

**SEA FISH INDUSTRY AUTHORITY**

**Seafish Technology**

**GILL NET AND OTHER SET NET FISHERIES IN CORNWALL**

**(INCLUDING PLYMOUTH)**

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Internal Report No. 1400

April 1990

K C Munday

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**SUMMARY**

'Set nets' constructed of various man-made materials offer a highly efficient means of catching fish. The majority of vessels under 10m in length around the Cornish peninsula are at some time of the year actively engaged in the use of set nets.

As the name applies, 'set nets' consist of long lengths of netting which are set in a certain position on the seabed and retrieved after a certain period of time; gill nets, trammel nets and tangle nets all fall within the category of 'set net'. The lengths of net fished can be enormous; a 10-12m vessel may work 4.5km (3 miles) of net.

Set nets are very selective in their mode of operation, for example, 70-80% of all fish taken in 4½in (12.1cm) hake gill nets are actually hake, with the majority of them falling into EEC size category 1.

Problems occurring within the set net fisheries include - wastage due to mortality of fish, conflicts of interest between set net fishermen and trawler fishermen, excessive shellfish mortalities and occasional bird and marine mammal mortalities (incidental mortalities).

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1 **INTRODUCTION**

Set nets have been used to capture sea fishes for many centuries. The advent of monofilament materials has both reduced their cost while considerably increasing their efficiency. The last decade has seen a massive increase in the use of this method.

In the 1970's, winter mackerel stocks were very abundant; the low opportunity cost and excess profits available from this fishery attracted a great deal of effort. The vessels involved were generally small (5m - 8m) but the excellent grossings and the availability of White Fish Authority (now Seafish) grants soon led to many skipper-owners upgrading their craft to the 10m-12m class. However, large nomadic pelagic vessels were soon attracted to the fishery; their catches were enormous and - although controls were eventually introduced - it was too late. The once healthy fish stock was in serious decline. The reduction in southwest mackerel stocks coincided with the availability of monofilament nets. Some vessels switched to mono gill nets as an alternative to the winter handline mackerel fishery and were highly successful. Other vessels followed and the gill net fishery rapidly grew.

2        AIMS

It is intended to examine the current status of Cornish gill nets fisheries and also include other set net fisheries. Aspects to be investigated include:-

1.        The nature and structure of the fleet.
2.        The distribution by port.
3.        The landings.
4.        The grounds fished.
5.        Target species and seasonality.
6.        The types of gear and method of use.
7.        Interactions between fisheries.
8.        By-catches and incidental mortality.

3 THE NATURE AND STRUCTURE OF THE FLEET AND THEIR DISTRIBUTION BY PORT

Looking at the size structure of the fleet, they appear to fall into 3 broad categories:-

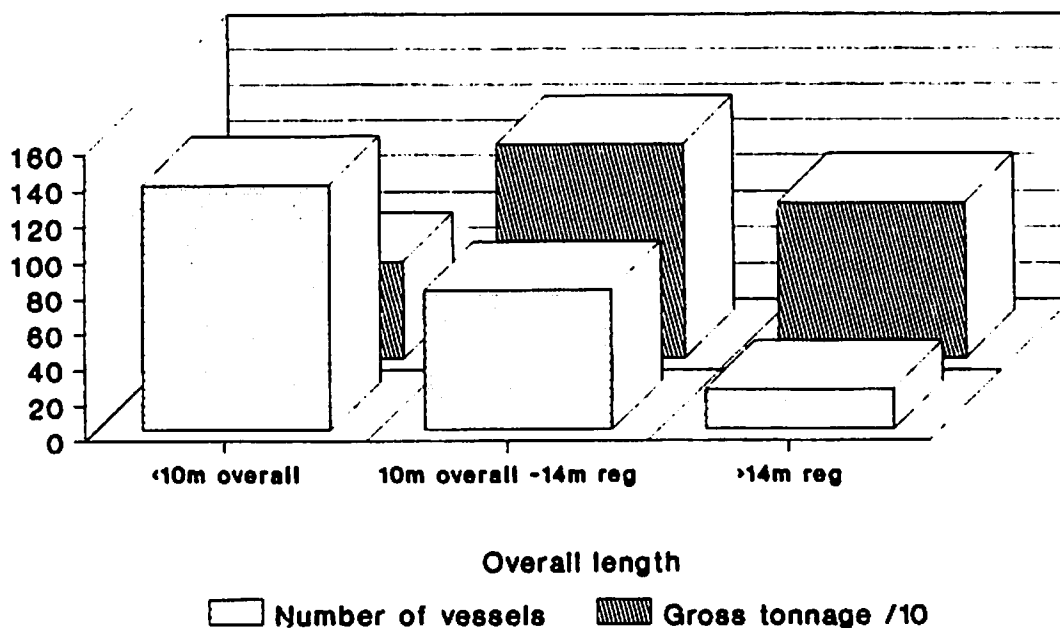
- a) Less than 10m overall length.
- b) 10m overall - 14m registered length
- c) Greater than 14m length.

