

NATIONAL RIVERS AUTHORITY

South West Region

TAW / TORRIDGE ESTUARY MANAGEMENT PLAN

Stage 1

**STATEMENT OF CATCHMENT USES
AND PROBLEM IDENTIFICATION**



NRA

National Rivers Authority

CONSULTATIVE COPY

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~~14/9/94~~

WEST REGION

STATEMENT OF CATCHMENT USES AND PROBLEM IDENTIFICATION

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TAW/TORRIDGE ESTUARY MANAGEMENT PLAN

STAGE 1

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1. CATCHMENT MANAGEMENT PLANS - INTRODUCTION TO THE CONCEPT

- 1.1 River and estuarine systems are subject to increasing use by a variety of activities. Many of these interact and some conflicts arise. There is also a large body of evidence that human activity is causing damage to the environment. Society's overall objective must be to have an environment which can be used and enjoyed without endangering or compromising the quality of life for ourselves or for future generations.
- 1.2 In a river system, conditions in one section are affected by circumstances upstream and, in turn, will affect conditions downstream. Land use and the related management practices affect water quality, even when far removed from the watercourse. It is impossible to separate the management of waters from that of land and the whole drainage basin must be considered as the minimum ecosystem unit for water management.
- 1.3 The estuary represents a meeting place of river water and the sea. It is characterised by a constantly changing mixture of salt and fresh water and is often dominated by fine sedimentary material carried into the estuary from the sea and from the rivers, resulting in the accumulations known as mud flats. Water quality in an estuary is never static. It is continuously affected by the quality of incoming sea and riverine water, the effluents discharged from towns and industry along the shore, the physical processes of sedimentation and resuspension, the biological processes occurring in the water column and in the muds and the driving forces of riverine flow and tidal action.
- 1.4 Estuaries support many living organisms although the diversity of species in this continually changing environment is lower than either fresh or sea water systems. Management of estuarine quality requires an understanding of the fate of pollutants arriving from the rivers, the discharges, the land and the sea. This is extremely complex and may be unacceptably costly to achieve. The real goal is to set meaningful controls for discharges to the estuary itself and to the upstream rivers, while working towards clear quality objectives to protect the legitimate uses of the estuarine waters.
- 1.5 The objective of catchment management must be to predict and reduce conflicts of use and to achieve all use related objectives. The National Rivers Authority (NRA) has decided that the best way of achieving this is through the production of Catchment Management Plans. These are drawn up in consultation with interested parties and represent an agreed strategy for realising the environmental potential of the catchment concerned, within prevailing economic and political constraints.

1.6 These plans will be in two stages, the first of which will identify :

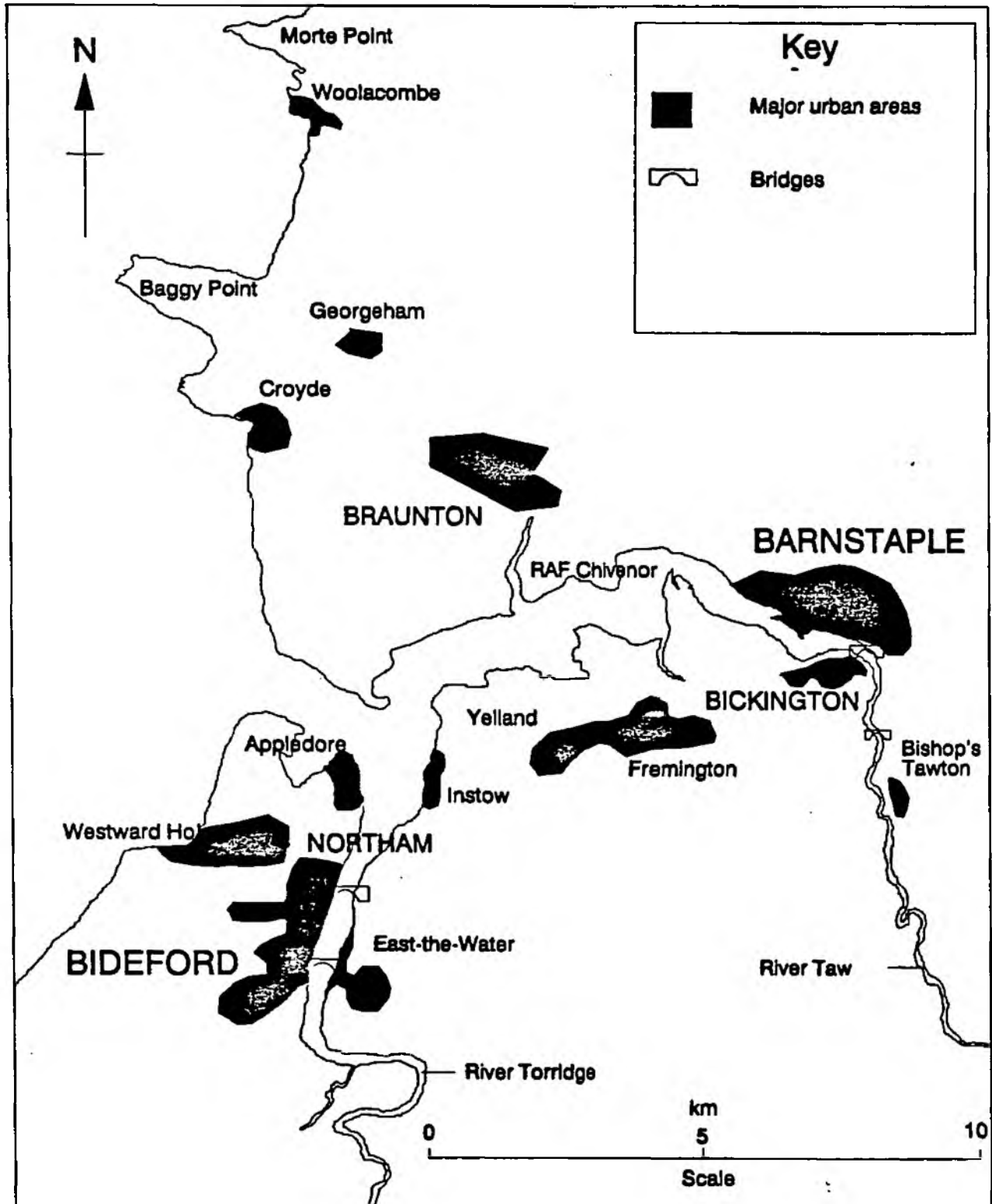
- the uses of the catchment;
- the environmental requirements for each use;
- the present state of the catchment when compared with these targets;
- gaps in our knowledge, and known problems and conflicts.

Solutions are given where they are easily identifiable but these do not represent the final version of solutions to all identified problems.

This document is Stage 1 for the Taw-Torridge Estuary and is released for public consultation.

