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The lobster, shrimp and prawn industry in Ghana – species, ecology, fishing and landing sites, handling and export

BY

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THE LOBSTER, SHRIMP AND PRAWN INDUSTRY IN GHANA
(Species, Ecology, Fishing and Landing sites, Handling and Export)

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EXECUTIVE SUMMARY

1.0. Introduction

Frozen shellfishes have become a big demand driven export commodity in the Ghanaian economy. Products have often failed to meet standards of importing countries. To ameliorate this, the species, ecology, fishing grounds , landing sites, problems encountered, major exporters and revenue gained were investigated. The main fishing grounds lie between Cape Timiris and Cape Estérias in the Eastern Central Atlantic Region including the Gulf of Guinea.

1.1. Lobsters

Have five families namely **Nephropidae, Palinudae, Polychelidae, Scyllanidae and Cailianassidae.**

1.2. Shrimps

Have two sub-orders **Caridea** with families **Crangonidae, Hippolytidae, Nematocarcinidae, Palaemonidae, Pandalidae** and **Pasiphaeidae** whilst the sub-order **Penaeoidea** has families **Aristeidae, Penaeidae Sicyonidae** and **Solenoceridae.**

2.0. Fishing grounds and landing sites

2.1. Shrimps

Occur at depths 20-60 metres over sea bottoms of fine sediment with major fishing grounds at Keta to Ada and Axim to Cape Three Points. The major shrimp season is from May to April. The major landing sites include Kpone, Mumford, Apam, Shama, Sekondi and Cape Three points.

2.2. Lobsters

Found in waters with rocky bottoms between Keta to Axim in waters 20 metres deep or more. The major fishing grounds for lobsters are off Dixcove to Shama and Gomoa to Ningo shores.

3.0. Handling

3.1. Shrimps- Landed frozen or unfrozen. Shrimps for export are peeled, iced /lime water washed, graded and exported live or frozen.

3.2. Lobsters

Kept in sacs of netting in the sea after harvesting them, washed, graded and exported live or frozen.

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Major source is from the waters from which the shellfishes are caught.

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5.1. Lobsters

Traded live, whole frozen, frozen tails, par- boiled or whole cooked in brine.

5.2. Shrimps

Traded whole, headon, head off shell on or head off shell off.

5.3. Grading

Lobsters and shrimps are graded by weight either as (a) whole lobsters or (b) lobster tails. Shrimps (head on, shell on) graded into sizes 0-7. Zero being largest (over 100g/shrimp) and 7 smallest (less than 8 g / shrimp).

6.0.Major Exporters

6.1. Lobsters

Companies include Vivers du Nord Ghana Ltd, Société Nouvelle Cap Lang, Kpone Lobster Export Company Ltd, Skippys Sea Food Company Ltd, Pako Bay Sea Food Ltd, of which Kpone Lobster Export Co. Ltd emerged as Gold Award Winner in 1998 with Holding Fishing Co. Ltd the winner in 1997.

6.2. Shrimps

Companies include Premus Trading Company Ltd, Kiku Company Ltd, Ninamich Enterprises, Pako Bay Sea Food Ltd and Divine Sea Food Ltd.

Revenue earned ranged from $963.557 for shrimps and $333,577 for lobsters in 1994 to $363, 286 for shrimps and $608,990 for lobsters in 2001.

7.0. Conclusions

In the last five years there has been a progressive decline in shrimps and prawns exported. On the other hand, there has been a corresponding increase in the amount of lobsters exported. Shrimps and lobsters are now being caught in much deeper waters and in smaller sizes. Habitat pollution has been a major source of contamination of shrimp and lobster products.

8.0. Recommendations

A closed season should be instituted during seaward migration of juveniles and the relationships between marine fisheries and estuarine and lagoon shrimp fisheries should be closely studied.

THE LOBSTER, SHRIMP AND PRAWN INDUSTRY IN GHANA
(Species, Ecology, Fishing and Landing sites, Handling and Export) .

1.0 INTRODUCTION

Frozen shellfish, and in particular lobsters, have become a big demand driven export commodity in the fisheries sector of the Ghanaian economy. However, the products do not meet the standards of importing countries and are frequently subjected to confiscation, rejection and in certain cases outright destruction. As part of the Agricultural Sector Improvement Programme (AGSIP) a team of Research Scientists from the Council for Scientific and Industrial Research (CSIR) made up of Mrs. M.A.O. Atikpo and Mr. L.A. Abbey of the Food Research Institute, Dr. M. Entsua-Mensah and Mr. K.A.A. deGraft-Johnson of the Water Research Institute came together to study the post harvest processing of prawns, shrimps and lobsters. As part of the study, the team investigated among others;

1. The ecology and identification of species, major fishing grounds and landing sites for shellfish (shrimps, prawns and lobsters) in Ghana,
2. Problems encountered in shrimping activities,
3. Types of holding containers for harvested shellfishes,
4. Major exporters of the commodities and the criteria for exporters,
5. Quantities exported and revenue gained within the last decade,
6. Possible sources of contamination in their habitats, during holding and finally draw conclusions and recommendations.

The main fishing grounds for lobster, shrimp and prawn resources in the Eastern Central Atlantic Region including the Gulf of Guinea stretches between Cape Timiris to the north and Cape Estérias to the south (Fig.1.). Many species and varying populations and sizes of lobsters, prawns and shrimps are found in the Gulf of Guinea.

