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Survey of bait collection in Britain

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Foreword

A bait digger or two with bucket and fork working the sediment flats at low tide was almost accepted as part of the seascape. However, when the diggers turned up in armies in certain areas and some began using bait pumps or even tractor and boat towed dredges to increase their valuable catch, it appeared likely that the nature conservation interest of some sites was at risk. In response, the former Nature Conservancy Council commissioned a number of specific impact studies and also tried to obtain a general picture of the extent and intensity of bait digging and its implications for nature conservation through a nationwide questionnaire. The results from that questionnaire form the basis of this report.

Since the information for this report was collated in 1990, a number of additional bait digging investigations have been initiated in the Wash (English Nature), the Severn Estuary (Countryside Council for Wales) and the Exe Estuary (Devon Wildlife Trust). Also, recent taxonomic work (Cadman & Nelson-Smith, in press) appears to support the long held distinction made by bait diggers between the lugworms found on the flats and the rather larger black lugworms found around extreme low water. The common lugworm, *Arenicola marina*, is now considered primarily intertidal while another newly described species, *Arenicola defodiens*, is found at the low water mark and subtidally. In consequence, there are implications for assessing the effect of the depletion by bait digging of intertidal beds of lugworm which, it is sometimes claimed, are quickly restocked by immigration from the sublittoral populations. This may not, therefore, be the case.

In addition, a recent review of the management of the exploitation of the lugworm and ragworm in conservation areas, (Olive, in press) concludes that major differences in population structure and recruitment pattern can exist between populations of the same bait worm species as well as between different species. This then must also be taken into account in assessing the potential impact of bait digging and its management at any particular site.

While it appears possible to manage a sustainable take of bait worms there will always be pristine areas where the damage and disturbance associated with bait digging is wholly undesirable.

Dr Roger Mitchell
August 1992

CADMAN,P.S. and NELSON-SMITH,A. (in press) A new species of lugworm: *Arenicola defodiens* sp.nov.

OLIVE,P.J.W. (in press) Management of the lugworm, *Arenicola marina*, and the ragworm, *Nereis virens*, (Polychaeta) in conservation areas: the importance of population structure and recruitment processes. *Aquatic Conservation: Marine and Freshwater Ecosystems.*

SECTION 1 : SYNOPSIS

Sea angling is a popular and expanding sport practised by over two million sea anglers in Great Britain. It relies upon the use of bait which is primarily collected live. Because of the growing numbers of bait collectors, concern has been raised over the sustainability of bait supply, conservation of the bait species and the habitat, as well as conflicts with other shore users. A questionnaire survey of angling clubs, conservation organisations and local authorities carried out by NCC in 1985 aimed to address these points. A general assessment of the status of bait collection and supply is presented in this report from the results of the survey. Its implications for nature conservation in Britain during the late 1980s are discussed.

The response from local authorities and conservation bodies was good, while that from angling bodies was very poor (only 86 out of 1300 questionnaires were returned).

The main bait species used by anglers are categorised as: lugworm, ragworms, white ragworms (or catworms) and peeler crabs. The report reviews their ecology and life cycles, with discussion covering specific details of growth and maturation rates, frequency of spawning, behaviour of larvae and their recruitment into the adult populations.

The pattern of supply and demand for bait varied around the country. Inland clubs generally obtained most of their bait from retail outlets, while about 60% of coastal clubs dug their own bait. The main demand for bait comes in winter and autumn when worm populations are at their lowest and peeler crabs are not available. This obviously has an impact on populations of bait species and recovery rates often depend upon the existence of refuge populations.

Most populations of bait species are not threatened by collection, even locally. The non-target invertebrates most affected by bait collection are large, long-lived, slow-growing infaunal species which may be fragile, easily damaged by bait diggers and slow to recolonise areas. These species are not necessarily present in good bait worm beds, which may have a naturally low species diversity. Habitat damage on sediment shores is most serious in low energy environments, where sediments are poorly sorted and recovery rates from bait digging can be very slow. Disturbance of feeding shore birds by the presence of bait diggers at low water can be a very serious problem.

Questionnaire responses indicated that most locally-based commercial diggers cause less damage than many individual anglers by routinely back-filling trenches and not taking undersized worms or populations at low densities. Furthermore, more retail outlets of bait would put less pressure on local anglers to collect bait. The large teams of commercial baitdiggers which travel around the country to obtain bait for large suppliers can, however, dig out bait beds and cause considerable damage to habitats and bait populations since they do not need to operate sustainably.

The report indicates there were more of both individual and commercial bait diggers on the shores than in the 1970s and that conflict arose between them. It highlighted problems in heavily industrialised areas where intertidal flats have been lost to development, leaving insufficient beds to supply the demand. These and other restrictions forced bait collectors further afield and responses indicated that some anglers regularly travelled considerable distances to obtain bait.

Bait digging can conflict with the use of public amenity beaches and the mooring or launching of vessels in the intertidal. This and the other conflicts has led to regulations, particularly byelaws, restricting bait collection in a number of places. Bait digging is legally regarded as a 'tolerance; in England and Wales there is no legal right to dig bait on the shore. Voluntary agreements exist in some places and can be a valuable way of conserving nature conservation interests.

Recommendations made for management of bait collection include promotion of existing codes of conduct for bait collection to reduce conflict witfh wildlife and other users of the shore; promotion of alternative sources of bait (eg. from bait farms); organised sustainable cropping of heavily used bait beds (possibly through rotating beds and protecting nursery beds, with the pattern of management based on a full understanding of the bait species' life cycle and local conditions); and zoning of shores where potential conflict exists with other users to be set up in collaboration with anglers to obtain their agreement and cooperation.

N. Clare Eno

SECTION 2 : INTRODUCTION

There are currently about 2 million sea anglers in Britain and a small number of commercial fishermen using long lines who require bait for fishing. It was estimated by the National Anglers Council in the 1970s that about 75% of anglers prefer to dig their own bait (NCC/NERC, 1979), but that figure seems to be too high for the present day. The main bait species used are polychaete worms, small crabs and molluscan shellfish (mainly mussels). With the exception of bait fish and small quantities of farmed bait, virtually all supplies are collected from the seashore, either by individuals for their own use, or by commercial bait collectors supplying the retail trade.

The growing numbers of bait collectors around the British coast had begun to cause concern by the early 1970s. Bait digging was noted as a potential problem in some areas by the NERC Working Party on Marine Wildlife Conservation (NERC, 1973). The Joint NCC/NERC Working Party (NCC/NERC, 1979) identified 'strong evidence of damage to sandy and muddy beaches by bait-digging.' Because of this concern, a desk study of the ecological impact of bait digging was commissioned by the Department of the Environment in 1976. This study made a preliminary assessment of the extent and nature of the problems (primarily by questionnaire, meetings and discussions with interested parties), examined biological information and made 14 proposals for further work (Clark, 1977). These proposals are listed in Annex 1.

Sea angling continued to grow in popularity as a sport in the 1970s and 1980s, with an increase in leisure time and unemployment. Conflicts between bait digging and other uses of the shore (particularly amenity use and nature conservation) grew proportionately. The result was the exclusion of digging in some bait grounds at a time when demand was at its height. Bait shortages began to cause concern to anglers in certain areas of the country. The questionnaire survey of angling clubs, conservation organisations and local authorities was repeated by the Nature Conservancy Council in 1985 and the results are presented in this report, together with a general assessment of the status of bait collection and supply and its implications for nature conservation in Britain during the late 1980s. This report addresses some, but not all, of the points raised in Annex 1. It makes recommendations for the management of bait collection and suggests additional recommendations for further work.

SECTION 3 : THE BAIT SPECIES

3.1 Lugworm

The lugworm is the most popular bait worm used by sea anglers in Britain, due in part perhaps to its widespread distribution and habitat of easily-dug sand and muddy sand beaches. It is also known as the common blow lug, lobworm, yellowtail, blacklug and runnydown. The last two names refer to the largest lugworms found only at low water mark of spring tides; some anglers and fishermen maintain that these are two different species. This distinction has yet not been supported by taxonomists[1] and all these worms are classified here as *Arenicola marina*, a polychaete, or bristle worm. Two less common tailless species are also found on British shores, but not considered here.

3.1.1 Ecology and life-cycle

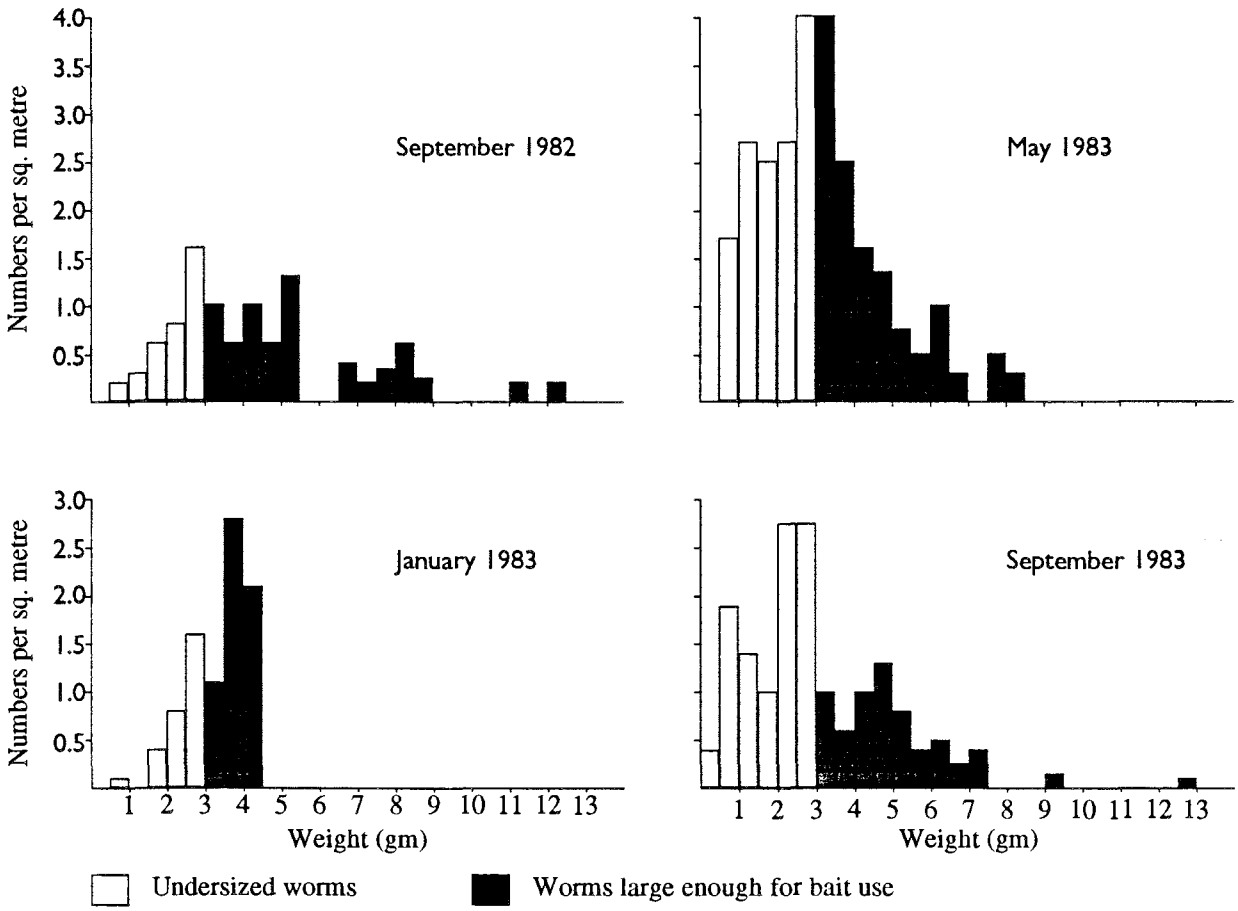
The presence of lugworm on a beach is apparent from the spiralled sand casts found on the surface above one end of each worm's 'U' shaped burrow. Worms feed inside their burrows on sediment containing the remains of decaying seaweed, diatoms and bacteria, and excrete sand casts at the tail end of the burrow. Large worms tend to be found at the lower levels of the beach and in the sublittoral, while smaller worms are found at shallower depths in the sand further up the shore. Small worms may be present in densities of well over 100 per square metre, whilst adult worm beds are considered very dense if occupied at 40 - 60 worms per square metre. Lugworms grow to different sizes around the country, with weights of 25g being found on the south and west coasts but no more than 10g in the north east.

Most lugworms breed between October and March, usually in November and December, although up to 20% of the population may spawn in July to September (Shahid, 1982). Each animal spawns on a single day, with the entire population of a beach completing spawning within just a few days, although populations on different beaches breed at different times. When spawning has occurred, a few worms die. The rest stop feeding and producing sandcasts for a while whilst their larvae are living attached to sand grains in the adult burrows. The larvae soon migrate from the adult worm beds to a zone just below the low water mark, where dense populations are found for the next six months. They then swim in a mucus tube to the upper part of the shore where the 'nursery' beds are found. The worms arrive in these beds at a size of about 1cm and remain here, where there are good supplies of organic material from the strandline, until they are large enough to move down the shore to the deeper-burrowing adult worm beds. These nursery beds at the top of the shore therefore provide an important source of recruitment to the adult beds and future years' breeding populations. Most anglers will not take worms for bait until they are at least two years old. Lugworms are capable of living for up to six years and can therefore breed several times during their lifetime, commencing in their second year.

Adult lugworm populations reach their lowest abundance in winter after breeding (and for a period worm beds may appear to be completely empty because of the cessation of feeding while larvae are in the burrows). Individual worms are also at their smallest size at this time. Numbers then pick up very quickly in spring and reach a peak in the summer from May to July. They also grow in size very quickly in this period, with the largest worms of the year being found in autumn before breeding. Figure 1 (from Olive, 1985a) shows the annual variation in population size structure and numbers of an unexploited population in Northumberland.

1. A description of a sublittoral species of *Arenicola* is in preparation in 1992.

Figure 1. Annual variation in the numbers and population size structure of an unexploited population of *Arenicola marina* in Northumberland (from Olive, 1985a)



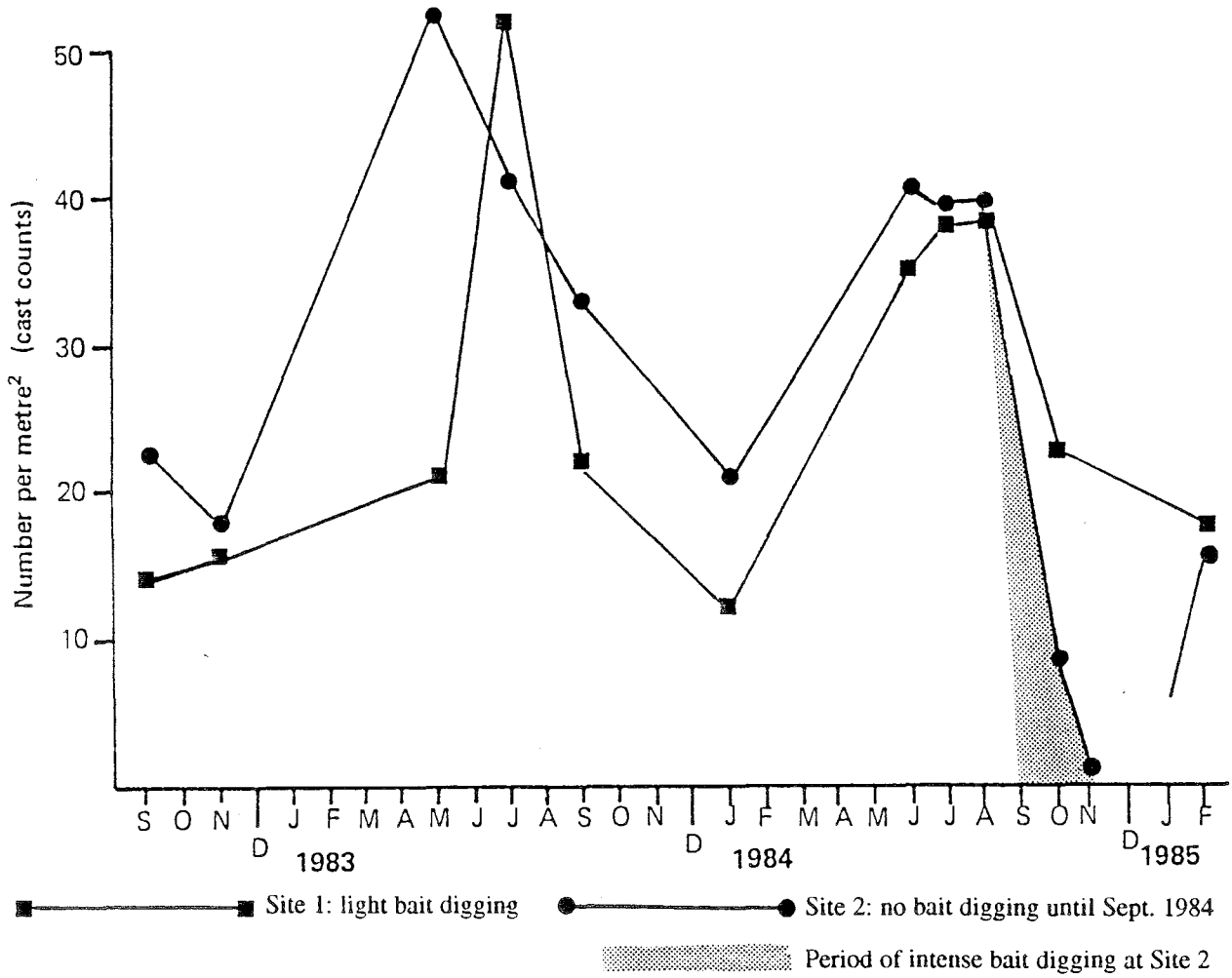
3.1.2 Impact of bait digging

Lugworms are traditionally collected by hand digging over the lower shore of a beach where dense worm beds are present. A spade or fork is used to turn over spits of sand, which are searched quickly for worms. A recent addition to the baitdigger's tools is the baitpump, an import from Australia, which is placed over the worm cast and used to withdraw the worm underneath in a column of sand. Not all lugworm beds are suitable for the use of this method. Lugworm dredges have been in use in the Netherlands for some years and recently introduced to Britain. These are described in section 4.4.2.

One of the populations studied by Olive was very heavily dug over in the winter of 1984. Figure 2 demonstrates how the density in an area of 200m x 1km fell from $40m^{-2}$ to less than one per metre within a period of about six weeks. In total, about four million worms were removed. Despite this astonishing scale of loss, migration of worms into the area enabled the population to recover within a few months. This site was, however, a relatively small area within a large expanse of intertidal sand flats, with ample capacity for recolonisation from nearby populations. Recovery after over-digging may not be so rapid where lugworms are present on a small pocket beach, with limited opportunity for recolonisation of the dug beds by adult worms from elsewhere. If the nursery beds of small worms at the top of the beach have also been affected by digging, recruitment to the adult population will be reduced. This may have a serious long-term effect upon the worm stocks.

The lugworm is a very resilient and reliable bait species because of its population biology. Harvesting of adult worms for bait should not affect the supply of juveniles from the nursery beds higher on the shore if these are left untouched. Adult worms will also migrate into dug areas from populations elsewhere in the area.

Figure 2. The effect of bait digging on the numbers of *Arenicola marina* in a population in Northumberland (from Olive, 1985a)



3.2 Ragworms

The true ragworms belong to the family Nereidae. The most important bait species in Britain are the king rag *Nereis virens* and the harbour rag *Nereis diversicolor*.

3.2.1 Ecology and lifecycle

Ragworms are usually found in slightly estuarine conditions in the intertidal and sublittoral. They live in burrows (which they rarely leave) in the sediment or under rocks and stones. The small harbour rag, which grows to a few inches long, spins a mucous net to catch food particles (mainly dead organic material) from the water. The king rag, up to two or three feet in length, also scavenges and can take small invertebrates. The large jaws may be used primarily for defence.

The reproduction of ragworms differs from the lugworm, in that the Nereidae are semelparous (or monotelic); they breed only once in their life and then soon die. When the worms are large enough to breed, hormonal changes take place which cause their bodies to alter in appearance. The males develop swimming legs and large eyes for use when they leave their burrows to spawn and the digestive systems of both sexes break down, enabling large numbers of eggs and sperm to be produced. A combination of changing temperature in the spring and lunar cycle (a spring tide) stimulates spawning of all the mature worms of a species in a single day. The king rag males swim out of the burrows to spawn and fertilisation of hundreds of thousands of eggs takes place inside each female's burrow. In the harbour rag neither sex leaves their

burrow, but in most other species both sexes of worm swarm together in the watercolumn. The spent worms die after spawning because their altered body structure is very fragile, preventing burrowing or feeding. Large numbers of dead male ragworms may be cast up onto beaches at this time; the females and harbour rags die in their burrows and are not usually found. The millions of developing larvae grow fast and quickly join the adult population to replace their parents.

Although a ragworm may be capable of maturing and breeding after one year's growth in good conditions, most have a slightly longer maturation period with a lifespan of two or three years before hormonal changes trigger breeding. Thus about one third or more of the population will breed each year. The mature animals will not necessarily be the largest in the population.

A population of king ragworm in the Menai Strait proposed Marine Nature Reserve is an exception to the usual pattern (Coates, 1983; Olive, 1987). Despite rapid initial growth of young worms in the Strait, comparable to that achieved in the laboratory, there is an unusually long period of growth in most individuals before spawning occurs. Animals of two to three feet in length which show no signs of maturation have been recorded. Small individuals are very scarce. The maximum proportion of the population found to be spawning in one year was about 20%, much lower than normal.

