

## 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

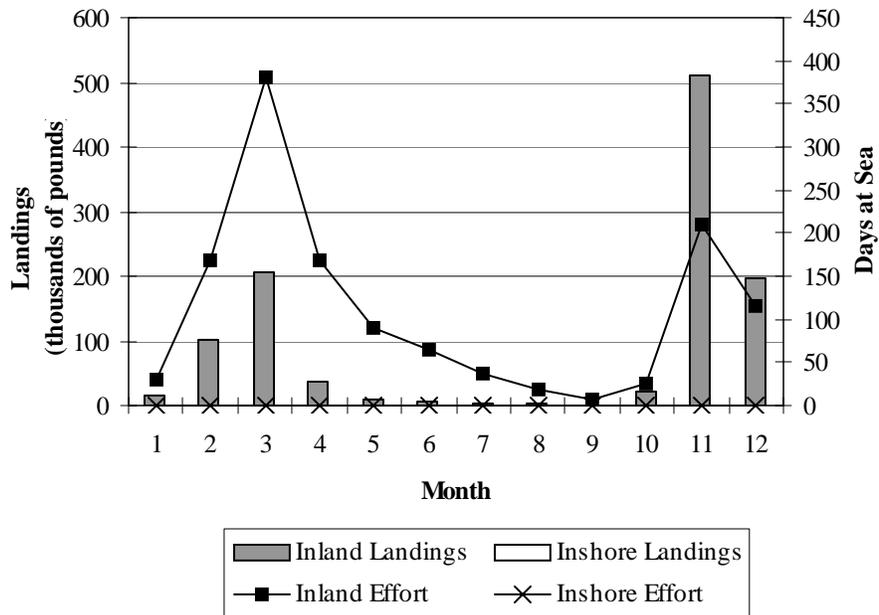
The number of vessels fishing crab trawls from 2000 to 2002 fluctuated with the highest number fishing in 2001 (Table 1).

**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

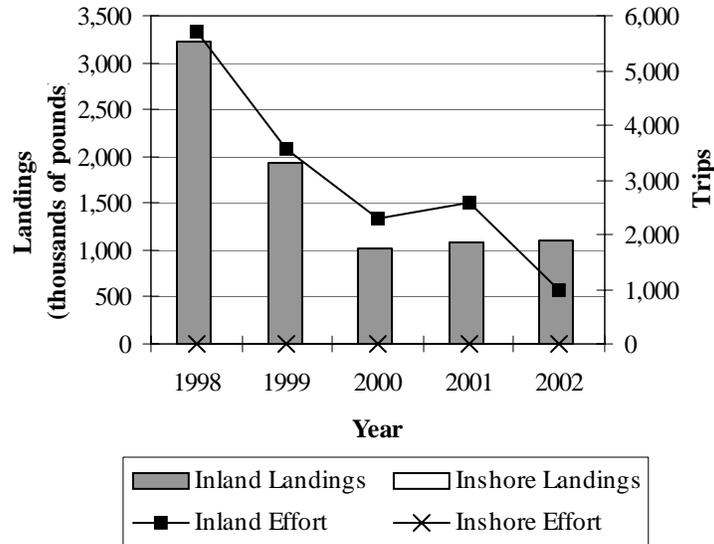
All effort by crab trawls is in inland waters. Crab trawling occurs primarily in Croatan, Roanoke and Pamlico sounds; the Pamlico, Pungo, Bay and Neuse rivers; and in Core Back and Bogue sounds including the White Oak, Newport and North rivers (Cunningham et al. 1992). See the NCAC for areas closed to 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).