1.7 The problems identified in Stage 1 and the agreed solutions will be presented in a Stage 2 plan.

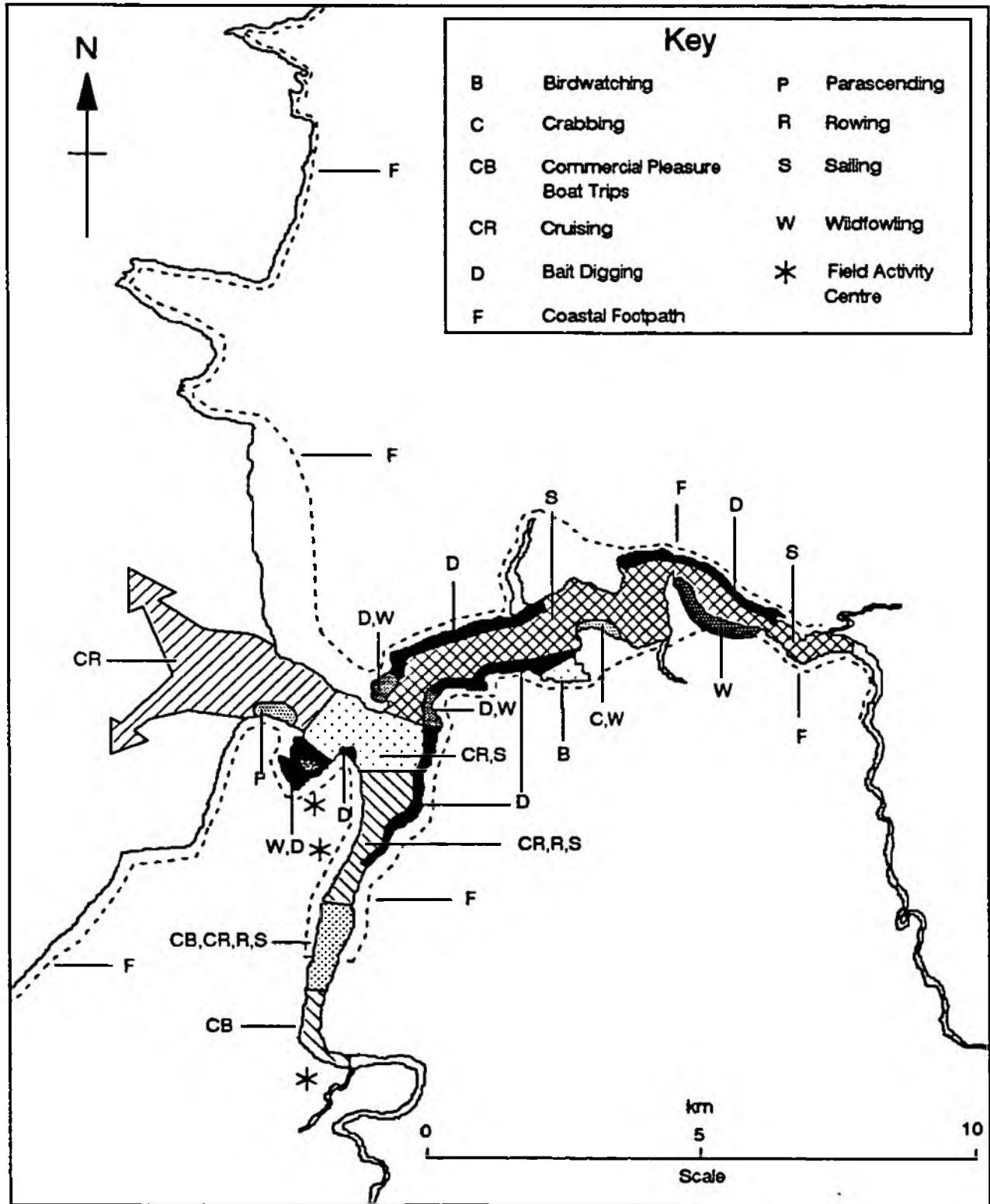
The Taw-Torridge Estuary



- 2.1 The combined estuary of the Taw and Torridge is situated on the north coast of Devon and opens into Bideford Bay. The tidal rivers pass through the towns of Barnstaple (Taw) and Bideford (Torridge) before converging at Appledore and flowing to the sea. The extensive sand dunes of Braunton Burrows lie to the north of the mouth of the combined estuary with the seaside town of Westward Ho! lying to the south.
- 2.2 Since the post war decline of rail and shipping in the region, tourism has become a significant element in the local economy. Bideford is still a port for small coasters but activity now is very slight.
- 2.3 The Torridge estuary is a major tourist attraction with concentrations of visitors going to Appledore, Instow and Bideford. Each arm of the estuary is widely used for recreational purposes.
- 2.4 Species of shellfish are harvested on a commercial and non-commercial basis from sites within both the Taw and Torridge arms of the estuary.
- 2.5 The Taw-Torridge estuary was re-notified as a Site of Special Scientific Interest (SSSI) in 1988 in recognition of its national importance for wildfowl, waders and elements of its intertidal plant and animal life. Together with the associated land, particularly Braunton Burrows NNR, this area is of international importance for conservation. Parts of the estuary and surrounding land are designated as a Coastal Protection Area; Area of Great Landscape Value; County Nature Conservation Zone and an Area of Outstanding Natural Beauty.
- 2.6 Pollution from sewage in both the Taw and Torridge arms of the estuary is perceived as a major problem and one which has generated a considerable public reaction. The amount of sewage which it is currently estimated will be discharged (from existing sewage disposal facilities) in the year 2012 is equivalent to that from a population of 69,750 people. It is unlikely that such a population will exist but industrial effluents are taken into account in calculating the probable load.
- 2.7 Agricultural run-off in the river catchments has also been identified as one of the major water quality problems facing the estuary.
- 2.8 Other industrial effluents discharged direct to the estuary come from a cotton processing plant at Braunton, vehicle washings from Appledore and a builder's yard at Bideford.
- 2.9 Northam waste disposal tip, the effluent discharge from RAF Chivenor and the sand and gravel extraction business operating from Crow Point, amongst others, are all potential polluters of the estuary.

The Taw-Torrldge Estuary

BASIC AMENITY



3.1 BASIC AMENITY - TAW/TORRIDGE ESTUARY

3.1.1 General

This use relates to those activities which attract people to the estuary and which may, therefore, bring them into close proximity with the water, but without intimate contact. Examples include birdwatching, walking, pleasure boat trips, sailing and rowing. As such, the principal areas of concern are general aesthetic acceptability throughout the area.

3.1.2 Local Perspective

The Taw-Torridge estuary is of major importance as a centre for tourism and recreation. The Field Activity Centres provide a base for all outdoor activities which make use of the water. The amenity value of the whole area is vital to the local tourist industry. The coastal footpath runs around most of the estuary and provides access for wildfowling, birdwatching and bait digging.

3.1.3 Environmental Objectives

To maintain and, where appropriate, improve water quality so as to prevent public nuisance arising from visual and smell problems.

3.1.4 Environmental Requirements

Water Quality:

Water Quality Suite 1 : Aesthetic Criteria (see Appendix 8.1.1).