The lifecycle of the ragworm can be completed in culture, which, together with its omnivorous nature and fast growth, makes it a suitable candidate for farming.

3.2.2 Impact of baitdigging

Most ragworms are dug in a similar way to lugworms, and harbour rags may be found living in lugworm beds in muddy sands. In some areas the king ragworm grows to a very large size and a more productive method of collection is to find signs of a burrow and dig for individual worms. Ragworms may also be found by overturning stones and boulders in sheltered, stony areas or by dragging rakes through the sediment from a boat when the tide is in. The latter is one of the methods used to take large numbers for the retail bait trade in some south coast harbours.

Exploited and unexploited populations of king ragworms were studied for one year on the north-east coast of England by Blake (1979). The densities of these populations were not significantly different, at about $15/m^2$ in summer and $3/m^2$ in winter, indicating that the dug population (which was most heavily exploited in the summer) was probably not threatened by bait digging.

The nature of the life-cycle of the ragworm provides a naturally high turnover, with the death after breeding of at least one third of the population each year followed by swift recruitment from the larvae. This enables a population to recover swiftly from baitdigging, provided that some adults remain to breed. Refuge populations will usually be present in adjacent subtidal areas and will act as a source of juveniles.

Where only a small proportion of the worms breed, as in unusual populations such as the king rags of the Menai Strait, the impact of baitdigging may be much more severe. The king rag population density here may be smaller than normal because of predation pressures on small worms by the largest individuals and territorial behaviour by the adults; it is certainly depressed below its carrying capacity by heavy bait digging. Olive (1987) recorded densities of 5-15 per $25m^2$. The proportion of worms maturing in any year is also very small and recruitment therefore relatively low (despite the millions of eggs which may be produced by each large female surviving to spawn). Bait diggers selectively search for individual large adults and may be very efficient in taking a high proportion of the sparsely distributed worms present. In this situation, intensive baitdigging can cause a significant reduction in the worm population, particularly if there is little opportunity for recolonisation from adjacent areas on the shore or in the intertidal. Suitable habitats below the low water mark at this site also appear to be scarce, so a refuge population is not available to act as a source of recruitment.

3.3 White ragworms

White or silver ragworms are named from their appearance. They are can also be known as catworms, because of their characteristic smell. White ragworms are bristle worms, like the ragworms described in the previous section, but belong to the family Nephtydidae. Six species very similar in appearance are found around the British coasts.

3.2.1 Ecology and lifecycle

White ragworms are found in clean sand beaches, very close to the low water mark and generally uncovered only during low water spring tides. They are not widely distributed and quite hard to find, due to the absence of any signs of their presence. All species are predators, particularly on other worms. They do not have permanent burrows like the other ragworms but wander through the sand in search of prey.

These animals are very slow-growing and long-lived and can be aged by counting the rings in jaw sections. The largest worms in a population could be 12 years old and an average three inch worm four or five (Olive, 1985c). Like the harbour and king ragworms, the sexes are separate and all worms in a population breed on one day. Unlike the other rags, *Nephtys* may breed several times during their life (they are iteroparous, or polytelic). Breeding does not take place every year; the worms sometimes reabsorb their eggs before spawning is due. Olive (1985c) records only two successful spawnings in one species during the ten year period from 1975 to 1985. The larvae have a long planktonic phase and may not settle into the sand until five weeks after fertilisation. They are then exposed to the threat of predation from cannibalistic adults.

3.3.2 Impact of baitdigging

This bait is dug by hand in the same manner as for the preceding species. White ragworms are much less widespread than the other ragworms, being hard to find and usually only taken by those anglers who know the location of a worm bed.

Their life cycle, with slow growth, infrequent spawning and low recruitment rates, makes *Nephtys* species very vulnerable to baitdigging. It is quite possible for populations to be wiped out locally. They are also very popular with some anglers as bait and much in demand. Sea anglers have expressed concern over the pressures on some populations, particularly from exploitation by match fishermen.

3.4 Peeler crabs

Peeler crabs are any species of crab which are approaching their moult. In order to grow, crabs must shed their shells at intervals; the new soft shell beneath then expands before hardening. Moulting takes place only at certain times of the year when conditions for growth are good; breeding also takes place at this time. A "peeler crab" is one which is approaching its moult, with the old shell beginning to lift away from the body. When the shell has just been shed, the crab is known as a "soft shell". Anglers maintain that the hormones produced by the crabs during moult are particularly attractive to fish. (Hermit crabs removed from their shell provide a similar type of bait at any stage in their life cycle, but without this added hormonal attraction). During these vulnerable stages moulting crabs hide under rocks and in crevices to escape predation. Bait collectors turn over rocks and stones on the shore during low tide to find these animals, and check whether they are about to moult by testing the adherence of the shell.

The common shore crab *Carcinus maenus* is very abundant around the coasts, both on the shore and in the shallow sublittoral. It is the species most commonly used for bait in Britain, although small individuals of the edible crab *Cancer pagurus* and the velvet swimming crab *Liocarcinus puber* may also

be taken (these are subtidal species and not so commonly found on the shore or generally deliberately sought by anglers). Undersized specimens of the edible crab are also protected by fisheries legislation and may not legally be collected.

Despite the very common nature and abundance of the shore crab, it is possible for heavy gathering of peelers for bait to reduce the numbers in a popular collecting site. The majority of bait collectors do not bother to return the boulders to their original positions, causing damage to the organisms on the top and underneath of the rocks. In a few areas of the country where rocks are not numerous on the shore (i.e. sheltered muddy estuaries) anglers place tiles onto the sediment to attract crabs and collect from these artificial sites.

3.5 Other bait species

A number of other species are collected for use as bait, but these are generally less wide-spread in use, or their collection does not have serious implications for nature conservation interests at present.

Molluscs are popular in some areas, particularly mussels *Mytilus edulis* (collected off rocks on the shore or from mussel beds in sheltered areas), razor shells *Ensis* spp. (dug on the lower shore of sandy beaches) and, in some parts of the south coast, slipper limpets *Crepidula fornicata*.

Sand eels are taken in seine nets in some areas of the south west, mainly as a bait for bass. They are also available frozen from tackle shops. Other popular fish baits include common species such as the mackerel, which are used cut into strips, usually in boat fishing.

Artificial lures are widely used for boat fishing. These are generally manufactured from plastic or rubber and are visual attractants. There have been some attempts to manufacture bait attractants (lugworm flavour etc), following a great deal of interest in artificial flavours used by freshwater anglers.

SECTION 4 : BAIT SUPPLY AND DEMAND

4.1 The scale of demand for sea angling bait

It is difficult to assess the full scale of the demand for bait species in Britain, since detailed information on the total numbers of sea anglers, the time they spend fishing and their consumption of bait is not available. In the 1970s the National Anglers' Council estimated that there were two million sea anglers in Britain. Since that time the numbers have certainly risen, due to the increased popularity of angling and amount of time spent on recreational activities by the population as a whole. More recently, there has been some anecdotal evidence of a down-turn in the amount of sea angling taking place. This is attributed to a reduction in catches in some inshore areas due to intensive commercial fishing activity or the effect of EC quotas leading to bans on the landing of cod from any vessel in certain sectors.

The main period of shore fishing is in the autumn and winter, when stocks of whiting and cod come inshore and may be caught off beaches. There is also a small peak in some holiday areas during the summer. The main period of demand for bait therefore comes during the autumn and winter, when worm populations are at their lowest density and peeler crabs are not available. An interesting indication of the scale of demand for bait was given by Holden (1985), describing the numbers of anglers present and quantity of equipment in use along a stretch of the Felixstowe beach during the peak whiting angling time. He estimated that 250 anglers were present along less than one mile of beach, using 28 miles of line, 750 hooks and 25,000 lugworms during a single night. (A fisherman can easily use 200 worms in a single angling session). Advertisements in *Fishing News* in the winter regularly request unlimited supplies of bait species, or 100,000 lugworm per week.

In 1985/86 Cowin (pers. com.) carried out some research into bait demand and estimated that the retail trade in England and Wales sold some 140 to 150 tonnes of king ragworm *Nereis virens* per year (about 37 million worms, worth up to £20 million at current prices of about 12-15p per worm). These are obtained mainly from south coast harbours and Northern Ireland. The numbers of lugworm supplied (at about 10p each) will have greatly exceeded this, with sources both in Britain and abroad, particularly the Netherlands. The National Anglers Council estimated in the 1970s that 75% of anglers dig their own bait (although this was not borne out by the results of the small sample of clubs which responded to the questionnaire study: see Section 6.9). Anglers probably dig almost an equal quantity of ragworm for their own use, and perhaps nearly twice as much lugworm as is supplied by the retail outlets.

4.2 The retail supply

Retail outlets are mainly supplied by companies with organised teams of commercial baitdiggers, individual professional diggers, the unskilled and unemployed and by overseas companies and individuals. (Farmed bait is also beginning to contribute significant quantities to this market, see section 4.3.3 below).

Professional bait diggers have been working in some parts of the country for a great many years. For example, in East Anglia, hundreds of individuals have been supplying the retail trade for many decades and some areas of shore are even allocated to commoners (see sections 6.3 and 7). These professional bait diggers have generally worked a relatively small area of shore continually, but on small scale and sustainable basis.

Groups of bait diggers have been working a number of bait beds on a rotational basis on the south coast for many years, and this approach has become more common recently, with the increased demand for bait. There are accounts of bait beds being completely dug out by these itinerant groups, which do not need to

use any one area on a sustainable basis (e.g. Arnold and Arnold, 1985 and 1987). Bait supply companies put together teams of bait diggers and provide their transport to new areas of shore, both locally and much further afield. For example, one team of commercial bait diggers travels from northeast England to southwest Scotland to dig bait for the winter market.

This increase in commercial baitdigging has resulted in conflict between competing teams of bait diggers and between local anglers and commercial bait diggers. There is some anecdotal evidence to suggest that the increase in bait digging pressures by anglers and new suppliers for the retail bait market have driven some of the traditional bait diggers out of business, by over-exploiting their home areas.

4.3 Bait digging for personal use

It has been estimated that one and a half million anglers may dig bait for their own use (National Anglers Council). These will include both match anglers (semi-professionals) taking very large quantities for their regular use, and the occasional angler taking some bait while on holiday. It is not essential for an angler to live on the coast or near bait beds in order for bait digging to be undertaken. Many sports anglers will regularly drive one hundred miles to obtain bait for an important fishing session.

The methodology employed by different groups of anglers will vary. Many experienced bait diggers work in a manner similar to the professional, with only the largest worms being taken and the bait beds infilled at the end of a bait digging session. Most anglers will not dig bait in this manner. There will be no limit on the size or number of worms taken, and amateurs will be prepared to continue bait digging for as long as there are any worms available; the cost-effectiveness of bait digging will not be a consideration in these cases and the process of bait digging can be an end in itself. Beds of undersized worms, including nursery areas, may be exploited. Holes and trenches will not be backfilled. The result of this sort of activity is to cause long-term damage to the bait beds and intertidal habitats. Much the same sort of consideration applies to the collection of peeler crabs for bait.

4.4 Methods of bait collection

4.4.1 Hand collection

The traditional method of baitworm collection is by digging, using a fork (or, less usually, a spade). Each spit of sand is turned over and quickly searched for worms. Professional diggers usually work along a trench, with each subsequent trench being dug alongside the previous one, into which the sand is turned. This is an economic method of working and enables the trenches to be filled as digging progresses, thus minimising the disturbance to the beach and ensuring swift recovery of the worm bed. Unfortunately many inexperienced baitdiggers do not work in such a systematic way, nor do they back-fill their holes. They may therefore cause much more damage and disturbance to an area, leaving behind a series of open holes and mounds of spoil.

Where bait species are more widely spread, the bait digger may search for the signs of individual animals (i.e. the largest king ragworms) or investigate several areas by digging small holes in order to find a site with a population worth exploiting.

A more recent method of collection of lugworms is by the bait pump, developed in Australia for taking small freshwater crayfish from their burrows. This can be used to draw a plug of sand, including the lugworm in its burrow, up to the surface. It only appears to work well on fairly fine, well-sorted sands, where the lugworm lies vertically in the burrow under the cast. Where feasible, this is easier to use than the traditional method of bait digging and causes less disturbance to the shore.

In a few muddy areas, ragworm can be collected by raking the fine sediment from a boat in shallow water. This is said to be one of the methods of bait collection used in Poole Harbour, Dorset.

Peeler crabs are also collected by hand, with stones and boulders on the shore being turned over to expose the animals. Large fucoid algae may also be removed from their holdfasts to expose crabs hidden within their fronds.

4.4.2 Mechanical collection

Mechanical dredgers have been in use in the western part of the Dutch Wadden Sea since about 1975, when four machines were harvesting about 18 million lugworms per year (Dijksterhuis, 1977). (Adding to this the 14 million dug by hand, bait collection removes about 1% of the total population of lugworm in the area). One of the Dutch mechanical dredgers has recently been sold to a British company and the first experimental dredging took place in Essex in 1989.

Mechanical dredges work at high tide. A barge is anchored over the sand flats on a 250-300m cable. The barge is very slowly winched towards the anchor and a metre-wide, 40cms deep gully is scooped out by the dredge. The sediment is sieved with jets of water through a 1cm mesh and lugworms removed by hand from the material retained on a conveyor belt inside the barge. Several gullies can be worked on each tide.

4.4.3 Bait farming

The king ragworm *Nereis virens* is the species which is most suitable for farming. It is fast growing, a popular bait and easy to breed in artificial conditions. The first British bait farming company, Seabait Ltd., was set up in 1986 on a power station site where warm water supplies were available. Seabait produced well in excess of one million six inch worms (five tonnes) in 1989. Their aim is to double, if not triple this output in 1990. The retail value is £2.25 per 80g pack (containing 16 worms). This compared well at £28 per kilogramme with another farmed product: salmon at £8/kg. Other bait production companies may already be contributing to farmed output. With an estimated 140-150 tonnes of king ragworm sold per annum by retail outlets and an equivalent quantity dug by anglers for their own use, the scope for production is vast (Cowin, pers. com.).

Of the other widely used bait worms, the lugworm *Arenicola marina* has a more complicated life cycle which is difficult to complete under laboratory conditions. Breeding of white ragworms is difficult to achieve. Research is nevertheless underway to attempt to culture these species and peeler crabs for the retail market. With the use of artificial hormones, it should be possible for a continual supply of peeler crabs to be provided.

A number of non-native polychaete species may have life cycles and growth rates which make them more suitable candidates for farming than *Arenicola marina* and other native bait worms. The commercial returns from introducing such species to the bait market in Britain could be very large, but the probability of introductions to the wild would be high, either through discharge of farm tank effluents or the use of live worms for bait. Such introductions would be in breach of the Wildlife and Countryside Act (1981) (without a license) and developments in the culture of non-native species should be monitored very carefully.

SECTION 5 : THE NATURE CONSERVATION IMPLICATIONS OF BAIT COLLECTION

5.1 Habitat damage

Damage to the habitat of bait species occurs in most cases of bait collection. The severity of this damage varies depending on the nature of the bait collection activity and the particular methodology used.

5.1.1 Bait digging

Digging for bait disturbs the sediment, which is removed from its original position, overturned and exposed to air and wave or current action. Stones and shell buried in the sediment are exposed. If the sediment is subsequently returned to the trenches by the bait digger (back- or infilling), then the effect of disturbance is reduced and recovery hastened. The use of a bait pump for lugworm collection prevents most habitat damage.

Some of the more detailed studies on recovery of sediments were carried out in the Firth of Forth (Anderson and McLusky, 1981; McLusky *et al.*, 1983). These studied the recovery of areas where bait digging had been simulated. A series of holes were dug, with the mounds produced from the spoil left alongside (the method used by many amateur bait diggers), and some long trenches excavated and infilled (copying the more experienced diggers). These were monitored over a period of 30 days, with microtopography, sediments in suspension and surface sediments being studied. A similar study (Anderson and Meyer, 1986) studied surface and suspended sediments after clam digging in Maine, USA. Coates (1983) and Johnson (1984) have also studied the recovery of bait dug areas in the Menai Strait.

The immediate effect of bait digging is to change the sediment stratigraphy. In undisturbed conditions, bioturbation of sediments (primarily by feeding lugworms) usually produces a layer of well-mixed sand ten cm deep, which overlies a bed of shell or stone. The sediment may be anoxic at or below this layer. The coarse material and anoxic sediments are moved to the surface by digging, exposed to the action of waves and currents and quickly oxidised.

Where no back-filling takes place, the mounds of spoil are exposed to increased wave and current erosion and winnowing out of the finer sediments. The basins collect organic material (drift seaweed) and fine sediments from suspension. The result is the formation of a soft, organically enriched and anoxic layer at the bottom of the basin, which also holds water permanently. The holes initially fill in much more swiftly than the mounds erode, but the latter disappear well before the basins fill completely. Backfilled trenches recover much more quickly, but some stones and shell dug up will still be left on the surface.

Overall recovery rates will depend on the energy of the site. Thus coarse sandy beaches with wave action will lose the signs of digging much more quickly than sheltered sites with poorly sorted sediments. Storms will speed up the disappearance of bait dug areas. In the very sheltered conditions of the Menai Strait, where bait digging results in the movement of underlying boulder clay to the surface, Johnson (1984) recorded that some experimental plots were still visible one year after having been dug. On the more exposed, muddy sand shore of Red Wharf Bay, Anglesey, unfilled holes and mounds took from 25 to 30 days to completely disappear. This is an insufficient period to enable shores to recover between the peaks of collection at each low water spring tide.

In addition to these physical effects, bait digging can cause changes to the chemical content of sediments. Howell (1985) records that increased levels of heavy metals were found in surface sediments

and invertebrates following intensive bait digging in Budle Bay. The exposure and subsequent oxidisation of deep sediments by digging enables heavy metals (cadmium and lead) which are bound to sediment particles in reduced (anoxic) conditions to become bioavailable. Cadmium is also concentrated in the anoxic layers by the activity of lugworms; their removal therefore exacerbates this problem.

Bait digging can also cause the destruction of mussel beds on sediment areas.

These physical changes to the intertidal habitat also affect the invertebrate populations of the shore, as described in section 5.2.

5.1.2 Bait dredging

Mechanical dredging for lugworm has a similar effect on the sediment habitat as that caused by hand digging. Mechanical digging for lugworms in the Wadden Sea, where the dredged sediment is strained through a sieve with water jets, leaves gullies 40cm deep and one metre wide, bordered on each side by a 1.5 metre wide ridge a few cm high (Heiligenberg, 1987). This is similar to, but more severe an effect than caused by a hand-dug trench with no back filling. Monitoring of the fauna of dredged sites was carried out for six months, so the relief of the sediment surface may have enabled relocation of the dredged areas throughout this time, although the author does not record the rate of physical recovery of the sediment surface over that period. Dredged tracks in Essex (pers. obs, 1989) tend to fill with water and accumulate seaweed, as seen for bait-dug holes, and previously buried shell rejected from the sieves is scattered over the surface. The area of effect can be greater than occurs during normal levels of bait digging.

5.1.3 Boulder turning

The impact of boulder turning during the search for peeler crabs has also been the subject of research (Bell *et al.*, 1984; Cryer, 1986; Cryer *et al.*, 1987; Liddiard *et al.*, 1987). In very heavily used areas, close to access points and centres of population, boulders may be turned repeatedly by bait collectors. Bell *et al.* (1984) demonstrated that up to 90% of all boulders in a shore transect at Mumbles Head, Swansea, could be turned within a two week period and some boulders may be turned 40-60 times during the summer. Most boulders (60%) are not replaced in their original position. Larger boulders which are upended and not overturned completely are more likely to be left as they were found. Liddiard *et al.* (1987) suggested that a minimum of 3,000 rocks are overturned daily during periods of reasonably low tides at both Mumbles and Oxwich. An unknown proportion involve the repeated overturning of the same rocks. No 'serious' collector was seen to replace rocks in their original position. The chief result of this damage to rocky shores is the loss of habitat stability, which in turn seriously affects the range of species found on and beneath boulders. The removal of large algae will also cause the destruction of their understory habitats, which are important for the shelter provided to small algae and invertebrates. The impact of this habitat damage on other littoral species is described in the following section.

5.2 Effects on invertebrates

5.2.1 The bait species

The most commonly used species, the lugworm *Arenicola marina*, is very widely distributed around the British coasts where suitable sediment habitats are found. As described in section 3.1, lugworms are abundant and very resistant to heavy exploitation because of their ability to recolonise dug beds by migration of adults from adjacent areas or recruitment of young worms from separate nursery beds on the upper shore.

Bait diggers usually remove only about 50% (Heiligenberg, 1987) or 70% (Blake, 1979) of the worms present in each area dug. Early studies of the recovery of lugworm beds after bait digging indicated that complete recolonisation occurred quickly (one month after areas had been experimentally dug out at Whitley Bay) (Blake, 1979). Cryer *et al.* (1987) found no significant increase in the density of worms in depopulated areas on South Wales beaches after six months during the autumn and winter, but the initial densities at these sites were very low (9 and 16 worms/m^2). Recovery of dug areas takes place most quickly (within three weeks) where holes and trenches are back filled (McLusky *et al.*, 1983).

