (Days at Sea)</b>
<b>1</b>	0	0	0	0
<b>2</b>	0	0	0	0
<b>3</b>	0	0	0	0
<b>4</b>	9,237	0	103	0
<b>5</b>	*	0	77	0
<b>6</b>	32,199	0	171	0
<b>7</b>	51,872	0	410	0
<b>8</b>	192,725	0	817	0
<b>9</b>	317,813	0	1,282	0
<b>10</b>	169,442	0	955	0
<b>11</b>	58,472	0	257	0
<b>12</b>	*	0	1	0

**Table 1-10.** Landings and effort by skimmer trawl from 1998 to 2002. (\*Data is confidential.)

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	181,739	0	1,083	0
<b>1999</b>	601,258	*	2,100	2
<b>2000</b>	627,819	*	2,448	1
<b>2001</b>	320,801	0	1,774	0
<b>2002</b>	837,891	0	3,584	0

**Table 1-11.** Landings and effort by butterfly net from 1998 to 2002. (\*Data is confidential.)

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	*	0	6	0
<b>1999</b>	*	0	9	0
<b>2000</b>	*	0	10	0
<b>2001</b>	*	0	6	0
<b>2002</b>	0	0	0	0

**Table 1-12.** Landings and effort by fly net in 2002 by month. (\*Data is confidential.)

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (Days at Sea)</b>	<b>Inshore Effort (Days at Sea)</b>
<b>1</b>	0	*	0	5
<b>2</b>	0	56,022	0	30
<b>3</b>	0	0	0	0
<b>4</b>	0	0	0	0
<b>5</b>	0	0	0	0
<b>6</b>	0	0	0	0
<b>7</b>	0	0	0	0
<b>8</b>	0	0	0	0
<b>9</b>	0	*	0	2
<b>10</b>	0	*	0	11
<b>11</b>	0	0	0	0
<b>12</b>	0	*	0	1

**Table 1-13.** Landings and effort by fly net from 1998 to 2002. (\* Data is confidential.)

<b>Year</b>	<b>Inland Landings (pounds)</b>	<b>Inshore Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Effort (trips)</b>
<b>1998</b>	0	1,874,251	0	103
<b>1999</b>	0	1,589,497	0	47
<b>2000</b>	*	1,216,039	3	32
<b>2001</b>	0	908,055	0	107
<b>2002</b>	0	394,200	0	39

**New Hampshire Trawl Gear Characterization**  
Prepared by the Atlantic States Marine Fisheries Commission

***TRAWLS***

Mobile gear is banned from state waters. New Hampshire regulations define mobile gear as including, but not limited to, otter trawls, mid-water trawls, beam trawls, pair trawls, drag seines in any form, purse seines, and Scottish seines. The term does not include cast nets, dip nets held in hand, hook and line, seines less than 50 square feet (4.6 square meters), and stationary gill nets anchored on each end (NHFG 2005).

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**New Jersey Trawl Gear Characterization**  
Prepared by the Atlantic States Marine Fisheries Commission

**1.1 TRAWLS**

**1.1.1 Otter Trawls**

1.1.1.1.1 Gear Description

Otter trawl vessels cannot be greater than 165 feet (50 meters) long or more than 3,000 horsepower. Mesh sizes depend on the targeted species, and range from 3.375 to 6.0 inches (8.6 to 15 centimeters) (NJDFW 2005). For general descriptions and diagrams of otter trawls see the gear appendix.

1.1.1.1.2 Gear Deployment

For a general description of how otter trawls are deployed see the gear appendix.

1.1.1.1.3 Targeted Species

The New Jersey trawl fishery primarily targets squid, mackerel, summer flounder, black sea bass, scup, Atlantic croaker, and winter flounder.

1.1.1.1.4 Number of Licensed and Active Fishermen

Otter trawl licenses are issued to an individual vessel. Non-residents can obtain an otter trawl license at the same fee as for residents and many out-of-state trawlers land in Cape May. Generally the number of active otter trawl fishermen is at or near the number of otter trawl licenses issued (Himchak 2005, pers. comm.). The number of licenses issued remained steady from 1999 to 2003 (Table 1).

Table 1. The number of otter trawl licenses issued from 1999 to 2003.

Year	Number of Licenses Issued
1999	90
2000	98
2001	89
2002	75
2003	88

1.1.1.1.5 Effort

The fishery occurs in inshore waters more than two miles from the coastline (NJDFW 2005). The Bureau of Marine Fisheries issues species-specific permits for summer flounder, black sea bass, scup, tautog, and others, and they require monthly reports. To some extent, depth fished, months fished, and time of day fished can be extracted from these monthly reports, which provide trip level data. This information was not provided for this report.

1.1.1.1.6 Status of the Fishery

The Bureau of Marine Fisheries issues species-specific permits for summer flounder, black sea bass, scup, tautog, and others, and they require monthly reports. To some extent, the catch and

effort trends in the otter trawl fishery can be extracted from these monthly reports, which provide trip level data. This information was not provided for this report.

#### 1.1.1.1.7 Sea Turtle Bycatch

There is no state-run observer program for the otter trawl fishery and no other sea turtle bycatch reports were available.

#### 1.1.1.1.8 Laws and Regulations

Gear specifications and open areas are set by regulation and are available in sections 4.1.1.1.1 and 4.1.1.1.4.

### 1.1.1.2 *Shrimp Trawls*

#### 1.1.1.2.1 Gear Description

The maximum internal opening of a shrimp trawl is 60 by 12 inches (150 by 30 centimeters). The mesh cannot be greater than 0.5 inches (1.3 centimeters) stretched (NJDFW 2005). For a general description of shrimp trawls see the gear appendix.

#### 1.1.1.2.2 Gear Deployment

No boat can have more than two shrimp trawls working at the same time, and each trawl must be separately and independently attached to the vessel by a single cable or tow line (NJDFW 2005).

#### 1.1.1.2.3 Targeted Species

Shrimp trawls are for taking grass shrimp and sand shrimp only. Fishermen must immediately return to the water any organisms other than shrimp (NJDFW 2005).

#### 1.1.1.2.4 Number of Licenses Issued

The number of shrimp trawl licenses issued remained steady from 1999 to 2003 (Table 2). The number of active shrimp trawl fishermen is at or near the number of shrimp trawl licenses issued (Himchak 2005, pers. comm.).

Table 2. The number of shrimp trawl licenses issued from 1999 to 2003.

Year	Number of Licenses Issued
1999	325
2000	334
2001	309
2002	325
2003	323

#### 1.1.1.2.5 Effort

The season for shrimp trawling is from April 15 to December 15 (NJDFW 2005). This fishery is small in scale and occurs in the State's intracoastal waterways. Depth fished and time of day fished are not reported by the licensees. Many recreational fishermen employ shrimp trawls to catch their own bait (Himchak 2005, pers.comm.).

#### 1.1.1.2.6 Status of the Fishery

Licensees do not report long term trends of catch and effort by shrimp trawls.

1.1.1.2.7 Sea Turtle Bycatch

There is no state-run observer program for the shrimp trawl fishery, and no other sea turtle bycatch reports were available.

1.1.1.2.8 Laws and Regulations

Gear specifications, deployment methods, and the open season are determined by regulation and are available in sections 4.1.1.2.1, 4.1.1.2.2, and 4.1.1.2.5.