No plastic debris.

No crude sewage discharges.

No coherent sewage slicks.

No smell nuisance.

Water Resources:

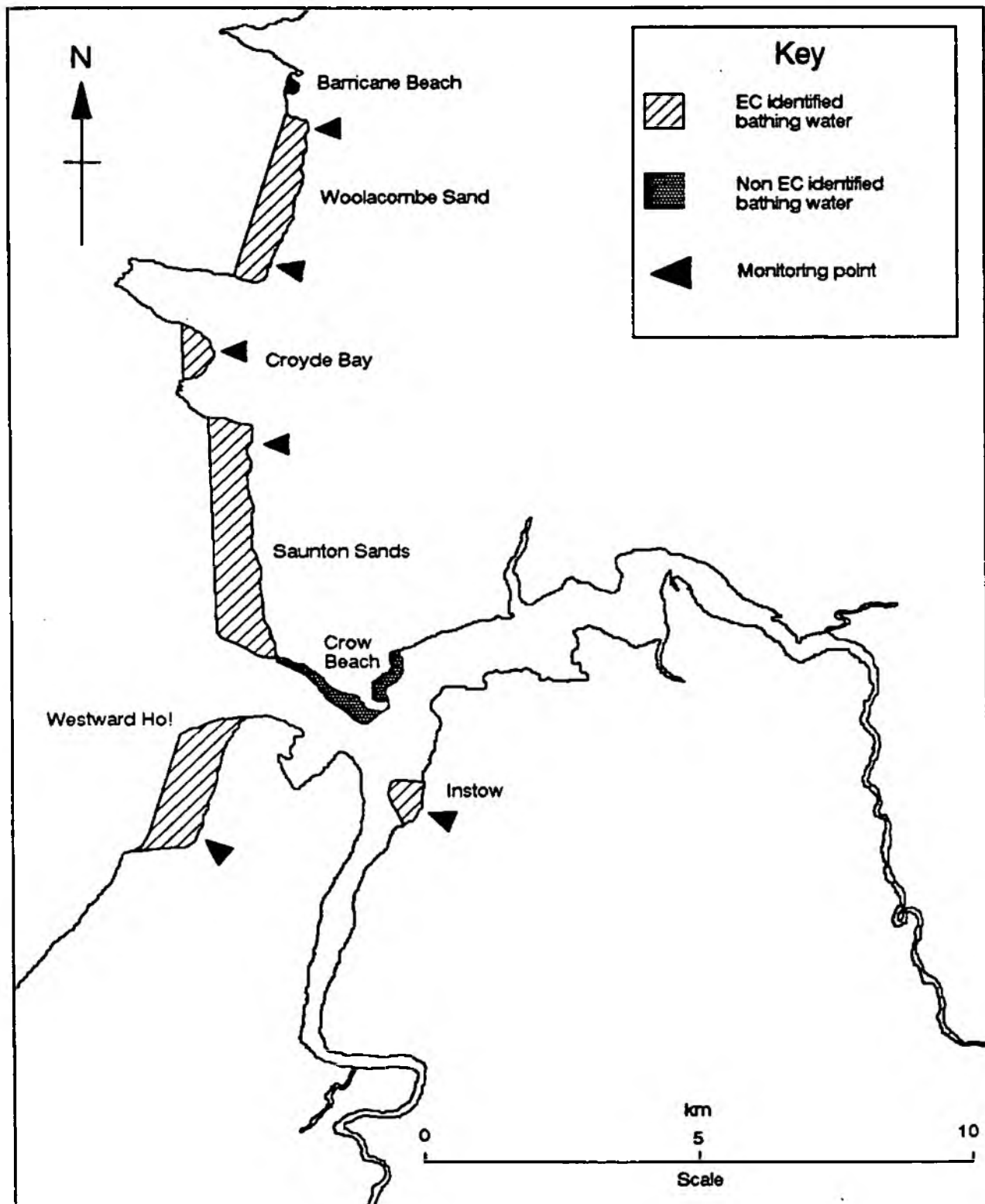
Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

Fisheries:

A healthy fish population enhancing the public's enjoyment of informal recreational activities close to the estuary.

The Taw-Torridge Estuary

BATHING



3.2 BATHING - TAW/TORRIDGE ESTUARY

3.2.1 General

This use relates specifically to swimming which may involve total or partial immersion in the water and, as such is judged to have particular requirements. It applies to all areas with access to bathing waters.

3.2.2 Local Perspective

Within the estuary limits, beaches at Instow, Westward Ho! and Saunton Sands lead on to bathing waters, identified by the European Community (EC) and where significant numbers of people are likely to swim.

Instow has become less popular for swimming as the water quality (in particular the aesthetic quality) has declined over recent years.

Crow Beach (adjacent to Saunton Sands) is very popular with local people during the summer.

To the north, Woolacombe Sand and Barricane Beach are also very popular with tourists.

3.2.3 Environmental Objectives

To maintain and, where appropriate, improve water quality so as to protect those engaged in bathing.

3.2.4 Environmental Requirements

Water Quality:

Water Quality Suite 1 : Aesthetic Criteria.

(see Appendix 8.1.1)

Water Quality Suite 4 : Bathing Water Criteria.

(see Appendix 8.1.4)