There is only one documented instance of lugworm beds being dug out by anglers. This occurred in exceptional circumstances when a formerly protected area of Budle Bay, Lindisfarne National Nature Reserve, was opened to bait diggers during a period of unusually heavy demand (Olive, 1985a). Despite the virtual clearance of the worm population in the most heavily-dug area, recovery took place within a few months with immigration of worms from neighbouring areas when the bait diggers ceased to use the site, even though this was during the winter period when lugworm populations are at their lowest levels.

Ragworms are also quite widespread in more sheltered and muddy areas. Like the lugworm, the harbour rag *Nereis diversicolor* has a resilient population ecology and is not considered to be threatened, even locally, by bait digging activities. The king rag *Nereis virens* is also usually resilient to exploitation, with the exception of the unusual population in the Menai Strait where delayed maturation makes over-digging a serious problem.

White rags or catworms, *Nepthys* species, are quite local in distribution. Their popularity with anglers, longevity and very infrequent reproduction make populations of these species very vulnerable to over-exploitation.

Shore crabs are ubiquitous in their distribution, although heavy collection may reduce populations locally. They are most commonly collected during their moult, when breeding also takes place and they are vulnerable and quite easy to locate. Collection does not take place throughout the year and recovery of populations is relatively swift.

The other bait species are also not under threat from collection. They are usually common (i.e. mussels and slipper limpets) or only a small proportion of the population is available for exploitation (i.e. razor shells, where most of the population is found in sublittoral areas).

5.2.2 Non-target species

During the process of bait collection, by hand, mechanical digging or boulder turning, many animals and plants other than those being sought will be damaged and their population levels reduced. The use of bait pumps will cause less damage than other methods. Species populations will be affected immediately by the disturbance at the time of bait collection, but their recovery will also be dependent upon the longer-term habitat damage caused.

A number of authors have studied the impact of hand digging for worms on other populations of common sediment shore invertebrates (Cadee, 1977; Cadman, 1989; Cryer *et al.*, 1987; Heiligenberg, 1987; McLusky *et al.*, 1983). The process of digging for bait causes the death of many other marine invertebrates, by physical damage, burial and smothering or exposure to desiccation and predation. The eel grasses *Zostera* species are also uprooted by bait digging and mussel beds loosened, leading to their destruction in bad weather.

Jackson and James (1979) suggest that intensification of digging for bait worms on the North Norfolk coast in the 1950s and '60s resulted in a decline in cockle *Cerastoderma edule* populations. Undisturbed cockle beds were not affected. The cockle cannot regain its normal position at the surface of the sediment if deeply buried in overturned spoil. Smaller, more numerous invertebrates are also affected. Cadee (1977)

recorded an 85% decline in the polychaete *Heteromastus filiformis* after digging. Heiligenberg (1987) examined the effects of both hand and mechanical digging in the Dutch Wadden Sea. Hand digging caused a significant reduction in many of the common species, including *Scoloplos armiger*, *Nereis diversicolor*, *Heteromastus* and, of course, *Arenicola* (50% removal). A total of 1.9g of other benthic animals were removed for every 1g of *Arenicola*. Mechanical digging has a much more serious effect, with complete removal of *Arenicola* and up to an 80 or 90% loss of the Baltic tellin *Macoma baltica*, *Scoloplos* and *Heteromastus*. Using this method, for every gram of lugworm taken, 9 to 13.4g of other invertebrates are removed from the area.

Recovery of these invertebrate populations is fairly swift, through migration into the dug areas. McLusky *et al.* (1983) found a reduction of 80-100% for the surface-living *Hydrobia ulvae* and nearly 100% for *Macoma* after hand digging, but normal populations in test plots after 15 days. Recovery on mounds and in trenches will vary, with some species avoiding these habitats, so a return to normal may not occur until the habitat has been restored (see section 5.1). Complete recovery of most common species will take place after the successful settlement and recruitment of juveniles to the population (in less than one year).

Long-lived, infrequently recruiting species such as large bivalves or burrowing echinoderms will take much longer to become re-established. These species may also be very vulnerable to bait digging disturbance because of their fragile nature. A population of the heart urchin *Echinocardium cordatum* was badly affected by a short period of heavy bait digging at Newton Haven, a small pocket beach in Northumberland, before a bye-law to control this activity was introduced.

In a few cases where bait digging takes place in very sensitive areas, the sediment community as a whole may be affected. In the Menai Strait very rich infaunal populations had previously been recorded in areas which were then heavily dug for king ragworms. These diverse populations are no longer present in the disturbed areas. Management of bait digging is proposed to enable recovery of these sites and, it is hoped, eventual recolonisation by the original full range of fauna. There have also been instances of bait digging for ragworm taking place within mussel beds on sediment areas. The physical disturbance of the beds can result in the mats of mussels breaking up and being washed away in poor weather. In this case the mussels provide a habitat for a wide range of species which may also be lost. Where shell fish beds or estuarine areas are covered by a Several Order, bait digging may be controlled to prevent damage to commercial species.

Boulder turning for peeler crab collection has a serious effect upon the flora and fauna of rocky shores. A rich under-boulder fauna is associated with stable boulder shore habitats. Sponges, coelenterates and ascidians encrust the undersides of rocks, with numerous other mobile invertebrates (worms, crustacea and echinoderms) sheltering here. These communities are dependent upon the shelter provided by this habitat. Seaweeds and a range of dependent fauna are found on the upper surfaces of the boulders. When boulders are overturned, the algae on the (formerly) upper side are smothered and the underboulder communities exposed to predation, wave action and desiccation. On heavily used shores, boulders are so regularly turned as to severely reduce their species diversity. Liddiard *et al.* (1989) noted that there was a marked reduction in the diversity of species recorded on rocks at disturbed sites, in comparison with undisturbed control sites. Cryer *et al.* (1987) noted that replacing a boulder the right way up when searching for crab bait significantly increased the probability of finding crabs under the same boulder on subsequent tides, even when a crab was not present on the first visit.

5.3 Disturbance of shore birds

Bird disturbance is one of the most serious impacts of bait digging in British estuaries in winter. During the peak demand for bait (for the winter beach fishing season), the use of intertidal areas for bait digging

coincides with the presence there of internationally important populations of over-wintering and migrating wildfowl and waders. These birds need to feed continually when the tide is out in order to survive the cold winter and migrate successfully back to their breeding grounds. The presence of numerous bait diggers on the shore frequently has the effect of driving off the feeding birds. Bait diggers will even work shores during low water spring tides at night, when birds would also normally be feeding. Because British estuaries are at their carrying capacity for these bird populations, they are generally unable to feed successfully at alternative sites when moved on by disturbance.

Possibly a secondary problem is the reduction in food species caused by bait digging. There is a fairly large loss in invertebrate biomass during bait digging (see section 5.2) and this affects non-target species as well as the bait worms. No attempt has yet been made to assess the significance of this reduction in abundance of food species in bait-dug areas on bird populations.

The habitat damage caused by bait-digging is also a factor affecting the feeding opportunities of birds on the shore. The basins and trenches left by hand and mechanical bait digging remain filled with water at low tide. Most birds will not use these flooded areas, tending to search for food on the exposed sand and mud flats. Bait digging therefore reduces the area available for feeding birds even when bait diggers are not present on the shore.

Monitoring has been carried out into the effect of bait diggers upon bird populations in Budle Bay, the sanctuary area of the Lindisfarne National Nature Reserve, Northumberland. Concern was initially voiced over the disturbance caused by relatively small numbers of bait diggers in this area in the early 1980s. An agreement was reached with angling groups to close Budle Bay to bait digging for two years, then to reopen a section of the area for a two year trial period and examine bird numbers in the Bay during this time.

During the period of closure bird numbers and bait density increased in the Bay. When intensive bait digging (with up to 120 persons at one time) again took place in 1984 and 1985, bird numbers fell, as shown by Figure 3. It was apparent that this disturbance was incompatible with the aims of the sanctuary area and Budle Bay was finally closed to bait diggers in 1986. Bird numbers using the area have since risen considerably.

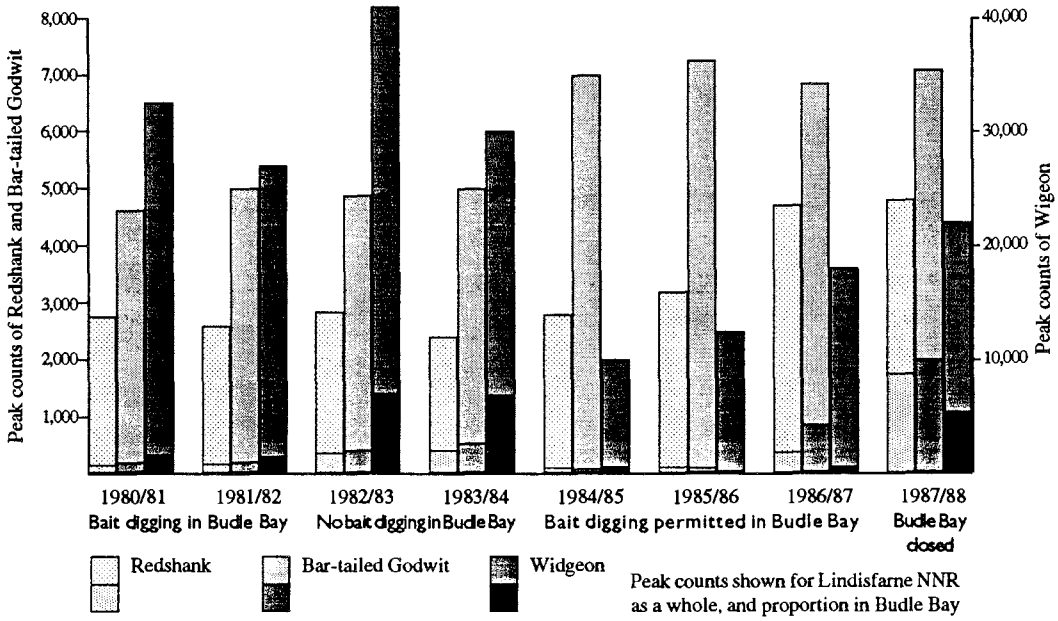
The impact on feeding birds of the introduction of mechanical bait dredging requires consideration. Bird disturbance at low water should not be such an important factor, if the dredging barges are left unattended at this time. On the other hand, this activity removes a very large amount of the invertebrate biomass, in comparison with hand digging, and the habitat damage will reduce the feeding areas available to shore birds.

5.4 Effects on the public use of shores

In many areas where there are a number of public uses of the shore, bait digging is unpopular with local authorities. The holes dug by bait diggers and generally not infilled remain obvious for long periods and may be thought unsightly. More seriously, the soft sediments which accumulate in these trenches are considered to be a public hazard; they may trip people walking on the beach or playing in the sea, or horse riders. There can also be concern that digging will undermine sea walls or other coastal structures. In harbours, bait digging among small boats has been implicated in the undermining of moorings and damage to boats which become stuck in holes at low tide. Boat owners wading out to their craft may also be endangered and there are instances of fishermen and lifeboat men being unable to launch safely from the beach.

As a result, several local authorities have brought in controls on bait digging under the Public Health Acts Amendment Act 1907, Section 82, to prevent danger to the public. Some Harbour Boards also control this activity. These authorities are listed in Annex 2 and their controls outlined in Section 6, by region.

Figure 3. The effect of bait digging upon bird numbers in the Budle Bay sanctuary area, Lindisfarne National Nature Reserve



5.5 Conclusions

Habitat damage on sediment shores is most serious in low energy environments, where sediments are poorly sorted and recovery rates from bait digging can be very slow. These sites are frequently in estuarine areas, close to centres of population, exposed to heavy use by anglers and also subject to many other development pressures. More wave exposed, sandy shores will not be as badly affected, although very large-scale use by mechanical bait dredgers could cause significant damage in these situations. Boulder turning for peeler crabs causes very serious habitat damage, particularly on sheltered, stable boulder shores.

Most populations of bait species are not threatened by collection, even locally. Many of the animals used by anglers are common and widely distributed, with their life cycles and ecology enabling a quick recovery from low population levels. Exceptions to this rule are the catworms *Nepthys* species and unusual king ragworm *Nereis virens* populations like that studied in the Menai Strait. Heavy bait digging pressures may seriously affect the survival of local populations of these groups. In the case of the Menai king ragworm, a single unique population could be endangered without the controls on this activity which are planned within the proposed Marine Nature Reserve.

The non-target invertebrates most affected by bait collection are large, long-lived, slow-growing infaunal species which may be fragile, easily damaged by bait diggers and slow to recolonise areas. Under-boulder fauna, which are dependent upon a stable and very specialised habitat, are also severely affected by boulder-turning by anglers in search of peeler crab. Diverse communities characteristic of some poorly-sorted sheltered sediments may also be damaged by bait collection. Mechanical bait dredging causes a high loss of biomass in areas dredged.

Disturbance of feeding shore birds caused by the presence of bait diggers on the shore at low water is a very serious problem. The removal of invertebrate biomass (bird food) is also potentially significant, particularly with mechanical dredging. Both methods of bait worm collection cause habitat damage and may restrict the areas of sediment shore available to feeding birds.

Bait digging can conflict with the use of public amenity beaches and the mooring or launching of vessels in the intertidal. Several local authorities have brought in bye-laws under the Public Health Act s Amendment Act, 1907, Section 82 or Harbour Acts to control this activity.

SECTION 6: THE BAIT DIGGING QUESTIONNAIRES

6.1 Methods and aims

A number of questionnaires on bait digging in Britain, tailored to the recipient groups, were circulated in 1985 to local authorities (County Councils, District Councils and some Harbour or Ports Authorities), Angling Clubs (sent out through the National Anglers Council and angling Federations), conservation organisations (NCC regions and wardening staff, RSPB staff and local groups, local wildlife trusts, Marine Conservation Society members) and individuals who requested questionnaires following publicity about the survey. Copies of these questionnaires and accompanying letters are presented in Annex 3. The author is most grateful to all those who assisted with and participated in this survey.

The intended aim was to provide a national picture of the demand for bait, how this was being met, the concerns held by anglers over the state of bait stocks and problems with bait supply. This would be compared with the conflicts of bait collection with other uses of intertidal areas, as perceived by local authorities and conservation bodies. Thus proposals for the integration of all these potentially conflicting uses of the shore could be drawn up.

The response from local authorities was very good, with replies from most. Many responses were also obtained from conservation organisations and individuals. Unfortunately only 86 of the 1,300 questionnaires sent to angling bodies for circulation to their member clubs were returned, representing a membership of about 5,000 (out of an estimated 2 million sea anglers in the country). This incomplete return can be attributed at least in part to the bad publicity which had arisen over the problems of bait digging versus bird conservation in the Lindisfarne National Nature Reserve and other areas at the time of the survey. Suspicions as to the true aims of the NCC survey were voiced in the press, despite the support of the national angling groups over distribution of the survey papers. Very occasionally, different returns from the same area gave opposing impressions of the local situation, some of which may have been a little misleading. It was therefore very difficult to draw firm conclusions on the anglers' views of bait supplies from these results. Other sources, such as the angling press, were also used to add to the picture.

The following sections draw together all the questionnaire results and additional comments received from all respondents for each of seven regions of the country. Maps have been drawn up for each of these regions to illustrate the results. These analyses generally represent the situation at the time of the questionnaire, although in a few cases subsequent developments have also been noted in the text. This regional approach was chosen to assist interpretation of the results by the contributing organisations and individuals and because there were very considerable regional differences in the pattern of bait supply and demand. These results had been circulated in map form to the participating bodies prior to the preparation of this report.

6.2 North east England

(Northumberland, Tyne and Wear, County Durham, Cleveland, North Yorkshire, Humberside)

6.2.1 Angling club returns

Responses were received from seven clubs, representing a total combined membership of 334 persons.

Most popular baits:

1. Lugworm
2. Peeler crab
3. White rag
4. Ragworm
5. Razorshell, mussel, sand eel, fish and lures from boats

The proportion of dug:purchased bait = 60:40.

Most anglers collected bait close to home, but many travelled up to 40 miles and a few 50 miles from home. There was one report of unreliable retail supplies. One boat angling club did not collect their own bait, but expected the skipper to provide it.

Three returns stated that bait supplies had not decreased and an equal number that they had, bait being more scarce than previously due to increased commercial bait digging (2) or pollution and reclamation of estuarine areas (1). Two returns reported restrictions on bait beds through port or local authority bye-law controls (Cleethorpes Borough Council and Port of Sunderland Dock Estate). Digging for lugworm is at its peak in autumn and winter in this area, providing bait for shore fishing in the winter months; (the time of year during which lugworm populations naturally decline).

The low returns from this region may be attributed in part to recent conflicts between nature conservation and angling interests in the North East.

6.2.2 Local authority returns

A response was received from all 19 local authorities, however only four had noted any conflicts between bait diggers and other interests. The remaining 15 did not record any accidents or damage attributed to bait diggers and, if aware of this activity, did not consider the (generally small amount of) bait digging that took place in their area to be of concern. Many areas of the coast in the North East are primarily rocky and bait digging is not possible over extensive lengths of shore.

Cleethorpes Borough Council control the 'digging for or removal of sand, bait etc. from the seashore' under the provisions of the Humberside Act (1982), which covers the foreshore within Cleethorpes Borough. This re-enacted a similar control in the Cleethorpes Improvement Act (1902) and is for amenity purposes as well as to protect the lugworm population. About 140 local individuals were licensed to dig bait in a designated area at the end of the amenity beach. There had been about 20 prosecutions for illegal bait digging. There was a marked difference in lugworm populations between the licensed and closed areas of the shore in this area, with sparse populations in the former attributable to the digging pressures there (Olive, pers comm., who also notes that many anglers do not agree that this is caused by bait digging and would like to see the closed areas opened to their use).

Bait digging in Boulmer Haven on the Northumberland coast had been a cause of concern for many years to local fishermen who launch their cobles across the beach. The holes and rocks left on the shore by bait diggers had caused difficulties in launching and even damage to boats and tractors, despite notices placed by the Northumberland Estates (owners of the foreshore) prohibiting bait digging in the launching

area. Bait digging is permitted anywhere else on foreshore owned by the Duke of Northumberland. An upsurge in digging activity occurred when the Nature Conservancy Council closed the Budle Bay bird sanctuary area to bait diggers in 1982 and again in the winter of 1984/85 during the miners strike, at which time up to 100/200 people a day were reported collecting lugworm in the Haven. As a result of the problems being caused to local fishermen, the Alnwick District Council adopted Section 82 of the Public Health Acts Amendment Act (1907) to enable the enactment of a bye-law stating that 'without lawful right or authority no person shall in any part of the restricted area dig for ragworms or for any form of fishing bait'

The Wansbeck District Council expressed concern over the digging of bait within the estuary of the River Wansbeck where holes left have 'caused distress' to several boat owners whose craft are moored within the estuary. Incidents had been reported where boat owners have stumbled into a bait-dug hole. The Council were monitoring this.

Scarborough Borough Council did occasionally experience problems with bait digging on Filey Beach, but these were of a minor nature and had not proved a nuisance great enough to warrant action by the Council. The Council attributed some of the increase in local bait digging activity to the controls at Cleethorpes, which had moved anglers on to other sites. The Scarborough Harbour Act (1843) has a clause preventing bait digging within the Harbour area in the interests of safety.

6.2.3 Conservation organisations

Bait digging had been a cause for concern to conservation bodies in three main areas of the North East coast: Budle Bay in the Lindisfarne National Nature Reserve, Newton Haven and Spurn Head Local Nature Reserve. These are described below. Additionally, there was some concern over possible damage to semi-exposed peat beds of geological interest in Hartlepool Bay. Whilst there were reports of digging and boulder turning in several other areas, nowhere else was there considered to be in conflict with nature conservation interests.