There are very few vessels between 12m and 14m (40ft and 45ft) registered length, creating a "natural break" in the fleet.

Figure 1 shows the length distribution of the region's netters. This includes vessels working nets only and others which derive a significant proportion of their income from netting.

FIGURE 1

**Fig. 1 The Length Distribution of the Cornish Netting Fleet including Plymouth**



The figure shows that there is a larger number of small vessels. If, however, catching power is equated to tonnage the bulk of this resides with the licenced vessels.

Most of the larger vessels are full-time gill netters; however, many of the others exploit alternative fisheries depending upon the season. A large number of vessels work crab pots or tangle nets during the summer and turn to gill nets during the winter. Others trawl for part of the year while some (generally under 10m) depend on gaining their summer income by running boat trips for tourists.

### 3.1 Distribution by Port

Although the majority of gill netting effort is based at Newlyn, there are netters distributed among ports on both the North and South coasts of the region.

**Plymouth** and its sub-ports has twenty boats involved in the set net fishery, but several operate only on a seasonal basis. The largest is 16m overall with five others over 10m.

**Looe and Polperro** also have twenty netters; half of these are in the 10m-12m class and the others are smaller. All of these vessels for part of the year appear to use alternative methods such as pots, tangle nets or trawling. There are some that use all four methods during a twelve month period.

**Mevagissey** is the home of one large and successful gill netter and eleven other netters over 10m. Some of these switch to alternative methods in the summer. There are twenty smaller vessels which net during the winter; although many run trips during the tourist season, some continue to net throughout the year.

**Falmouth**, including St. Mawes and Helford, has netting boats and twelve of these are over 10m. Again there is a high degree of flexibility and only a few work gill nets all year round.

**Newlyn** is the centre of gill netting effort in the Southwest. There are nineteen vessels in the under 15m class and seventeen smaller licenced vessels working as netters for the majority of the year. A small number of vessels under 10m also work from Newlyn.

A number of Newlyn based vessels and some from Falmouth work from the **Isles of Scilly** when tides are favourable. St. Mary's Harbourmaster reported up to twenty visiting boats being tied-up alongside in his harbour, although ten is a more common number. There are two Scillonian gill netters working from St. Marys; one is just over 10m and the other is just under. The skipper-owner of the largest of these vessels reported that there is little other gill net activity among local vessels, although a number of boats work monofilament tangle nets during the summer.

**St. Ives/Hayle** has five vessels under 10m working exclusively set nets. Another ten vessels in the 9m-14m class, gill net during most of the winter months and use pots and tangle nets during the summer. Twelve smaller ones, including some cove boats based mainly in St. Ives, also work nets and handlines usually close inshore.

The **Newquay** fleet fish mainly for shellfish during the summer but, like St. Ives and Hayle, switch to gill netting in the winter. There are three 10m-12m boats netting all year round and another five in this class which work nets in the winter and nets and/or pots in the summer. There is one under 10m vessel which is a netter and five others of this size which work nets some of the time.