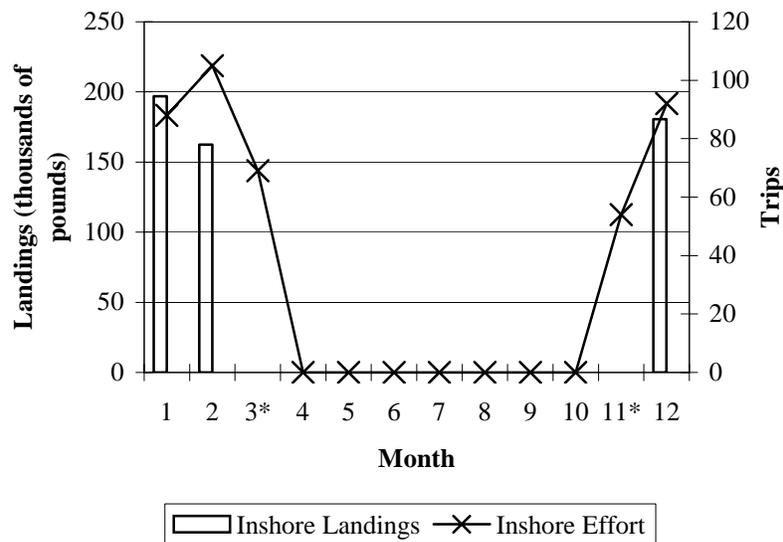
**Table 2.** Number of vessels fishing flounder trawls from 2000 to 2002.

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).

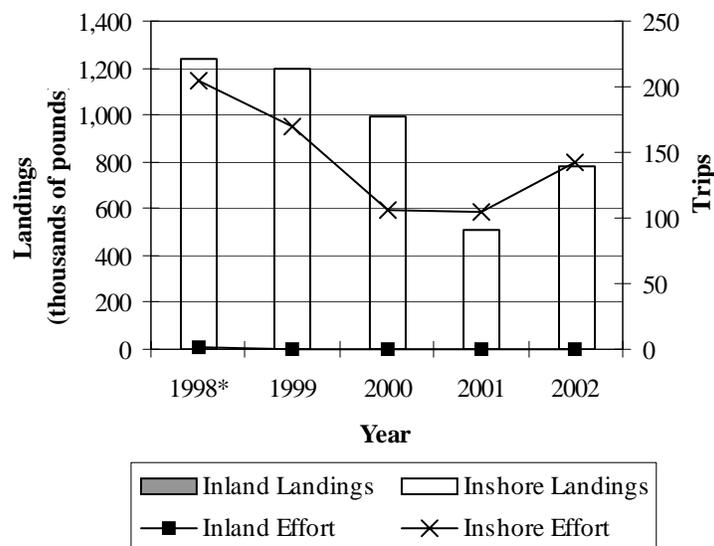
In 2002, most landings and effort occurred during the winter (Figure 3, Table 1-4). The quota on summer flounder causes the seasonal variation of the flounder trawl fishery. The NMFS, the MAFMC, and the ASMFC share oversight of summer flounder. In 2002, they allocated 14.58 million pounds (6,613 metric 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).

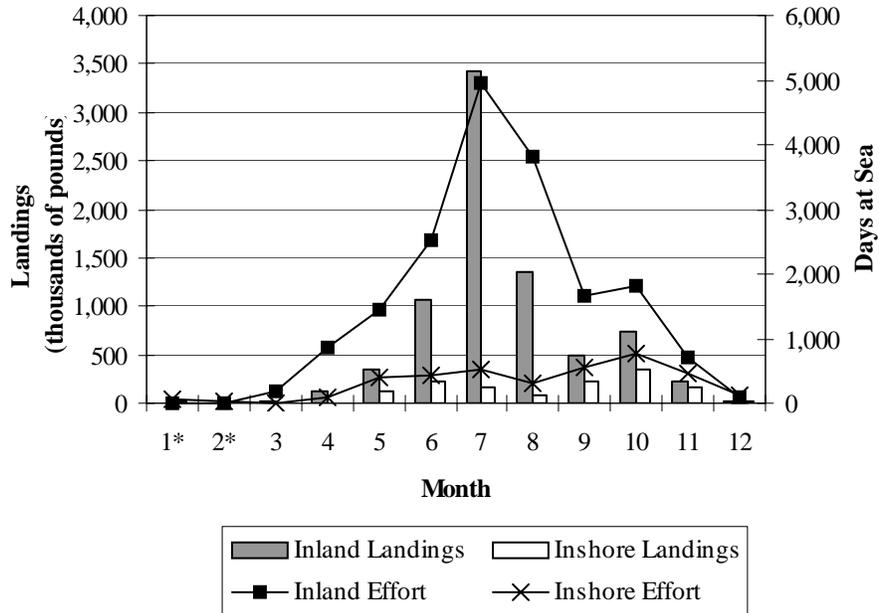
**Table 3.** Number of vessels fishing shrimp trawls from 2000 to 2002

<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).