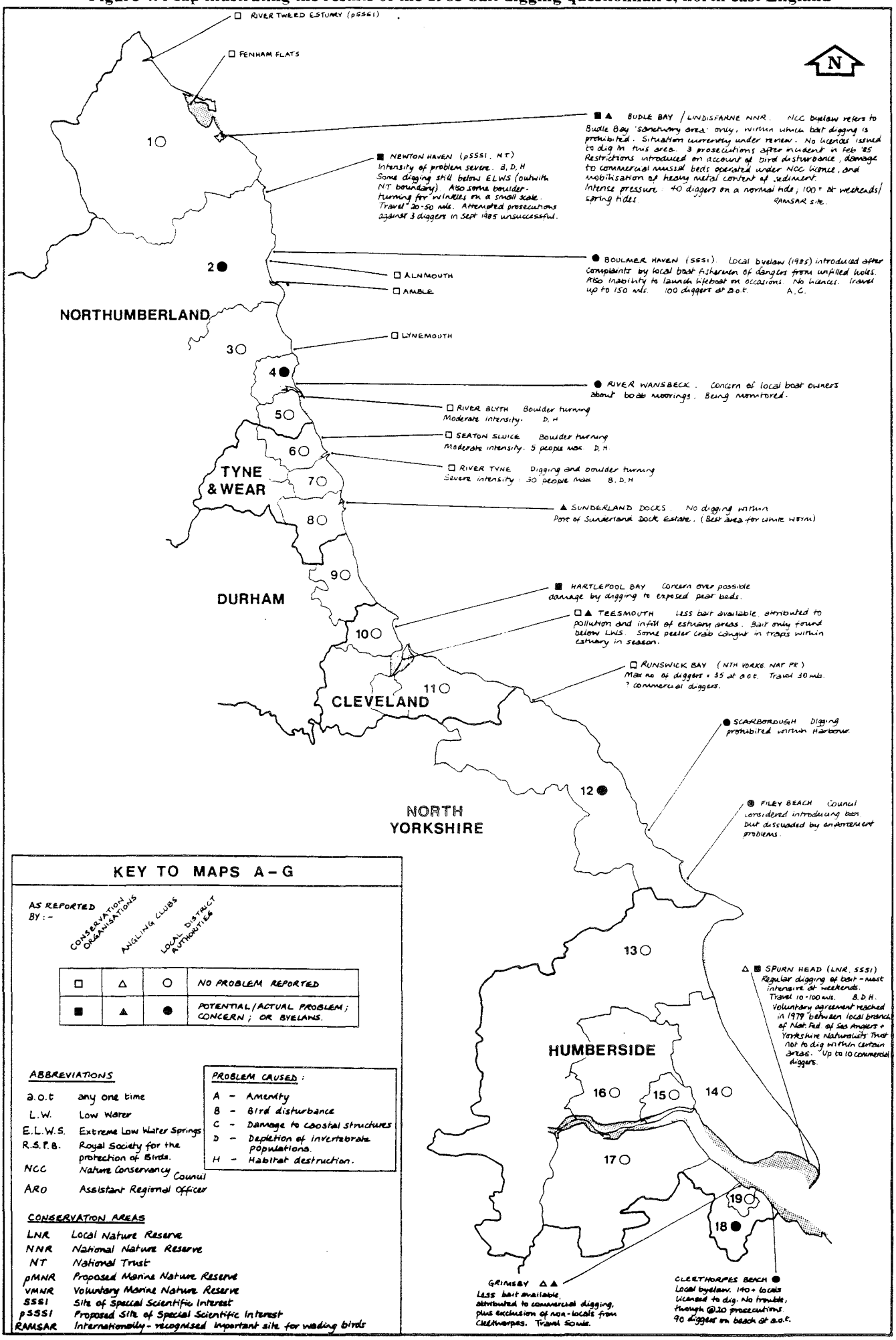
Nature Conservancy Council bye-laws control bait digging, among other activities, within the Lindisfarne National Nature Reserve. Budle Bay is designated as the sanctuary area within the Reserve and no wildfowling or bait digging is permitted within this zone. Bait digging was finally banned in the Bay in 1987 following a number of years in which it was closely regulated to determine whether the presence of bait diggers was causing an effect on bird numbers using the area. Not only were bird numbers shown to be affected by the presence of bait diggers, but damage was also caused to commercial mussel beds operated under licence in the Bay and intense bait digging during the winter of 1984/85 caused heavy metals (lead and cadmium) in the deep sediment to be mobilised by digging and taken up by invertebrates in the sediment. Bait digging was permitted in other areas of the Reserve. Anglers travel from 30 to 100 miles to Lindisfarne to dig bait.

The National Trust leases land and foreshore at Newton Haven, where a small beach has attracted bait diggers in the past. Numbers increased following the introduction of controls at Budle Bay in the early 1980s to up to 15 diggers at a time (a significant number in such a small area) travelling 20 to 50 miles to the site. A ban using standard National Trust bye-laws in 1983 and an attempted prosecution reduced the number of diggers to an average of about four. These worked below the level of low water of spring tides (outside the original limits of the leased area) where damage was caused to populations of burrowing sea urchins of scientific interest. The National Trust subsequently applied to the Crown Estates Commissioners for a lease of the seabed in order to control yacht moorings in the Haven and bait digging carried out at the bottom of the shore.

Spurn Head is owned and administered by the Yorkshire Wildlife Trust as a Local Nature Reserve. Disturbance to feeding birds by bait diggers using the reserve had been a cause for concern in the past. The Trust reached a voluntary agreement with visiting anglers to exclude bait digging activity within a

specified area of the mudflats and in *Zostera* beds. This appeared to work well. Up to 100 bait diggers may use the Reserve at one time (before matches) but the average is usually less. There were about ten commercial bait diggers, five of them regular. 10 to 100 miles were travelled to reach the site.

Figure 4. Map illustrating the results of the 1985 bait digging questionnaire, north east England



6.3 East England

(Lincolnshire, Norfolk, Suffolk, Essex, Kent)

6.3.1 Angling club returns

Responses were received from 15 clubs, representing a total combined membership of about 630 persons.

Most popular baits:

1. Lugworm
2. Peeler crab and Ragworm
3. White rag and Sand eel
4. Mussel and fish baits etc.

More than half of the clubs obtained all or virtually all their bait supplies from shops, whilst two clubs collected their own bait exclusively. The remainder (five) collected and purchased their bait in proportions of about 40:60.

Five clubs reported that they dug bait only in their local area but others reported travelling up to 30 miles for bait. Only six clubs reported no change in the availability of bait (numbers and size) but many noted that bait worms were smaller and/or fewer in number than in the past. Four of these obtained their bait solely from commercial outlets, three from shops and by digging and one club by digging alone. The most common reasons given for this decrease in bait supplies were an increase in angling and hence demand, over-digging and commercial digging to send bait to other areas. Shortages of bait in the shops were noted in bad weather and in November or December. Recent cold winters were also suggested as a reason for a decline in supplies in Kent. One respondent noted that it now took twice as long to obtain the same quantity of bait as it had done four years ago in the Southend area, but another noted no change in supplies there due to the local bye-law which restricted digging within 1/4 mile of the foreshore and "helps to conserve stocks and wildlife". One angler suggested that many people took more bait than was really required for their use, and wasted it.

6.3.2 Local authority returns

Responses were obtained from 22 of the 25 local authorities in this region. 19 of these had no knowledge of any problems arising from bait digging in their areas.

Colchester Borough Council had considered a bye-law to control bait digging at West Mersea Island in the past, but after consultations this was decided not to be necessary.

Maldon District Council have bye-laws enacted under Section 82 of the Public Health Act (1907) in respect of a Several Fishery foreshore granted to the Borough of Maldon by Royal Charter prior to the Magna Carta. This covers much of the inner part of the Blackwater Estuary to a line well east of Osea Island. The bye-law was intended primarily to prevent damage being caused to the foreshore and injury to members of the public as a result of bait digging by commercial diggers. There were no licenses issued to enable bait digging by individuals.

The Borough of Southend-on-Sea has a bye-law enacted under 'The Southend-on-Sea Corporation Act (1895)' which for safety reasons limits bait digging to areas seaward of a quarter mile limit from the seawall. There had been no serious accidents, but beach users trip in holes left by bait diggers or in the soft mud which remains for some days after holes have been filled in. Some damage to hardways had been caused, and the bye-laws were to be extended to cover certain hardways beyond the 1/4 mile limit and to extend the 1/4 mile limit to another beach. Numerous successful prosecutions had been made and an injunction obtained against one persistent offender, who reportedly was imprisoned.

6.3.3 Conservation organisations

The Lincolnshire and East Anglia coast is of considerable nature conservation importance, with numerous nature reserves. The very large areas of soft shore and small population of the region generally prevent significant bait digging pressures arising.

There are also many wildfowlers operating in the area and, in Lincolnshire in particular, a few confrontations between bait diggers (particularly commercial bait diggers) and wildfowlers had been reported. The cause of this conflict is the potential for bird disturbance arising from the presence of bait diggers on the shore.

No serious problem had been noted with the limited bait digging occurring at important nature conservation sites in Lincolnshire. Bird disturbance was localised and the areas affected small. Although bait diggers might travel up to 90 miles to reach the sites, most were locals. Additionally, the RAF ranges in the Wash provide areas in which bait digging cannot take place and the offshore banks and very extensive areas of shore exposed at low water prevent access to much of the area. Commercial bait diggers work some areas of the Wash for lugworm and have been perceived to be a threat to certain interests and some areas of wildlife importance, however alternative sites for bait digging are available if conflicts do arise.

In the winter of 1984 there was a headlined report in the Angling Times of the likelihood of 'dire bait shortages' on the East coast caused by commercial digging by out of work anglers from all over the country. Bait suppliers were warning of shortages and that as a result smaller worms were being taken to fill orders and worm beds not recovering in future years. One dealer recommended that ideally large areas of lugworm beds should be left untouched each year.

On the Norfolk coast the picture was very much the same, with bait digging being spread over a large area and, with a few exceptions, having little effect on nature conservation interests. Local effects were noticeable in a few areas, for example where white rag beds were dug intensively on good spring tides, although these were generally professionally exploited with trenches backfilled to minimise habitat damage. Problems occurred where bait digging in higher saltmarsh creeks could cause long term damage to these very sheltered and stable sites and where shellfish beds were damaged or disturbed. This is a particular problem in the Brancaster and Holkham area where many bait diggers congregated, including commercial diggers, travelling about 40 miles to the site.

This area is interesting in that there are common land units from Holme to Burnham Overy on the North Norfolk coast. These include intertidal areas and give the rights holders (possibly 150 of these) exclusive rights to bait digging. It is an important source of commercial bait supplies to other parts of the country. It is apparent, however, that many of the bait diggers using this area are not locals with common or customary rights to take bait. There was local concern that licensing or rotation of areas may be necessary to preserve diminishing stocks at Holkham, where bait beds were no longer recovering fully after intense exploitation the previous year, undersized worms were being taken and high-level saltmarsh creeks and pans were being damaged in the search for bait. Bird disturbance was also locally acute. A scientific study has been carried out in this area (Jackson and James, 1979) which suggests a correlation between the decline in cockle populations in the 1950s and 1960s with the expansion of commercial bait digging at this time. The cockles are thought to have been killed by burial during bait digging and were still common in areas where bait digging does not take place.

Bait digging was very uncommon on the Suffolk coast, where opportunities are limited. No problems were considered to arise as a result, with the exception of concern over the possible danger to paddling children from unfilled holes in the Stour Estuary. In Essex, extensive areas of soft coast are present and with large populations locally, bait digging was common and widespread. Concern was voiced by the Essex Naturalists' Trust over bird disturbance, erosion of saltings by trampling and damage to beds of

Zostera (eel grass) and *Enteromorpha* (green alga) which are important feeding areas for birds. The lower part of the Blackwater Estuary seemed to be quite heavily used and disturbed in this way. [In 1989 commercial bait dredging took place within the Dengie National Nature Reserve, causing considerable concern].

In Kent, most bait digging took place on the north coast, where anglers have reported a decrease in bait supplies. In the area around the Isle of Sheppey bait digging was only restricted in the Swale Nature Reserve, where about 100 local bait diggers were issued with permits by Kent County Council. Pegwell Bay has been a popular source of bait worms for several decades and was experiencing up to 60 people digging at a time (on August Bank Holidays - winter numbers unknown). There were reports of mussel beds being broken up to obtain ragworm and also that worms were now smaller here than in the past.

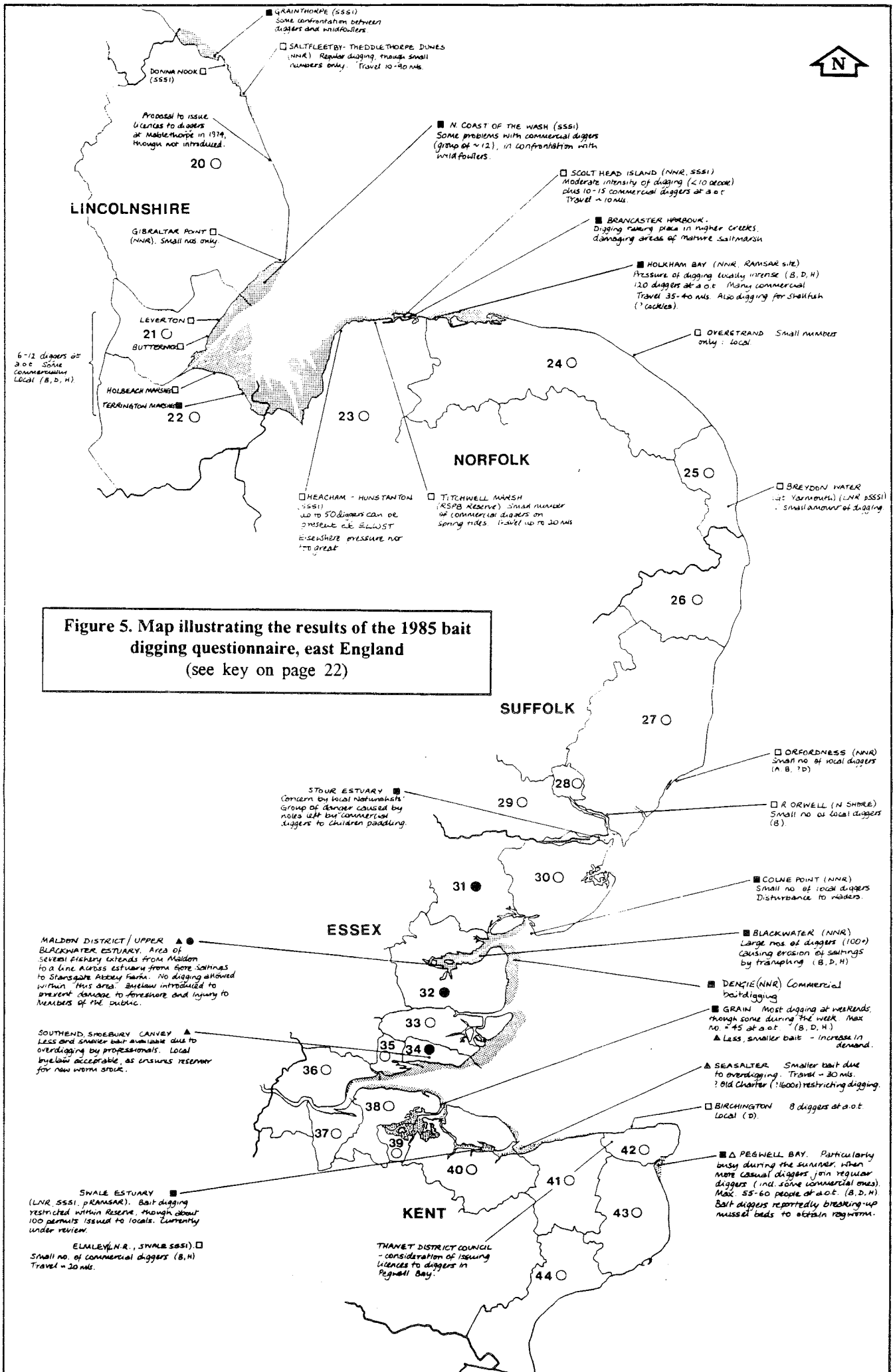


Figure 5. Map illustrating the results of the 1985 bait digging questionnaire, east England
(see key on page 22)

6.4 South England

(East Sussex, West Sussex, Hampshire, Isle of Wight, Dorset)

6.4.1 Angling club returns

Responses were received from 31 clubs, with a total combined membership of over 3,000.

Most popular baits:

1. Lugworm and Ragworm
2. Peeler crab
3. White rag
4. Slipper limpet
5. Sand eel
6. Razor shell, squid, mackerel and other fish/shellfish

Only a few clubs purchased all or most of their bait (nine) and most purchased about half their requirements. Only four clubs dug most of the bait they required themselves. Those digging their own bait tended to live fairly close to their sources, whilst those travelling from further away bought bait from shops.

Several returns stated that bait supplies had not declined and indeed some had thrived, (five from Sussex, and six from south coast harbours and the Solent), but many of these obtained all or much of their bait from commercial outlets. It was pointed out that many areas of the Solent were inaccessible to bait diggers, providing unexploited stocks. An MoD club with access to a closed military area noted that stocks had improved (larger size and increased numbers) following strict marshalling of diggers. Several clubs drew attention to the good conservation sense of their members. There were recommendations for a campaign to make anglers buy and dig fewer worms to reduce numbers thrown away after competitions *etc.* Members of one club dig their lugworm in the summer months and freeze for use in winter.

Thirteen clubs reported that bait supplies had declined, with fewer or smaller bait available. The most common reason suggested for this decline was an increase in the numbers of anglers and commercial bait diggers, there being a large number of the latter working through areas in rotation on the south coast. Additionally, inexperienced anglers were thought to be taking immature bait and not 'digging to a pattern'. Unemployment was also suggested as a reason for the increase in both sea angling and bait digging.

When readily available, worm bait from commercial suppliers was thought to be generally of poor quality and becoming more and more expensive. Overpricing of retail bait supplies was thought to encourage bait digging by anglers for their own use and one club suggested that their members would have to start obtaining their own bait if prices continued to rise. A club obtaining bait through commercial outlets suggested that a short supply of (professional) bait diggers would seem to be the reason for difficulties in obtaining bait.

Among other reasons for a decrease in bait supply suggested were the clam trawlers working close inshore in Southampton Water at the time of the survey. At low tide these could be seen to have overworked the bait beds to the extent that it was impossible to stand on them without sinking to the knees. Additionally, reclamation of areas of intertidal had removed areas of bait beds. The manner, rather than the extent of bait digging was thought to be causing problems in one area where sheltered harbour conditions meant that the large mounds and holes left by some diggers are not levelled by the action of waves and remained for several weeks. This affected populations of ragworm and white rag which need hard compacted sediment for recolonisation after digging. Concern over stocks of white rag, a popular bait species in the area, was mentioned by more than one club. Apparently it was sought after by anglers from 50 to 100 miles away who come to the area in order to dig supplies for use elsewhere because of publicity in the angling press about the 'magical' qualities of this bait.

6.4.2 Local authority returns

A response was received from all 26 local authorities and one harbour board (questionnaires had not been circulated to all harbour authorities since a list of these bodies was not available). A nil return was obtained from 19 local authorities.

The Borough of Gosport noted that some areas were being more heavily used for bait digging in recent times and when the holes were not backfilled the 'foreshore looks like a lunar landscape'. The area concerned had planning permission for a marina. The response for the City of Southampton noted that the largest area of bait digging on 'Mudland' in the City used to be where the container port now stands at Millbrook on the western side of the City. At that time (pre-1950) commercial bait digging took place in the area. Associated British Ports own large areas of the waterfront (the Docks) but had no knowledge of substantial bait digging taking place.

The Langstone Harbour Board enacted a bye-law in 1984 to prohibit bait digging within three metres of a mooring clump or within ten metres of a slipway or jetty. This was necessary because digging was causing moorings to be broken out and move and on one occasion the lifeboat cradle and lifeboat became stuck in a hole when being launched. Chichester Harbour Conservancy bye-laws prohibit bait digging within 50 feet of any mooring or 20 feet of any structure.

In 1978 the Eastleigh Borough Council prohibited bait digging at Netley in Southampton Water between 1 June and 30 September under Section 82 of the Public Health Acts (Amendment Act) 1907 in order to ensure the safety of the public, because the local Parish Councils had been concerned about the hazards of bait dug holes and soft sand in backfilled holes.

The New Forest District Council last considered the question of alleged dangerous conditions being left on foreshores as a result of deep digging for bait without any reinstatement of the holes in the late 1970s, but did not enact bye-laws because of the difficulty of enforcing them. During the same period the Medina Borough Council also received complaints about erosion of sand and mud-filled holes from bait digging activity at St Helens Duver on the Isle of Wight and the potential danger this might cause to small children. Bye-laws were proposed, but not enacted following representations from anglers. Complaints continued and the Isle of Wight County Council Act (1980) now gives District Councils power to make bye-laws to control bait digging, although the incidence of complaints appeared to have fallen off in the mid 1980s and no bye-law was then planned. Very similar complaints had also been received from members of the public in Poole Harbour and control of bait digging had been discussed between the Borough of Poole and the Harbour Commissioner. No action appeared to have been taken, but there was at least one area in the Harbour where bait digging was prohibited.

Weymouth and Portland District Council had proposed bye-laws to require back-filling of holes after bait digging. This was apparently not acceptable to the Home Office because of the difficulty in distinguishing between holes dug by bait diggers and children (the latter would not have been covered by the bye-law).

The Borough of Christchurch has a general bye-law which restrains people from excavating in the beach to the annoyance or danger of others. There is no record of this being used to stop bait digging. Information was received on a local bye-law being used to control bait digging in Pagham Harbour, with licences issued, although Chichester and Arun District Council did not mention this in their return.

6.4.3 Conservation organisations

Very limited amounts of bait digging by local anglers were recorded in East Sussex and this was certainly not thought to be a source of concern to nature conservation interests over most of the coast, although it was noted that some bird disturbance occurred in Rye Harbour where there is a Local Nature Reserve. This

was probably greatest at dusk when the roost forms. In West Sussex the levels of bait digging at Adur Levels caused a little concern.

The south coast harbours were fairly heavily used by bait diggers, mainly locals but with some travelling up to 20 miles. There was locally intensive digging by commercial bait diggers who move around the bait beds. The very sheltered nature of these harbours, where ragworm are taken in muddy gravel, causes the disturbance to the sediment caused by digging to remain apparent for long periods. The harbours also hold internationally important bird populations and bird disturbance is of concern, particularly within nature reserves. Areas of Portsmouth Harbour were heavily used because of their accessibility to a large centre of population. Boulder turning, bait digging and the non-infilling of holes was considered to be causing disturbance to wildlife and some danger to bathers from mud hollows in Southampton Water. The Lepe County Park attracted up to 60 bait diggers at a time in summer, many of which (50%?) were commercial. This caused amenity problems, with possible danger to bathers as well as damage to the intertidal habitat and wildlife. There was also intensive bait digging at times elsewhere along the west Hampshire coast, with more than 100 bait diggers noted in the Pennington-Keyhaven area.