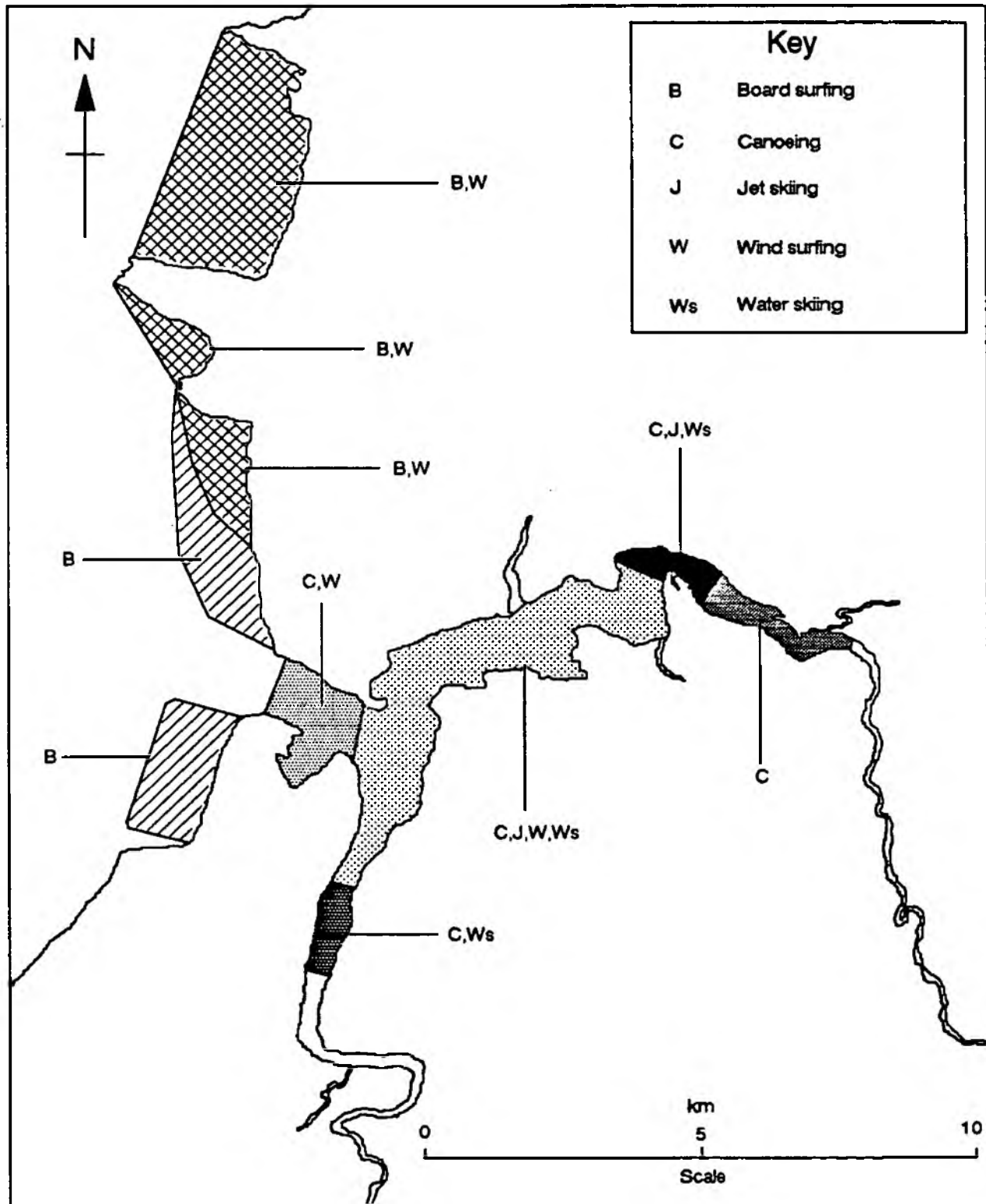
No sewage discharges direct to bathing areas.

Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

The Taw-Torrige Estuary

OTHER IMMERSION SPORTS



3.3 OTHER IMMERSION SPORTS - TAW/TORRIDGE ESTUARY

3.3.1 General

This use deals with those sports such as windsurfing, canoeing and waterskiing, where there is a risk of intimate contact with the water. It excludes bathing which has been dealt with separately.

3.3.2 Local Perspective

The whole of the estuarine area (except where tidal currents become too severe at the mouth of the conjoined estuary) is popular for immersion or water contact sports. Woolacombe Sand and Croyde Bay to the north and Westward Ho! to the south of the estuary are also popular as surfing and wind surfing beaches.

When weather conditions permit, these activities continue on a year round basis.

3.3.3 Environmental Objectives

To maintain and, where appropriate, improve water quality so as to protect those engaged in water contact related recreation.

3.3.4 Environmental Requirements

Water Quality:

No crude sewage discharges.

Minimum of 100 fold initial dilution for major discharges of settled sewage to offshore waters.

Minimum of 50 fold initial dilution for discharges of biologically treated sewage.

Water Quality Suite 4 : Bathing Water Criteria (see Appendix 8.1.4), to be applied at the shoreline. (NB These standards may be applied throughout water contact sport areas in future years.)

Water Resources:

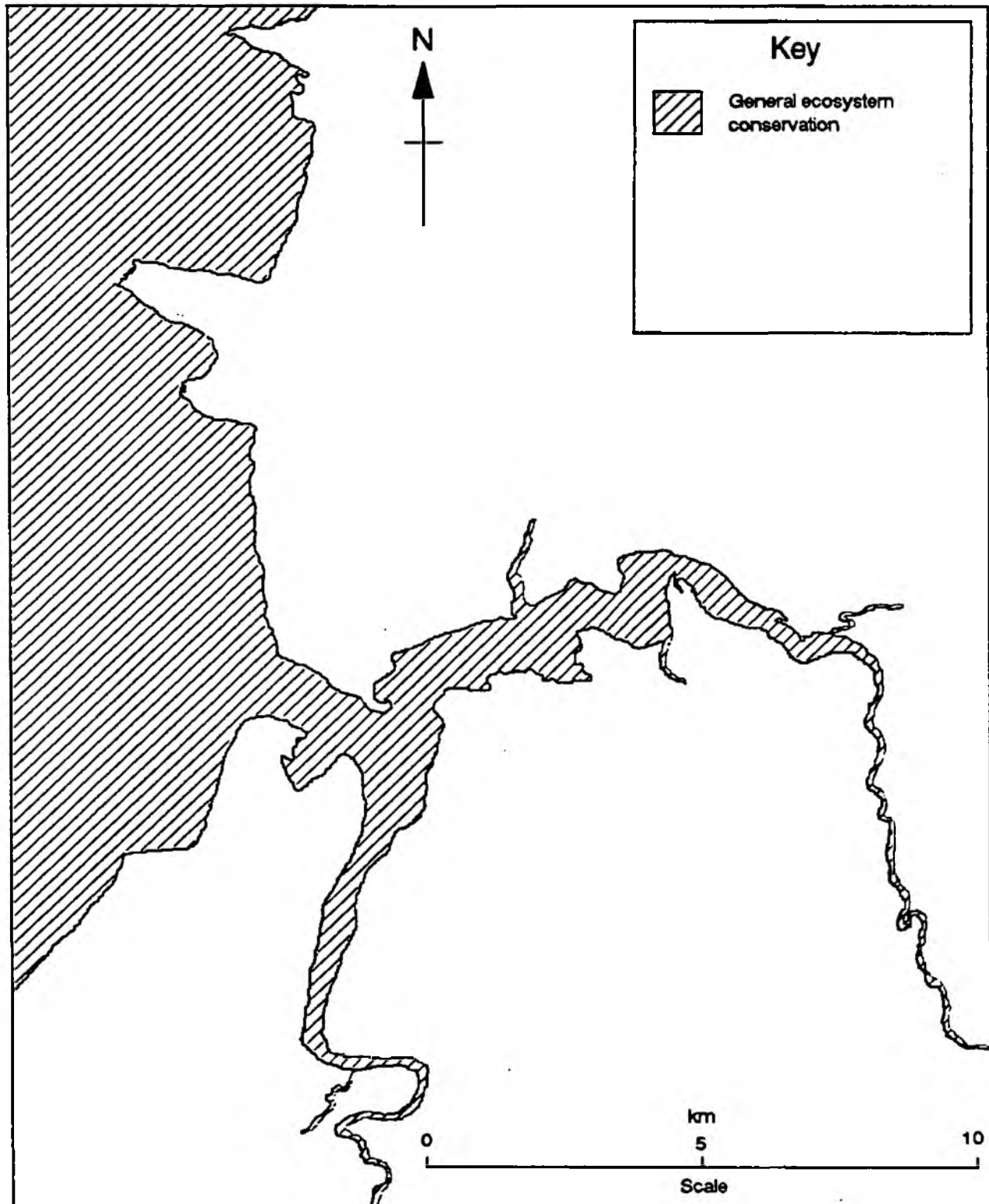
Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

Estuarine Features:

Safe and easy access to and from the water for people and equipment.