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**New York Trawl Gear Characterization**  
Prepared by the Atlantic States Marine Fisheries Commission

## ***1.1 TRAWLS***

### **1.1.1 Otter Trawls**

#### *1.1.1.1 Gear Description*

The minimum mesh size for trawl nets targeting summer flounder is 6.5 inches (15 centimeters) diamond or square, unless the fisherman has a small mesh exemption certificate from the US Department of Commerce (6 NYCRR Section 40.5(b)). The minimum mesh size for trawl nets targeting winter flounder is also six inches (15 centimeters) square, but this requirement is expected to be amended in early 2006 (Young 2005). The minimum mesh size for trawl nets targeting weakfish is four inches (ten centimeters) square (6 NYCRR Section 40.5(d)). The minimum mesh size for trawl nets targeting scup and black sea bass is 4.5 inches (11 centimeters) diamond, and roller rig or rock hopper gear cannot be equipped with rollers greater than 18 inches (46 centimeters) in diameter (6 NYCRR Section 40.5(f) and (g)). Trawls targeting tautog cannot have roller rig or rock hopper gear equipped with rollers greater than 18 inches (46 centimeters) in diameter (6 NYCRR Section 40.5(h)). For a general description of bottom otter trawls see section 4.1.2.1 of the main appendix.

#### *1.1.1.2 Gear Deployment*

For a general description of how otter trawls are deployed see section 4.1.2.1 of the main appendix.

#### *1.1.1.3 Targeted Species*

New York's otter trawl fishery is a very mixed species fishery. Otter trawl fishermen landed 76 species of fish and crustaceans in 2003. The major species caught included billfish, butterfish, summer flounder, winter flounder, yellow-tail flounder, monkfish, silver hake, Atlantic mackerel, scup, black sea bass, longfin squid, and weakfish. Other species, considered bycatch but landed with some degree of regularity, included striped bass, Atlantic cod, American John dory, conger eel, sea robins, American shad, smooth dogfish, spiny dogfish, skates, tautog, and tilefish (Young 2005).

#### *1.1.1.4 Number of Licensed Fishermen*

All commercial fishermen who fish trawls must hold a New York State commercial food fish license. Fishermen taking summer flounder must hold a summer flounder permit. The number of licenses and permits issued from 2000 to 2004 is available in Appendix 2.

#### *1.1.1.5 Effort*

For areas closed to trawling, see ECL Section 13-0341. Effort by geographic area, depth fished, month, and time of day is not readily available and would require a considerable effort to tabulate. New York is in its third year of requiring State license holders to submit Vessel Trip Reports. Following the conclusion of the 2005 reporting year a

request of the New York VTR for 2003, 2004, and 2005 could provide effort information (Young 2005).

#### *1.1.1.6 Status of the Fishery*

New York Food Fish Licenses are controlled by legislative limits on the numbers that can be sold (see ECL Section 13-0328). The number of food fish licenses decreased from 2000 to 2004 (Table 2-1).

#### *1.1.1.7 Sea Turtle Bycatch*

A number of studies have been conducted on the occurrence and activity of sea turtles in New York's waters (Morreale and Standora 1993, 1998, 2005; Reynolds and Sadove; CRESLI). These studies provide some information on interactions between sea turtles and fishing activity. From 1988 to 1992, Morreale and Standora conducted a mark-recapture study in New York waters. In all, there were 337 captures of 228 individuals, including mostly loggerheads (56%) and Kemp's ridleys (27%). Commercial fishermen accounted for 84% of the captures, and 93% of these fishermen were pound net fishermen. Trawlers reported 16 captures (Morreale and Standora 1998). There is no state-run observer program for the otter trawl fishery. In addition, DiGiovanni et al (2000) report a green sea turtle recovered from a trawl net off Robins Island. The animal was rehabilitated and later released (DiGiovanni et al. 2000). A leatherback sea turtle came in on a trawler into Shinnecock in 1993. This turtle was tagged and released offshore (DiGiovanni, pers. comm. 2006).

#### *1.1.1.8 Laws and Regulations*

The minimum mesh size in the cod end of trawl nets targeting summer flounder is six inches (15 centimeters) square (6 NYCRR Section 40.5(b)). The minimum mesh size for trawl nets targeting weakfish is four inches (ten centimeters) square (6 NYCRR Section 40.5(d)). The minimum mesh size for trawl nets targeting scup and black sea bass is 4.5 inches (11 centimeters) diamond, and roller rig or rock hopper gear cannot be equipped with rollers greater than 18 inches (46 centimeters) in diameter (6 NYCRR Section 40.5(f) and (g)). Trawls targeting tautog cannot have roller rig or rock hopper gear equipped with rollers greater than 18 inches (46 centimeters) in diameter (6 NYCRR Section 40.5(h)). The NYSDEC has species-specific regulatory authority, but no authority to regulate gear.

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## APPENDIX 2. LICENSES AND PERMITS ISSUED FROM 2000 TO 2004

Table 2-1. The number of licenses and permits issued from 2000 to 2004

License/Permit Type	Number Issued				
	2000	2001	2002	2003	2004
<b>Resident Food Fish License</b>	1,287	1,225	1,197	1,153	1,131
<b>Non-Resident Food Fish License</b>	66	57	50	54	49
<b>Marine Bait License</b>	28	34	43	56	58
<b>Striped Bass Permit</b>	0	0	554	555	545
<b>Summer Flounder Permit</b>	359	360	357	349	347
<b>Resident Horseshoe Crab Permit</b>	0	322	330	311	306
<b>Non-Resident Horseshoe Crab Permit</b>	0	11	13	10	10
<b>Lobster Bait Gillnet</b>	50	60	63	60	63
<b>Menhaden Purse Seine License</b>	23	20	4	21	20
<b>Resident Whelk License</b>	0	237	269	292	276
<b>Non-Resident Whelk License</b>	0	16	15	15	12
<b>Resident Crab License</b>	697	683	675	649	629
<b>Non-Resident Crab License</b>	31	30	34	34	32
<b>Resident Lobster License</b>	657	600	554	506	477
<b>Non-Resident Lobster License</b>	48	45	40	38	36
<b>Lobster Landing License</b>	13	10	12	13	14
<b>Resident Non-Commercial Lobster License</b>	882	996	1,051	940	932
<b>Food Fish Landing License</b>	46	46	46	50	45
<b>Party/Charter Boat License</b>	401	443	474	496	492

**Rhode Island Trawl Gear Characterization**  
Prepared by the Atlantic States Marine Fisheries Commission

**1.1 TRAWLS**

**1.1.1 Otter Trawls, Pair Trawls, and Beam Trawls**

*1.1.1.1 Gear Description*

Fishermen possessing 500 pounds (227 kilograms) or more of scup from November 1 through April 30 or 200 pounds (91 kilograms) or more of scup from May 1 through October 31 may only fish with nets that have a minimum mesh size of five inches (13 centimeters) diamond or square mesh with a minimum length of 75 meshes from the terminus of the net. For nets with less than 75 mesh codends, the entire net must have a minimum mesh size of five inches (13 centimeters) diamond or square (RI Regulations Part 10.11).

Fishermen possessing 500 pounds (227 kilograms) or more of black sea bass from January 1 through March 31 or 100 pounds (45 kilograms) or more of black sea bass from April 1 through December 31 may only fish with nets that have a minimum mesh size of 4.5 inches (11 centimeters) diamond applied throughout the codend for at least 75 meshes from the terminus of the net. For trawl nets with codends less than 75 meshes the trawl net must have a minimum mesh size of 4.5 inches (11 centimeters) throughout the net (RI Regulations Part 10.11).