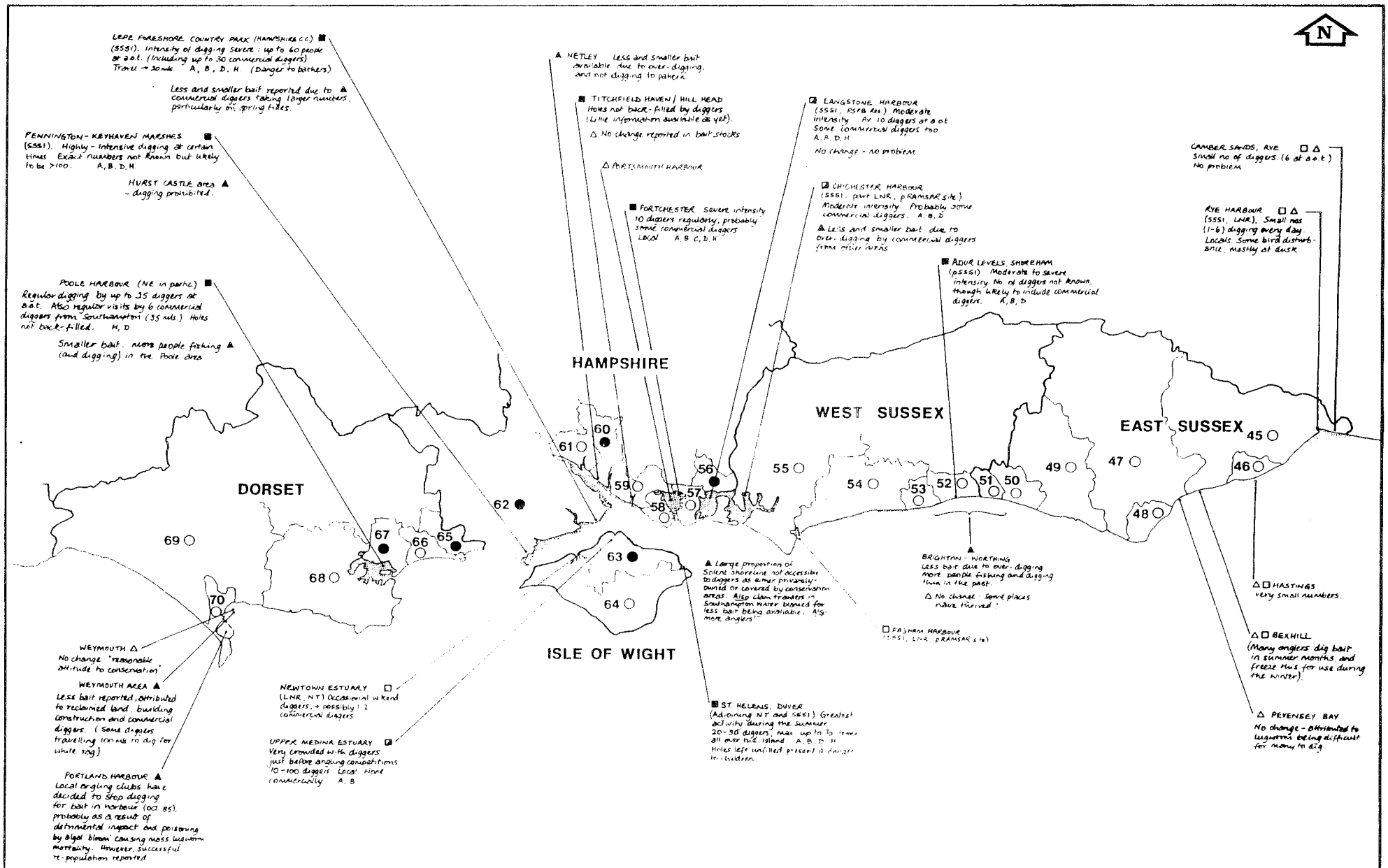
On the Isle of Wight there was most pressure on the bait beds in the tourist season and/or prior to angling competitions. Whilst many fairly isolated areas were only used by a few bait diggers, two sites which experienced considerable pressures were the Medina Estuary and the Duver at St Helens. The latter site is also mentioned above in the section on local authorities, and the effects of bait digging here had caused the appearance of the beach to change from predominantly sandy to muddy sand and shingle, with deep muddy pools left by bait diggers. As well as the effects on habitat and wildlife, the amenity value of the beach had suffered. This caused most concern locally.

Poole Harbour had been studied by a local angler who reported the severe effects on the lug and ragworm populations and general habitat disturbance caused in some areas by the very intensive digging of a group of five or six commercial bait diggers from Southampton in 1985. The sites dug by this team had not recovered by the following year, with patchy anaerobic conditions remaining in areas where the worm populations had been removed and the latter still not back to former levels. This contrasts with the very quick recovery of ragworm populations in the intertidal during the winter of 1962/63, when, although the shore populations were wiped out, the habitat was undisturbed and the worms recolonised within weeks. Poole is generally used by local anglers to collect bait, and can support quite large numbers of locals, however the 'one-off' intense digging activity of commercial groups is incompatible with these interests and with nature conservation in this very sheltered and important site.

In south and southwest England bait digging pressures are at their greatest during the summer months, when the tourist season is at its peak. At this time of year lugworm populations are also most numerous and, in the absence of over-wintering bird populations, this potential source of conflict with bait diggers over disturbance on the shore is much reduced. Additionally, other users of beaches outnumber bait diggers in most areas, so general recreational use is already a cause of wildlife disturbance. Instead, amenity problems caused by the digging of holes are more severe because of the large number of people using the shore for leisure pursuits.

Figure 6. Map illustrating the results of the 1985 bait digging questionnaire, south England

(see key on page 22)



6.5 South west England

(Devon, Cornwall, Somerset, Avon)

6.5.1 Angling club returns

Responses were received from 15 clubs, representing a total combined membership of nearly 800 persons.

Most popular baits:

1. Peeler crab and Lugworm
2. Sand eel and Ragworm
3. Fish baits
4. Various molluscs
5. White rag

(These baits reflect the more rocky nature of the coastline in much of the southwest)

Five clubs, mainly those based away from the coast, purchased almost all their bait from commercial outlets, and six, close to the coast, mainly obtained all their needs themselves. Sand eel and crab were the baits most commonly collected since sources of worm are quite scarce in the southwest, particularly Cornwall. The remaining four clubs obtained about half their bait themselves and half from commercial sources; presumably the worm baits purchased mainly originate from outside the region.

In the Exe and Teign Estuaries tiles are laid on the mud surface to provide shelter for shore crab. In this way a supply of soft and peeler crab is ensured with the minimum damage to wildlife habitats.

Nine clubs reported no change in bait supplies, or an improvement in worm numbers, although a few noted that there had always been inadequate supplies in some areas. Two clubs in South Devon reported no change in bait supplies, although two other in the area attributed smaller and fewer bait to pollution and bad practices by anglers digging and wasting bait. Commercial bait digging was reported to be reducing worm stocks in a few places in Cornwall, including Plymouth, Padstow and the River Fowey. Pollution was also attributed as a cause for declining stocks together with loss of areas to marinas and other such developments. One club was particularly alarmed by the depletion of lugworm beds in the Fowey Estuary in 1985 where it was reported that over 2,000 worms had been removed each week and exported from the area by commercial bait diggers, so that the beds appeared to be dug out. A similar story came from the Camel Estuary, where commercial bait digging in the early 1980s had apparently virtually dug out the beds so that a few years later the beds were 'hardly worth digging'.

Bait digging was restricted in a number of harbour areas, including the Fal, Newlyn, Penzance, Penryn Estuary and near moorings at Golant (Fowey Estuary, controlled by the Fowey Harbour Commission).

Declines in stocks, if noted at all, were obviously very localised and it was pointed out that there was no real commercial pressure in most of Cornwall and good worm supplies were generally available. Stocks varied naturally from year to year. There was concern from one club about the increased pressures upon sand eel stocks netted for bait, with more being taken and immature eels being left dead on the beaches, however another club attributed an increase in sand eel stocks to reduced predation as a result of declining bass and mackerel stocks.

In the outer reaches of the Severn Estuary, where there are extensive stretches of low tide flats, some decline in numbers and reduced size of bait worms were noted in the most accessible areas and easily dug beds, but not further afield.

6.5.2 Local authority returns

A response was received from all but one of the 18 District or Borough Councils. Teignbridge D.C. have a set of bye-laws controlling activities in the Dawlish Warren Local Nature Reserve, which were enacted in order to provide general protection to wildlife on the Reserve and to control disturbance on the mudflats. Although bait digging could be controlled under this bye-law, it was not thought to be a significant problem in the area and no attempt had been made to stop the activity.

Torbay Borough Council does not allow bait digging in most of Torquay Inner Harbour, Brixham Harbour or Paignton Harbour, in order to prevent the damage to boat hulls which had been caused by stones turned over by diggers. The Tor Bay Harbour Bye-laws control this activity.

At Torpoint, Cornwall, damage had occurred to moored boats. Caradon District Council therefore used Section 82 of the Public Health Acts (Amendment) Act (1907) to prohibit the extraction of bait from the foreshore at this site. The bye-law was first implemented in 1984 and ensures the safety of boats moored at low tide and the safety of persons attending the boats.

The Penzance Harbour Bye-laws (1980) prohibit digging outside designated areas in order to prevent direct or indirect damage to boats and moorings due to pits or loosening of the harbour bed. In the past there had been instances of sprained ankles and damage to boats from bait digging.

6.5.3 Conservation organisations

The very restricted opportunities for bait digging means that the pressures from this activity on important nature conservation sites are also very slight in most areas. Amenity effects (as outlined in the local authority returns) were most significant and the damage to shore life arising from the turning and non-replacement of boulders during the collection of crab was also noted in some areas.

No incidents of conflict between bait diggers and nature conservation or other such interests were recorded in Devon, Avon or Gloucestershire and few cases in Cornwall. Some conflict between bait diggers and oyster fishermen in the Fal Estuary was reported, because the oyster beds almost overlap the ragworm beds exposed at low water of spring tides. The presence of bait diggers on the shore in the Hayle Estuary was thought occasionally to cause disturbance to feeding birds.

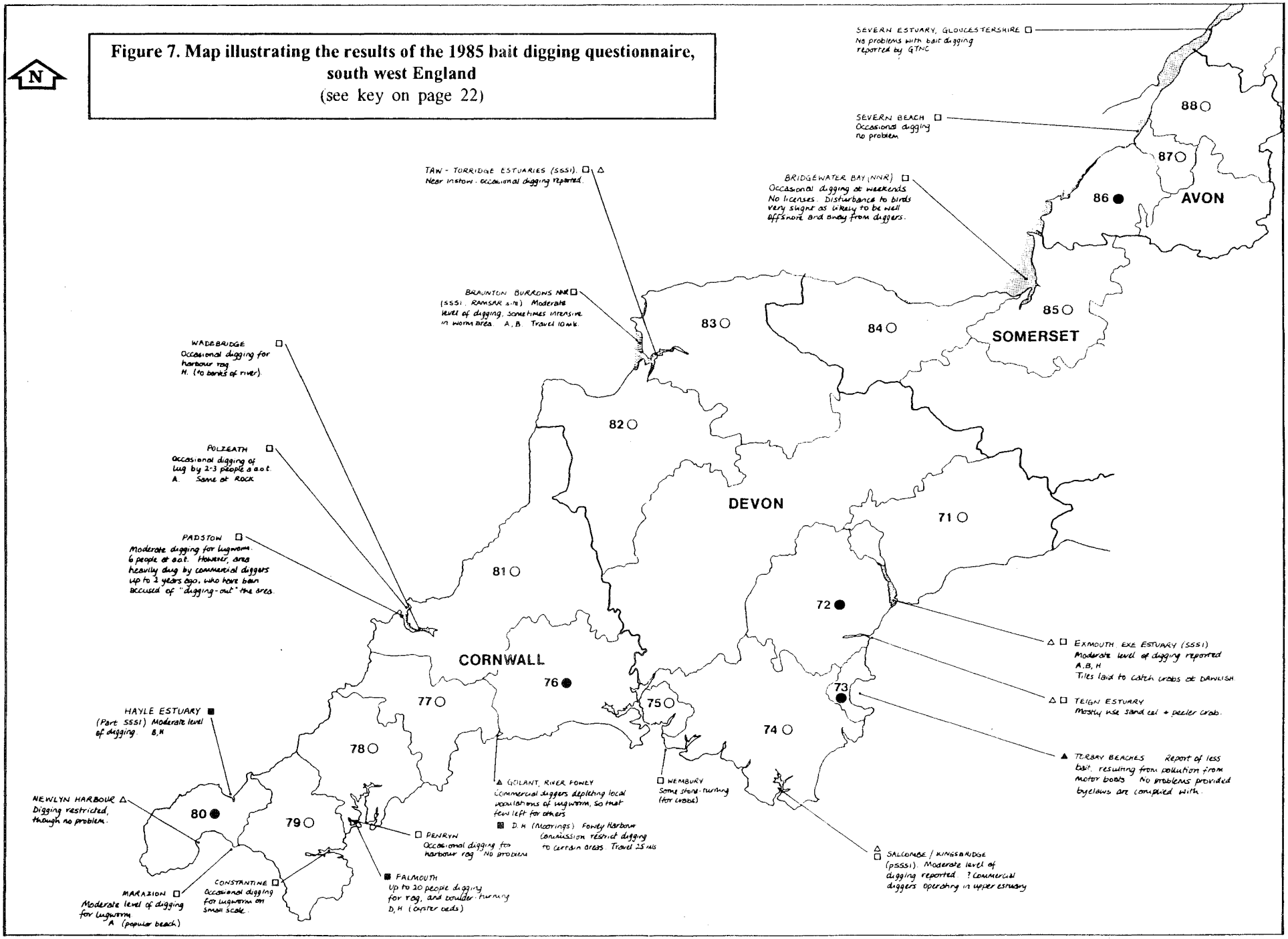


Figure 7. Map illustrating the results of the 1985 bait digging questionnaire, south west England
(see key on page 22)

6.6 Wales

6.6.1 Angling club returns

Two returns were received from Wales, both from RAF clubs with a combined membership of 55. The inland club had not dug bait in their current season but purchased all from commercial suppliers (using rag, lug, crab, sand eel and squid). The coastal club used mainly lug and some rag, when available, for worm baits, but mackerel was their most widely used bait. There had been no decrease in the extensive bait beds dug by this club.

6.6.2 Local authority returns

A response was received from 20 of the 21 District, Borough and City Councils, including one return from Dyfed County Council for Preseli District Council. The majority had no knowledge either of bait digging taking place around their coastline or of any problems arising from this activity.

Dyfed County Council pointed out that virtually all the Pembrokeshire foreshore is owned by the Crown Estate and leased to the National Park Authority via the County Council. One of the general National Park bye-laws affects all Crown foreshore in the county and restricts killing or taking of any wildlife, to control public behaviour generally on access land within the Park. In the 1970s there had been considerable concern about the scale of digging for razor shell in one area of the Park and the use of this bye-law to control bait digging was considered at that time. Expert advice (from the Nature Conservancy Council, among others) concluded that this activity would not damage local populations of this animal, which are mainly found below the low water mark, and the controlling powers were not used then or subsequently to prohibit bait digging.

Aberconwy Borough Council noted that the Lancashire and Western Sea Fisheries Committee Division bye-laws protect the Conwy mussel beds. Otherwise no restrictions on bait digging were known.

6.6.3 Conservation organisations

On the northern side of the Severn Estuary, a number of localities in Gwent were regularly dug for lugworm and king ragworm, with boulder turning for peeler crab in a few sites. A local naturalist reported declines in worm stocks in some areas which had been heavily dug by locals for commercial sale and there was disturbance to a bird roost at one site, however digging pressures were generally only moderate.

Occasional bait digging and boulder turning was occurring along the Glamorgan coast, becoming more intensive in summer in a few areas. Damage was caused to the reefs of 'honeycomb' worm (*Sabellaria alveolata*) at Newton Beach where the colonies were broken up in the search for ragworm. This very destructive practice has resulted in a marked reduction in the extent of these fascinating structures in many areas of the west and southwest where they are found. On the more exposed beaches, razor shells were collected, occasionally by large numbers of people.

Boulder turning has been studied by students from Swansea and Cardiff, who have found that in many parts of the Gower coast and adjacent areas individual boulders were turned over between 40 and 60 times from May to September in heavily used areas, or ten times in less disturbed areas. Unfortunately only 40% of crab collectors in this area replace boulders the right way up. The effect of this is to cause considerable damage to both seaweeds on top of boulders and to animal communities living under the boulders. Scientists working in the Gower area had noticed a marked drop in the diversity and richness of underboulder communities over the last few decades and this was attributed to turning of boulders in the search for crabs (see Section 5).

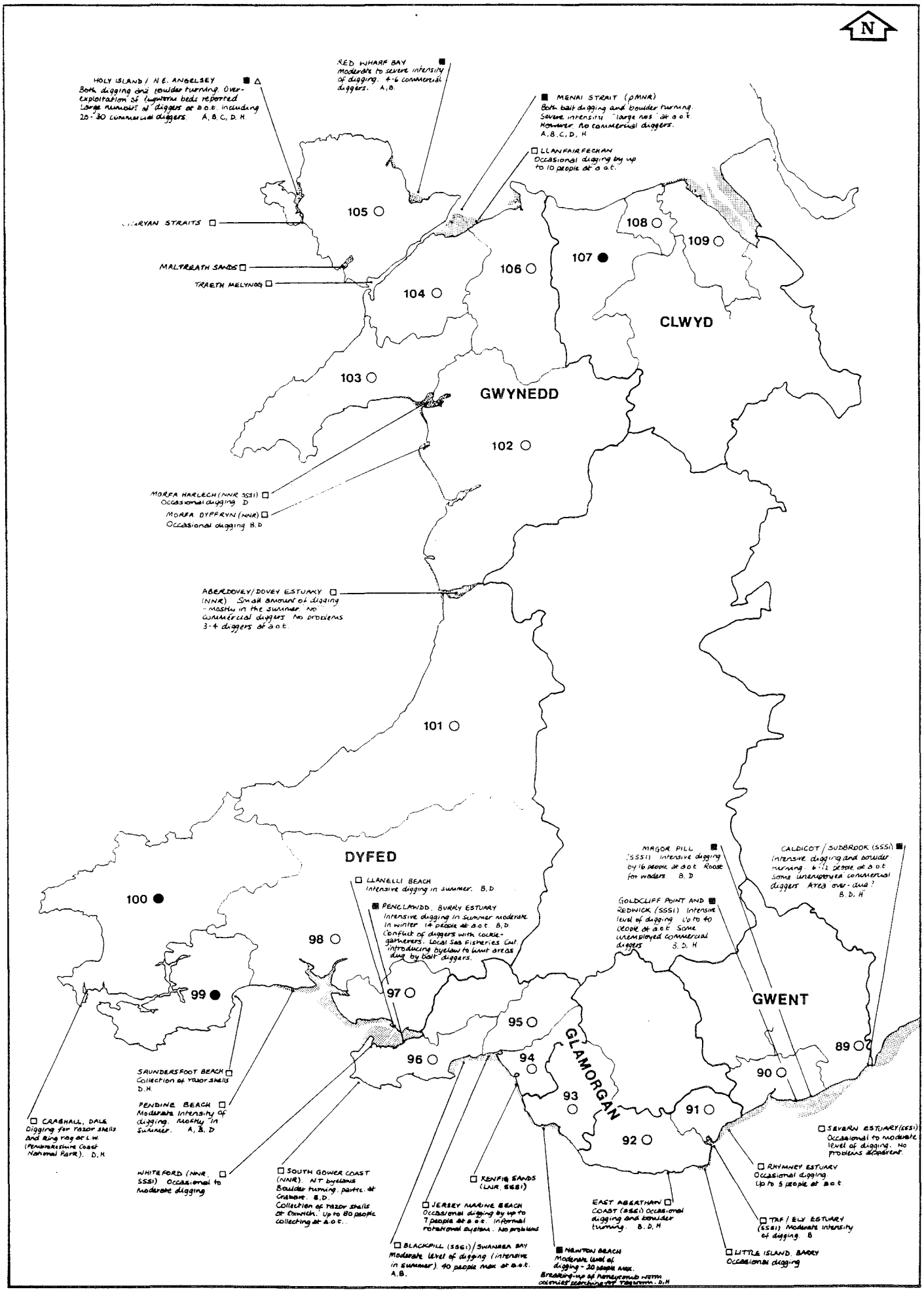
In the Burry Estuary a moderate amount of bait digging took place in the winter, but this became more intensive during the summer months, particularly around the tourist beaches. There had been a conflict of interests between bait diggers and cockle fishermen in the traditional cockling area at Penclawdd. The South Wales Sea Fisheries Committee had recently introduced a bye-law to limit the areas open to bait digging in order to protect the fishery. The problem caused appeared to be as much one of difficult access by cockle fishermen over areas dug for bait as of damage to cockle stocks.

Bait digging around the coast of west Wales was not considered to represent any problem to conservation interests, except in the sheltered waters of the Menai Strait. The Strait was a popular collecting ground for ragworm, lugworm and crab, particularly during the summer and early autumn. The very sheltered nature of the ragworm beds meant that the holes dug by anglers can extend down through the marine sediments of sands, mud and gravel to underlying boulder clay. These holes were very rarely backfilled and could remain visible on the shore for several months. The impact of lugworm digging on sandy shores was less severe. Another cause of damage to other interests in the Menai Strait was boulder turning and the disturbance to stone fishtraps (*goradau*) constructed on the shore in Tudor times or earlier. These archeological remains had suffered considerable damage near Beaumaris. Depletion of intertidal communities had occurred in the same area. Local fishermen had also expressed concern over damage to mussel beds. Because the ragworm in the Strait are all thought to live in the intertidal, with no refuge populations below the low water mark, they are particularly susceptible to over-digging.