The Taw-Torrige Estuary

GENERAL ECOSYSTEM CONSERVATION



3.4 GENERAL ECOSYSTEM CONSERVATION - TAW/TORRIDGE ESTUARY

3.4.1 General

This use relates to the protection of all aquatic flora and fauna, along with dependent organisms in the whole of the estuarine catchment and neighbouring coastal waters.

3.4.2 Local Perspective

The Taw-Torridge estuary is of major importance as a conservation area. It offers a wide variety of habitats for plants and animals. The extensive sand and mudflats within the estuary are of international importance as feeding ground resting areas for wintering and migrating birds. Fish use the estuary as a spawning and nursery area, as a rich feeding ground and as a migratory route to and from the Rivers Taw and Torridge.

3.4.3 Environmental Objectives

To maintain and, where appropriate, improve the water quality, water resources and water related topography so as to protect all aquatic life and dependent organisms.

3.4.4 Environmental Requirements

To identify the distribution and abundance of particular habitats and species.

Water Quality:

Water Quality Suite 2 : List I Substances (Tidal Waters).
(see Appendix 8.1.2)

Water Quality Suite 3 : List II Substances (Tidal Waters).
(see Appendix 8.1.3)

Pollution Control:

To prevent pollution from industry, agriculture and the public by advice, persuasion and prosecution of offenders.

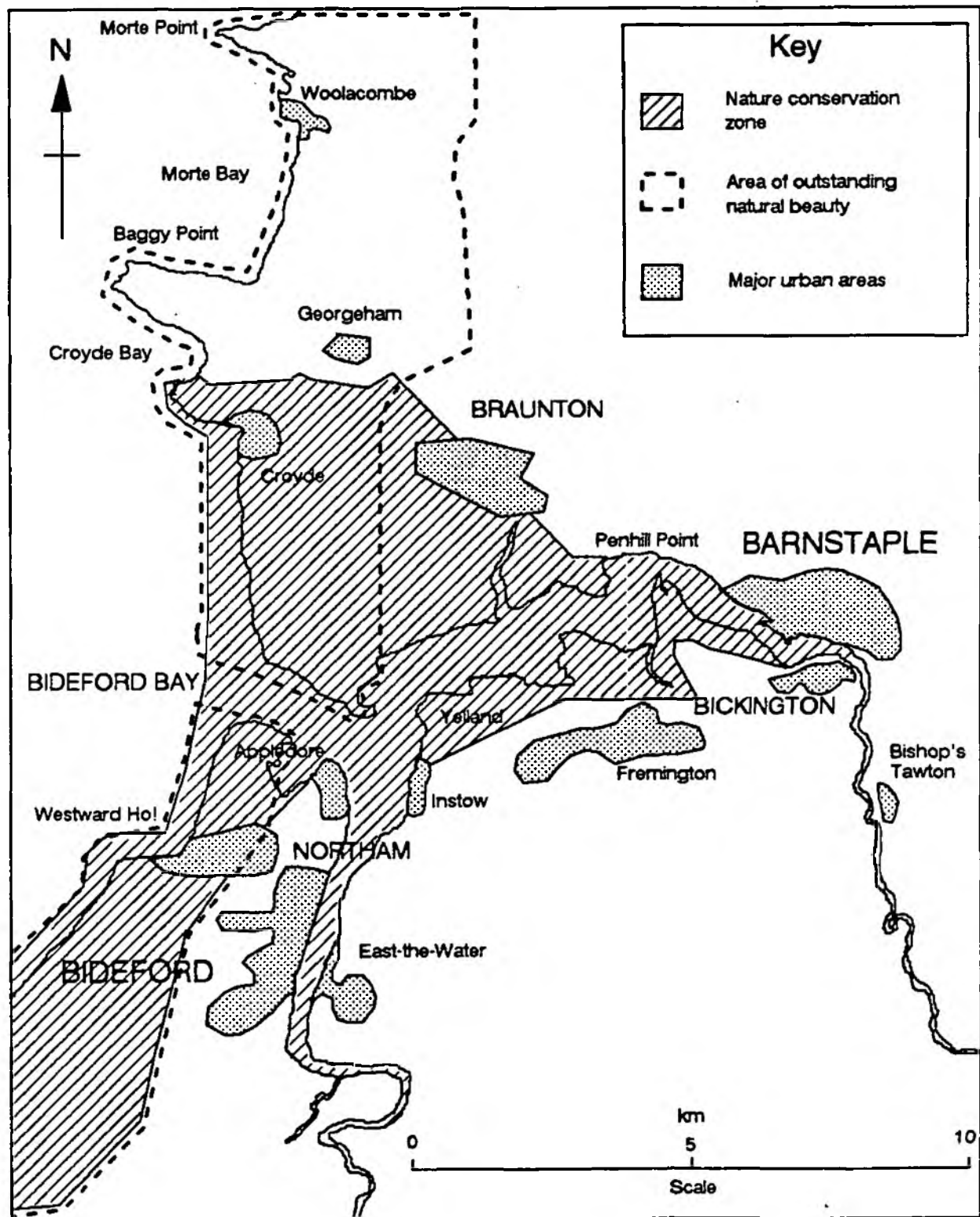
Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