Fishermen in possession of scup or black sea bass cannot use rollers greater than 18 inches (46 centimeters) in diameter (RI Regulations Part 10.11).

Bottom trawl nets targeting winter flounder must have a minimum mesh size of six inches (15 centimeters) diamond or 6.5 inches (17 centimeters) square (RI Regulations Part 7.8).

For general descriptions and diagrams of trawls see the gear appendix.

*1.1.1.2 Targeted Species*

Trawling vessels target scup, black sea bass, and winter flounder among other species. Otter trawl fishermen may target summer flounder in the summer, though this fishery has declined in recent years.

*1.1.1.3 Number of Licensed Fishermen*

In 2002, 12 fishermen held a license to fish otter/beam trawls. Twelve fishermen held this license in 2001, and 16 held this license in 2000 (RIDFW 2004). The number of those fishermen actively fishing was not available for this report. For a complete list of licenses and permits issued see Appendix 2.

*1.1.1.4 Effort*

For areas closed to trawling see Part 11.2, 11.5, 11.6, and 11.14 of Rhode Island regulations. Otter trawl fishermen targeting summer flounder fish in state waters in the summer, though this fishery has declined in recent years (RIDFW 2005b). Information on the depth, month, and time of day fished was not provided for this report.

#### *1.1.1.5 Status of the Fishery*

Trends in catch and effort by trawl fishermen were not provided for this report, and no other information on trends in the fishery were available.

#### *1.1.1.6 Sea Turtle Bycatch*

There are no current state-run observer programs in Rhode Island, and past projects have not observed sea turtle bycatch. No other sea turtle bycatch information was available.

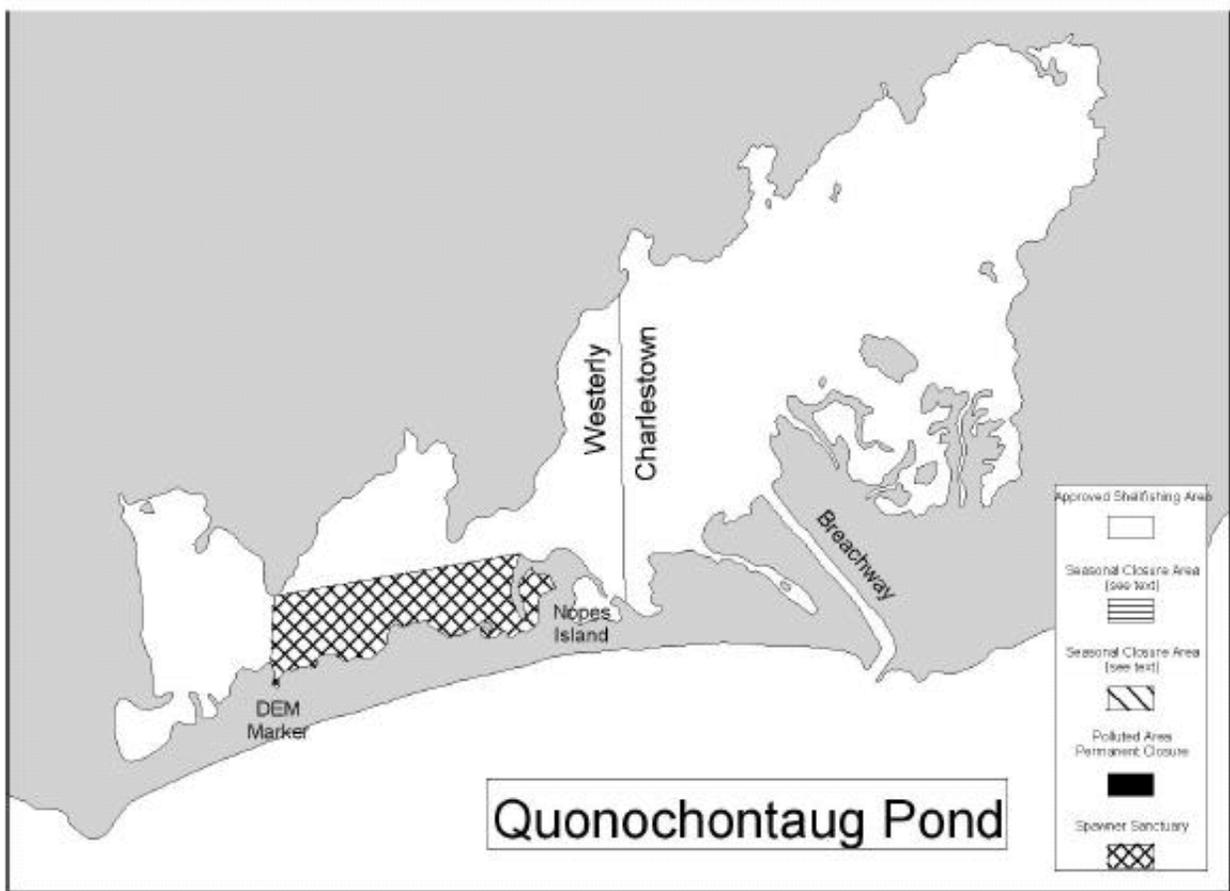
#### *1.1.1.7 Laws and Regulations*

Fishermen possessing 500 pounds (227 kilograms) or more of scup from November 1 through April 30 or 200 pounds (91 kilograms) or more of scup from May 1 through October 31 may only fish with nets that have a minimum mesh size of five inches (13 centimeters) diamond or square mesh with a minimum length of 75 meshes from the terminus of the net. For nets with less than 75 mesh codends, the entire net must have a minimum mesh size of five inches (13 centimeters) diamond or square. Fishermen possessing 500 pounds (227 kilograms) or more of black sea bass from January 1 through March 31 or 100 pounds (45 kilograms) or more of black sea bass from April 1 through December 31 may only fish with nets that have a minimum mesh size of 4.5 inches (11 centimeters) diamond applied throughout the codend for at least 75 meshes from the terminus of the net. For trawl nets with codends less than 75 meshes the trawl net must have a minimum mesh size of 4.5 inches (11 centimeters) throughout the net. Fishermen in possession of scup or black sea bass cannot use rollers greater than 18 inches (46 centimeters) in diameter (RI Regulations Part 10.11). Bottom trawl nets targeting winter flounder must have a minimum mesh size of six inches (15 centimeters) diamond or 6.5 inches (17 centimeters) square (RI Regulations Part 7.8).

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# APPENDIX 1. Quonochontaug Pond



**APPENDIX 2. Fishing Licenses Sold from 2000 to 2004.**

Table 2-1. Fishing licenses sold by gear type from 2000 to 2002.

<b>License</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
<b>Fishermen</b>			
Shellfish	1,381	1,337	1,320
Multi	986	998	991
Multi/Gnet	366	371	366
Lobster	93	95	95
N/c Lob Diver	541	539	529
N/c Lob Pot	425	434	439
Ot/Beam Trawl	16	12	12
Shell Dredge	1	1	1
Rod & Reel	392	390	388
Misc Pot	1	1	1
FW Minnow	17	14	14
<b>Dealers</b>			
Lobster	8	7	7
Shellfish	12	10	10
Finfish	13	14	14
Multi	77	79	79
<b>Landing</b>			
Resident	6	12	14
Non-res	142	144	135

Table 2-2. Fishing licenses sold in 2003 and 2004.