The Nature Conservancy Council were undertaking consultations with anglers over the establishment of sanctuary areas within the most heavily dug shores of the proposed Menai Strait Marine Nature Reserve. Bait digging and shellfish collection would not take place in these sanctuaries, in order to enable the recovery of intertidal habitats and communities and incidentally to provide a source of young rag for recolonisation of dug areas. Rocky areas would also be included in voluntary sanctuary zones and restoration of damaged areas would be undertaken, particularly of the *goradau.*

No commercial bait digging appeared to take place in the Menai Strait, but both commercial, local and holiday bait diggers used many beaches elsewhere on Anglesey. Although the intensity of digging can be high at a few sites, the worm populations were large and quite able to withstand collection. Problems arose from the holes left unfilled (although these are quite quickly lost on exposed beaches) and from bird disturbance in the 'Inland Sea' between Holy Island and Anglesey, where some depletion of lugworm beds had also been reported.

Figure 8. Map illustrating the results of the 1985 bait digging questionnaire, Wales (see map on page 22)



6.7 North west England

(Merseyside, Lancashire, Cumbria)

6.7.1 Angling club returns

No angling clubs from this area responded to the questionnaire.

6.7.2 Local authority returns

Eleven of the fourteen local authorities responded to the questionnaire. Of these, only the Lancaster City Council were concerned about bait digging activities in their area. Although in 1985 no accidents had been proven to result from bait digging, there was concern about the safety of horses, sand yachts and beach trains which shared the beach with bait diggers. There was also a widely held belief that people had had non-injurious accidents stepping into bait-dug holes. At that time the City Council issued an informal permit to anyone who wished to dig for bait. This contained conditions excluding commercial digging, digging in certain areas and requiring the back-filling of holes. The Council was considering making bye-laws (based on those at Maldon, Essex, under the Public Health Act, 1907) to cover the whole of the foreshore at Morecambe and Heysham they owned and which would control bait digging in the most frequented areas of the beach at Morecambe. Considerable opposition to the proposed bye-law had been encountered from local anglers. The Council also pointed out that the Western Sea Fisheries Committee bye-laws controlled mussel beds in various parts of the Bay.

6.7.3 Conservation organisations

The Wirral peninsula has several beaches with extensive stocks of lugworm which could support bait digging without much problem, including some commercial digging (one bait digger set up business under the Enterprise Allowance scheme in 1987). The Mersey Estuary had virtually no bait digging at the time of the survey, but water quality improvements might lead to an increase in this activity.

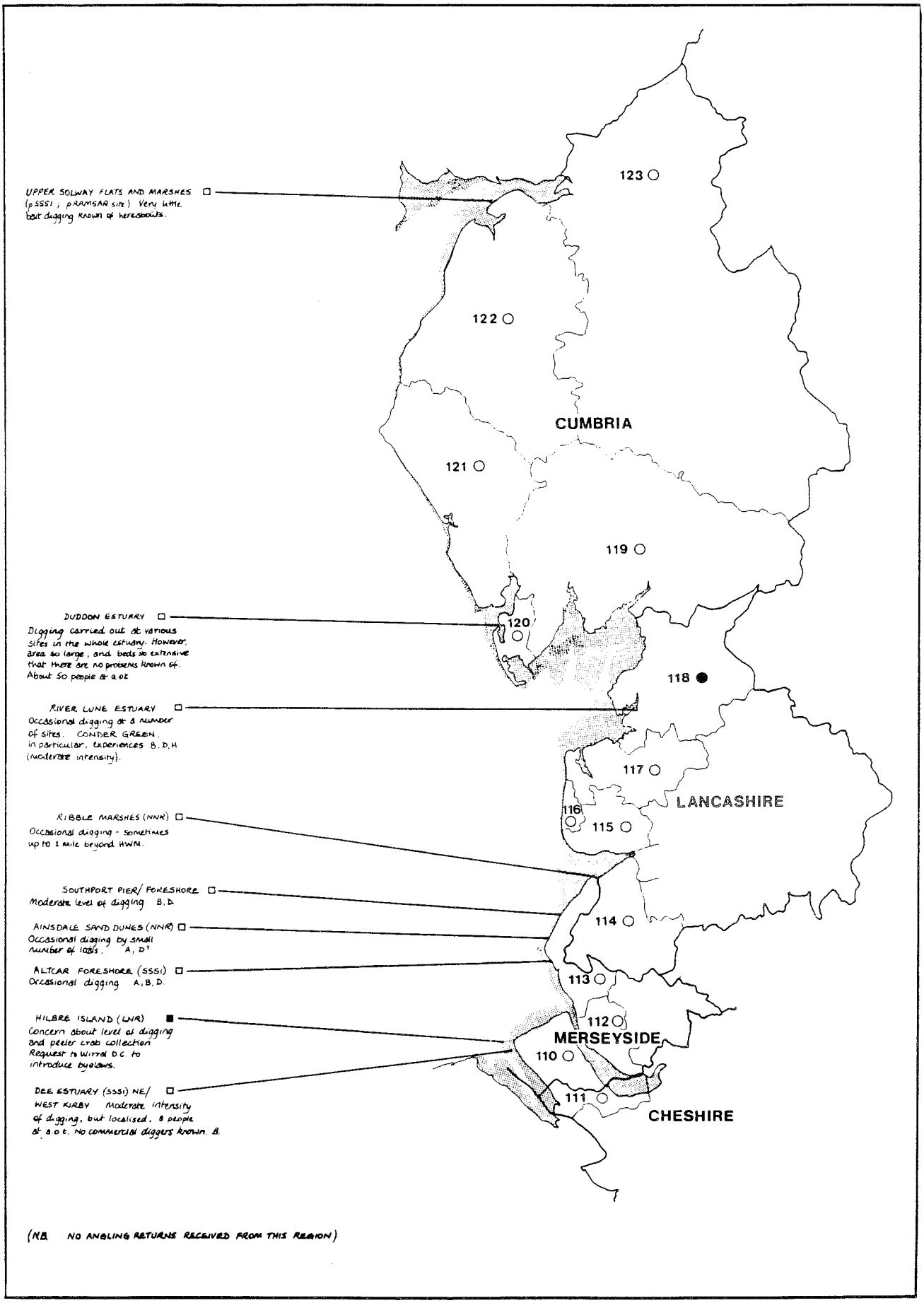
The Local Nature Reserve at Hilbre Island contains the only rocky shore between Great Orme Head in Wales and St Bees Head in Cumbria, and the Reserve Management Committee were very concerned about boulder turning for crab bait which could cause damage to this site. The Wirral District Council were to be asked to pass a bye-law to protect this site from bait collection. Elsewhere in the area, king ragworm was dug in very sheltered areas of exposed glacial clays. As in the Menai Strait, these clays do not become restabilised when dug over, and this activity therefore presented a problem to features of geological as well as biological interest. Bird disturbance also occurred, but was considered to be of less importance.

Occasional bait digging occurred all around the outer part of the Merseyside coast, with most near Southport Pier. This did not appear to be a major problem in the area because of the very extensive sand flats, which appeared to be able to absorb these pressures.

In the Morecambe Bay area, one respondent was concerned about the effect of bait digging in an arm of the tidal reaches of the River Lune, where the creek at Conder Green is used by wading birds at low tide. It was suggested that these were disturbed by bait digging and that this was particularly significant in August and September of 1984 (the year prior to the questionnaire). Elsewhere in the River Lune, bait digging was reported to be very infrequent by the respondents (but see local authority comments above).

The general response was that, at the time of the questionnaire, the whole area of Morecambe Bay and the Duddon Estuary in Cumbria contained such extensive intertidal flats and worm beds that no nature conservation problems arose. Additionally, virtually no bait digging was taking place on the English side of the Solway Firth. This situation changed in the spring of 1988 when reports were made in the press that the Cumbrian coastline had been 'flooded' with bait diggers from the northeast coast where accessible bait supplies were inadequate for anglers' needs. Many of these bait diggers were reputed to be unemployed, taking bait for commercial sale. This was causing concern to sea anglers as much as to nature conservation representatives. The areas affected were thought to be parts of Morecambe Bay, the Duddon Estuary, Maryport and Solway.

Figure 9. Map illustrating the results of the 1985 bait digging questionnaire, north west England
(see map on page 22)



6.8 Scotland

6.8.1 Angling club returns

Responses were received from 16 clubs with a total combined membership of 548 persons.

Most popular baits:

1. Lugworm
2. Shellfish baits (mussels, razor, cockles etc.)
3. Fish baits
4. Ragworm
5. White rag and crab

All the clubs which responded collected all or virtually all their own bait, even though one club had to travel 40 to 200 miles to do so, and all but two reported no change in bait supplies. The two clubs noting a decline in numbers and size of worms were based in centres of population around the Clyde Estuary and the southern shore of the Firth of Forth. Many clubs did not dig very much worm bait, preferring to use shellfish or fish baits instead and therefore left their bait beds almost untouched.

Four clubs complained of bait diggers coming in from other areas to exploit local beds, often commercially. One of these (Lochryan) later went on to take exclusive control of their local area by leasing the bait digging rights at Stranraer and only allowing anglers to dig manually for their own lugworm and ragworm and to take sufficient for one day's fishing. Other points noted were the presence of fishing boats trawling very close inshore, which were said to be damaging undersized fish stocks and one club said that a reduction in fish stocks meant that less bait was now required for fishing trips.

A number of restrictions on bait digging were noted from around the country, including Nature Reserves at Aberlady Bay, Tentsmuir, half the estuary at Newburgh and the rifle range at Barry Sands.

6.8.2 Local authority returns

A response was received from 29 of the 35 local authorities in Scotland. The majority of these were nil returns, however, Wigton D.C. noted that although the Council had no controls, "those areas of the foreshore within the District where such practice has, in the past, taken place, have, by and large, been in the ownership of private individuals who have, from time to time, taken recourse to the law to protect their interests against commercial exploitation of the resource". The Council were not aware of such a practice being resorted to in the last few years prior to 1985 and the means used to take this action was not given.

Kyle and Carrick District Council in Ayr noted that the preparation of a bye-law to control bait digging was under consideration. Moray D.C. replied that there were no plans at present to initiate controls, but that if controls were to be initiated in the district, the most probable locality would be within the proposed Findhorn Bay Local Nature Reserve.

The three district authorities within Fife (Dunfermline, Kirkcaldy and North East Fife) co-operated in drafting new bye-laws to govern the seashore and adjacent waters in terms of the Civic Government (Scotland) Act (1982). These bye-laws are 'for the purposes of preventing nuisance or danger at, or preserving or improving the amenity of, or conserving the natural beauty of, the Seashore and Adjacent Waters' and appear to provide a means of preventing bait digging in specified areas.

The East Lothian District Council have bye-laws under the Countryside (Scotland) Act, regulating the use of the John Muir Country Park and the Aberlady Local Nature Reserve. Bait digging for private and non commercial use only was permitted within the Country Park, but all digging was prohibited within the Nature Reserve, where it is an offence to take any animal or bird.

6.8.3 Conservation organisations

At the time of the questionnaire in 1985, bait digging in Dumfries and Galloway was limited to locals only and of a very sporadic nature through much of the year, although increasing slightly in the summer months with angling by tourists. In the winter of 1986 a change in this pattern occurred, with the influx of a few gangs of commercial bait diggers from north east England. Local residents in the area of Luce Bay were very upset by the arrival of about 20 bait diggers from the Newcastle area who camped near the beach and from October to January removed very large quantities of lugworms for sale in their home area. Much concern arose from the fear that digging on such a scale would affect bait supplies for the summer visitors and damage the tourist trade in the area. They were seeking a winter ban on bait digging to prevent this occurrence. NCC advised that research carried out in Northumberland indicated that bait stocks in summer were unlikely to be much affected by depletion of large lugworms the previous autumn and winter. Similar problems in Loch Ryan, Stranraer, resulted in action being taken by the local angling club - see above. There was no record of a similar influx in the Solway Firth in 1988, as had been noted on the Cumbrian side of the estuary.

No problems were recorded in the Clyde area from conservation bodies, (despite comments from angling clubs in the area), nor, unsurprisingly, from any respondents on the remainder of the west coast, or anywhere in the Highlands and Islands where bait digging activity is minimal or non-existent.

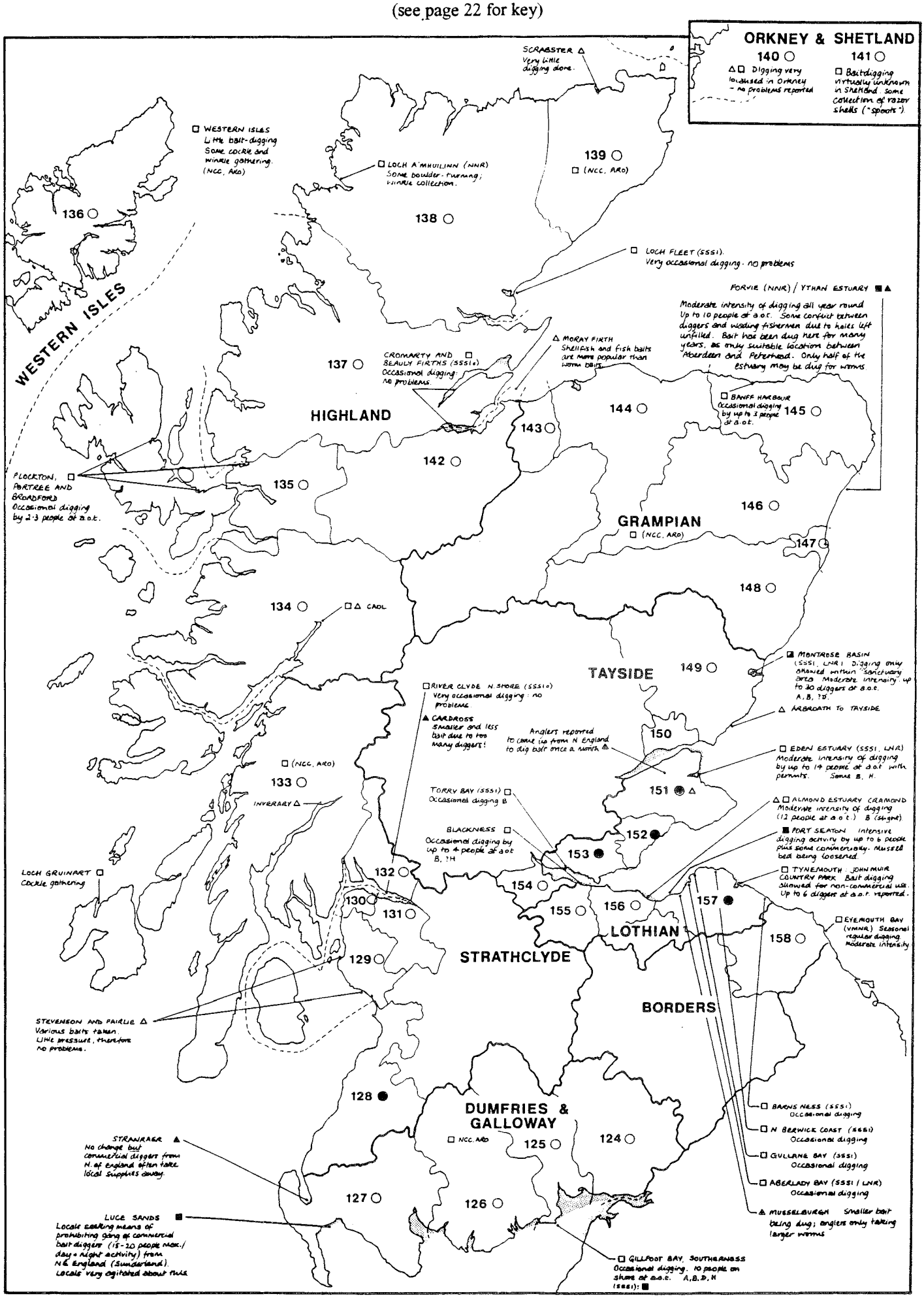
Lugworm was dug in the Ythan Estuary, and had been for many years, particularly at weekends. No effect upon the site had been noted, with the exception of a small amount of bird disturbance. Rod fishermen in the estuary have objected to the holes dug, which are considered dangerous when wading.

The Montrose Basin Local Nature Reserve has a Wildfowl Sanctuary Zone in the eastern third of the Reserve where the general public may dig for bait without a permit. Bait digging outside this area is not permitted and commercial bait digging, which was quite extensive here, is now not allowed anywhere in the Reserve.

The Eden Estuary Local Nature Reserve is covered by bye-laws enacted by the NE Fife District Council, which control bait digging among other activities. These were only enforced for commercial or large scale collection at the time of the survey, although collection of bait and shellfish was being monitored by the warden and bait diggers might in future require a permit or be restricted to a specific area.

More bait digging took place in the Firth of Forth, with damage being caused at Port Seton to a mussel bed which was being broken down by bait diggers (both local anglers and commercial diggers). Bait digging turns over and loosen the mussels, so that they are susceptible to being washed away. Research into the effects of bait digging was undertaken at Blackness in the Firth of Forth.

Figure 10. Map illustrating the results of the 1985 bait digging questionnaire, Scotland
(see page 22 for key)



6.9 Conclusions

The pattern of supply and demand for bait varied around the country, depending upon the size of the local population (and hence their demand) and the physical nature of the coastline. The conflicts experienced with other users of the coast also varied on a regional basis, for much the same reasons.

Inland clubs generally obtained most of their bait from retail outlets, and more coastal anglers were now having to do so, particularly towards the end of the winter season when stocks were scarce. The limited number of returns from angling clubs suggested that the proportion of anglers digging their own bait is no longer 75% (National Anglers Council figure for 1970s), but more like 60% for coastal clubs and very much less for inland groups, although these low returns cannot be used to provide a reliable picture.

There were, however, obviously more bait diggers on the shores than was the case in the 1970s. There are many more anglers, so the numbers digging bait for their own use has increased (despite an apparent decrease in the proportion of all anglers involved). There are also more commercial bait diggers; although a few of the original professionals had apparently been put out of business, total numbers have increased with the addition of others, perhaps the unemployed and part-timers. Some respondents suggested that the latter do not have the same understanding and respect for the environment and bait stocks, although most commercial diggers cause less damage than amateurs by back-filling trenches and not taking undersized worms or populations at low densities. There were now more instances of conflict between commercial bait diggers, particularly when working in groups, and locals or individual anglers. In the absence of adequate retail bait supplies in an area, large numbers of anglers may be forced onto a shore to collect bait, causing more damage than would a group of professional bait diggers supplying the same population.

In heavily industrialised areas, where there are large populations of anglers requiring bait, many intertidal estuarine areas have been lost to port and industrial development (through reclamation or pollution). In this situation there are unlikely to be sufficient areas of bait beds to supply all the local demand, particularly in winter. Additionally, remaining intertidal areas are usually of high nature conservation interest (for their wintering shore bird populations) and conflicts between nature conservation and angling requirements are more likely to occur, as has been the case in northeast England.

In holiday areas, the competition between bait diggers and the general public for use of beaches, particularly in the summer, is added to the conflict of interests. Bye-laws have been enacted to protect amenity and nature conservation interests, further restricting bait digging opportunities. The increased mobility of anglers (some prepared for a drive of up to 300 miles to collect bait) has caused this demand and conflict to spread to neighbouring areas where bait supplies were previously adequate for local requirements. As demand for bait increases in these areas, bye-laws are enforced more strictly or new bye-laws introduced, further exacerbating the pressures on other sites. It was apparent that several local authorities were considering new bye-laws to control bait digging activity.

There are a number of informal or voluntary agreements in force around the country between anglers, or anglers and conservation bodies, to restrict bait digging in sensitive areas. These can be very successful when bait diggers belong to one club, or are all local, but bait diggers from other areas may not be prepared to abide by such agreements.

SECTION 7 : LEGISLATION

7.1 The legal status of baitdigging

The public right to fish and ancillary right to take bait

The legal position of baitdigging in the intertidal has been the subject of much debate. The question of whether there is any public right to dig bait is the most important legal consideration here. Anglers maintain that baitdigging is ancillary to the common law right to fish in the waters between high and low water marks. If this were the case, it would provide for the taking of bait for the individual's own use in fishing, but should not enable some one to dig bait for another's use.

Legal advice to NCC has counselled that it is well established in law that the public right to fish (in the sea) does not include any right of interference with the soil (the land under the sea). It appears, therefore, that there is no such ancillary right to dig bait (at least in England and Wales) and baitdigging is a 'tolerance'. In this case, the following considerations apply.

Profits à prendre

The 'natural products' found on the seashore belong to the owner of the shore. The only right which may exist to take something of this kind from someone else's land is a 'profit à prendre'. This right is generally attached to the holding of land (usually close to the commons where the right is practised, in this case, the shore) and is passed to each successive owner of the land. All commons are profits à prendre, but the latter may also exist in gross; not attached to ownership of land, but as a grant or prescription entitling the possessor (an individual and his heirs in perpetuity) to some use of the land. In neither case can profits à prendre be part of a public right of fishing and very few bait diggers carry out their activity in relation to a land holding or through inheritance.