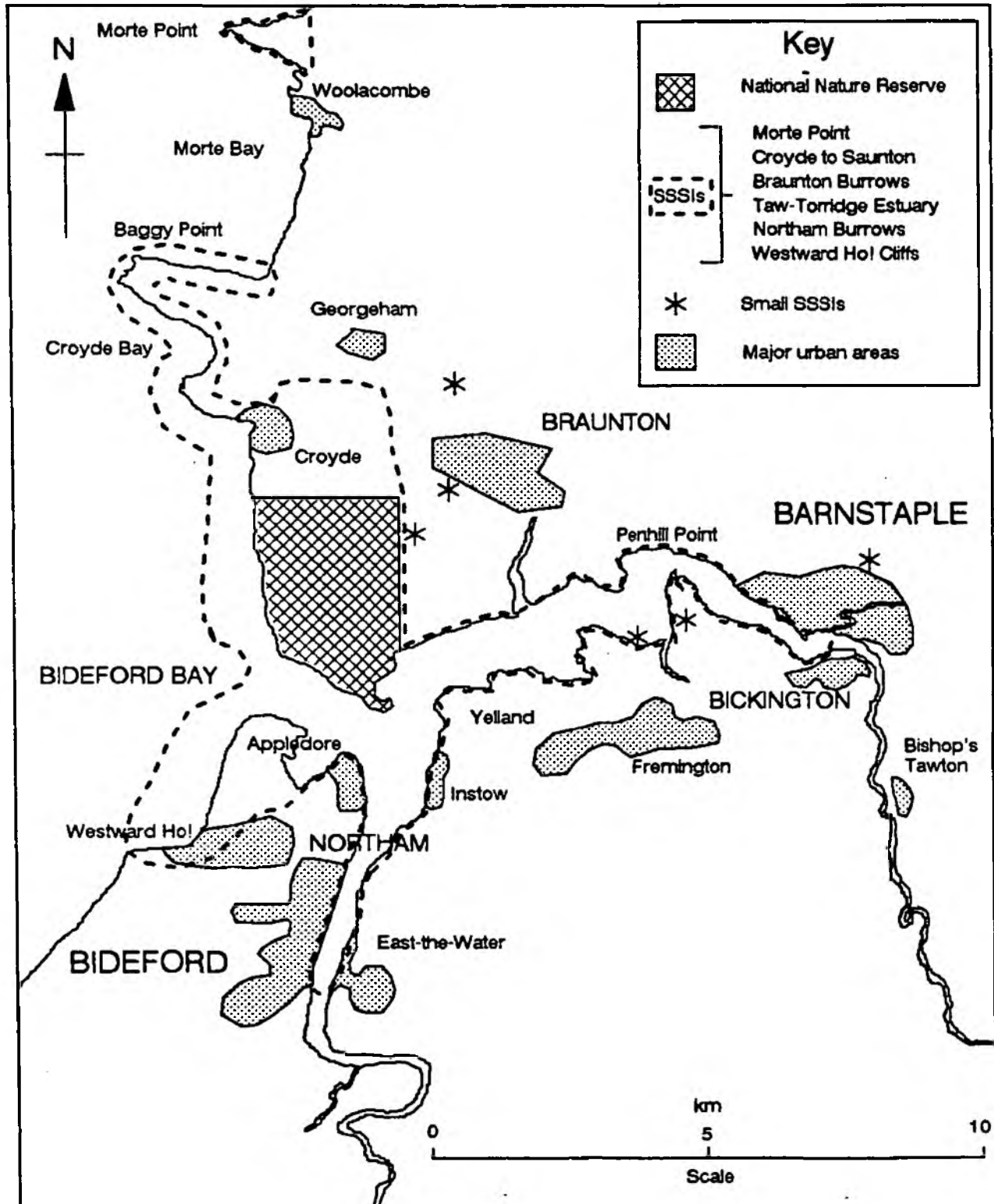
Fisheries:

To maintain habitat diversity and quality in order to support satisfactory fish communities.

The Taw-Torridge Estuary SPECIAL CONSERVATION AREAS - MAP 1



The Taw-Torridge Estuary SPECIAL CONSERVATION AREAS - MAP 2



3.5 SPECIAL CONSERVATION AREAS - TAW/TORRIDGE ESTUARY

3.5.1 General

This use relates to the protection of those areas that have been formally designated as being of particularly high conservation value. Such areas include National and Local Nature Reserves and all Sites of Special Scientific Interest (SSSI). It is acknowledged, however, that the lack of a specific designation does not remove the responsibility to consider its value.

3.5.2 Local Perspective

As with much of the South West region the Taw-Torridge estuary contains many features of worth in terms of its landscape, wildlife and archaeological heritage. The Rivers Taw and Torridge enter the estuary, where SSSI status exists, and discharge to the sea between coastal dune systems, one of which is designated as a World Biospheric Site. The conservation value of the estuary is of regional, national and international significance.

3.5.3 Environmental Objectives

To maintain and enhance where appropriate, water quality, water resources, fisheries and estuarine features so as to safeguard the identified special conservation interests.

3.5.4 Environmental Requirements

To identify the particular needs of the designated areas.

Water Quality:

Water Quality Suite 1 : Aesthetic Criteria (see Appendix 8.1.1)

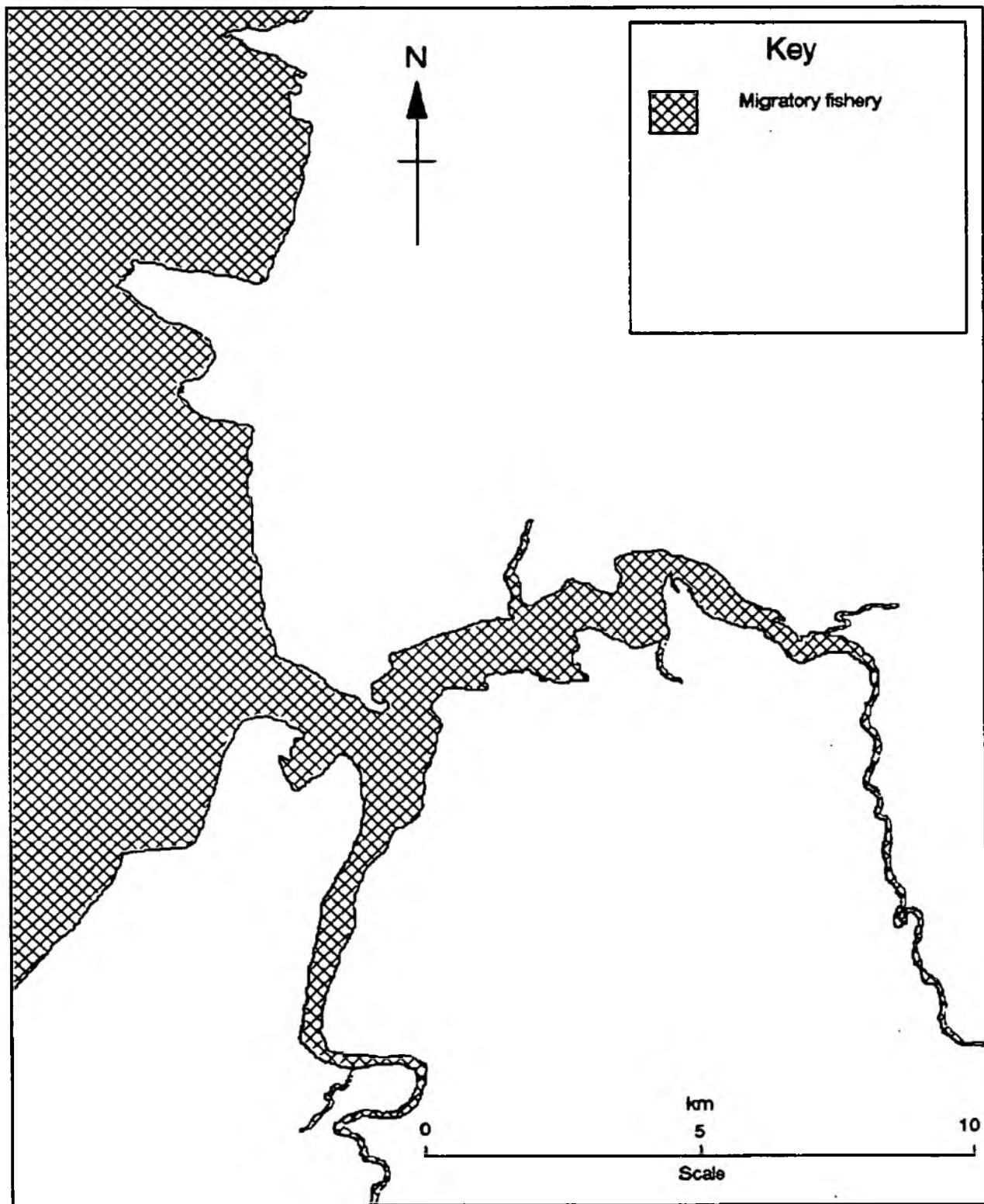
Water Resources:

To limit or regulate licensable abstractions so that conservation interests are not harmed by reduced flows in watercourses, or reduced groundwater levels.