<b>License</b>	<b>2003</b>	<b>2004</b>
<b>Multi-Purpose License</b>	<b>1,191</b>	<b>1,135</b>
<b>Principal Effort License</b>	<b>1,325</b>	<b>1,148</b>
<i>Lobster Endorsement</i>	61	56
<i>Non-lobster Crustacean Endorsement</i>	19	20
<i>Quahog Endorsement</i>	924	776
<i>Non-quahog Endorsement</i>	672	556
<i>Restricted Finfish Endorsement</i>	338	326
<i>Non-restricted Finfish Endorsement</i>	138	147
<b>Commercial Fishing License</b>	<b>271</b>	<b>283</b>
<i>Lobster Endorsement</i>	50	48
<i>Non-lobster Crustacean Endorsement</i>	68	69
<i>Non-quahog Endorsement</i>	156	172
<i>Non-restricted Finfish Endorsement</i>	192	198
<b>Over 65 Shellfish License</b>	50	86
<b>Student Shellfish License</b>	107	97

Table 2-2, cont.

<b>Landing Permits</b>	<b>2003</b>	<b>2004</b>
<b>Resident</b>		
<i>Multi-purpose</i>	17	20
<i>Finfish</i>	9	8
<i>Crustacean</i>	2	1
<i>Shellfish</i>	0	0
<i>Miscellaneous</i>	0	0
<b>Non-Resident</b>		
<i>Multi-purpose</i>	54	46
<i>Restricted Finfish</i>	5	5
<i>Non-restricted Finfish</i>	26	23
<i>Crustacean</i>	2	2
<i>Shellfish</i>	1	4
<i>Miscellaneous</i>	0	0
<b>Gear Endorsements</b>		
Fish Trap	9	9
Gillnet	323	307
<b>Other Licenses and Declarations</b>		
Aquaculture License	10	9
Vessel Declaration	1,905	1,829
Boat Plate	96	65
<b>Dealer Licenses</b>		
Multi-purpose	172	176
Finfish	14	30
Lobster	10	6
Shell	11	22

## South Carolina Trawl Characterization

Prepared by the Atlantic States Marine Fisheries Commission

### ***TRAWLS***

#### **1.1.1 Bottom Otter Trawls**

##### 1.1.1.1.1 Gear Description

South Carolina's bottom otter trawl fishery includes shrimp trawls, crab trawls, and whelk trawls.

##### 1.1.1.1.2 Number of Licensed and Active Fishermen

South Carolina issues both Resident and Non-Resident Trawl Licenses. The total licenses issued decreased from 2001 to 2005 (Table 1). The number of active otter trawl fishermen in 2004 was 270 (ACCSP 2006).

Table 1. The number of resident and non-resident otter trawl licenses issued from 2001 to 2005

<b>Year</b>	<b>Resident Licenses Issued</b>	<b>Non-Resident Licenses Issued</b>	<b>Total Licenses Issued</b>
<b>2001</b>	418	269	687
<b>2002</b>	403	314	717
<b>2003</b>	372	199	571
<b>2004</b>	365	190	555
<b>2005</b>	337	151	488

##### *1.1.1.2 Blue Crab Trawls*

##### 1.1.1.2.1 Gear Description

South Carolina regulations require a minimum mesh size of four inches (ten centimeters) stretched for blue crab trawling (SCMRA Section 50-5-750).

##### 1.1.1.2.2 Number of Licensed and Active Fishermen

For the total number of otter trawl licenses issued from 2001 to 2005 and the number of active fishermen in 2004, see section 4.1.1.1.2.

##### 1.1.1.2.3 Effort

South Carolina's blue crab trawl fishery is a winter fishery (Murphy 2006). The SCDNR sets the season for taking blue crabs by trawl, but it must be between December 1 and March 31 (Chapter 5 of Title 50; SCCOL Section 50-5-740). Crabs are also retained as bycatch in the shrimp trawl fishery during the open shrimp trawling season. For areas open to trawling see SCCOL Section 50-5-700. It is unlawful to trawl at night (SCCOL Section 50-5-735). Specific information on the depth fished is not available, but trawlers usually work in 15-40 ft. (D. Whitaker, SCDNR).

##### 1.1.1.2.4 Status of the Fishery

There was no information available on the status and trends in the blue crab trawl fishery.

#### 1.1.1.2.5 Sea Turtle Bycatch

Blue crab trawls are not required to have TEDs (Murphy 2006). There is no state-run observer program for the blue crab trawl fishery. Sea turtles rarely enter South Carolina water before the season ends (March 31).

#### 1.1.1.2.6 Laws and Regulations

South Carolina regulations require a minimum mesh size of four inches (ten centimeters) stretched for blue crab trawling (SCMRA Section 50-5-750). It is unlawful to trawl at night (SCMRA Section 50-5-735). The SCDNR sets the season for taking blue crabs by trawl, but it must be between December 1 and March 31 (SCMRA Section 50-5-740).

### 1.1.1.3 *Shrimp Trawls*

#### 1.1.1.3.1 Gear Description

Shrimp trawls footropes are generally 40 to 50 feet (12 to 15 meters), and the mesh size is 1-7/8 inches (4.8 centimeters) stretched (Delancey 2005). For a general description of otter trawls see section 4.1.2.1 of the main appendix.

#### 1.1.1.3.2 Gear Deployment

The number of trawls towed ranges from one for outboard boats, to up to four. Vessels towing four trawls are 40 to more than 70 feet (12 to more than 21 meters) long. The maximum combined footrope is 220 feet (67 meters). The trawls are weighed with chain along the footrope, which is attached to the trawl doors. There are several floats attached to the headrope. Shrimp trawls are trawled over the bottom for one to five hours per tow. “Tongue” or four-seam trawls are used primarily for white shrimp, and have proportionately more webbing fishing higher in the water column than “flat” or two-seam trawls, which are used for brown shrimp (Delancey 2005).

#### 1.1.1.3.3 Targeted Species

Shrimp trawls target white, brown, and pink shrimp. Less than one percent of the total catch is pink shrimp (Delancey 2005).

#### 1.1.1.3.4 Number of Licensed and Active Fishermen

For the total number of otter trawl licenses issued from 2001 to 2005 and the number of active fishermen in 2004, see section 4.1.1.1.2.

#### 1.1.1.3.5 Effort

Most effort occurs in state waters when the trawling season is opened by DNR notice, from May/June through December/early January. Trawling is restricted to oceanic and lower sound and bay areas (Delancey 2005). For areas open to trawling see SCMRA Section 50-5-700. It is unlawful to trawl at night (SCMRA Section 50-5-735). Information on the depth fished was not available, but trawlers typically trawl in 15-40 ft. In 2004 highest effort occurred in late summer/early fall, and was concentrated in state waters (Figure 1, Table 1-1).

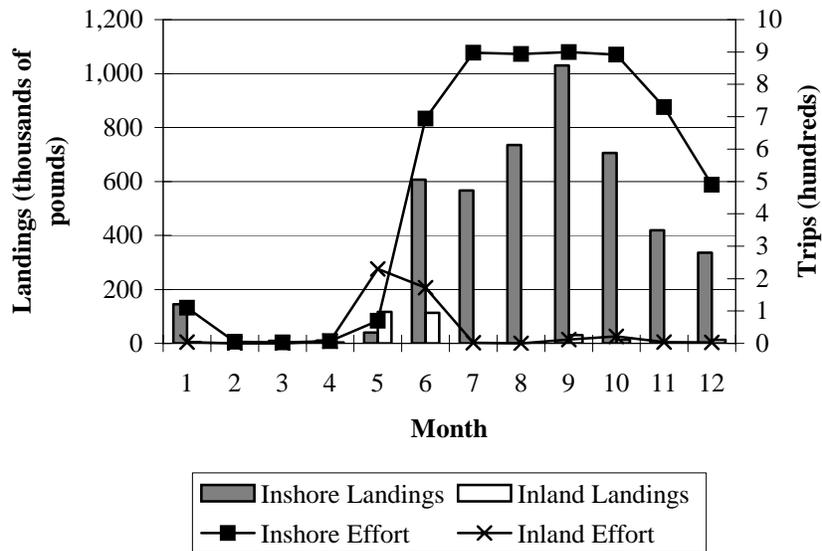


Figure 1. Otter trawl landings and effort in 2004 by month.