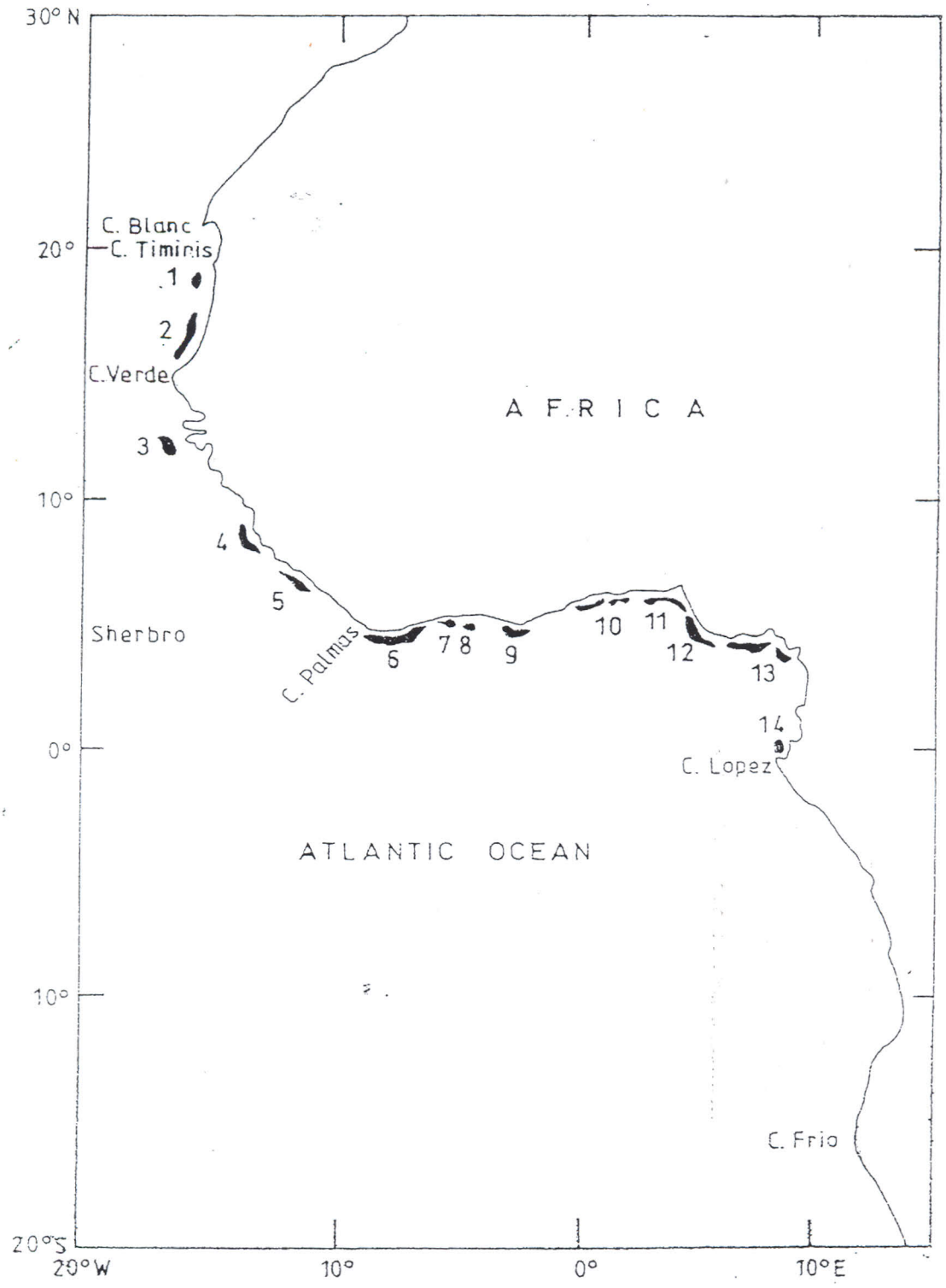


Fig. 1 Main fishing grounds and CECAF statistical divisions
1: Cape Timiris ; 2: St. Louis of Senegal ; 3: Roxo-Bissagos ;
4: Shebro ; 5: Monrovia ; 6: Sassandra - Tabou ; 7: Grand-Lahou ; 8: Grand-Bassam ; 9: Axim - Cape Three Points ;
10: Ada / Keta ; 11: Lagos ; 12: Niger delta ; 13: Cameroon ;
14: Cape Esterias

1.1 Lobsters

Schneider (1990) named five families of lobsters:

i) **Nephropidae** (True lobsters) represented by a single species *Nephropsis atlantica*

ii) **Palinuridae** (Spiny lobsters)

iii) **Polychelidae** generally of no significant commercial interest at present; although a species *Stereomastis sculpta talismani* is important as a by-catch in deep- sea trawls.

iv) **Scyllaridae** (Slipper lobsters) having four known species with only *Scyllarides herklotsii* (Red slipper lobster) sold in some local markets when caught as by-catch.

v) **Callianassidae** (Ghost shrimps) has one specie *Callianassa turnerana* which swarms every three to five years in estuaries and is of considerable importance in artisanal fisheries at the local level.

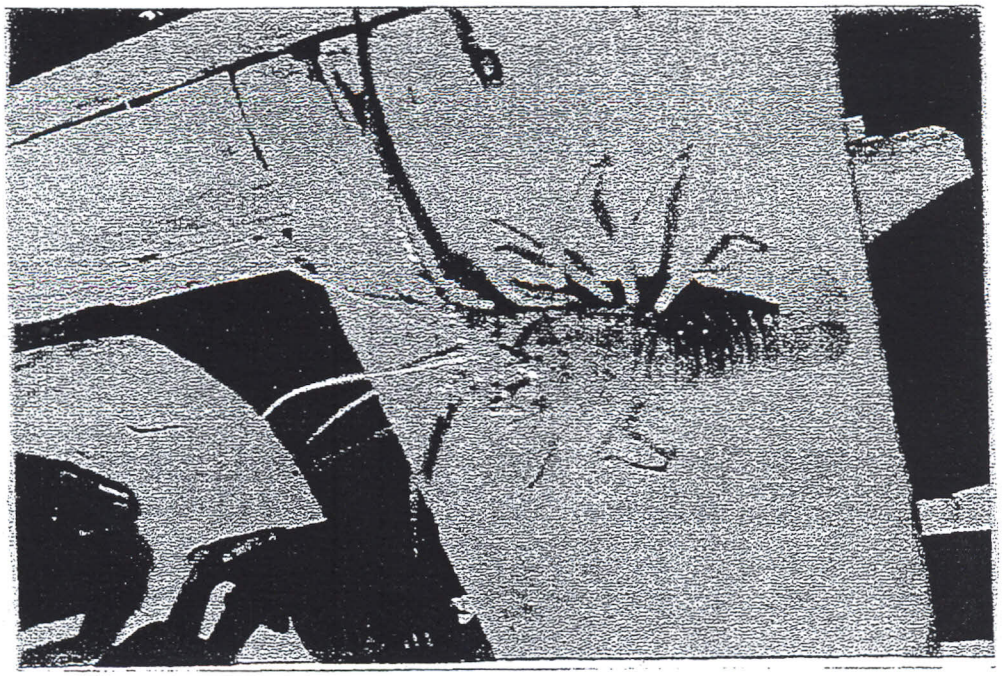
Palinuridae has *Panilurus argus* (Carribean spiny lobster) and *P. regius* also known as *P.rissonii* (Royal spiny lobster or Spiny rock lobster). The latter is the most common lobster in Ghana (Plate 1).

1.2 Shrimps

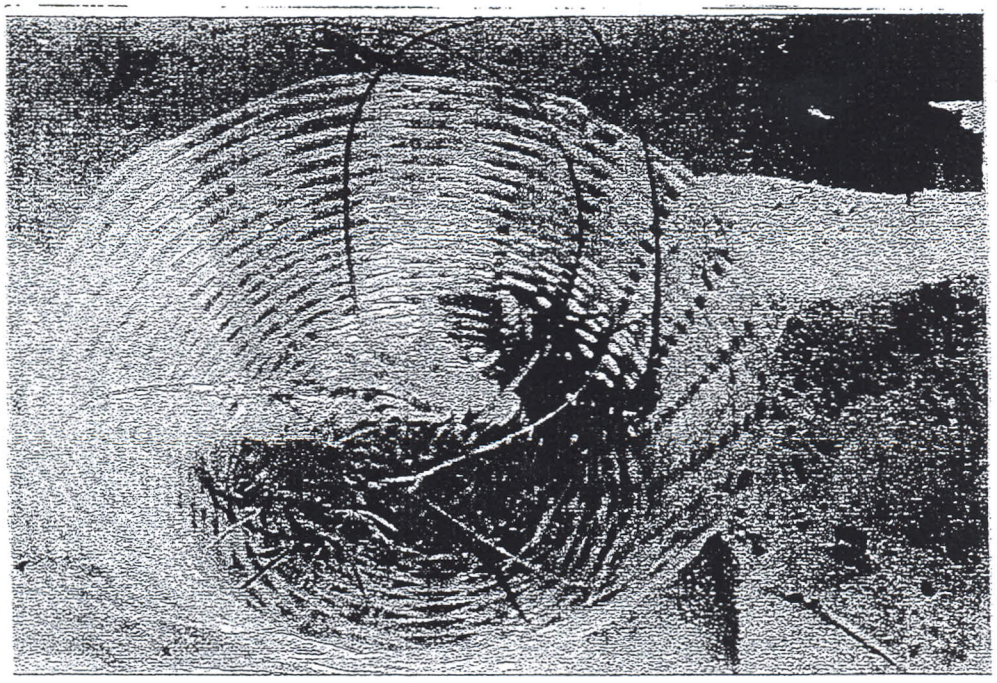
There are two sub-orders of shrimps and prawns in the Gulf of Guinea. The sub-order **Caridea** has families namely **Crangonidae**, **Hippolytidae**, **Nematocarcinidae**, **Palaemonidae**, **Pandalidae** and **Pasiphaeidae** whilst the sub-order **Penaeoidea** has families **Aristeidae**, **Penaeidae**, **Sicyonidae** and **Solenoceridae** of which the Penaeidae shrimps are of major commercial importance.

In West Africa including Ghana, four main species of shrimps from the family Penaeidae occur in their waters and are of commercial importance according to Garcia and Lhomme (1980). These are *Parapenaeopsis longirostris* (Deep water Rose Shrimp), *Penaeus* (*Melicertus*) *kerathurus* (Caramote prawn or Tiger shrimp), *Penaeus* (*Farfantepenaeus*) *notialis,* and *P. brasiliensis* (Southern Pink shrimp),

Plate 1



Panilurus regius
Royal Spiny lobster or Spiny Rock lobster



which is also misidentified as *P.* (*Melicertus*) *duorarum*. The southern pink and tiger shrimps are the most important and dominant species. The southern pink shrimp, the larger of the two species dominates shrimp landings by the larger commercial shrimpers while the artisanal fleet landings are dominated by the tiger shrimp (Plates 2a, 2b, and 3).