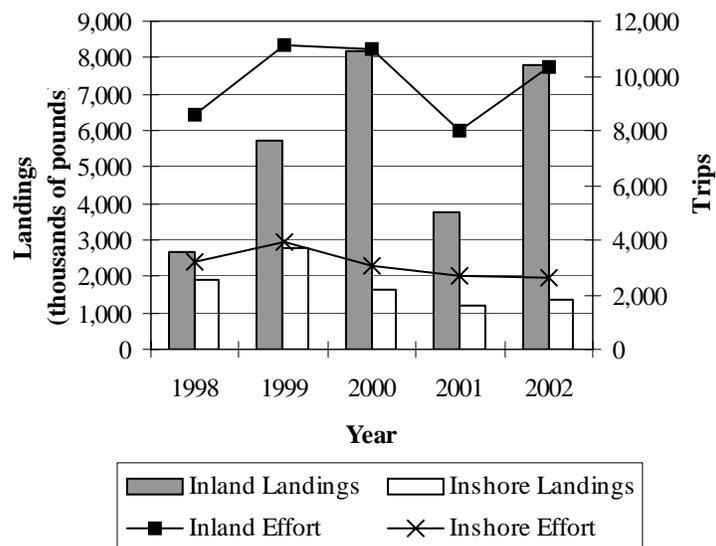
Along with this commercial use, North Carolina also allows recreational fishermen with RCGL licenses to use shrimp trawls. The DMF estimated Recreational Commercial Gear License (RCGL) holders took 5,373 trips using shrimp trawls in 2002 (NCDMF 2003b). Preliminary data from 2003 showed RCGL holders took 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.

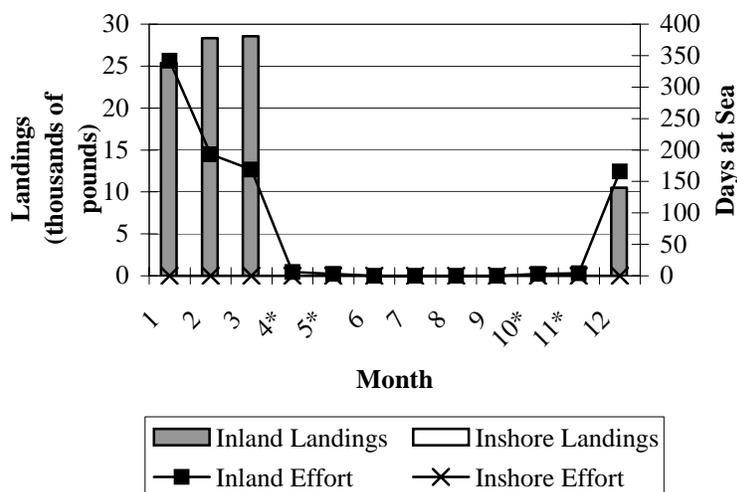
Year	Active Inland Vessels	Active Inshore Vessels
2000	86	0
2001	80	0
2002	73	0

### 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.

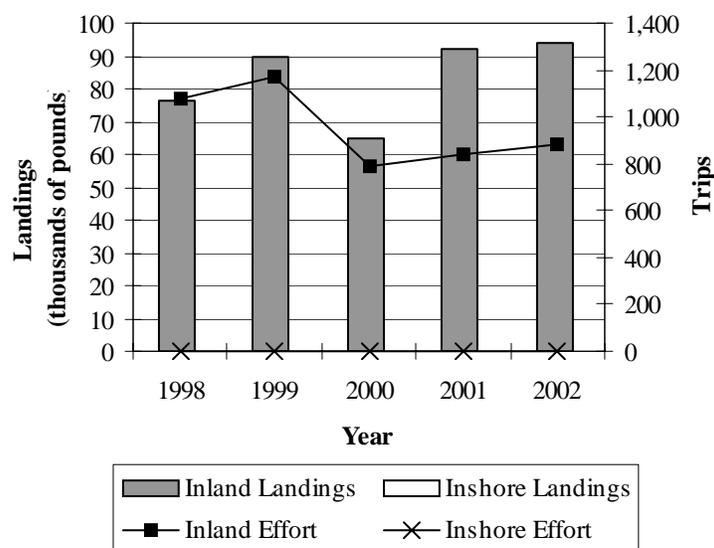
Between 1998 and 2002, clam kicking only occurred in inland waters. Landings and effort were highest in the winter months in 2002 (Figure 7, Table 1-7).