#### 4.1.1.3.6. Status of the Fishery

The South Atlantic shrimp fishery has declined dramatically since 2001 (SAFMC 2004). The size and abundance of shrimp have been below those seen from 1995 to 2000 (Delancey 2005).

#### 1.1.1.3.6 Sea Turtle Bycatch

There are no state-run observer programs in the shrimp trawl fishery. Shrimpers have often mentioned capturing sea turtles (Delancey 2005). TEDs are required in trawl nets (SCCOL Section 50-5-765). All trawl nests that harvest shrimp must have a TED if the net is >12' footrope length. As of 2003, no TED is required for hand-retrieved trawls. There are tow time restriction of 55 minutes (April 1 to October 31) and 75 minutes (November 1 to March 31). Try nets with >12' footrope must have a TED.

#### 1.1.1.3.7 Laws and Regulations

The shrimp trawl season is regulated by seasonal closure and restricted to specific areas by state law. The maximum combined footrope is 220 feet (67 meters). Shrimp trawls may only be operated during the following times: April 1 to August 31 5:00am to 9:00pm; September 1 to October 31 6:00am to 8:00pm; November 1 to March 31 6:00am to 7:00pm (Delancey 2005).

#### 1.1.1.4 Whelk Trawls

##### 1.1.1.4.1 Targeted Species

Whelk trawls target whelk.

##### 1.1.1.4.2 Number of Licensed and Active Fishermen

For the total number of otter trawl licenses issued from 2001 to 2005 and the number of active fishermen in 2004, see section 4.1.1.1.2.

#### 1.1.1.4.3 Effort

For areas open to trawling see SCMRA Section 50-5-700. The season for whelk trawling opens in late winter and early spring when offshore bottom waters are less than 55 degrees. One criterion for closure is water temperature. It is internal DNR policy that whelk trawling will close for the season throughout the state six days after water temperatures first hit 64 degrees. It is unlawful to trawl at night (SCCOL Section 50-5-735). Information on the depth fished is not available.

#### 1.1.1.4.4 Status of the Fishery

There was no information available on the status and trends in the whelk trawl fishery.

#### 1.1.1.4.5 Sea Turtle Bycatch

The whelk trawl fishery has anecdotal information on sea turtle takes. TEDs are not required in whelk trawls (Murphy 2006). The season for whelk trawling opens in late winter and early spring when offshore bottom waters are less than 55 degrees. One criterion for closure is water temperature. As stated in 4.1.1.4.3, whelk trawling will close for the season throughout the state six days after water temperatures first hit 64 degrees.

#### 1.1.1.4.6 Laws and Regulations

It is unlawful to trawl at night (SCMRA Section 50-5-735).

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## APPENDIX 1. DATA TABLES

Table 1-1. Otter trawl landings and effort in 2004 by month

<b>Month</b>	<b>Inland Landings (pounds)</b>	<b>Inland Effort (trips)</b>	<b>Inshore Landings (pounds)</b>	<b>Inshore Effort (trips)</b>
<b>1</b>	144,681	110	4,191	4
<b>2</b>	707	5	0	0
<b>3</b>	9,295	3	0	0
<b>4</b>	10,463	7	3,562	7
<b>5</b>	40,394	70	117,241	230
<b>6</b>	607,033	694	113,166	172
<b>7</b>	566,514	898	1,288	2
<b>8</b>	735,356	894	0	0
<b>9</b>	1,030,258	900	30,992	12
<b>10</b>	705,261	892	13,064	22
<b>11</b>	418,803	730	1,137	4
<b>12</b>	336,651	490	12,985	3

# **Texas Trawl Gear Characterization**

**Prepared by  
Coastal Fisheries Division  
Texas Parks and Wildlife Department**

## **INTRODUCTION:**

Part of evaluating the fisheries impact by gear is an assessment of effort geographically and temporally. However, Texas Parks and Wildlife Department (TPWD) does not track effort in commercial fisheries directly, nor does this agency maintain "days away from port" and "trip number" data. The agency does maintain license sales and landings information. NOAA Fisheries maintains some shrimp effort, and where applicable, NOAA data has been included in this report. A commercial trip ticket program, currently under beta testing in Texas, will reveal some trip-level effort when the program is fully implemented that will greatly enhance our ability to evaluate the impact of commercial fishing gear in temporal and spatial ways not currently available.

TPWD does not manage any observer programs. TPWD relies on data collected by NOAA fisheries for any on-board information from commercial harvesters. However, during the past year TPWD outreach specialists interviewed commercial fishermen in each fishery along the Texas coast to learn first hand how fishermen used various gear. This type of information was gathered from recreational fishermen during structured interviews as part of the agency's harvest program creel.

This report describes the types of gear used in Texas, the fisheries where they are used, and the regulatory efforts of TPWD supporting the long-term goal of sea turtle recovery.

## **TEXAS COMMERCIAL FISHING GEAR TYPES**

### **Otter Trawls and Beam Trawls**

An otter trawl (Figure 11) is a

“...device constructed of twine webbing so that when fully assembled and rigged, it will take the shape of a huge funnel while being towed. To spread the mouth so that it will cover the largest possible area, each wing is fastened to a trawl ‘door’. Each door is fitted with chains to be attached to a towing cable from the trawling vessel. The resistance of the water to the forward motion of the doors, as they are towed at

different angles, forces them to pull in opposite directions and thus keep the mouth of the net open.” (NMFS trawl definition).

Beam trawls are very similar in construction, but rely on a metal frame instead of doors to spread the mouth of the net (Figure 12). This gear is not designed to contact the substrate.

Three types of commercial shrimp boat licenses are available. Those licensed as Gulf Shrimp Boats are restricted from operating in the bays and estuaries of Texas. Bay Shrimp Boats trawl the bays and estuaries for “table” shrimp (shrimp intended for human consumption). Bait Shrimp Boats also operate in the bays and estuaries, but may take only shrimp intended to be used as bait. The primary difference between the two is that bait shrimp fishermen must keep 50% of their catch alive and they may fish in “bait bays” with certain net mesh restrictions. The shrimp fishery is managed on a regional and seasonal basis with gear requirements; catch limits, and legal hours varying with location, season, and license type (Figure 7). Texas primarily regulates these gears by setting maximum widths for the mouth (measured by the leadline on otter trawls and by the width of the frame on beam trawls) and regulating allowable mesh sizes. (Appendix A). Bycatch Reduction Devices (BRDs) and Turtle Excluder Devices (TEDs) are required in many of these management schemes. Several designs of BRDs and TEDs have been approved for use in Texas (Appendix B).