Fisheries:

Management of the fishery within special conservation areas needs to be undertaken in conjunction with the controlling body for the reserve.

The Taw-Torridge Estuary MIGRATORY FISHERY



3.6 MIGRATORY FISHERY - TAW/TORRIDGE ESTUARY

3.6.1 General

This use relates specifically to the maintenance of water quality in the estuary to ensure successful migration of populations of salmonid species and eels both to and from the freshwater environment. The wider community of organisms, including the salmonids' food organisms, are already covered under the use : General Ecosystem Conservation.

3.6.2 Local Perspective

The largest run of salmon and sea trout occurs in the Taw-Torridge estuary from May to September, especially during periods of spates and spring tides, although fish are present in the estuary all year round. They have a tendency to remain in the estuary during periods of low river flow.

Young eels spend their first year in the estuary and move into the rivers during March and August of their second year, although many may remain to grow to maturity in the estuary. Migration appears to be dependent on water temperature. They will then spend several years in the river, feeding and growing, before migrating back to the sea to spawn.

3.6.3 Environmental Objectives

To maintain and, where appropriate, improve water quality and water resources so as to protect the passage to and from freshwater of salmon, sea trout and eels.

3.6.4 Environmental Requirements

Water Quality:

Water Quality Suite 2 : List I Substances (Tidal Waters).
(see Appendix 8.1.2)

Water Quality Suite 3 : List II Substances (Tidal Waters).
(see Appendix 8.1.3)

Ammonia (un-ionised) : <0.021 mg N/l (Annual Average).

Dissolved Oxygen : >5 mg/l (95 percentile).

Water Resources:

To limit or regulate licensable abstractions so that detrimental impacts are not caused to the migratory passage of salmon, sea trout and eels.

To regulate impoundments to ensure fish passes are installed which meet MAFF specifications.

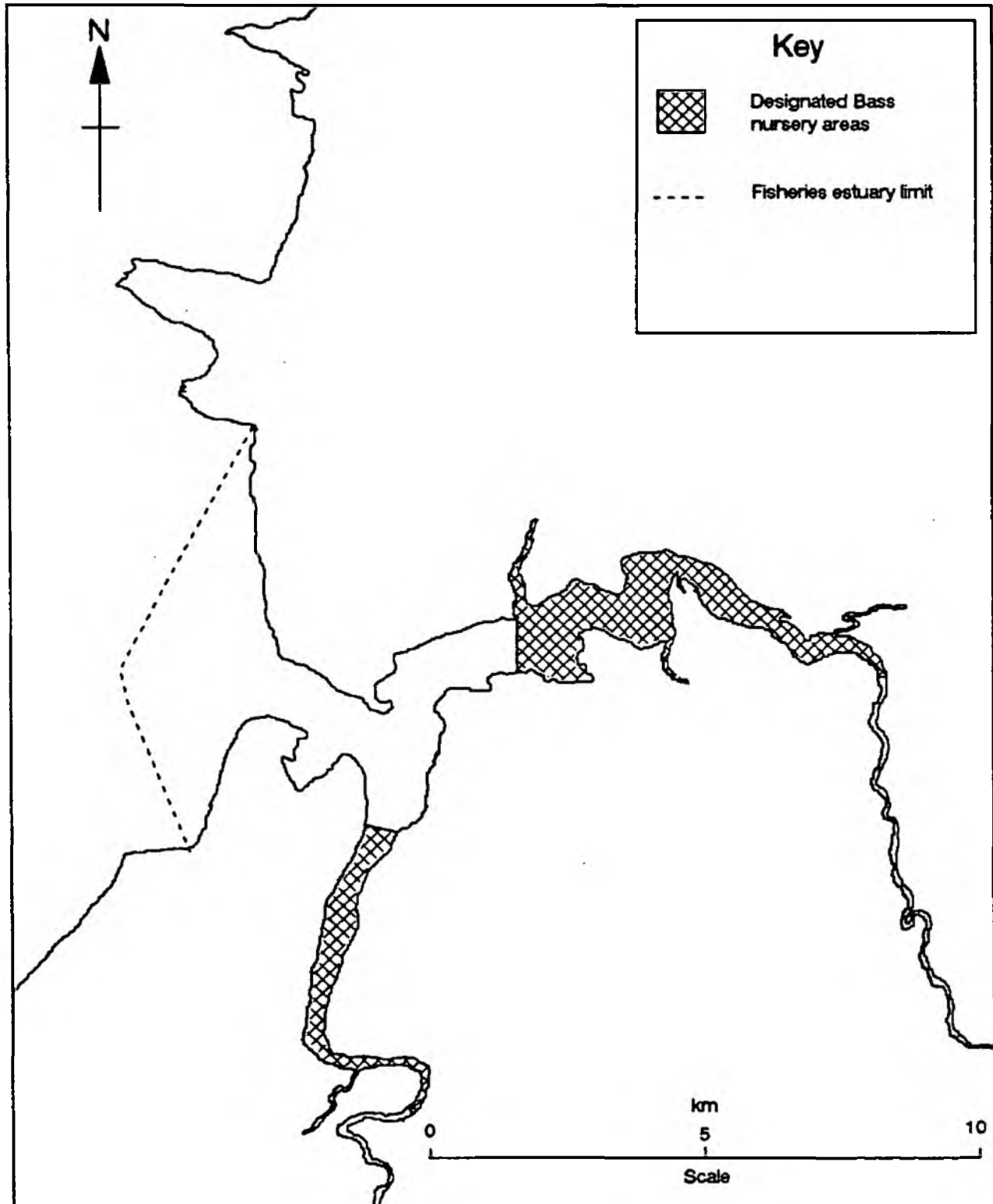
Fisheries:

To maintain habitat diversity and quality in order to support satisfactory fish communities.

Estuarine Features:

No physical barrier should prevent the passage of migratory fish.

The Taw-Torridge Estuary SEA FISHERIES



3.7.1 General

This use relates to the maintenance of satisfactory populations of shellfish and fin fish and to the conditions necessary for their continued survival and exploitation in the joint estuary of the Taw and Torridge. The Authority, uniquely in Devon, is responsible for sea fisheries regulation in the Taw and Torridge estuaries.