**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

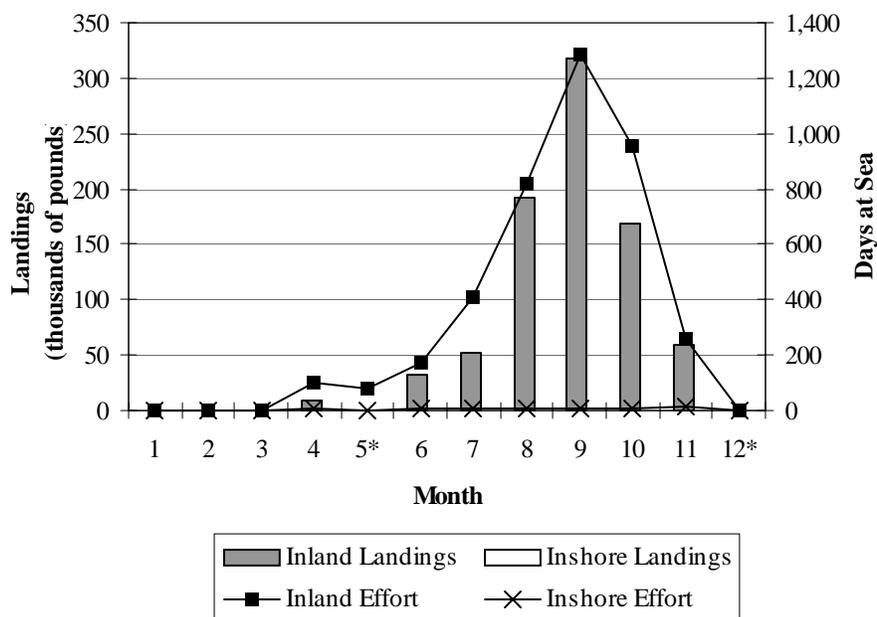
There were no vessels fishing in inshore waters with skimmer trawls from 2000 to 2002. There were 211, 157 and 173 vessels fishing in inland waters during 2000, 2001 and 2002, respectively (Table 5).

**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

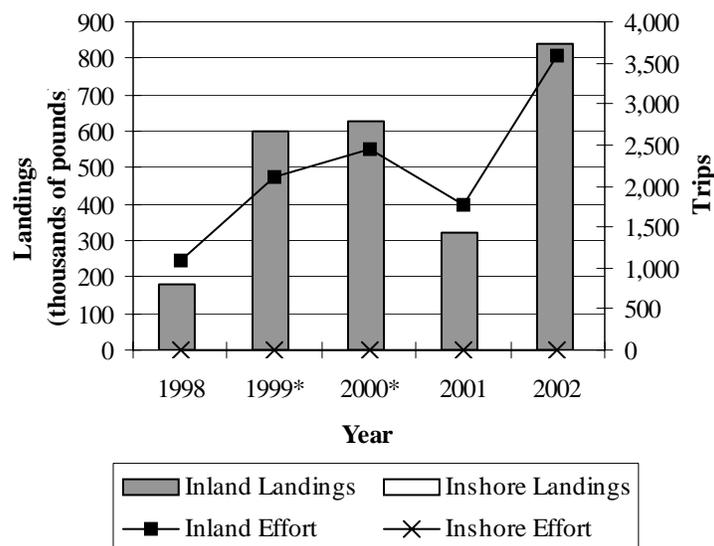
Skimmers are used most often for white shrimp during mid-summer to fall in Pamlico and Core sounds, south to New River Inlet. It is reported that as many as 30 to 40% of vessels fishing in these waters are using skimmer trawls. Skimmer trawl use in Core Sound may be as high as 90% (Epperly et al. 2002). 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