In summary, TED regulations reflect federal laws:

All shrimp boats fishing in Texas "outside waters" must have an approved TED installed in each trawl that is rigged for fishing. "Approved TED" definition is a device designed to be installed in a shrimp trawl forward of the cod end (tail bag) for the purpose of excluding sea turtles from the net and that meets the dimensions and specifications of an approved device as described in 50 CFR Part 223 §223.207. "Outside waters" are all waters contiguous to and seaward from the shoreline and out nine miles. Vessels are exempt if they have no power net retrieval system, have only a pusher-head trawl, skimmer trawl, or wing net rigged for fishing, or substitute tow-time restrictions in lieu of using a TED. The only other gear that is exempted are try-nets 21 feet wide or narrower and beam trawls that have ridged vertical bars fitted no more than 4 inches apart. TEDs are only required on gears used for shrimp fishing.

Recreational fishing license holders with an Individual Bait-Shrimp Trawl Tag may use an otter trawl to capture shrimp for personal use. They are allowed one trawl which may not be greater than 20 ft in width, with a stretched mesh not smaller 1-3/4 in, and with doors not larger than 450 in<sup>2</sup>. Recreational shrimping is also subject to regulations varying with season and location.

The Texas shrimp fishery targets four penaeid species; white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), pink shrimp (*Farfantepenaeus duorarum*), and seabobs (*Xiphopanaeus kroyeri*).

Trawl potential impacts on sea turtles is covered under **Sea Turtles** below.

## **SEA TURTLES**

Texas shrimp fishermen are not required to keep logbook records of turtle encounters. During TPWD outreach interviews, commercial fishermen agreed that sea turtle encounters are more prevalent in Gulf waters than in bay waters, and that they believed the sea turtles encountered in the bays are more likely to be juvenile than adult. The interviews revealed that fishermen could not readily recognize the different species of sea turtles. For example, a shrimp fisherman may describe a turtle as, "a green one," or "not a green one." TPWD outreach interviews did not provide reliable information related to takes of sea turtles by commercial fishermen, but it is likely the vast majority that have been taken fell to trawls before the introduction of TEDs and BRDs in the Gulf shrimp fishery.

TPWD has a rigorous fisheries independent monitoring program. TPWD uses 600-ft experimental gillnets during the spring and fall each year. TPWD uses experimental otter trawls, 18.75-ft headrope, throughout the year in the Texas Territorial Sea and the bays. Other gears, used without turtle takes, include sixty-foot bag seines, and 19.5-in oyster dredge. During 30 years of TPWD fisheries independent monitoring, only 39 sea turtle takes have been recorded. The composition of these sea turtle interactions is comprised of four loggerhead, 24 green, ten Kemp's ridley, and one unidentified sea turtle. Thirty of the 39 takes were taken from experimental gillnets. Gillnets are not a legal fishing gear in Texas, but are used as part of the fisheries independent survey program. The nine interactions from experimental trawls were distributed throughout the inshore and offshore waters. Thirty-one of the 39 turtle interactions occurred during the last 10 years (Tables 6 and 7).

Although most Texas fishermen, individually, have a negligible impact on sea turtles, Texas is taking a proactive role in conserving these animals. TPWD has a basic, three-pronged program: 1) partnering with others to protect nesting females and nests on Texas beaches along with documenting all strandings in Texas; 2) partnering with others to protect nesting females and their nests on Gulf nesting beaches in the State of

Tamaulipas, Mexico; 3) regulating the Gulf shrimping fleet for sustainability of marine resources, including shrimp and sea turtles along with other non-targeted species. Partners include state and federal governments (National Park Service, U.S. Fish and Wildlife Service, NOAA Fisheries), private industry (e.g., shrimp fishermen and seafood dealers etc.), conservation organizations, and NGOs on both sides of the national border.

Since 1998, TPWD has financially supported recovery efforts going to both the Tamaulipas and Texas projects. Support is ongoing and is expected to continue.

Regulating shrimp with respect to turtle conservation is primarily done through effort reduction in the nearshore area by the use of seasonal shrimping closures (e.g., South Texas Closure and the Texas Closure) and, in addition to TED and BRD requirements, the restriction of using no more than two trawls with no more than 130-feet of headrope in the sensitive near-shore zone. The commission approved these shrimping regulations in August 2000.

Turtle protection efforts are concentrated along the Texas and Mexican Gulf beaches and nearshore Gulf where sea turtles are most abundant. The vast majority of sea turtles are found inside 20 fathoms, and most of those are typically inside 10 fathoms. Both beach conservation projects are long established, low cost, efficient programs and TPWD has joined forces to collaborate with these established programs rather than design independent programs.

TPWD's goal is to protect and conserve threatened and endangered sea turtles in state waters. The Kemp's ridley is the most endangered sea turtle in the world and this species uses Texas beaches and waters for migrating, feeding and nesting. TPWD also has considerable interest in establishing a secondary nesting population on Padre Island to reduce the risks of a natural or man-made disaster in Mexico.

Nesting is up and strandings are down since shrimping regulations were implemented in 2000. Sea turtle populations in Texas appear to be increasing. The Kemp's ridley population is expanding 14-17% a year. Still, shrimp trawling is the leading cause of sea turtle mortalities. Turtle excluder devices in the trawls have definitely helped save juvenile and adult sea turtles. Shrimping effort is believed to have dropped due to high fuel prices and low prices in the domestically produced shrimp market. TPWD expects fewer strandings as effort in the shrimping industry declines. At the current rate, this species could be down-listed from endangered to threatened within the next decade if project funding and recovery trends continue.

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**Figure 7. Texas Shrimping Zones**