There are a very few examples known of individuals holding private rights to take bait from a specific area of the shore. These may arise as above by grant from a landowner or by local custom, following long use of the area. The only examples of common land units on the shore which were identified by the survey are on the North Norfolk coast (see section 6.3). Under common law this use must have been in existence from legal time immemorial (fixed at 1189). Courts may accept evidence of a sufficiently long period of use 'as of right' (i.e. openly, but not by force or permission) as being equivalent to there having been a 'lost modern grant' for an individual to take bait from an area. The period of time required for such a right to have been established may be decades to hundreds of years. Such claims may be difficult to prove even for a defined group of the local inhabitants of an area, but impossible for members of the general public who travel any distance to dig bait. Under the Prescriptions Act (1832), which does not apply to profits à prendre in gross, it is necessary to show that the activity has taken place "as of right" for 30 years. If the activity has been exercised for 60 years it shall be deemed absolute and indefeasible, unless it appears that it was enjoyed by consent or agreement in writing. Of course, landowners may still permit a person to take bait and licenses for bait digging can be (and are being) issued.

There are a number of examples of baitdigging having been controlled by an authority which has been granted the necessary power by statute to make bye-laws (see section 6 and Annex 2). The success of prosecutions under some of these bye-laws appears to confirm the status of baitdigging as a tolerance and not a right, since some such bye-laws are expressly stated to be without prejudice to any public right or private profit à prendre. Compensation may be required if a right to dig bait does exist and is controlled by a bye-law.

The situation in Scotland differs a little, in that the encyclopaedia of the Laws of Scotland notes the inalienable right which the public have to take limpets, cockles and other small shellfish from the foreshore. While this is analogous to the English case, it has been suggested that a precedent was set when an old authority (Balfour) was quoted during the case of Hall *v.* Whillis (see Annex 4, which also gives lists of legal precedents, definitions etc). This authority states that any person may gather wilkis [whelks?], cockles, limpets, mussels and other small fish, or bait for taking of fish upon the sands or rocks (of the foreshore) uncovered at low tide. Bait digging as such is not mentioned, and Hall *v.* Whillis specifically concerned the collection of shellfish from rocks, so that no disturbance of the soil was required. The textbook of Scottish Law appears to be ambiguous on the point of bait collection.

This having been said, there are several bye-laws in existence which do control bait digging on Scottish shores, but these have not been tested in the courts. Attempts to control baitdigging in Scotland are most likely to succeed if intended to prevent a change in practice of the collection of bait by digging and resultant damage to the shore or bait stocks or other species. Commercial bait digging might, as noted above, be considered outside the individual right to take bait for fishing.

7.2 Bye-laws

A number of the bye-laws controlling bait digging have been noted in section 6, under each region. A listing of these is given in Annex 2, but this is certainly incomplete and should not be taken as any more than an indication of the scope of legislation currently in use.

Most bye-laws controlling bait digging identified by the survey were passed under Harbour Acts or Local Authority Bye-laws; the latter generally under the Public Health Acts Amendments Act 1907, s. 82. (The survey did not always identify the Act under which controls had been applied). These are to ensure public safety, maintain the appearance of beaches for amenity purposes, or to safeguard harbour walls, slipways and boat moorings. Bait digging permits are available under some of these bye-laws; either for locals only, or at certain times of the year, in specified areas or conditional upon back-filling of holes. There was obviously much inconsistency in approach, with some authorities being unable to obtain clearance for bye-laws which had been approved in other districts.

Of these local authority bye-laws identified (Annex 2), only four seem to be aimed at preserving the natural environment and wildlife. One of these permits bait digging under license in the Swale Local Nature Reserve; bait digging is prohibited under a second within the Aberlady LNR in Scotland; another does not prohibit bait digging at all (Dawlish Warren) and the last has not yet been enforced (in the Pembrokeshire Coast National Park).

Other bye-law making authorities such as the National Trust and the NCC frequently have bye-laws available which may be used to protect wildlife, but these were very rarely enforced to prevent bait digging. Exceptions are in the Lindisfarne National Nature Reserve, where one part of the reserve is closed (although bait digging is permitted in another area) and at Newton Haven, both in Northumberland. With increasing pressures on shores, enforcement may become more necessary in some areas.

Some controls on bait digging were identified by anglers or conservation bodies in areas where the district council had indicated no knowledge of any bye-laws. In many cases these were probably under Harbour Acts, or controls by the owners of areas of foreshore, or a Sea Fisheries Committee. It was not clear how bait digging on privately owned areas of shore was controlled.

The questionnaire results indicated that several bye-law making authorities were considering whether to introduce controls on bait digging, or had definite plans to do so. Others had decided against controls in the past, but might reconsider, because of the concern about levels of bait digging being heard.

The enabling legislation is far from ideal and requires improvement. If a public right to take bait does exist, primary legislation would be needed to remove this.

SECTION 8 : RECOMMENDATIONS FOR THE MANAGEMENT OF BAIT COLLECTION AND FURTHER RESEARCH

There is an urgent requirement for improved management of bait collection activity around the British coasts, particularly in heavily populated areas of England and Wales and in a few of the southern Scottish bays and estuaries. Several strategies are needed to meet and reduce the demand for bait and to minimise conflicts with other uses of the intertidal area. The following areas are suggested for attention by the author, but have not been circulated for comment and may be incomplete:

1. **Promotion of existing codes of conduct for bait collection**
2. **Promotion of alternative sources of bait from:**

   Bait farming

   Sustainable commercial operations (where compatible with wildlife and other interests)

   Novel artificial baits
3. **Organised sustainable cropping of heavily used bait beds**
4. **Zoned use of shores where bait collection competes with other interests**

(the last two may be combined).

8.1 Promotion of existing codes of conduct for bait collection

Many of the perceived problems arising from high levels of bait digging activity are the result of the unsightly and even dangerous mess left behind by the majority of bait diggers who do not back-fill (fill in) their trenches and holes. Research has demonstrated that the recovery rate of in-filled areas is very much more rapid than when mounds and basins are left after bait digging. The technique ensures that the visual appearance of the site, the habitat and its infaunal invertebrate populations return to a normal state in the minimum period possible. Widespread use of back-filling would minimise the conflict between bait digging and amenity uses of beaches, which appears to be the single most common reason for controls being imposed upon anglers. It would also help the recovery of bait stocks, by hastening recolonisation of the beds from adjacent areas.

The collection of peeler crabs from rocky shores can also be severely damaging to shore ecology, because of the tendency for anglers not to return boulders to their original position. Again, the problem causes damage to all the animals and plants on the shore, significantly reducing diversity and hence the overall value of the site as a source of bait in future, as well as for nature conservation.

Anglers must be encouraged to follow the bait collectors' code, with particular emphasis on the back-filling of bait dug holes and replacement of rocks when collecting peeler crabs.

8.2 Promotion of alternative sources of bait

i) Bait farming

The potential for bait farming has already been covered in section 4. The huge market for farmed bait should be promoted more fully, to encourage new companies to enter this specialist field and take up the

culture of additional native species. (Care must be taken to ensure that the introduction of non-native bait species to the wild does not take place).

Opportunities for bait farming should be promoted more widely

ii) Commercial bait collection

Commercial bait digging operations have a very important place in the provision of bait for the sea angling market. Despite the frequent stories of conflicts between professional bait diggers, anglers and other interests, in many situations commercial bait diggers may be less damaging to the natural habitat and bait stocks than the amateur. They provide large quantities of bait for the market, thus preventing the need for many more individuals to take bait from the shore for their own use. Commercial diggers can, however, cause serious damage to fragile sites which they visit on an infrequent basis, to crop in a non-sustainable manner, and this is cause for concern. Certain areas of shore cannot support large groups of commercial bait diggers.

Commercial bait digging is a most important source of bait for the retail market and reduces bait digging pressures by individual anglers; but it must be carried out on a sustainable basis, preferably in remote areas of robust habitats which are not already under pressure from bait collection and where conflicts with nature conservation interests do not arise.

iii) Mechanical bait dredging

Bait dredging has provided retail outlets with large quantities of good quality bait from the Netherlands for many years. An apparent advantage of this method is that one of the major conflicts of hand bait digging with nature conservation interests (bird disturbance) is prevented. On the other hand, the amount of habitat damage and quantity of invertebrate biomass removed is much higher than for hand digging. This consideration will outweigh the former benefit in some areas.

Mechanical bait dredging may be a valuable source of bait for retail outlets and reduce hand digging pressure in other areas. Sites where this activity takes place must be selected very carefully to minimise damage to sensitive areas.

iv) Artificial baits

Considerable advances have recently been made in the production of artificial bait flavour enhancers for freshwater angling. Manufacturers should now be encouraged to carry out research into the production of artificial sea baits, to help replace the requirement for natural baits, particularly worms, and reduce the reliance of sea anglers on these traditional baits.

The market opportunities for the sale of good artificial alternatives to worm and crab baits must be promoted and research and manufacture of artificial baits encouraged.

8.3 Organised sustainable cropping of heavily used bait beds

The resilience of most of the common bait worms to exploitation by bait collection is recognised. This characteristic can be used to maximise the yield from a shore by rotational use of bait beds. Olive (1986) has proposed an example of a system for this, which also incorporates the requirement for certain 'no-go' areas where other uses of the shore are considered to be incompatible with bait digging. Figure 11 is taken from his paper.

For lugworm beds, it is suggested that a six month rotational period of use would be suitable, since these worms will move into depleted beds very quickly. While one zone was open to bait digging the other would be closed, and these changed over every six months, allowing new, unexploited stocks of lugworm to be dug at regular intervals. In most cases some areas would be left permanently open. Even where there is no competing use of the shore requiring a 'no-go' zone, the nursery beds must always be identified and protected. Recolonisation will also occur from areas below the low water mark.

Ragworm beds may require a slightly different approach to allow for their different life cycle. Since about one third of the population is likely to breed each year, and all age classes are found together in the bait beds, it would be wise to operate a rotation which allows areas a minimum two year period of closure. This would require at least two zones to be closed at any one time, with one newly opened each year. In the case of unusual populations where worms are longer-lived, such as in the Menai Strait, this period of closure would need to be much longer and therefore require more rotational zones. This could be very difficult to achieve within a limited area of shore and permanent closure of some sanctuary areas will be necessary.

Yields of bait worms can be maximised with a rotational system of open and closed areas for digging, based upon a full understanding of the bait species' life cycle and local conditions.

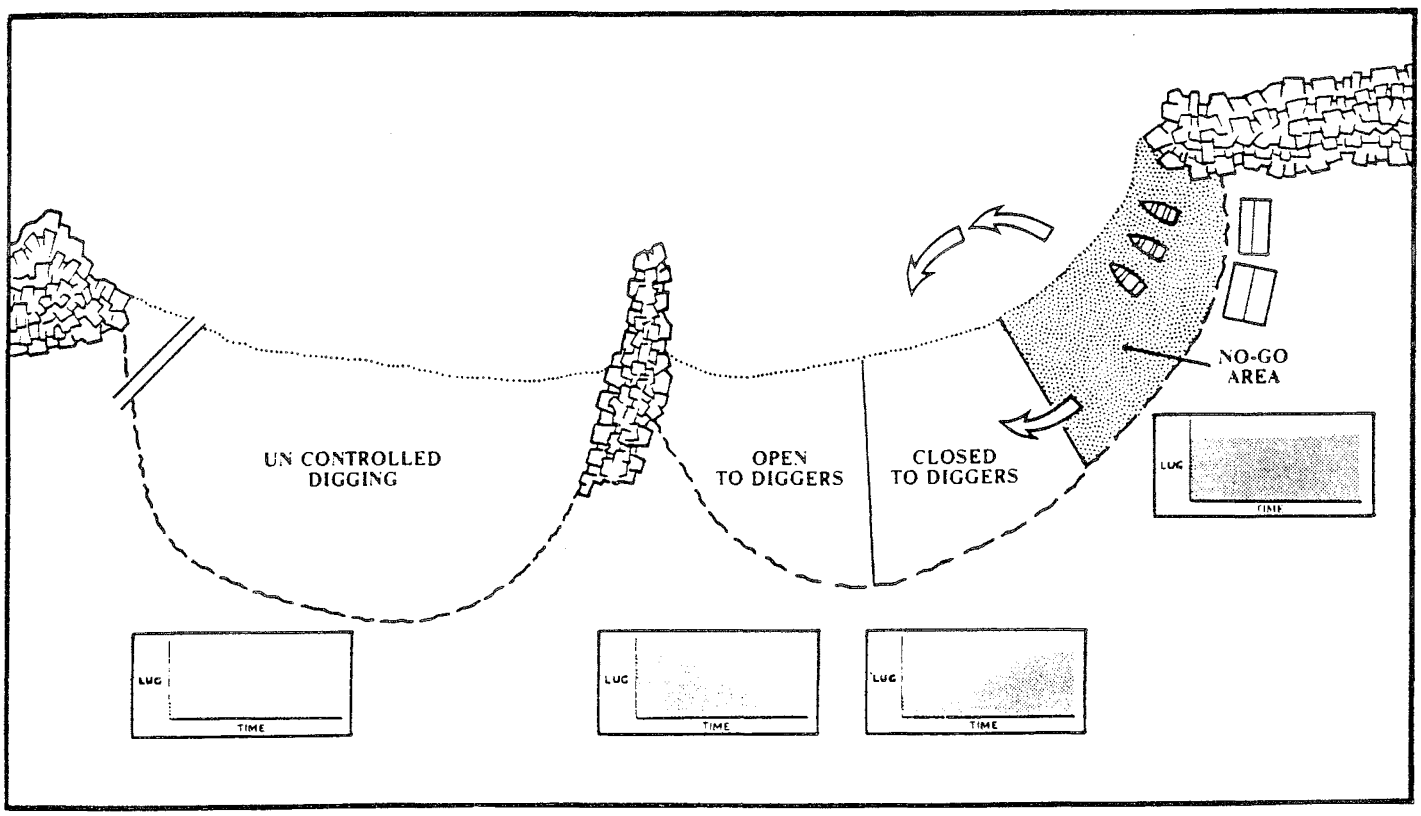


Figure 11. Recommendations for a managed bait digging system to provide sustainable yields of lugworms on a shore. (From Olive, 1986).

(One section is permanently open to bait diggers, another two areas are rotated every six months and the fourth is permanently closed).

8.4 Zoned use of shores where bait collection competes with other interests

In many areas of the coast there are competing uses of the shore with which intensive bait digging is not compatible. These include amenity use (i.e. bathing, boating, riding), shellfisheries and nature conservation. The most effective means of resolving these conflicts, without having to resort to blanket prohibition of bait digging, is to set up a system of zoning, based upon the nature of the competing interests and the bait species.

Surveys of amenity or fisheries use and information on the distribution of species and communities of nature conservation importance will be required to determine which areas must be treated as 'no-go' zones for bait digging. These may be bird sanctuaries, sections of shore with diverse and fragile invertebrate populations (i.e. bivalves and heart urchins), or areas of shore used for launching boats and bathing. In addition to reducing conflicts with bait digging, these closed zones will be of benefit to bait diggers by providing a source of both juvenile and adult worms for recolonisation of dug areas. This can be combined with rotational opening of bait digging areas, as described above, to provide a steady supply of bait worms.

A system of zoning of beaches should be applied where there is conflict between different interest groups to separate these uses and minimise friction between them, while still retaining bait digging at the site where ever possible.

The single greatest obstacle to be overcome in order to operate this system is the need for the cooperation of all visiting anglers. It has proved to be possible for local groups of anglers to operate such a voluntary system of zoned use (for example at Spurn Head and on a voluntarily closed beach at Portland), but anglers coming from further afield may not be prepared to abide by the agreement. This has even been the case where zonation was backed up by a bye-law, as in Budle Bay. It is always important to try to achieve voluntary controls rather than a ban, for restriction in use of former bait beds has been shown many times to cause serious problems elsewhere in the region, as bait diggers are moved on to new sites. Detailed consultation with angling groups and full publicity will be essential to achieve success.

Any voluntary system of zoned use of a shore for bait collection must be established through full consultation with angling groups to obtain their agreement and cooperation.

In some areas where the numbers of bait diggers are too high to enable demands to be met, and voluntary controls have not been considered adequate, it has been considered necessary to seek statutory controls on the total numbers of bait diggers operating locally. Licensing systems are already in operation in several regions. Licences may be available to any applicant, but carry specific conditions, such as the back-filling of holes, be valid at certain times of the year or for the taking of bait for personal use only. Others are limited to local inhabitants and a very few sites have an upper limit on the number of licences available, to ensure that the estimated carrying capacity is not exceeded. There is one example in Scotland of a group of local anglers taking a lease of an intertidal area in order to be able to control the scale of bait digging activity by visitors. Any of these controls may be operated in combination with a zoning system, whereby only specified areas are open to bait digging.

There will be certain situations where statutory controls are the most appropriate option to control bait digging and prevent damage in areas where it is completely incompatible with other interests. In such situations a bye-law to prohibit bait digging will be required. It is most important to ensure that such a control is really essential before considering this step. In the case of nature conservation interests, surveys of invertebrate communities or bird use must be used to justify the need for cessation of this activity. The knock-on effect of moving bait digging pressures to other sites, which may be up to 100 miles distant, must also be considered.

Prohibition of bait digging must be justifiable and should only be considered when all other options are infeasible. The implications on other sites of the closure of bait beds must not be overlooked.

Many of the areas of further research proposed by Clark (1977, see Annex 1) have now been studied. One subject which still requires further study is the effect of bait digging and dredging upon feeding birds; not so much the disturbance effects, but the availability of food following destruction of shore habitats and removal of invertebrates.

Further research is required into the effects of bait collection on the availability of food to feeding birds.

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ANNEX 1 : PROPOSALS FOR FURTHER STUDY FROM THE REPORT ON *THE ECOLOGICAL IMPACT OF BAITDIGGING,* CLARK, 1977.

1 A more detailed survey is needed to discover the full extent of legislation prohibiting bait digging. [Note: the survey sent questionnaires only to local authorities].

2 A survey is needed of all coastal areas where public access is prohibited or regulated in such a way as to prevent bait digging.

3 The legal provisions relating to all coastal reserves should be examined and the extent to which they can be and are enforced against bait diggers should be reviewed.

4 An enquiry, coupled where necessary by direct observation, is needed to discover the numbers of bait diggers, areas dug, frequency of digging, amount of bait removed, etc. on a number of selected beaches in different parts of the country.

5 The enquiry should include an assessment of how much bait is dug by anglers for their own use and how much for resale. A distinction should also be made between bait dug commercially for resale locally and that for 'export' to other areas.

6 Commerce in bait by major suppliers should be investigated with regard to methods of extracting bait and general collecting practices and logistics; ultimate destination of the bait; economics and general experience of major bait suppliers and their local outlets.

7 An analysis of changes in population and population structure should be made on a number of beaches subject to varying degrees of predation by bait diggers. This should be in association and partly consequent upon, proposal 4. [Note: to determine whether intensive bait digging has led to a decline in local populations].

8 The process of physical recovery of dug areas of beach should be followed on beaches of different current characteristics. This investigation should include an examination of particle size characteristics of the substratum in disturbed during recovery.

9 Recolonization of denuded areas by appropriate fauna should be followed in experimental plots. Attention should be directed to all the macrofauna and not simply bait species.

10 An attempt should be made to assess the extent to which the intertidal region of beaches is restocked by the migration into it of members of a subtidal population.

11 A detailed study should be made of maturation, reproduction and movements of important bait species (most critically of *Arenicola marina* and *Nereis virens*) and of the population ecology of selected colonies of these worms.

12 Surveillance of population density and recruitment should be made of bait species in a number of sites around the British coast to ascertain whether or not they are subject to large, long-term fluctuation.

13 An assessment should be made from existing knowledge and by direct investigation of the extent to which bait species removed by bait diggers depletes the food supply of shore-feeding birds.

14 An assessment should be made of the impact of disturbance by bait diggers on the feeding behaviour of shore birds.

ANNEX 2 : CONTROLS ON BAIT DIGGING IDENTIFIED DURING THE SURVEY

Relevant legislation mentioned in the responses to the questionnaire survey is listed below, together with authorities using this legislation to control bait digging. Other controls noted in responses but not attributed to a particular authority or Act are not listed. Section 6 should be read to identify these.

Civic Government (Scotland) Act (1982)
Section 121 allows local authorities to make byelaws 'for the purpose of preventing nuisance or danger at, or preserving or improving the amenity of, or conserving the natural beauty of, the seashore and adjacent waters...'. Under (c), byelaws may be used to regulate 'the exercise of sporting and recreational activities on the seashore'.
Dunfermline, Kirkcaldy and North East Fife D.A.s were cooperating in drafting new bye-laws under this Act.

Countryside (Scotland) Act (1967), Section 54
East Lothian D.C. (for John Muir Country Park LNR)

Harbour Acts (Various):
Chichester Harbour Conservancy byelaws prohibit bait digging within 50ft of any mooring or 20ft of any structure.
Fowey Harbour Commission controls bait digging near moorings at Golant, in the Fowey Estuary.
Langstone Harbour Board enacted byelaws in 1984 to prohibit bait digging within 3m of moorings or 10m of slipway or jetty.
Penzance Harbour Act (1980). Byelaws prevent damage to boats and moorings.
Port of Sunderland Dock Estate
Scarborough Harbour Act (1845)
Tor Bay Harbour Act (1970)
(Controls also noted in harbour areas in the Fal, Newlyn and Penrhyn Estuary).