**Padstow** is the home of two 17m gill netters; there are five netters in the 10m-12m range, one of which is occasional. There are fourteen under 10m vessels which work a combination of gill nets, tangle nets and pots.



Nearby Port Isaac is a difficult harbour to work from and the eight boats in the 9m-12m size range are all high speed vessels. Until recently these boats were almost exclusively potters, but gill nets are being used during the winter and tangle nets worked in combination with pots during the summer.

The Cornish coast has numerous coves, small harbours and inlets from which a large number of very small boats operate. Many use small quantities of set nets together with handlines and pots. Although the total effort exerted by these cove boats is not very significant, their nets are shot in a sensitive area (close inshore). Cove boat fishing is also economically and socially important to many isolated communities.

#### 4   GROUNDS FISHED

Set nets are worked from close inshore principally by the smallest vessels. A great deal of effort by the medium sized boats is concentrated in the 12 mile coastal band, largely on areas of rough ground where the danger of clashes with trawlers is reduced. Boats working further offshore often stay with their gear to minimise the danger from trawlers; the larger vessels working six or seven day trips out to the Labadie Bank to the west and southwest to the Cockburn Bank.

5      TARGET SPECIES, SEASONALITY AND LANDINGS

The most frequently targeted species is Hake which is fished for all year round. Pollack is the subject of a targeted fishery in the spring when they congregate on wrecks. Unrealistic quotas at present prevent cod being a targeted species to any extent. They are caught in good numbers inshore during the winter and spring off both North and South coasts. They are also often numerous offshore on wrecks during the summer and autumn. The skipper of one of the larger hake netters told me he believed that "a good fishery for cod would exist were it not for the inadequate quotas". This would take pressure off other species. Many other species are caught offshore but are not normally targeted. Winter-only gill netters are usually restricted to the area near their home ports and direct their effort at whichever species (if any) is available to be caught.

Inshore fishermen have a directed fishery for bass; this is generally during the summer on the South coast but from December to February on the North coast, when larger vessels sometimes participate.

Tangle netters land a variety of demersal species; turbot, ray and monk all feature strongly. Crawfish and (less importantly) lobster are the main shellfish although quantities are usually worked from spring until early autumn and not during the winter.

The value of net-caught fish in the region is estimated to be one third by value of the catch of the region. It is thought to be in the region of £8 million for Newlyn in 1989.

Further details of the species caught in set nets, seasonality and some examples of catches are included in Section 6.

6 METHOD OF EMPLOYMENT, GEAR IN USE AND EXAMPLES OF CATCHES

When the set net fishery started to expand about 10 years ago, most vessels shot their nets from the side and hauled their gear using simple flat or V drum haulers. Today many are equipped with conveyor or even more sophisticated haulers and shoot their gear from bins or pounds in the stern.

The principle types of gear in use are summarised in Table 1. Some types of net such as trammels (used extensively in other areas) are little used in this area. Table 1 is followed by a description of the gear, its mode of use and includes some samples of the catches.

Mesh Size mm	Type	Meshes Deep	Setting Ratio	Main Species Caught
80-85	.40 mono gill net	40-60	2:1	Mullet
105	.40 mono gill net	40-60	2:1	Bass with mixed by-catch
120	.65 mono gill net	60	2:1	Hake
130-135	.40 mono tangle net	14	4:1	Dover soles, plaice
150	8 ply multimono gill net	25-30	2:1	Cod, pollack, ling, spurdog
150	.65 mono wreck net	40-60	2:1	Pollack, ling, saithe and cod
260-300	.57 - .65 mono tangle net	6½-10½	2-3:1	Monk, turbot, ray, crawfish, spider crab

Table 1 Commonly used Set Nets in Cornish Waters.

## 7 MATERIALS AND MODE OF RIGGING

The mode and materials used in rigging vary. A typical gill net might have a double 6mm polypropylene headline with 6oz (170g) floats every 2 metres. The foot consists of No. 4 leadline combined with 8mm leaded rope. Nets used inshore or consistently on soft ground may be more lightly rigged.