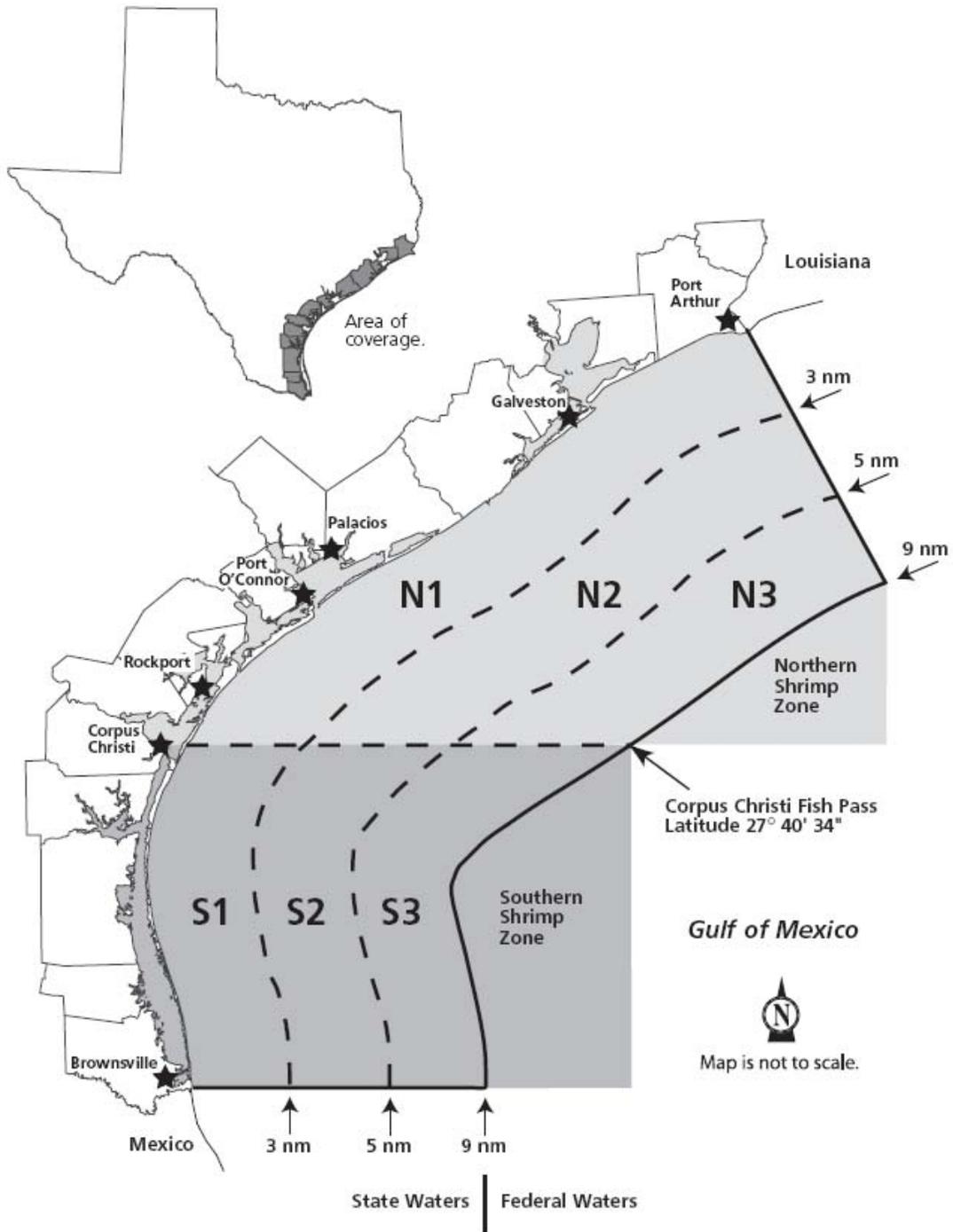
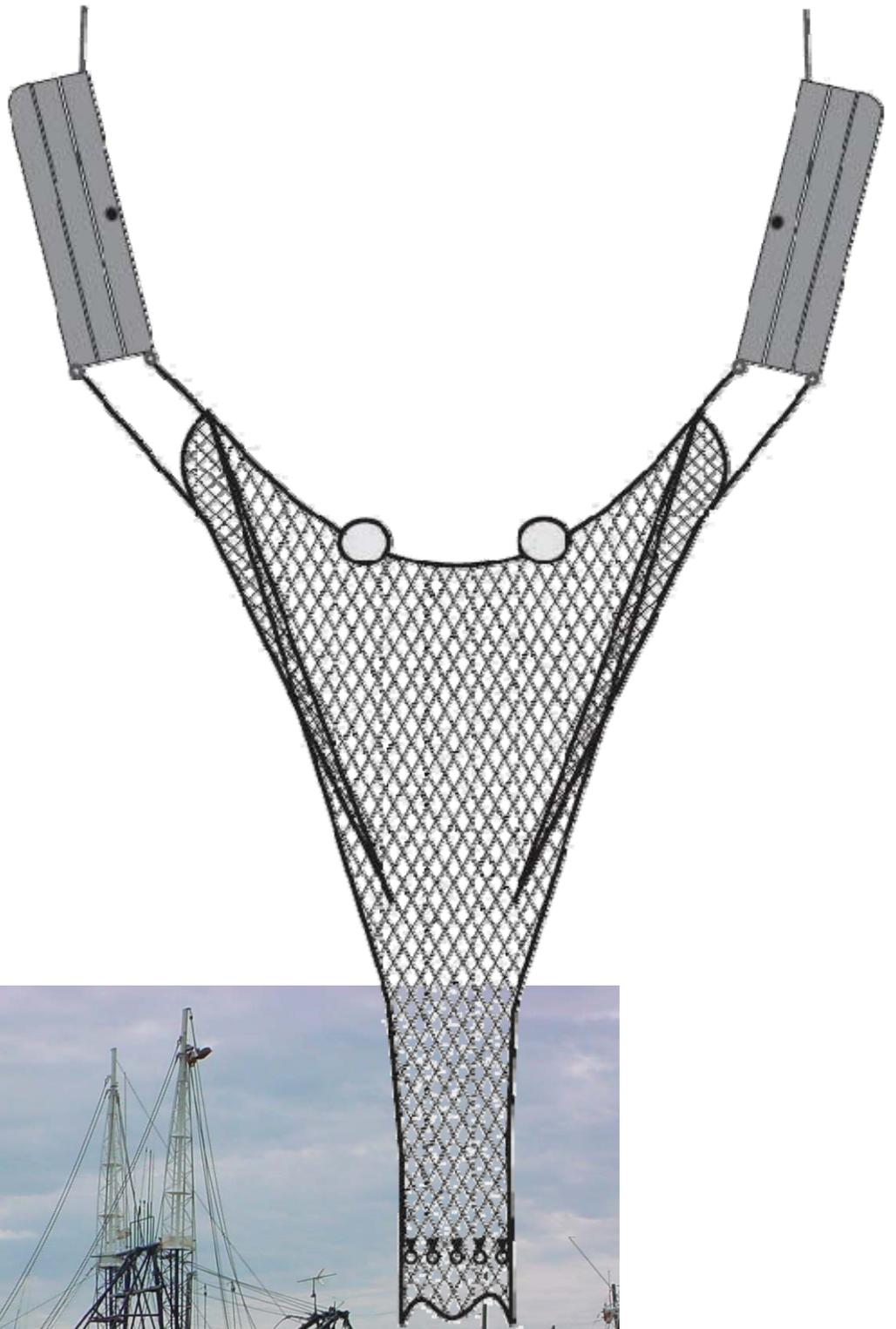


Figure 11. Otter Trawl



**Figure 12. Beam Trawl**



**Table 1. Commercial License Sales by Actual License Year**

<b>Type of License or Stamp</b>	<b>1993-94</b>	<b>1994-95</b>	<b>1995-96</b>	<b>1996-97</b>	<b>1997-98</b>	<b>1998-99</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>
Class B Menhaden Boat License	n/a	n/a	n/a	n/a	49	42	33	25	26	22	22
Commercial Crab Trap Tags	90618	86127	88222	90740	83731	n/a	n/a	n/a	n/a	n/a	n/a
Commercial Fishing Boat (Menhaden Only)	13	14	17	55	24	21	17	15	13	14	11
Dup. Res. Comm. Crab Fisherman's Lic.	n/a	32	29	0	0						
Dup. Resident Finfish Fisherman's License.	n/a	n/a	n/a	n/a	n/a	n/a	0	7	13	0	0
Duplicate Res. Bait Shrimp Boat Lic. Plates #	4	19	14	24	16	15	16	10	4	0	0
Duplicate Res. Bay Shrimp Boat Lic. Plates #	1	30	16	15	23	20	13	16	0	0	0
Duplicate Res. Commercial Fishing Boat Lic. Plates	4	11	7	13	11	6	4	5	2	0	0
Duplicate Res. Commercial Oyster Boat Lic. Plates	1	1	1	1	3	1	0	1	2	0	0
Duplicate Resident Gulf Shrimp Boat Lic. Plates #	3	6	3	0	6	3	0	6	3	0	0
Fishing Guide #	1278	1472	1643	1636	1639	1676	1818	1887	1862	1895	n/a
Individual Bait Shrimp Trawl Tags	1147	991	991	839	887	835	776	697	628	585	522
Non-Res. Saltwater Fishing Guide											3
Non-Resident Commercial Bait Shrimp Boat	0	0	1	1	1	0	0	0	0	0	0
Non-Resident Commercial Bay Shrimp Boat	0	0	2	1	2	1	2	1	0	1	0
Non-Resident Commercial Crab Fisherman	n/a	n/a	n/a	n/a	n/a	1	0	0	0	0	0
Non-Resident Commercial Finfish Fisherman's	6	11	4	6	5	5	2	1	1	1	1
Non-Resident Commercial Fishing Boat	27	35	59	37	23	27	22	13	14	20	20
Non-Resident Commercial Gulf Shrimp Boat	403	465	495	487	383	401	426	469	480	360	254
Non-Resident Commercial Oyster Boat	7	12	13	11	10	19	25	17	10	6	85
Non-Resident Commercial Oyster Boat Captain's	9	18	14	13	9	18	21	16	6	5	93
Non-Resident Commercial Oyster Fisherman's	0	0	0	0	0	0	0	0	0	0	0
Non-Resident Commercial Shrimp Boat Captain's	n/a	n/a	394	447	322	373	371	421	428	319	230
Non-Resident General Commercial Fisherman's	43	45	61	31	32	34	21	15	22	22	19
Non-Resident Shell Buyer's	0	1	2	0	3	1	1	1	1	0	0
Non-Resident Sport Oyster Boat #	0	1	1	0	0	0	0	1	0	0	0
Resident Commercial Bait Shrimp Boat #	1475	1787	1588	1500	1484	1401	1318	1265	1172	1090	984
Resident Commercial Bay Shrimp Boat #	1589	1841	1643	1569	1522	1460	1344	1288	1191	1100	985