Local Acts:
Humberside Act (1982) (previously Cleethorpes Improvement Act 1902)
Cleethorpes B.C. controls the 'digging for or removal of sand, bait etc. from the seashore', for amenity purposes as well as to protect the lugworm populations.

Isle of Wight County Council Act (1980)
Empowers District Councils to control bait digging.

Southend on Sea Corporation Act (1895)
Borough of Southend on Sea limits bait digging to areas seawards of a quarter mile from the seawall for safety reasons. Numerous successful prosecutions and one injunction obtained, resulting in imprisonment.

National Parks and Access to the Countryside Act 1947

Section 20(2)(b) permits the NCC to make byelaws to prohibit or restrict the killing, taking, molesting or disturbance of living creatures of any description in a nature reserve ... or the doing of anything therein which will interfere with the soil ... and s. 21 allows local authorities to make similar byelaws for local nature reserves. Section 101(8) provides that such byelaws apply to Crown land if the appropriate authority (in this case the Crown Estate Commissioners) consent.

An example of the byelaws made under this Act is provided by the South Bank of the Swale Nature Reserve byelaws which prevent (a) the killing, taking, molesting or wilful disturbance of living creatures of any description and (e) wilfully removing any soil, mud, rock, sand, shell or shingle ... and digging into the beach or mud flats. These byelaws are expressly stated to be without prejudice to any public right or private profit à prendre. Kent County Council issues permits under this byelaw.

Other examples: Teignbridge D.C. (to protect wildlife and control disturbance in the Dawlish Warren Local Nature Reserve)

Pembrokeshire Coast National Park byelaws affect all Crown foreshore in Dyfed, but have not been used to control bait digging.

National Trust Act, 1971, Section 24

The Trust may make byelaws for the regulation and protection of and for the prevention and suppression of nuisances and the preservation of order upon and the regulation of the conduct and securing of safety of any person and in particular...(a) for prohibiting any person without lawful authority from digging ... sand, clay or other substance; (e) for prohibiting injury of any building, structure or other thing; (n) generally for prohibiting or regulating any act or thing tending to injure or disfigure the land ... or to interfere with the use and enjoyment thereof by the public. Used at Newton Haven, Northumberland.

Public Health Acts Amendment Act (1907)

Section 82(1) refers to the regulation of tents, booths etc., shows, vehicles and games, but goes on 'and generally regulate the user of the seashore for such purposes as shall be prescribed by such byelaws'. The byelaw must be made 'for the prevention of danger, obstruction, or annoyance to persons using the sea-shore'. The following local authorities control bait digging with this Act:

Alnwick D.C. (to prevent problems caused to fishermen launching boats off the beach).

Caradon D.C. (controls at Torpoint where moored vessels had been damaged).

Eastleigh D.C. (bait digging controls at Netley due to concern over hazards of bait dug holes to the public).

Lancaster C.C. (proposed, for foreshore owned at Morecambe and Heysham).

Maldon D.C. (in respect of Several Fishery area, to prevent damage to foreshore and injury to public as a result of commercial bait dig ging.)

Sea Fisheries Regulations Act (1966)

Refers to powers of Sea Fisheries Committees (in England and Wales). i.e. Lancashire and Western SFC controls in mussel beds and South Wales SFC controls to protect the cockle fishery.

Wildlife and Countryside Act (1981)

For National Nature Reserves: the Nature Conservancy Council may 'make byelaws for the protection of the reserve' under Part II, Section 35; and for Marine Nature Reserves byelaws 'may provide for prohibiting or restricting, either absolutely or subject to any exceptions ... (ii) the killing, taking, destruction, molestation or disturbance of animals or plants of any description in the reserve, or the doing of anything therein which will interfere with the seabed or damage or disturb any object in the reserve;' under Part II, Section 37.

ANNEX 3 : BAIT DIGGING QUESTIONNAIRES

Dear Club Secretary

Baitdigging Questionnaire

Despite the impression given by the angling press over the last year, there are very many areas in Britain where there is little or no conflict between nature conservation and angling interests in regard to bait digging.

This is not really surprising since we are all concerned to maintain the populations of worms and other sand-dwelling animals of the sea shore - whether for the preservation of bait stocks and food for fish or for the benefit of the general wildlife and shore birds. In fact, angling associations are justifiably proud of their reputation in promoting conservation and anti-pollution issues around the country.

The areas in which good supplies of bait are found are sometimes also important to wildlife, maybe because they support large numbers of wildfowl and/or wading birds or because the sites contain a rich population of worms and other animals in the sand including some unusual and fragile species of interest to scientists. An example of these is the heart urchin or sea potato, a very long-lived burrowing sea urchin, which may easily be destroyed unintentionally by bait digging. Also some species of birds are very shy and easily disturbed by the presence of people on the shore at low tide level.

As Britain's representative, the Nature Conservancy Council has an international responsibility for conserving the large numbers of birds which gather in our estuaries in winter from all over Northern Europe and the Arctic. Some of these need to feed continually on the lower shore whilst the tide is out in order to obtain sufficient food to survive the cold weather and prepare for the long spring migrations back to their breeding grounds.

NCC fully appreciates the need for anglers to have adequate supplies of bait. However, the recent growth in numbers of sea anglers has increased the pressures on bait stocks and in some parts of the country appears to have resulted in the demand for bait outstripping the supply. Many of the problems appear to arise not from the activities of anglers taking bait for their own use or the long-established, reputable professional baitdiggers who supply essential commercial outlets, but due to casual commercial bait

diggers with the reputation of an irresponsible attitude towards the shore environment and bait stocks. When heavy use by bait diggers results in conflicts with an important conservation interest, NCC may, in agreement with local angling groups, seek to meet the needs of both by setting aside part of the area for wildlife.

NCC has already received much information from conservation organisations and individuals concerning the location and amount of baitdigging taking place around the coasts. We are, however, anxious to obtain a balanced picture of the adequacy of the bait supply throughout the country and hence to determine in which areas problems do actually exist. For this reason the attached questionnaire is being circulated to angling clubs nationwide. The results will be of assistance to the NCC in carrying out its duty to conserve areas of coast for wildlife, whilst at the same time, ensuring that anglers are not restricted from obtaining bait supplies unless absolutely essential. It is intended to use examples of areas where bait digging coexists without friction side by side with wildlife conservation interests as guidelines to overcome any conflict between these interests in other localities.

The results will also be made available to Sea Angling Clubs through the National Anglers' Council and any areas of concern identified by the survey will be discussed at the meetings held at regular intervals between the NAC and NCC.

Your comments on these issues and prompt return of the attached questionnaire would be much appreciated.

Yours faithfully

Sarah Fowler

QUESTIONNAIRE TO SEA ANGLING CLUBS 1986

NAME OF CLUB _____

ADDRESS _____
_____
_____
_____

Replies to:

Sarah Fowler
Nature Conservancy Council
Northminster House
Peterborough
PE1 1UA

Person to whom further queries should be addressed _____

1. Number of club members .....

2. Areas in which sea angling takes place: .....

.....

3. Areas in which members dig bait ..... Distance from home area of club .....

4. Which of the following are used in your area as bait?

   a. Ragworm .....
   b. Lugworm .....
   c. Cat worm (white ragworm) .....
   d. Peeler crab .....
   e. Slipper limpet .....
   f. Sand eel .....
   g. Razor shells .....
   h. Other (please specify) .....

   (Please indicate which are preferred)

5. Estimate: What proportion is taken by individual anglers? .....

   What proportion is purchased from commercial suppliers? .....

6. How many anglers use aquariums or fridges to keep bait? .....

7. Are total supplies adequate for local needs? .....

8. Have supplies of bait dug by anglers become scarcer? .....

   i. Less bait .....
   ii. Smaller bait .....
   iii. No change .....

9. What, if anything, do you attribute this to?

.....

10. Do you have any difficulty from local bye-laws restricting bait digging? If so, where is this a problem?

.....

11. Any other comments you would like to make.

BAIT DIGGING QUESTIONNAIRES

INSTRUCTION SHEET

Two questionnaires are provided. You can use the first to list all the areas in which you have noticed bait digging or collection taking place. The second should be used if you have a lot of detailed information on a single site.

Please put accurate site names and county down on the form, together with grid references for the site, so that we can easily identify it. If it is possible to provide a map of the area(s) concerned, this would be extremely useful. If not, an estimate of the length of coast affected in each area would be valuable.

If the area is of conservation importance it may have a statutory designation. Please note this if known. Examples: LNR : Local Nature Reserve, NNR : National Nature Reserve, SSSI : Site of Special Scientific Interest, PSSSI : Proposed SSSI, PMNR : Proposed (Statutory) Marine Nature Reserve, VMNR : Voluntary Marine Nature Reserve. Others may include National Trust properties.

Some sites have restrictions upon bait digging through bye-laws enforced by a Local Authority or other body (eg National Trust or Nature Conservancy Council). There may be a notice on the beach stating that bait digging is banned. If this is the case, such information would be most useful. Is there still bait digging in the area? If you have local knowledge you may know whether the bye-law is enforced by Wardening. Have prosecutions for the breaking of such bye-laws been attempted in the past or are any prosecutions impending? Are licenses issued to allow bait digging?

How acute is the problem of bait digging? Occasional visits by people to the shore, moderate, or really severe with large crowds of people digging over most of the beach? What is the largest number of people ever seen digging - and do you know how many are taking bait for commercial purposes?

The problems caused by bait digging may fall into several categories - most are listed on the questionnaires.

Amenity - extensive digging on the shore causes unsightly trenches and mounds. These can be a danger to bathers and horse riders as well as being visually offensive.

Birds are unable to feed at low tide when the shore is occupied by people digging for worms. This can be a serious problem in Nature Reserves or estuaries which are important for feeding birds in winter.

Coastal Structures Sea walls or harbours could be undermined by extensive digging. Some bye-laws have been passed to prevent this damage by bait digging.

Where a beach is of importance for Marine Nature Conservation, bait digging can destroy its interest by causing the death of burrowing animals such as large bivalves or echinoderms (depleting the invertebrate population) or by destroying the structure of the beach by bringing stones and rocks to the surface. Where collection of peeler crabs takes place boulders on a beach may be turned so frequently that this habitat is also destroyed.

If you have further information on a site which is not shown on the questionnaire, pleas make a note of this fact so that we will be able to contact you again if necessary.

Don't forget to put your name, address and telephone number on the form.

Further forms can be obtained from: S L FOWLER
NATURE CONSERVANCY COUNCIL
NORTHMINSTER HOUSE
PETERBOROUGH
PE1 1UA

NATURE CONSERVANCY COUNCIL BAIT DIGGING QUESTIONNAIRE No.1 1985

COMPLETED BY: NAME REGION/ADDRESS

Please return to:- S L FOWLER
NATURE CONSERVANCY COUNCIL
NORTHMINSTER HOUSE
PETERBOROUGH
PE1 1UA

SITE NAME	GRID REFS.	COASTAL LENGTH	MAP ATTACHED	CONSERVATION DESIGNATION	ANY BYE-LAWS?	ENFORCED?	PROSECUTIONS?	LICENSES	ACTIVITY: BAIT DIGGING	ACTIVITY: BOULDER TURNING	INTENSITY OF PROBLEM: OCCAS.	INTENSITY OF PROBLEM: MODRT.	INTENSITY OF PROBLEM: SEVERE	ESTIMATED NOS. BAIT DIGGERS: MAX NO PEOPLE	ESTIMATED NOS. BAIT DIGGERS: COMMERC DIGGERS	PROBLEMS CAUSED: A B C D H OTHER	MORE INF AVAILABL

MAIN PROBLEMS CAUSED: A : AMENITY, B : BIRD DISTURBANCE, C : COASTAL STRUCTURES ENDANGERED, D : DEPLETED INVERTEBRATE POPULATIONS, H : HABITAT DESTRUCTION, OTHER (PLEASE SPECIFY)

Survey of bait collection in Britain, Annex 3

BAIT DIGGING / COLLECTION QUESTIONNAIRE NO.2 1985

COMPLETED BY: ..... ADDRESS: .....

TELEPHONE NO: ....

....

....

SITE NAME	GRID REFS.	AREA/LENGTH: OF COAST AFFECTED	MAP PROVIDED

NATURE CONSERVATION DESIGNATION:

LNR ..... SSSI ..... PMNR ..... OTHER

NNR ..... PSSSI ..... VMNR .....

ANY RELEVANT BYE-LAWS?	ANY PROSECUTIONS?
ARE THESE ENFORCED?	NO. OF LICENSED BAITDIGGERS?

MORE INFORMATION AVAILABLE?

MAIN ACTIVITIES: BAIT DIGGING ..... BOULDER TURNING .....

INTENSITY OF ACTIVITY: OCCASIONAL ..... MODERATE ..... INTENSIVE .....

COMMENTS:

PROBLEM CAUSED: AMENITY ..... BIRD DISTURBANCE .....

COASTAL STRUCTURES ENDANGERED ..... HABITAT DESTRUCTION .....

DEPLETION OF INVERTEBRATE POPULATIONS ..... OTHER .....

COMMENTS:

MORE INFORMATION AVAILABLE .....

ESTIMATE: MAX.NO. OF BAIT DIGGERS OR COLLECTORS ON SHORE AT ONE TIME	NO. OF COMMERCIAL BAIT DIGGERS	RANGE OF DISTANCES TRAVELLED TO SITE

TYPE OF BAIT TAKEN:	WHITE RAG/CATWORM	OTHER (SPECIFY)
RAGWORM	SLIPPER LIMPET	
LUGWORM	PEELER CRABS	

SHORE TYPE:	MUDDY GRAVEL	OTHER (SPECIFY)
MUD	SAND	
MUDDY SAND	BOULDERS	

Please return to: S L FOWLER
NATURE CONSERVANCY COUNCIL
NORTHMINSTER HOUSE
PETERBOROUGH PE1 1UA

ANNEX 4 : LEGAL TEXTS AND DEFINITIONS

Coulson and Forbes on Waters

Hall on Sea Shore

Stuart Moore on Foreshore

Phear - Rights of Water

Wisdom - The Law of Rivers and Watercourses

Wisdom - Water Rights (Oyez)

Woolrych on Sewers

Stuart Moore - History and Law of Fisheries

Woolrych on Waters

Hall on Profits à Prendre

Oke - Fishing Laws

Angell on Tide Waters

Chitty - Games Laws and Fisheries

Halsbury. Laws: Articles on Fisheries, Water, Easements and Profits, Commons, Custom and Usage

Schultes - Aquatic Rights

Gould on Water

Definitions: (from Halsbury):

The seashore/foreshore : between the high-water mark of the ordinary tides and low-water mark. (N.B Spring tides are used in Scotland).

The soil of the seashore and of tidal waters is *prima facie* vested of common right in the Crown, unless it has passed to a subject by grant or possessory title.

At common law the public has a right to fish in the tidal reaches of all rivers and estuaries and in the sea and arm of the sea within the limits of territorial waters of the kingdom except where the Crown or some subject has acquired a propriety exclusive of the public or where Parliament has restricted the common law rights of the public. ...the public can now be excluded or modified only by act of legislature.

The public right must be exercised reasonably and in accordance with the statute law. The public has no right to fish by kiddles, weirs or other engines fixed in the soil for such methods involve a use of the soil which cannot be vested in the public but must belong either to the Crown or to some private owner. The public may, however, lay lines, draw nets and adopt any other mode of fishing.

A profit à prendre cannot be supported by custom in favour of an indefinite and fluctuation body of persons because, were such a right recognised, the result would be that the subject matter of the right would soon be exhausted and the owner of the land subject to the right would be wholly deprived of the ordinary incidents of ownership. ... An alleged custom which would destroy the subject matter of the right would be unreasonable; and since no unreasonable custom can exist, such a right would be void.

Continued...

Commonly quoted precedents in law concerning or applicable to bait digging by the public in England and Wales:

Bagott v Orr 1801. All England Law Reports Reprint 1775-1802. (The court attached importance to the fact that the shellfish being collected might be wholly or partly in the soil of the shore).

Goodman v Mayor of Saltash 1882. Law Reports : Appeal Cases: 1881-82: Volume VII, p 633. (Concerns a profit à prendre through a grant assigned to a specific group of individuals in an area).

Tilbury v Silva 1890. Reference 62 LT 254 1890. The Law Times. Vol LXII, p 256. (Concerns definition of a profit à prendre).

Beckett v Lyons 1967. Court of Appeal. (A 'fluctuating body' such as the public could not acquire a prescriptive right or profit à prendre to take sea washed coal from the shore through common law by use since time immemorial - bait dig ging is also a profit à prendre).

In Scotland:

Hall v Whillis 1852. Cases decided in the Court of Session. No. 82.

REFERENCE KEY TO THE

COASTAL DISTRICT COUNCILS OF GREAT BRITAIN

1. Berwick-upon-Tweed D.C.
2. Alnwick D.C.
3. Castle Morpeth B.C.
4. Wansbeck D.C.
5. Blyth Valley D.C.
6. North Tyneside D.C.
7. South Tyneside B.C.
8. Sunderland B.C.
9. Easington D.C.
10. Hartlepool D.C.
11. Langbaurgh B.C.
12. Scarborough B.C.
13. East Yorkshire D.C.
14. Holderness B.C.
15. Hull C.C.
16. The East Yorkshire Borough of Beverley D.C.
17. Glanford D.C.
18. Cleethorpes D.C.
19. Great Grimsby D.C.
20. East Lindsey D.C.
21. Boston D.C.
22. South Holland D.C.
23. King's Lynn and West Norfolk D.C.
24. North Norfolk D.C.
25. Great Yarmouth B.C.
26. Waveney D.C.
27. Suffolk Coastal D.C.
28. Ipswich D.C.
29. Babergh D.C.
30. Tendring D.C.
31. Colchester B.C.
32. Maldon D.C.
33. Rochford D.C.
34. Southend-on-Sea D.C.
35. Castle Point D.C.
36. Thurrock D.C.
37. Gravesham D.C.
38. Rochester upon Medway C.C.
39. Gillingham D.C.
40. Swale D.C.
41. Canterbury D.C.
42. Thanet D.C.
43. Dover D.C.
44. Shepway D.C.
45. Rother D.C.
46. Hastings B.C.
47. Wealden D.C.
48. Eastbourne B.C.
49. Lewis D.C.
50. Brighton B.C.
51. Hove B.C.
52. Adur D.C.
53. Worthing B.C.
54. Arun D.C.
55. Chichester D.C.
56. Havant D.C.
57. Portsmouth D.C.
58. Gosport D.C.
59. Fareham B.C.
60. Eastleigh D.C.
61. Southampton D.C.
62. New Forest D.C.
63. Medina B.C.
64. South Wight B.C.
65. Christchurch D.C.
66. Bournemouth D.C.
67. Poole B.C.
68. Purbeck D.C.
69. West Dorset D.C.
70. Weymouth and Portland B.C.
71. East Devon D.C.
72. Teignbridge D.C.
73. Torbay D.C.
74. South Hams D.C.
75. Plymouth D.C.
76. Caradon D.C.
77. Restormel B.C.
78. Carrick D.C.
79. Kerrier D.C.
80. Penwith D.C.
81. North Cornwall D.C.
82. Torridge D.C.
83. North Devon D.C.
84. West Somerset D.C.
85. Sedgemoor D.C.
86. Woodspring D.C.
87. Bristol D.C.
88. Northavon D.C.
89. Monmouth D.C.
90. Newport D.C.
91. Cardiff D.C.
92. Vale of Glamorgan B.C.
93. Ogwr D.C.
94. Afan D.C.
95. Neath B.C.
96. Swansea C.C.
97. Llanelli D.C.
98. Carmarthen D.C.
99. South Pembrokeshire D.C.
100. Preseli D.C.

101. Ceredigion D.C.
102. Meirionnydd D.C.
103. Dwyfor D.C.
104. Arfon D.C.
105. Ynys Mon - Isle of Anglesey D.C.
106. Aberconwy B.C.
107. Colwyn B.C.
108. Rhuddlan D.C.
109. Delyn D.C.

110. Wirral M.B.
111. Ellesmere Port and Neston D.C.
112. Liverpool C.C.
113. Sefton M.B.
114. West Lancashire D.C.
115. Fylde D.C.
116. Blackpool D.C.
117. Wyre D.C.
118. Lancaster C.C.
119. South Lakeland D.C.
120. Barrow-in-Furness D.C.
121. Copeland D.C.
122. Allerdale D.C.
123. Carlisle D.C.

124. Annandale and Eskdale D.C.
125. Nithsdale D.C.
126. Stewartry D.C.
127. Wigtown D.C.
128. Kyle and Carrick D.C.
129. Cunninghame D.C.
130. Inverclyde D.C.
131. Renfrew D.C.
132. Dumbarton D.C.
133. Argyll and Bute D.C.
134. Lochaber D.C.
135. Skye and Lochalsh D.C.
136. Western Isles D.C.
137. Ross and Cromarty D.C.
138. Sutherland D.C.
139. Caithness D.C.
140. Orkney D.C.
141. Shetland D.C.
142. Inverness D.C.
143. Nairn D.C.
144. Moray D.C.
145. Banff and Buchan D.C.
146. Gordon D.C.
147. Aberdeen C.C.
148. Kincardine and Deeside D.C.
149. Angus D.C.
150. Dundee C.C.
151. North East Fife D.C.
152. Kirkcaldy D.C.
153. Dunfermline D.C.
154. Falkirk D.C.
155. West Lothian D.C.
156. Edinburgh C.C.
157. East Lothian D.C.
158. Berwickshire D.C.