2.0. FISHING GROUNDS AND LANDING SITES.

2.1 Shrimps

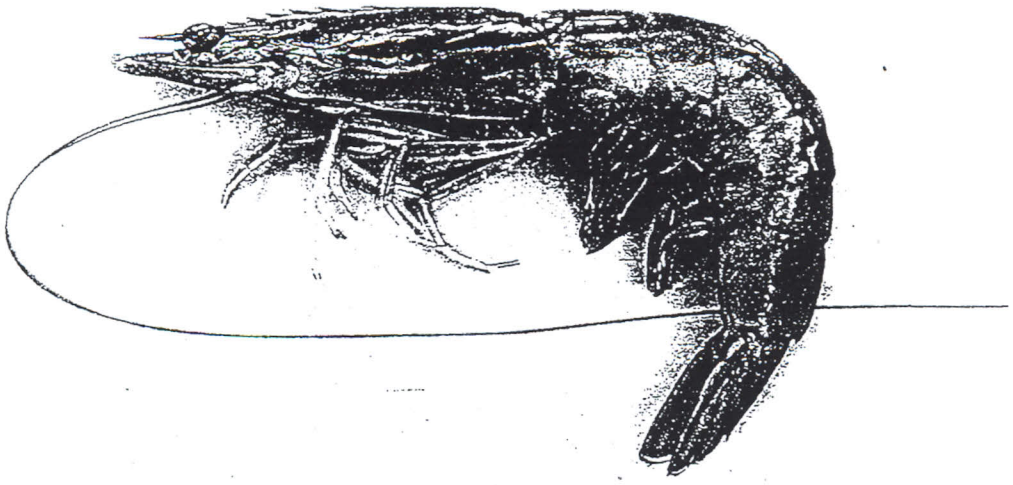
According to Garcia and Lhomme (1980), exploitable concentrations of shrimp populations are encountered at depths of between 20-60 meters over sea bottoms containing more than 75% fine sediment. However, commercial quantities of tiger shrimps have been found in waters down to 200 meters off the coast of Ghana. According to Fisheries Department of the Ministry of Food and Agriculture (MOFA) June to December is the major shrimping season. However, during interviews in the field the general opinion indicated the shrimping season to be between May and August with peaks in September to October. The low or lean season was from November to April.

The major shrimp fishing grounds are localized in the Keta to Ada and Axim to Cape ThreePoints areas of Ghana. Other important grounds are found off Shama and Adwoa in the Western Region, and Nungua in the Greater Accra Region (Fig.2). The major areas lie in waters between 24-45 meters deep covering a total of 200 square miles (520 km^2) of which 310 km^2 is located off Axim to Cape Three Points (Garcia and Lhomme,1980). The major landing sites are:

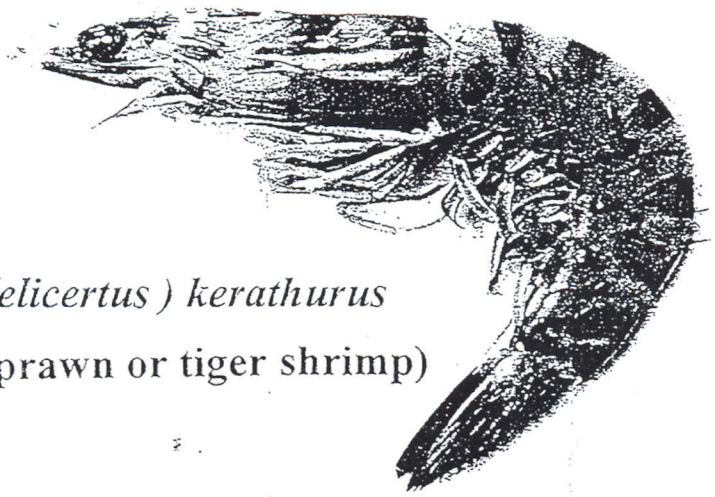
1. Kpone (Plate 4)
2. Tema (Newtown).
3. Sekondi Beach
4. Elmina
5. Mankoadze

Plate 2a

Important commercial shrimp species in Ghana

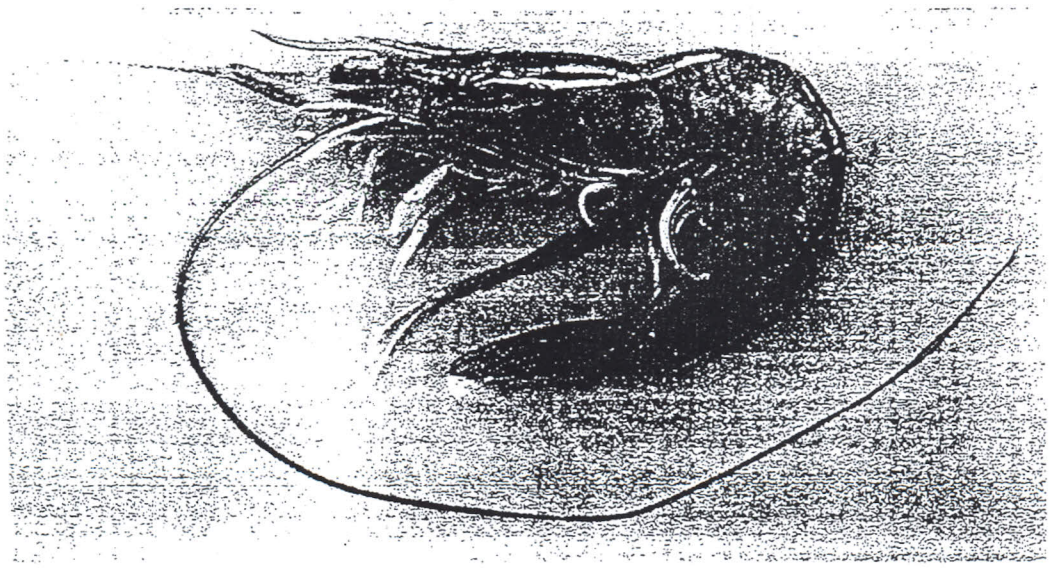


Penaeus (Farfantepenaeus) notialis (Southern pink shrimp)



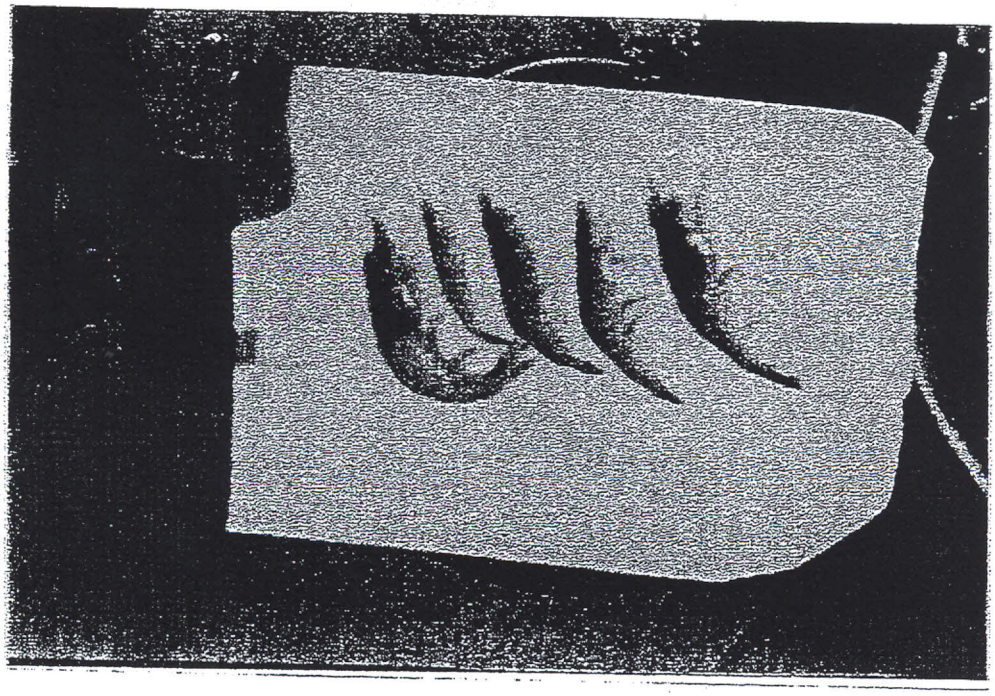
Penaeus (Melicertus) kerathurus

(Caromote prawn or tiger shrimp)



Parapeneopsis longirostris (Deep water rose shrimp)