Sole nets are lightly rigged; a single 8mm polypropylene headrope combined with a No. 2.5 leadline footrope would be typical.

Tangle nets may be similarly rigged but often the footrope and headrope have an additional rope. This is to improve the durability of the gear when worked on hard ground.

Hake nets usually have a false footrope to reduce the quantity of crabs entangled. This also reduces the by-catch of cod which allows boats to comply with quota restrictions without having to dump prime fish.

### 7.1 Mullet Nets

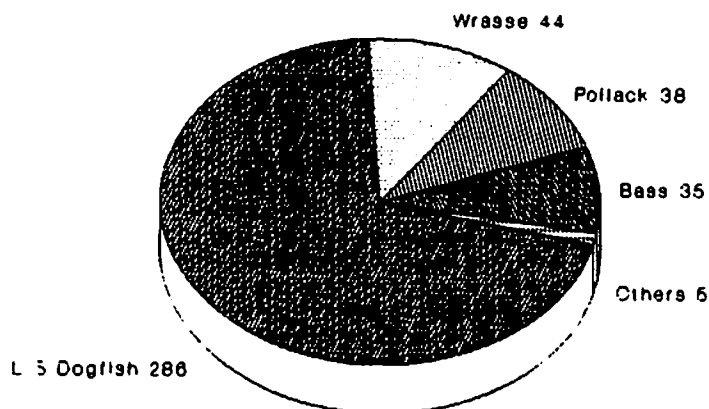
These nets are used close inshore mainly by very small boats, sometimes by part-time and "hobby" fishermen. Both grey and red mullet are caught and, on occasions, quantities of small bass. Large by-catches of a variety of immature fish of other species often occurs. These may be discarded or in season used as bait for crab pots. These nets also often catch migratory trout and seabirds. The enforcement of regulations and restrictions on their use in order to protect young bass is welcomed by most sectors of the industry.

### 7.2 Bass Nets

Bass nets are generally shot in very short tiers of either 90 or 180 metres, at right-angles to the coastline. The fishing vessel often starts shooting as close to the shore as the skipper "dares" to venture. Many other species, including cod, pollack and saithe are also caught. Although mostly immature, these species are usually of a marketable size. Unfortunately, seabirds are also caught on occasions.

Figure 2 shows a sample catch from bass nets; the large quantities of lesser-spotted dogfish (frequently caught) are often discarded but are sometimes sold as crab bait.

**Fig 2 Fish caught in Bass nets**  
0.9km 105mm 60md 4ply multimono nets  
overnight fishing 2 hauls November 1989



catches in kgs showing all species  
totalling over 2kg

### 7.3 Hake Nets

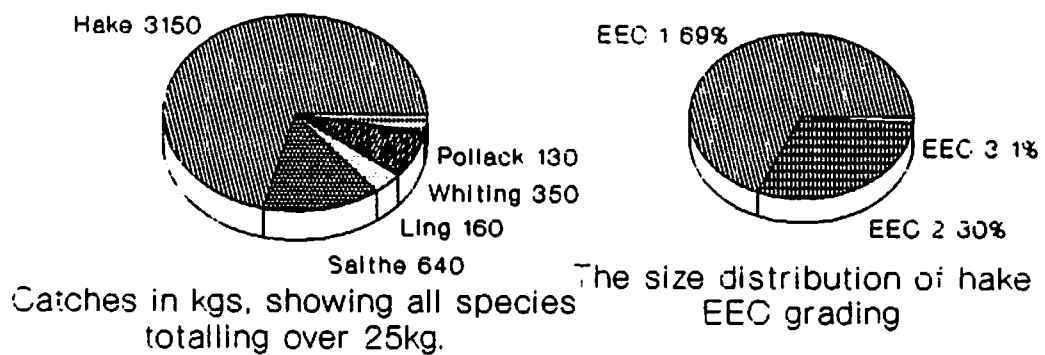
The hake fishery is offshore and only prosecuted during neap tides; all the participating vessels are over 10m. The nets are shot in tiers of about 1km into feed marks. Vessels operating in this fishery often co-operate with one another, exchanging information about catch rates and marks frequently and allowing the fleet to "home in" on best fishing.