**Table 1.Cont'd. Commercial License Sales by Actual License Year**

<b>Type of License or Stamp</b>	<b>1993-94</b>	<b>1994-95</b>	<b>1995-96</b>	<b>1996-97</b>	<b>1997-98</b>	<b>1998-99</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>
Resident Commercial Crab Fisherman	n/a	n/a	n/a	n/a	n/a	302	277	255	230	234	229
Resident Commercial Finfish Fisherman's	1282	1525	986	876	784	800	734	548	495	502	432
Resident Commercial Fishing Boat	1459	1561	1681	1488	1332	959	876	315	326	285	279
Resident Commercial Gulf Shrimp Boat #	1421	1376	1343	1267	1142	1174	1188	1344	1266	1003	1086
Resident Commercial Mussel & Clam Fisherman's	77	113	458	198	32	11	26	22	9	22	16
Resident Commercial Oyster Boat	312	352	325	404	360	297	294	293	281	319	381
Resident Commercial Oyster Boat Captain's	386	412	409	543	488	423	414	413	368	433	554
Resident Commercial Oyster Dredge #	n/a										
Resident Commercial Oyster Fisherman's	13	4	5	8	8	3	5	3	2	5	1
Resident Commercial Shrimp Boat Captain's	n/a	n/a	3286	3127	3094	3156	3093	3116	2810	2537	2350
Resident Freshwater Fishing Guide											601
Resident General Commercial Fisherman's	4733	4564	3201	2621	2312	1887	1611	1148	1022	768	778
Resident Saltwater Commercial Fishing Boat #	n/a										
Resident Saltwater Fishing Guide											900
Resident Shell Buyer's	2	6	10	9	4	1	2	1	1	1	0
Resident Sport Oyster Boat #	149	138	98	82	71	67	73	53	47	47	58
Transfer of Res. Comm. Bait Shrimp Boat Lic.	n/a	n/a	58	109	96	76	163	133	14	0	0
Transfer of Res. Comm. Bay Shrimp Boat Lic.	n/a	n/a	68	114	105	83	168	141	16	0	0
Transfer of Resident Commercial Fishing Boat Lic.	n/a	19	37	22	9	8	6	5	1	0	0
Transfer of Resident Commercial Oyster Boat Lic.	n/a	14	6	2	6	8	14	1	1	0	0
Transfer of Resident Commercial Shrimp Boat Lic.	n/a	282	35	22	15	17	13	30	1	0	0
Transfer Res. Comm. Finfish Fisherman's Lic.	n/a	34	12	0	0						

**Table 3. Texas Commercial Finfish and Shellfish Landings (lb X 1000), (in press)**

		Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Finfish</b>	Black Drum	1822.8	2915.6	4253	3866.2	2690.6	2838	2837.1	2501.1	2330.7	1676.7	1717.1	
	Flounder	211	274.2	218.2	184.5	217.9	287.8	159.5	121.2	173.3	158.5	151.1	
	Sheeps-head	39.5	54.1	103.2	94.8	117.2	118.2	106.9	85.3	92.6	67.6	68.3	
	Snapper	1164.4	1244.1	1687	2023.9	1626.6	1629.4	1553.6	1658.9	1698.9	1807.1	2505.1	
	Other	1348.8	1961.8	1616.3	1812.6	1616.7	1762.6	1719.2	1362.5	1611.9	1391.9	1276.8	
	<b>Total</b>	4586.5	6449.9	7877.8	7981.9	6269	6635.8	6376.4	5728.9	5907.3	5101.8	5718.4	
<b>Shellfish</b>	<b>Shrimp</b>	Brown & Pink	33215.2	31216.2	28818.8	24259	32829.5	25624.2	36529.7	30582.2	25360.9	26430.6	21238.4
		White	8920.7	7465.1	8748.7	8956.4	9446.8	9158.1	9576	9347.7	10942.6	8019	9558
		Other	1513.6	1377.8	1933.8	2458.8	1581.1	612	317.2	1360.7	412.3	714.4	353.1
	<b>Total</b>	43649.4	40059	39501.3	35674.2	43857.4	35394.3	46422.8	41290.6	36715.8	35164	31149.6	
	Blue Crab	5154.4	5786.5	6311.4	7083.8	6988.5	6472.1	4653.3	5168.2	7037	4811.3	3960.9	
	Oyster	4581.5	4670.6	5705.4	4687	3437.9	6411.2	6187.8	4775.4	4708	6833.4	5519.5	
	Other	41.9	56.1	127.5	75.3	84.7	97.7	106.3	109.6	93.1	94.2	80.9	
	<b>Total</b>	53427.2	50572.1	51645.6	47520.3	54368.6	48375.3	57370.2	51343.9	48553.9	46902.9	40710.8	
<b>Grand Total</b>		58013.7	57022	59523.4	55502.2	60637.5	55011.2	63746.6	57072.9	54461.2	52004.7	46429.2	

<b>Table 6. Sea Turtle takes from TPWD experimental otter trawls</b>			
<b>Area</b>	<b>Date</b>	<b>Seaturtle Species</b>	<b>Length</b>
Matagorda Bay	18-Apr-88	Loggerhead	690
Gulf - off Aransas	27-Apr-04	Loggerhead	690
Matagorda Bay	06-Aug-01	Kemp's Ridley	629
Gulf - off Sabine	16-Sep-97	Kemp's Ridley	240
Gulf - off Aransas	16-Jul-97	Kemp's Ridley	600
Lower Laguna Madre	07-Jul-97	Green	560
Lower Laguna Madre	11-Jun-98	Green	293
Lower Laguna Madre	22-Mar-01	Green	341
Gulf - off Sabine	27-Apr-92	Unidentified	N/A

## **Virginia Trawl Gear Characterization**

Prepared by the Atlantic States Marine Fisheries Commission

### ***1.1 TRAWLS***

Trawling is prohibited in Virginia waters (4VAC20-420-20).