Plate 2b



A mixture of Southern pink and tiger shrimps

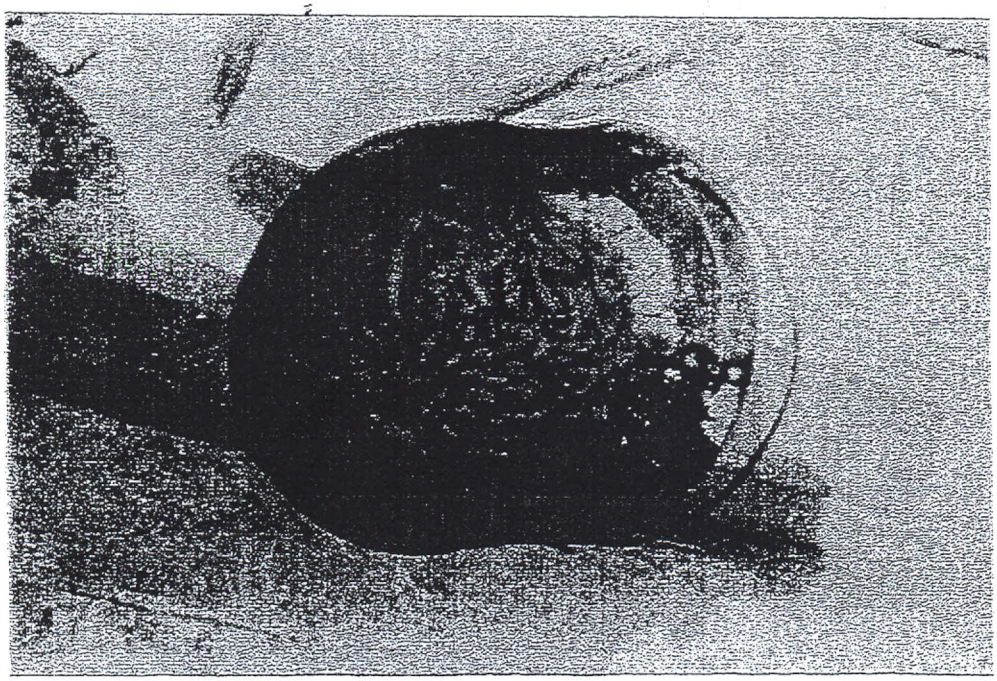
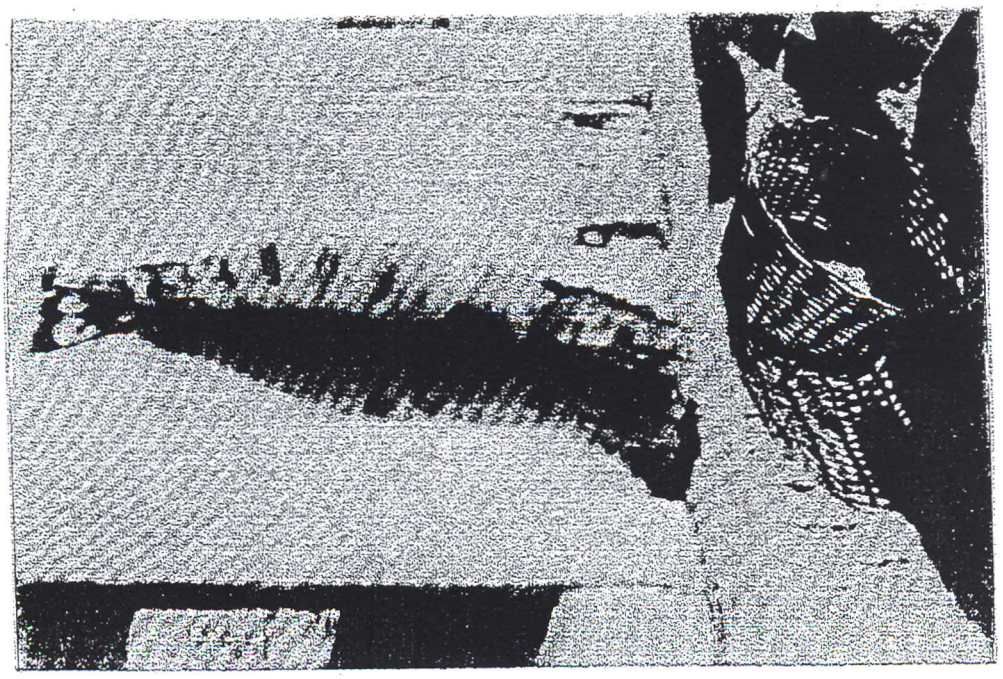
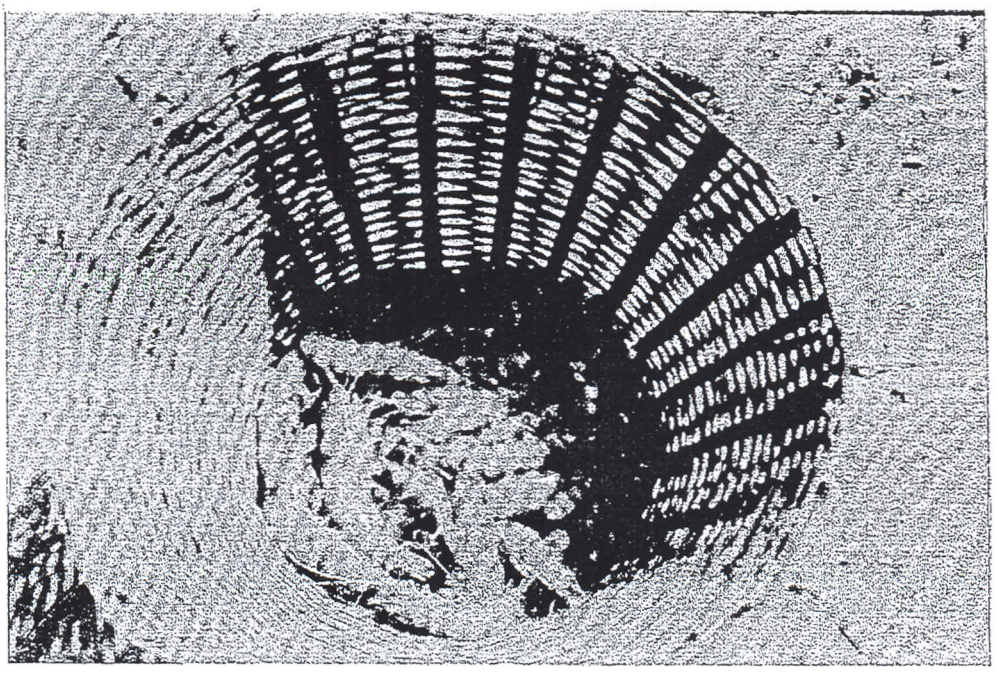