The smaller 10m-12m vessels work about 4500m of net per day, while the larger over 15m vessels work in the region of 9000m. Soak times are typically 14-16 hrs with hauling starting at first light and the gear being shot back towards the end of the day.

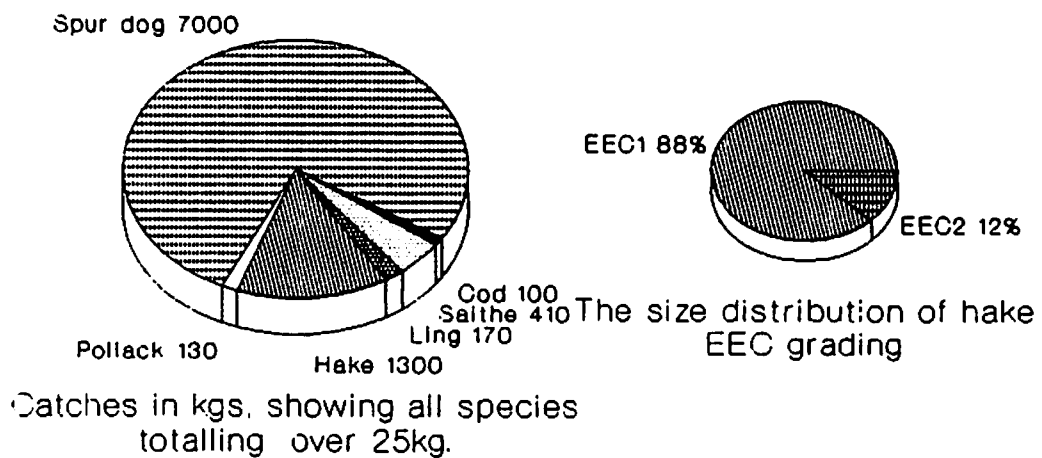
The gear used is very selective and 70-80% of the catch is often hake, with the largest catches of whitefish in the spring. This ratio rarely falls below 50% except when packs of spurdog are encountered. The bulk of hake caught are also of good size with the majority falling into EEC size Category 1. Figure 3 shows two examples of the landings by a 17m vessel in September and December. Although the values of each landing are very similar, the composition of the catches are quite different.

FIGURE 3.

**Fig 3 Six Day Trips by a 17m Hake Netter  
using 9 km 119mm 60md mono nets.  
(a) The Labadie Bank, Sept 1989**



**(b) The Labadie Bank Dec 1989**



#### 7.4 Sole Nets

Soles are present in small numbers around the coast for much of the year. However, as well as soles these nets catch starfish, crabs and all manner of other seabed creatures and debris. These nets can only be worked effectively when soles are reasonably abundant and the quantity of "rubbish" is not too great. A 10m vessel will attempt to work 5km of these nets per day but working 3 or 4 handed may often have trouble cleaning them. Sleepless nights spent "picking out" are a common feature of sole netting. A boat will usually have two sets of gear - one to haul and one to shoot.

There is a fishery on the inshore South coast in the autumn of the year involving mainly very small vessels. On the North coast there is a net fishery in the spring, during the Trevoise season, which also attracts beam trawlers - both U.K. and from several other European nations.

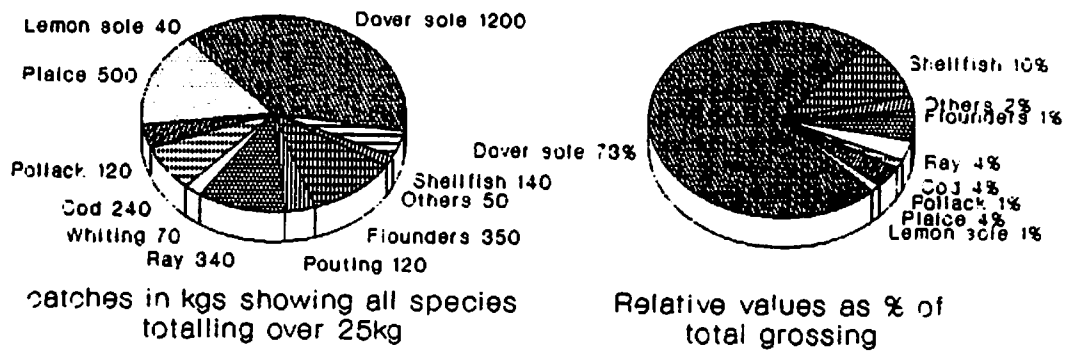
The risk of having gear towed away restricts this fishery to a band just inside the 6 mile limit. An increasing number of mini "rule beater" beamers makes even these inshore grounds an insecure area for static gear.