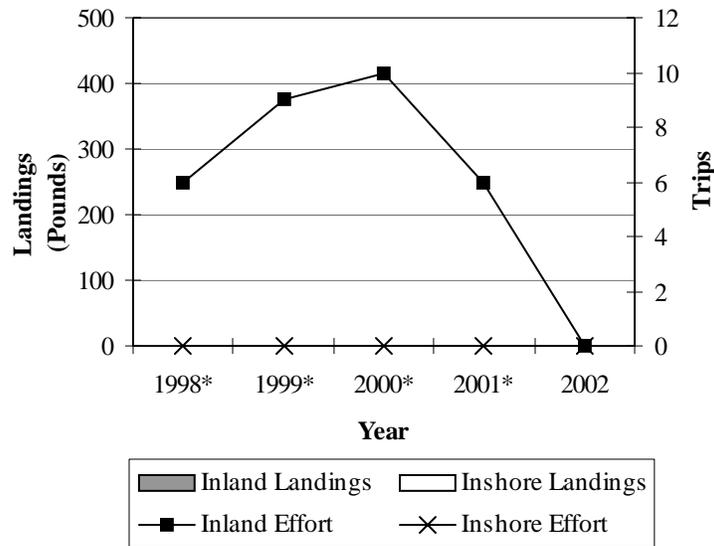
In inland waters, there were three vessels fishing in 2000 and 2001 but none in 2002. There were no vessels fishing butterfly nets in inshore waters.

#### 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

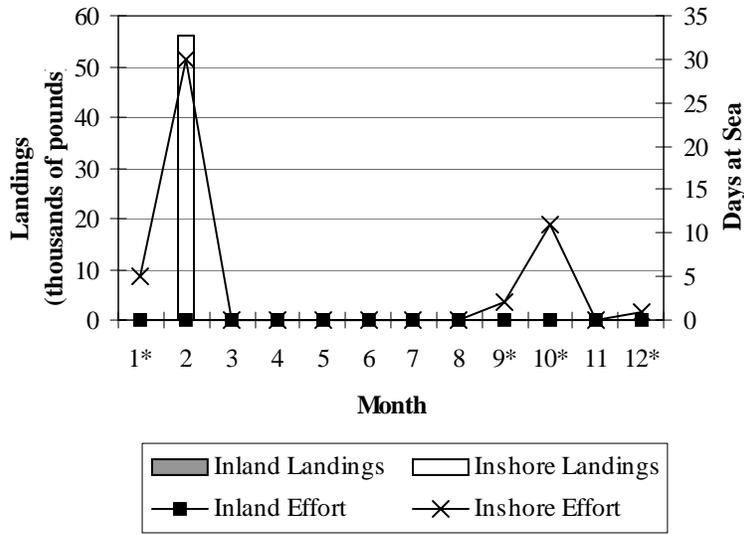
The number of active flynet vessels rose from nine in 2000 to 35 in 2001 and then dropped to 21 in 2002 (Table 6).

**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

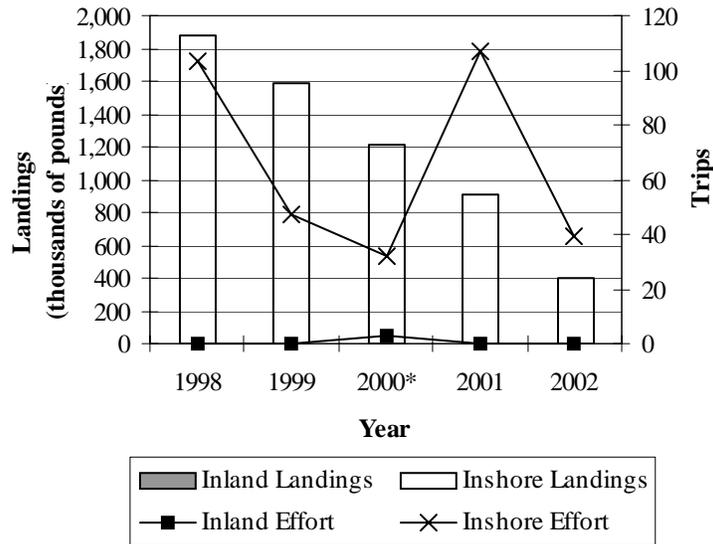
Flynet fishing generally takes place in depths less than 36 meters (118 feet) from Oregon Inlet to Cape Hatteras from October through April (NCDMF 2004a). Flynets are no longer allowed south of Cape Hatteras in order to protect weakfish stocks (Bianchi 2004, pers. comm.). This fishing occurs in both 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