Plate 3



The Caramote prawn or tiger shrimp



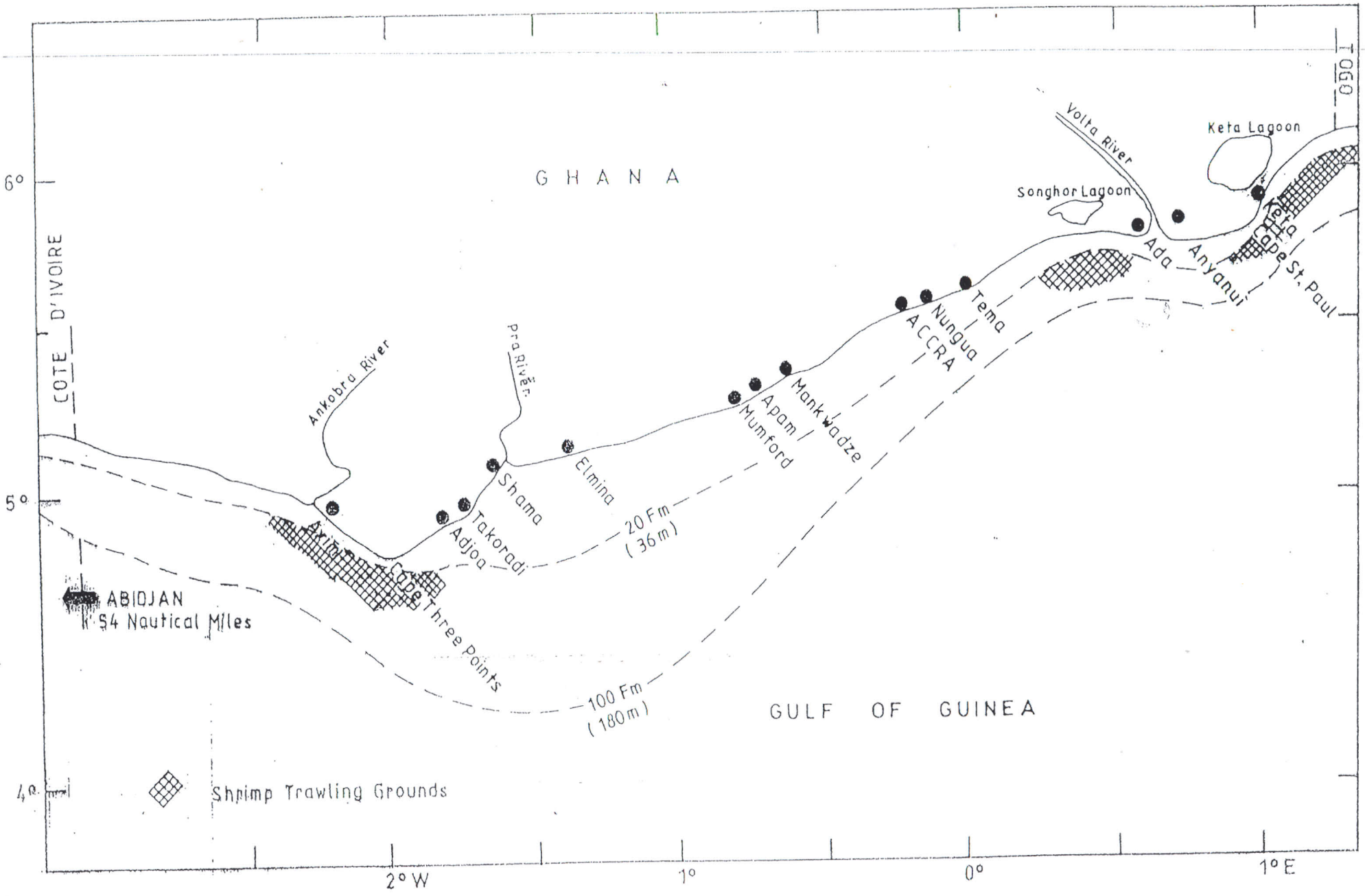


Fig.2 Shrimping Grounds off Ghana (Modified after Jones, 1970)

6. Apam (Plate 5)
7. Mumford (Plate 6)
8. Keta (Plate 7)
9. Dzita
10. Atitieti (Plate 8)
11. Axim (Plate 9)
12. Shama
13. Cape Three Points / Princess Town (Plate 9)
14. Atimpoku /Kpong and Sogakope (Freshwater Prawns)

Shown in Plate 10 are bowls of landed shrimps with some cuttlefishes being cleaned for the local market. The Annual Landings (metric tonnes) of shrimps by both artisanal and inshore fleets from 1977 to 1989 is shown in Table 1.

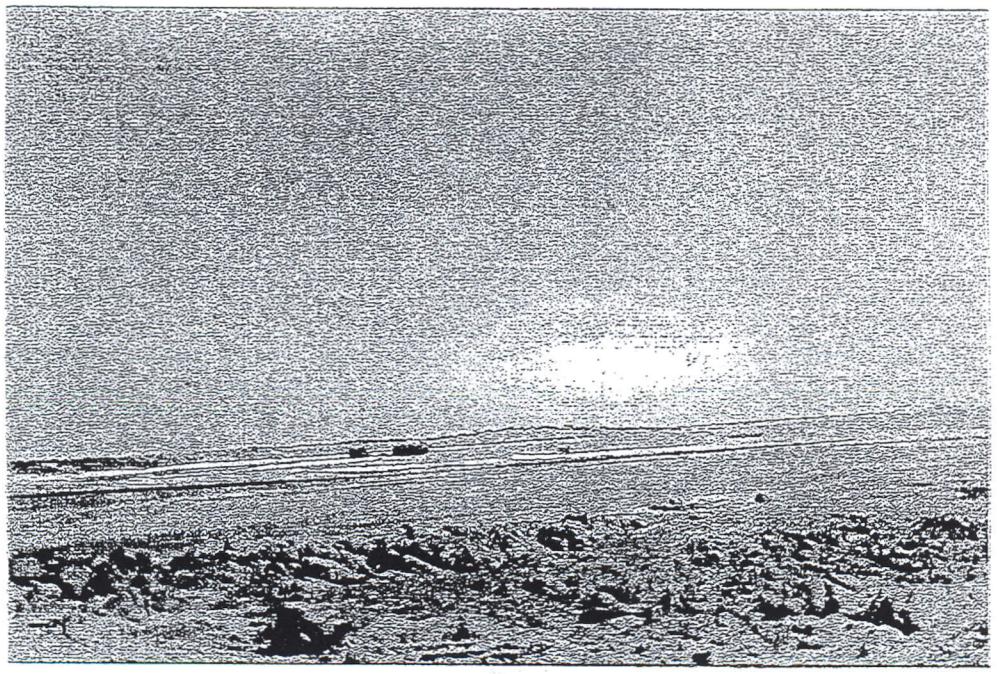
Table 1. Annual Landings of Shrimps (Artisanal and Inshore fleets)

Year	Landings (metric tones)
1977	643.20
1978	422.80
1979	202.10
1980	584.80
1981	489.90
1982	331.20
1983	331.70
1984	216.50
1985	508.00
1986	552.50
1987	1602.10
1988	1177.30
1989	1152.85**

**This data is for Artisanal shrimpers only.

Source: Fisheries Department of MOFA, February 1990.

Plate 4



A view of Kpone Landing Site

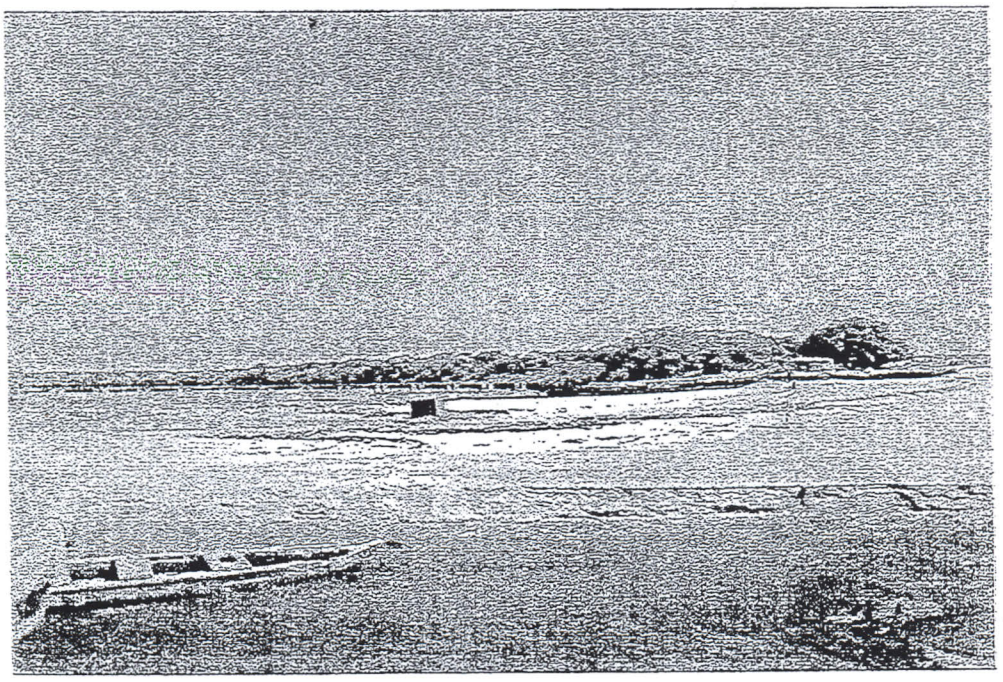
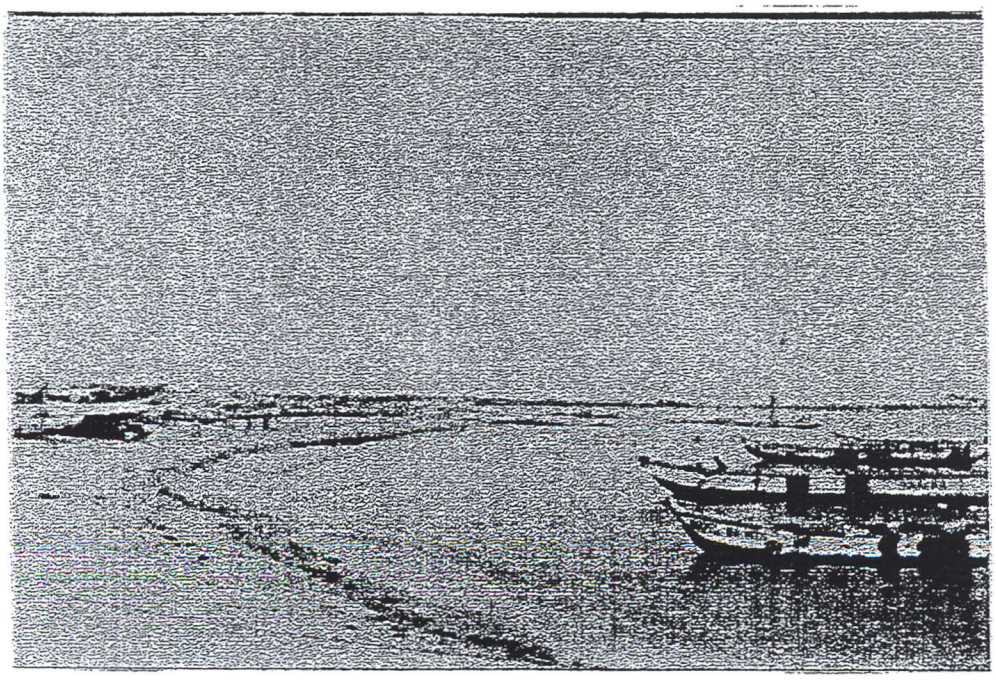