Figure 4 shows the accumulated landings and relative values of the species caught by one 11m vessel during March 1990. Although this vessel was carrying 10km of sole gear, the quantity worked per day was on average only 3km. This was because wreck nets and 150mm gill nets were also used during this period.



FIGURE 4

**Fig 4 Fish Caught by a 11m Sole Netter  
working 3km 150mm 14md o.40 mono nets  
12 days fishing March 1990**



This Figure shows that sole comprise 70% of the value of the catch and that shellfish (crawfish, lobster, spider crab and brown crab) are the next most important component.

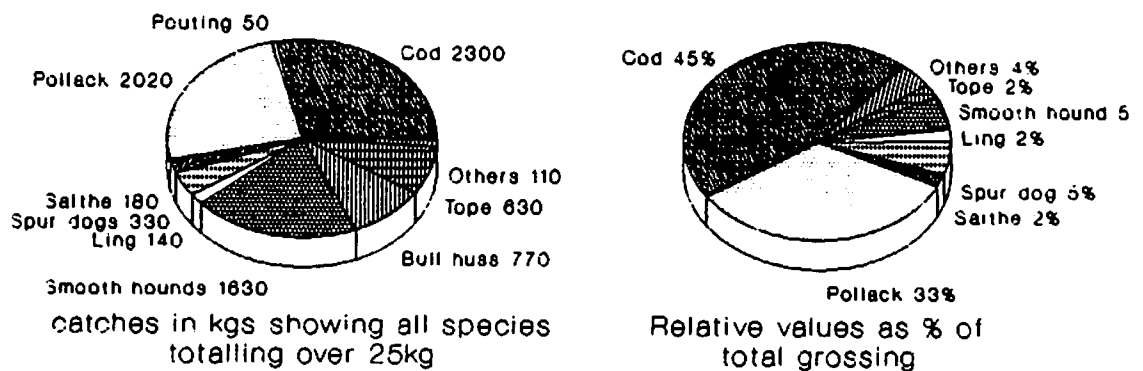
#### 7.5 Cod Nets - 150mm

These nets are used mainly (but not exclusively) during the winter months and are usually shot into marks near, or on, rough ground. Tiers may be 1km or even 2km in length depending on the size of the vessel. However, some skippers prefer shorter tiers allowing them to target the marks more accurately. These nets are normally left overnight and on occasions considerable wastage occurs when bad weather forces an extended soak time. There are also times when the nocturnal activities of congers considerably reduce the marketable catch. A typical 10m vessel would probably work 4km of these nets per day.

Although these nets may be directed at cod (particularly by smaller vessels from ports like Mevagissey on the South coast) they are usually directed at whatever species happens to be available on the grounds within the vessels range. Cod quotas also have a strong influence in directing effort away from these species. This is particularly unfortunate with respect to smaller vessels, which may be forced to fish longer distances offshore, beyond their "normal" range, unable to take advantage of a resource on their "doorstep".

Figure 5 shows the catch of one 11m vessel during January and February of 1990. The catch here is dominated by cod and pollack which is often but not always the case.

**Fig 5 Fish Caught by a 11m Gill Netter  
working 3km 150mm 30md multimono nets  
11 days fishing Jan/Feb 1990**



others include whiting, hake, ray, conger, bass and wrasse.