Plate 5



A view of Apam Landing Site

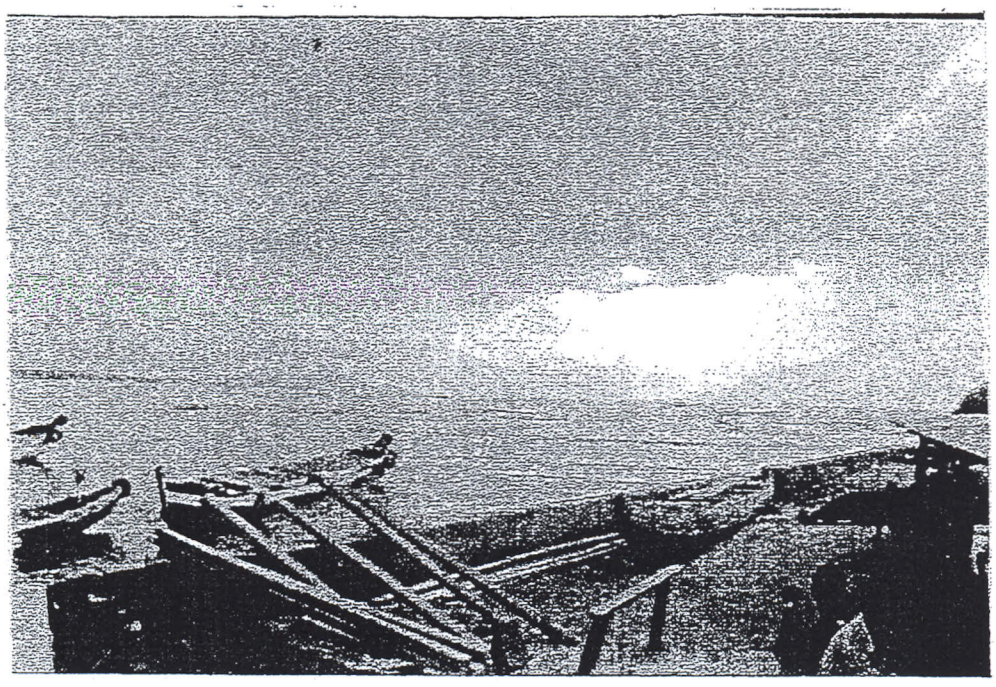
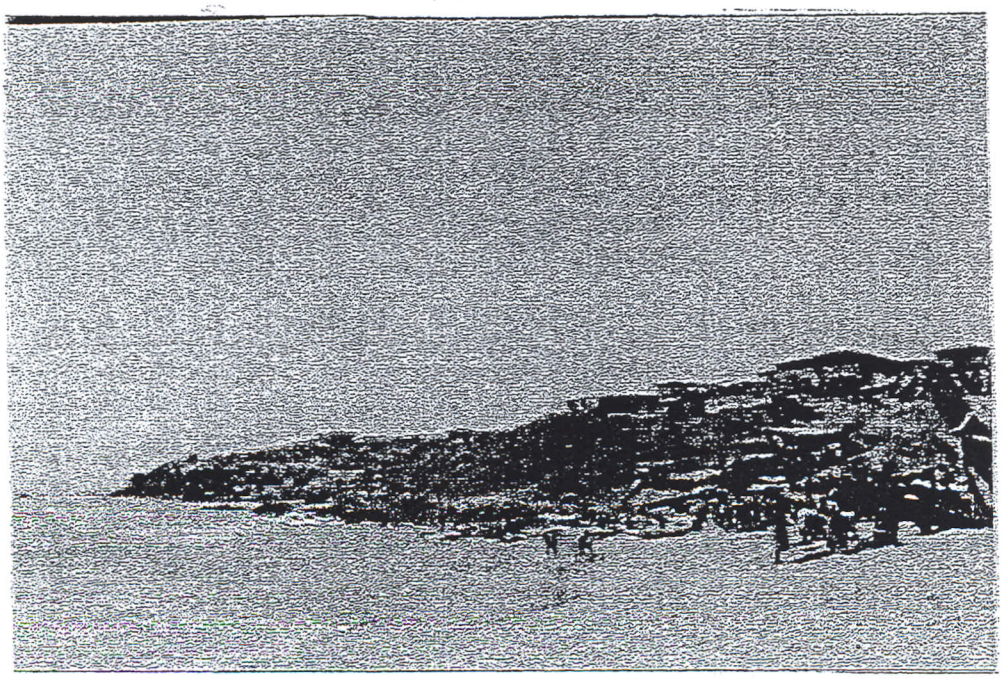


Plate 6

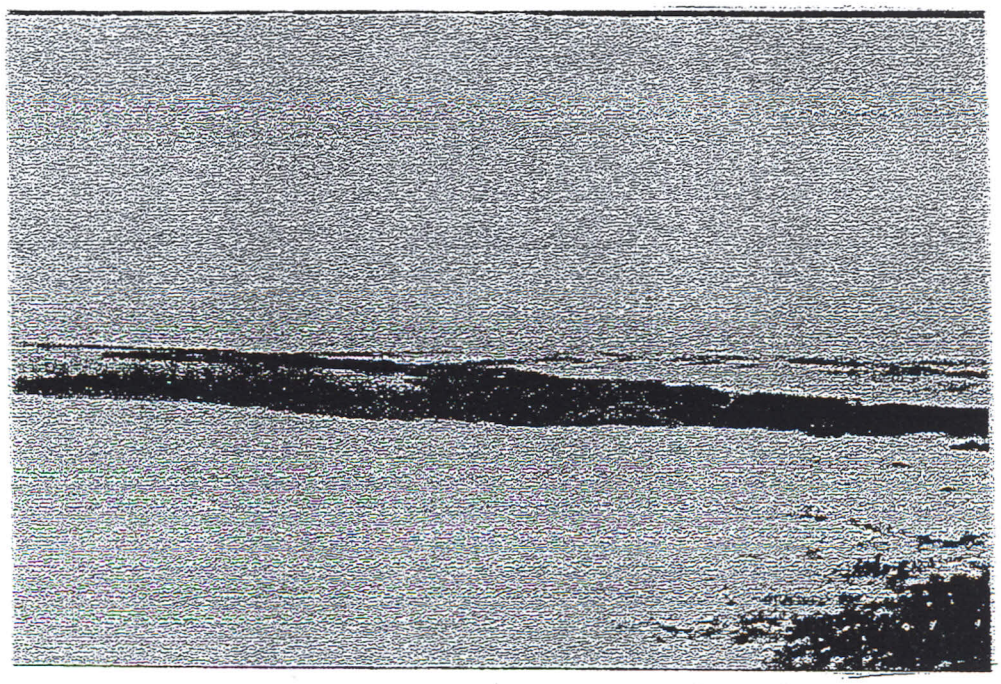


A view of Mumford Landing site

Plate 7

A view of Keta Lagoon

Plate 8



A view of Atitieti (Proposed site for shrimp farm)

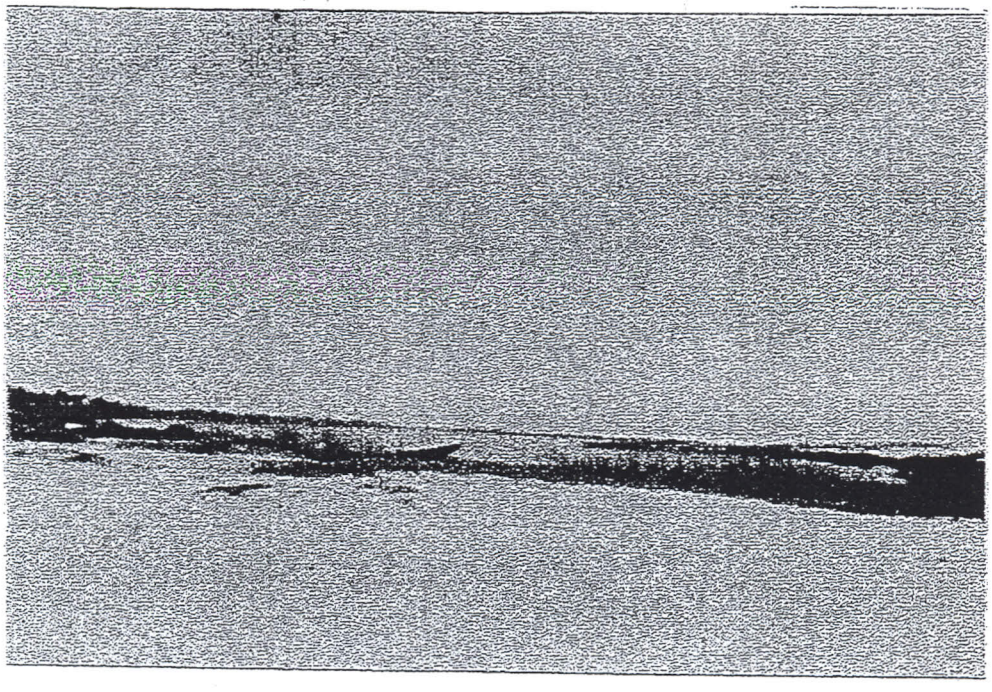
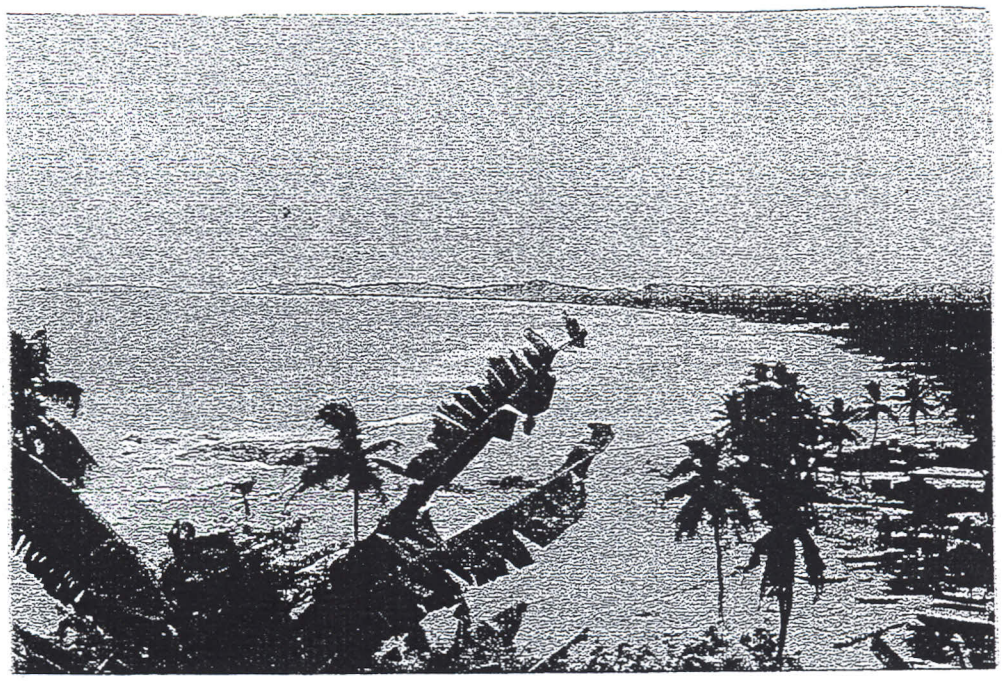


Plate 9

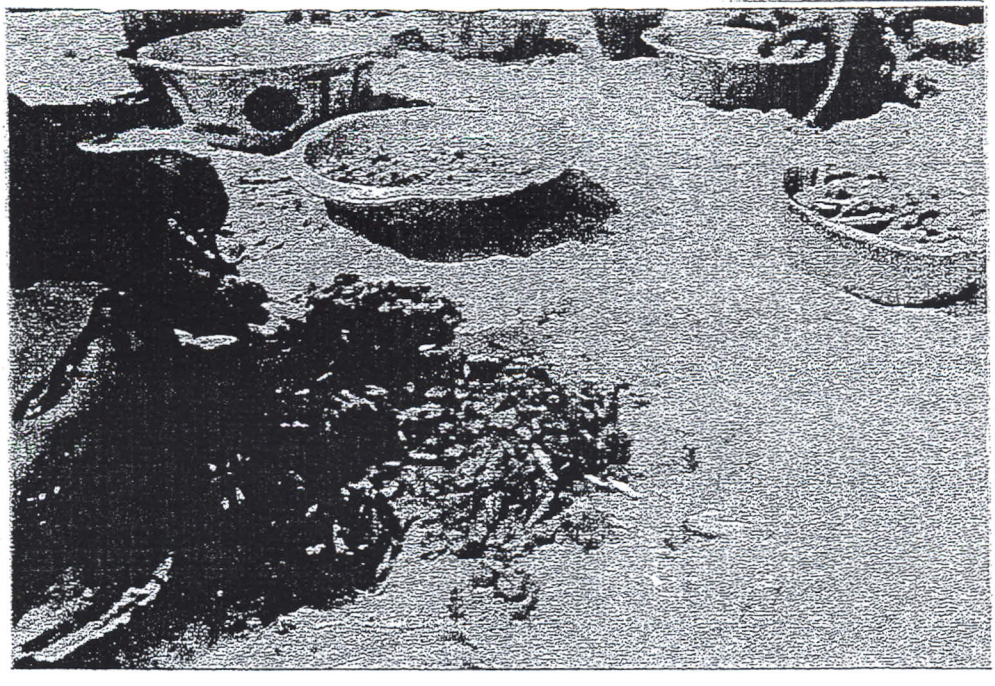
A view of Axim beach near the Ankobra Estuary



A view of Princess Town Cove

Plate 10

Landed shrimps and Cuttlefishes



2.2. Lobsters

Lobsters are found in both inshore and deep-sea locations with hard deposits or rocky bottoms. Such locations stretch from off Keta in the Volta Region to off Axim in the Western Region. The richest grounds are however off Dixcove-Shama, Gomoa (Apam, Mumford, Dago, Mankoadze) and Ningo shores (Fig. 2).

For harvesting lobsters, the artisanal canoe fishermen lay nets, whilst the artisanal trawlers use trawl nets. The latter trawl for up to 12 hours per fishing expedition whilst the former lay the nets in the sea and retrieve them after a number of hours.

During interviews it was observed that before 1986, artisanal trawling for lobsters was even carried out in waters only 3 meters deep. However, from the 1990's trawling had to be done in waters 8 meters deep for smaller lobsters and 15 to 20 meters or more for larger ones. In the 1980's, individual boats caught up to 4 kg of lobsters a day. Now only 2 kg of lobsters are obtained within 3 to 4 days.

3.0. HANDLING

3.1. Shrimps

The artisanal fleet do not usually freeze the shrimps when caught, thus land them unfrozen. However, some of them put ice cubes or flakes on the shrimps. Many of those who do not use ice do not usually spend the night at sea but when they do they spend less than 12 hours on a fishing expedition. Shrimps for export, when landed are usually peeled and washed in lime/iced water mixture before grading, packaging and freezing for domestic consumption or export.