## 7.6 Wreck Nets

Wreck netting is usually very seasonal and limited mainly to the first few months of the year when fish congregate on wrecks prior to spawning. Tiers of nets are short (180m-270m) and are shot over or very close to the wreck. The locations of wrecks are closely guarded secrets and as a "first come, first served" attitude persists, there is considerable competition to shoot on wrecks before anyone else as soon as tide and weather conditions become favourable.

Winter catches are dominated by pollack, although in deeper water ling and sometimes saithe become increasingly important. Catches can be very high with 2 tonnes of fish being caught in a single tier. At these times, very large landings cause the prices to drop very sharply.

There is also a potential summer wreck fishery for cod, but again quotas - which do not appear to reflect the available fish - prevent vessels exerting much effort on this fishery.

## 7.7 Tangle Nets

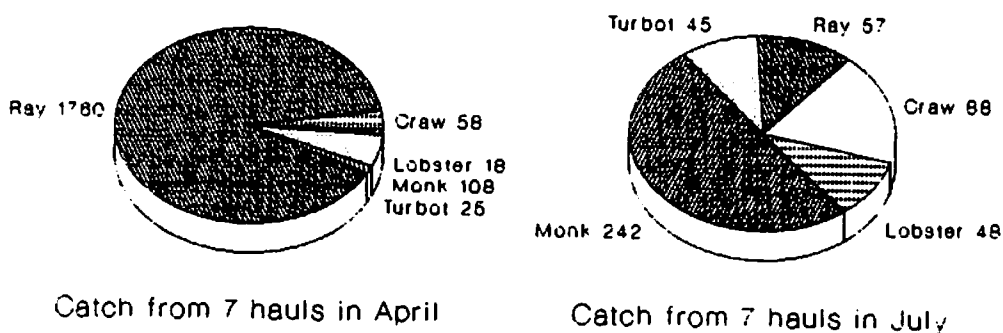
Large-meshes tangle nets are worked extensively all around the region from close inshore to 50 miles off. The vessels engaged in the fishery range from the very small and part-time to the larger vessels of the fleet. A 17m vessel might work up to 50km of these nets, while a 10m vessel if netting only would probably have 30km.

Tangle nets are shot on a variety of substrates depending on the targeted species, and usually in the direction of the tide. Soak times vary from 3 days to 1 week but can often extend beyond this due to adverse weather, when increasing quantities of the whitefish become spoiled. The loss of whitefish is often offset by an increasing catch of crawfish and lobsters. There is an unfortunate trend by some vessels to use excessive quantities of gear and intentionally extend soak times. During bad weather this leads to very extended soak periods (over a month) and quantities of shellfish may also die and be wasted on these occasions.

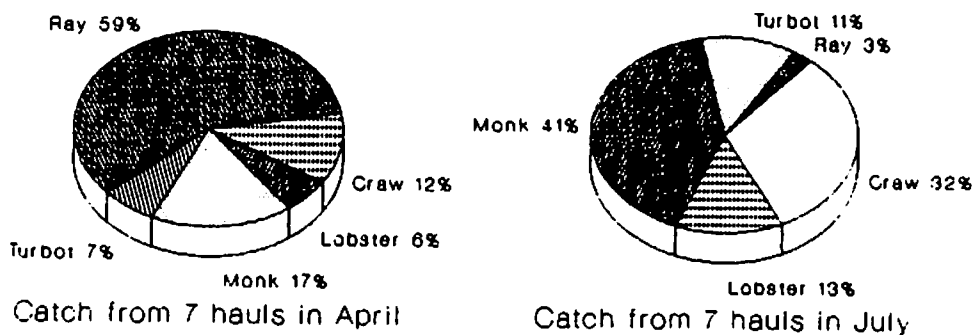
Brown crabs are an unwanted by-catch in tangle nets; they are very difficult if not impossible to untangle and are usually broken out of the nets. The bodies are discarded but the claws are landed for processing into white crab meat. Excessive soak periods lead to large quantities of crabs being destroyed in this way.

FIGURE 6.