3.2 Lobsters

With regards to the agents or suppliers, once lobsters for exporter are obtained, they are held unfed in sacs of netting material of size 1.8 m by 0.5 m (Plate 11), then hung

Plate 11

Lobster holding sac

in the sea until due for collection by the exporters. In earlier times, wooden boxes were used instead of sacs and this practice caused more deaths of lobsters due to poor water circulation in the boxes.

Due to demand, the lobsters are held for up to 5 days before collection and between 5-15 kg of lobsters are held in a sac. The lobsters are washed in clean water for a few minutes before handing them over live to the exporters.

4.0. CAUSES OF CONTAMINATION

From interviews the local suppliers believed that the major sources of contamination of products was the quality of the waters from which the lobsters were caught and kept. These sources of contamination according to the fishers emanate from discharges from marine engines (outboard and inboard engines), sewage, garbage and industrial pollutants from land sources through estuaries and lagoons.

5.0. GRADING AND PACKAGING FOR EXPORT

Recommendations by the Ghana Export Promotion Council, Ghana are as follows:

5.1 Lobsters

5.1.1 Packaging

Lobsters (live)

1. Only strong lobsters from holding floating boxes or ponds should be collected.
2. Live lobsters should not be held out of water for any length of time before packaging and shipment.
3. Relative humidity in packaging room and within package should not fall below 70%. Temperatures should be around 5°C in both holding tank and within immediate environment surrounding the lobster.
4. The packaging material must be insulated against heat and cold. It must maintain shape and structural wholeness to prevent mechanical damage to lobsters, e.g. Styrofoam, wax impregnated and cardboard.

5.1.2. Criteria for exporters

Lobsters may be traded as live, whole frozen, frozen tails or as par-boiled or whole cooked in brine.

1. Lobsters must be alive till time of processing. The tail is placed in ice immediately after it is removed from the head and blast frozen as soon as possible. Whole lobsters are deep frozen within 6 hours of death. The flesh must be firm, chewy, odorless and completely white. No brown-green coloration must be observed.
2. All blood and intestines must be completely removed before processing
3. The surface must be free from algae, excreta, hair or other extraneous matter.
4. Cooked lobsters must have been boiled by immersion in 3% salt water for at least five minutes, ensuring that the temperature does not fall below 100°C during the boiling time.
5. No foamy material must be observed between the shell and meat when cooked.
6. Cold storage temperatures must be less than –25°C.
7. The products must not be kept in ice or chilled at 0°C-2°C longer than 5 days.
8. Blood vessels must be bright red. not brown when lobster is in raw uncooked state.

5.2. Shrimps

Shrimps are traded as whole head on, head off shell on or head off shell off.

5.2.1. Packaging and Export Criteria

1. Shrimps should be sorted out and culled on board (at sea). All dead fish, damaged shrimps and extraneous material must be removed by hand or sieve.
2. Shrimps should be washed with seawater and dipped in polyphosphate solution to remove sand and mud and to reduce bacterial contamination.
3. Washed shrimps must be chilled immediately and kept in ice till at the point of freezing on board. The ratio of ice to shrimp should be 1:1 and at room temperature of –30°C.

4. Frozen shrimp must be stored at not less than –30°C at sea and transferred to similar cold store temperature on land before thawing for further processing.
5. Shrimp cooking must be carried out with sufficient heat to cook shrimp in 5-6 minutes. The ratio of salt water to shrimp must be at least 1:5. Salt-water strength should not be more than 5%.
6. Shrimp boxes or crates must not be more than 20 cm deep and shrimp layers which should not be more than 5 cm deep should be sandwiched between layers of flake ice.
7. Iced shrimp must not stay for more than four days without freezing or further processing. Processing after two days is best.
8. Shrimp meat should be translucent, white, firm and chewy.
9. There should be no taints, off flavours or black coloration in the head or legs.

5.3. Grading

Grading of lobsters and shrimps are done according to weight as follows:

a. **Whole Lobsters:**

100-200gm/piece- under size for export, not recommended
200-300gm/peice

300-400gm/piece – limited marketability

400-500gm/piece
500-600gm/piece - Range B optimum for export
600-700 gm /piece
700-800gm /piece

800- 1000gm / piece – Range A suitable for export
Over 1200gm/piece

1000 – 1200 gm/ piece – Oversize for export: Limited marketability.

b. **Lobsters tails:**

1-2 oz (28-57 gm each) – undersize, unsuitable for export.

2-4 oz (57-113 gm each) –Limited marketability

4-6 oz (113-170 gm each)

6-8 oz (170- 227 gm each) - Exportable range
8-10 oz (227-283 gm each)
10-12 oz (283-340gm each)
12-14 oz (340-397 gm each)
14 - 16 oz 397-454 gm each

During the interviews it was observed that exporters usually rejected lobsters of less than 50-60 grams.

Shrimps (Head on, Shell on):

Size 0: less than 10 shrimps/ kg (over 100g/shrimp)
Size 1: 10 –20 shrimps /kg (50-100g/shrimp)
Size 2: 20-30 shrimps/kg (33-50g/shrimp)
Size 3: 30-40 shrimps/kg (25-33g/shrimp)
Size 4: 40-60 shrimps/kg (17-25g/shrimp)
Size5: 60-80 shrimps/kg (12-17g/shrimp)
Size 6: 80-120 shrimps/kg (8-12g/shrimp)
Size 7: Over 120 shrimps /kg (less than 8g/shrimp).

However the Fisheries Department (1990) graded shrimps ranging from size 0 to 6. Zero sizes were the largest shrimps while Grade 6 were made up of small sized shrimps.

6.0. MAJOR EXPORTERS

The quantities of prawns, shrimps and lobsters exported over the last decade is as obseved in Table 2.

6.1. Lobsters

The major lobster exporters listed by the Ghana Export Promotion Council were:

1. Vivers du Nord , Ghana Ltd.
2. Société Nouvelle Cap Lang.
3. Kpone Lobster Export Company Ltd.
4. Skippys Sea Food Company Ltd.
5. Pako Bay Sea Food Ltd,

of which Kpone Lobster Export Co. Ltd emerged as Gold Award Winner in 1998 with Holding Fishing Co. Ltd the winner in 1997. Other exporters / buyers observed from field survey at the landing sites in the Gomoa area included:

1. Worseacom Company of Tema
2. Ivan Enterprises of Accra
3. Romeo Enterprises of Accra
4. Teddy Enterprises of Accra, and
5. Paps Enterprises of Takoradi.

6.2. Shrimps

The major exporters listed by the Ghana Export Promotion Council were;

1. Premus Trading Company Ltd.
2. Kiku Company Ltd.
3. Ninamich Enterprises
4. Pako Bay Sea Food Ltd.
5. Divine Sea Food Ltd.
6. Unregistered Exporters

7.0. CONCLUSIONS

- Over the last 5 years or more, there has been a progressive decline in the quantities of shrimps and prawns exported annually whilst there has been generally corresponding increases in the quantities of lobsters exported annually.
- Prawns, shrimps and lobsters now have to be caught in much deeper waters than was the case in the late 1980s and early 1990s.
- More and more smaller sized products are being caught in Ghanaian waters.
- Habitat contamination according to interviewees is a major cause of pollution of products to be exported.

8.0 RECOMMENDATIONS

1. Closed seasons should be instituted during the period of seaward migration of juvenile shrimp, namely:

i) The period between February and May where low economic returns from shrimping activities forces shrimpers to turn to other fishes.

ii) The period between August and October when juvenile fish abound, especially in coastal waters.

2. Shrimp fishery in the lagoons and estuaries must be carefully studied to establish the link between them and marine fisheries.

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10.0. REFERENCES:

Anon (2000). The Akoben, A symbol of Export Excellence. Ghana Export Promotion Council. Export Award Ceremony 2000. 48pp.

Fisheries Department (1990). Prospects for Shrimp fishing on Ghanaian Waters: A look at the shrimping activities of the Kiku Company Ltd. Prepared by Fish Stocks Group, Research and Utilization Branch, Tema, February, 1990. 12 pp.

Garcia, S.and F. Lhomme (1980) Pink shrimp resources pp121-145. In: Troadze, J.P and S. Garcia (eds). The fish resources of the Eastern Central Atlantic. Part one: The Resources of the Gulf of Guinea from Angola to Mauritania. FAO Fish. Tech. Rep (186.1): 166pp.

Schneider, W. (1990). FAO species identification sheets for fishery purposes. Field Guide to the Commercial Marine Resources of the Gulf of Guinea. Prepared and published with the support of the FAO Regional Office for Africa. Rome, FAO 1990. 268pp.

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