**Fig 6 Landings by 10m Tangle Netter**  
**Showing seasonal variation in catches**  
**(a) Weight of main species kgs.**



**(b) Relative values of main species**



## 8 INTERACTIONS BETWEEN FISHERIES

There is considerable competition for both fish and fishing grounds. Static gear vessels have increased in numbers and become larger and more sophisticated. They are now working much more gear at increasingly longer distances offshore. Trawlers and trawl gear have also evolved and there is now less rough ground on which trawlers are unable to work.

Clashes between the static and active gear sectors are frequent, particularly when static gear is unattended. Many skippers accept gear losses as part of the job. Turbot netters working 50 miles off the south coast, leave their gear unattended for a week at a time, and rig their nets very lightly and cheaply to minimise the financial loss when some of their gear is inevitably towed away. The trawlers involved are both British and from other EEC nations. Problems in communicating do tend to exacerbate encounters with foreign vessels.

Netters working in the 12 mile inshore band compete with one another and with other vessels for the best grounds. While netters have to work closely in the direction of the tide, most potters prefer to shoot across it. With strings of pots and tiers of nets each up to 2km long, accidents and conflict are inevitable. In general though, fishermen converse on the VHF radio to avoid problems and usually resolve any difficulties amicably.

9        INCIDENTAL MORTALITY

Seabirds and marine mammals which prey upon fish below the seas surface are likely to be involved in contact with fishing gear. The invisibility of monofilament nets and the fact that they are often "baited" with their prey species increase the chances of direct contact.

Selectivity factors will dictate whether the animal is likely to become entangled in the net; to be caught it must be able to penetrate the net far enough to make escape by reversing difficult but be unable to pass through a mesh. Body profile is therefore very important. Most diving seabirds are unfortunate in this respect. They have small heads and comparatively large bodies and are highly likely to become entangled in a wide range of mesh sizes. Slacker hanging ratios will also greatly increase the chance of entanglement.

The frequency at which seabirds are caught is directly related to their abundance in areas where nets are set. Guillemots, razorbills, shags and cormorants are the most commonly caught along with the two species of auk. High mortalities during the winter months have occurred in St. Ives Bay on a number of occasions. Considerable controversy is provoked by these incidents which become the focus of media attention.

Bird mortalities rarely occur in the larger mesh gill nets worked further offshore. As diving birds are not uncommon here and are believed to dive to the seabed it is probable that they are capable of passing through these mesh sizes.

Salzman (1989) describes how problems of excessive bird mortalities were resolved amicably on the other side of the Atlantic and it is to be hoped the problem can be similarly resolved here.

Mortalities of dolphins, porpoises and seals are believed to occur infrequently. These mammals are too large to be able to penetrate the mesh sizes commonly used in gill nets. Seals quite frequently "spoil" large quantities of whitefish in these nets but are very rarely caught themselves.

The larger mesh tangle nets are set without floats and this reduces the chance of marine mammals being entangled, as this gear is usually very close to the seabed. The greatest danger probably occurs while it is being shot.

10     THE FUTURE

The set net fisheries of Cornwall are of major importance to the fishing industry of the region. The use of these methods has expanded rapidly throughout the last decade and as predicted by Millner (1985) larger vessels are being attracted to the fishery. Very large quantities of gear are now being worked and further expansion must be channelled into new grounds or alternative species.

The squid is a valuable species present in these waters and it may be possible to catch in correctly designed set gear.

For new grounds to be exploited there is a need to upgrade the larger vessels of the fleet to enable them to work longer trips in safety and a degree of comfort. A new 60ft (18.3m) GRP vessel has just joined the netting fleet and apart from one other purpose-built netter based at Mevagissey, all the other larger vessels engaged in netting are "elderly" - most started their lives as trawlers. There seems little prospect of this changing in the near future.

Set nets are highly selective and optimum mesh sizes, when sensibly used, allow prime fish to be harvested without catching immature fish or damaging the environment. Badly used, however, they can cause considerable wastage and not only of the species they are intended to catch. Methods of encouraging sensible use need to be developed.

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Caleb Munday - 27.4.90