3.7.2 Local Perspective

The Taw and Torridge estuaries and the joint estuary provide important nursery areas especially for bass and mullet and, to a lesser extent, herring. Flounder, plaice, brill, sole, cod and whiting all use the estuary as a feeding ground.

The bass and mullet fishery is exploited by small numbers of fishermen using drift or seine nets. Longliners in the outer parts of the estuaries take mostly cod and whiting and some flatfish.

A number of bass conservation measures were introduced by MAFF in January 1990. The minimum landing size was raised from 32 to 36cm and nets with mesh sizes between 65 and 89mm may not be used by British fishing vessels. The recent designation of nursery areas within the estuaries will protect young bass by the prohibition of detrimental fishing methods in certain months of the year.

Small scale commercial collections of mussels are made in the Taw and Torridge estuaries. Oysters and cockles are similarly exploited on a small scale and there is limited public collection of mussels and cockles.

3.7.3 Environmental Objectives

To maintain and, where appropriate, improve water quality, water resources and catchment features so as to sustain natural populations of fin fish and shellfish appropriate to an estuary in such a geographical location. It is also necessary to maintain environmental quality so as to support artificial rearing of shellfish in the estuary.

3.7.4 Environmental Requirements

Water Quality:

These are covered under General Ecosystem Conservation, Commerical Harvesting of Fish and Commerical Harvesting of Shellfish.

Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

Fisheries:

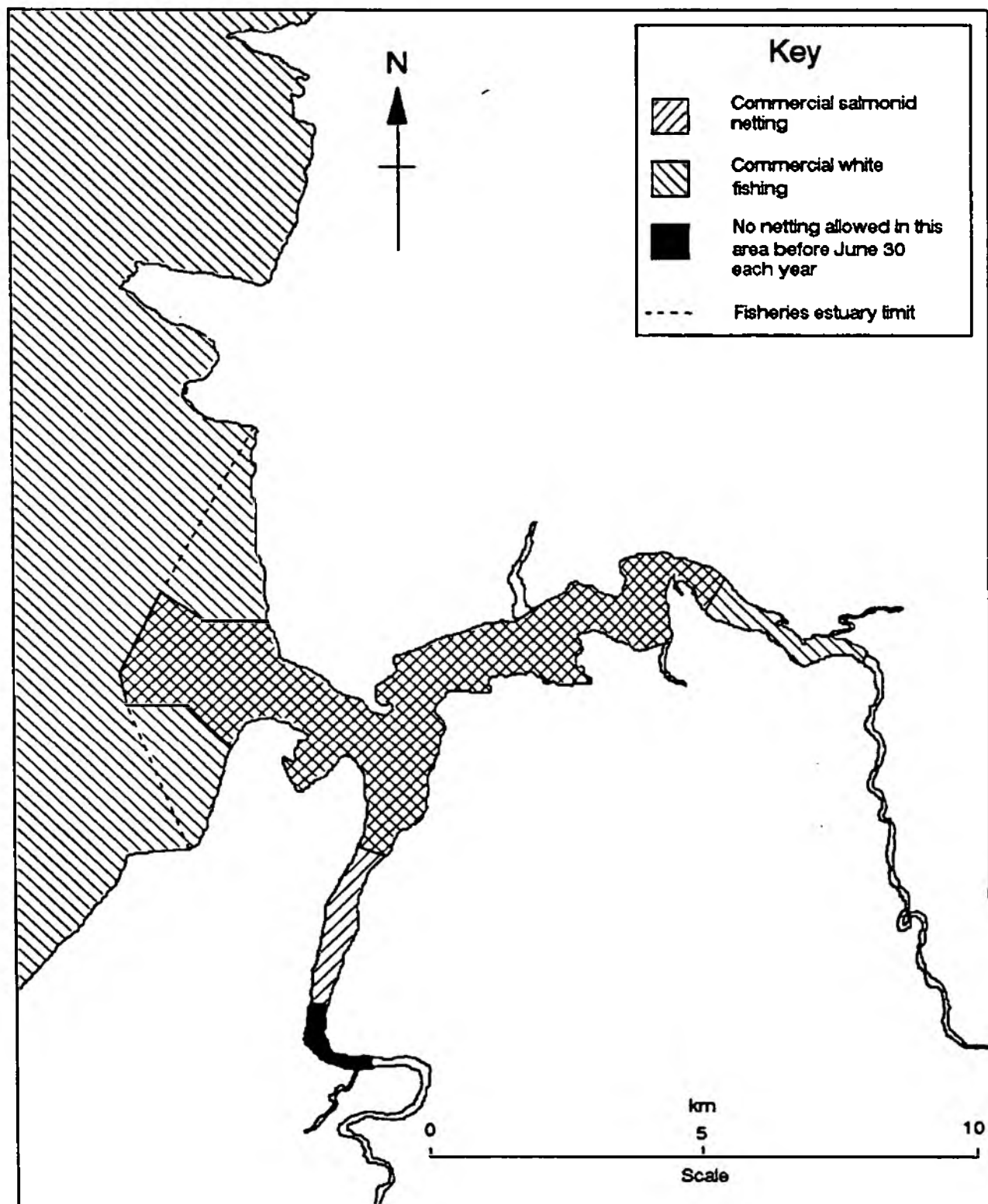
To maintain habitat diversity and quality in order to support satisfactory fish communities.

Estuarine Features:

Spawning and nursery areas should be sufficient to maintain the fishery.

The Taw-Torrige Estuary

COMMERCIAL HARVESTING OF FISH



3.8 COMMERCIAL HARVESTING OF FISH - TAW/TORRIDGE ESTUARY

3.8.1 General

This use relates specifically to the maintenance of commercial marine fish populations within the estuary and immediate offshore waters, ensuring they are fit for processing and/or marketing prior to human consumption. The wider community of organisms, including those species essential to feed the fishery, are already covered under the use : General Ecosystem Conservation.

3.8.2 Local Perspective

The Taw-Torridge estuary is important as a spawning and nursery area and as a rich feeding ground for different species of fish. Bass and mullet are known to use the estuary both as a nursery area and for feeding. They will be found in the estuary in large numbers especially during the summer months. Adult flatfish also feed here throughout most of the year. For example, adult flounders will migrate into the mudflats at low water to feed on the invertebrate fauna. Mature flatfish leave the estuary in February to spawn in the open sea and return during the summer.

3.8.3 Environmental Objectives

To maintain and, where appropriate, improve water quality such that commercial marine fish shall be acceptable for processing and/or marketing prior to human consumption.

3.8.4 Environmental Requirements

Water Quality:

Water Quality Suite 2 : List I Substances (Tidal Waters).
(see Appendix 8.1.2)

Water Quality Suite 3 : List II Substances (Tidal Waters).
(see Appendix 8.1.3)

Water Resources:

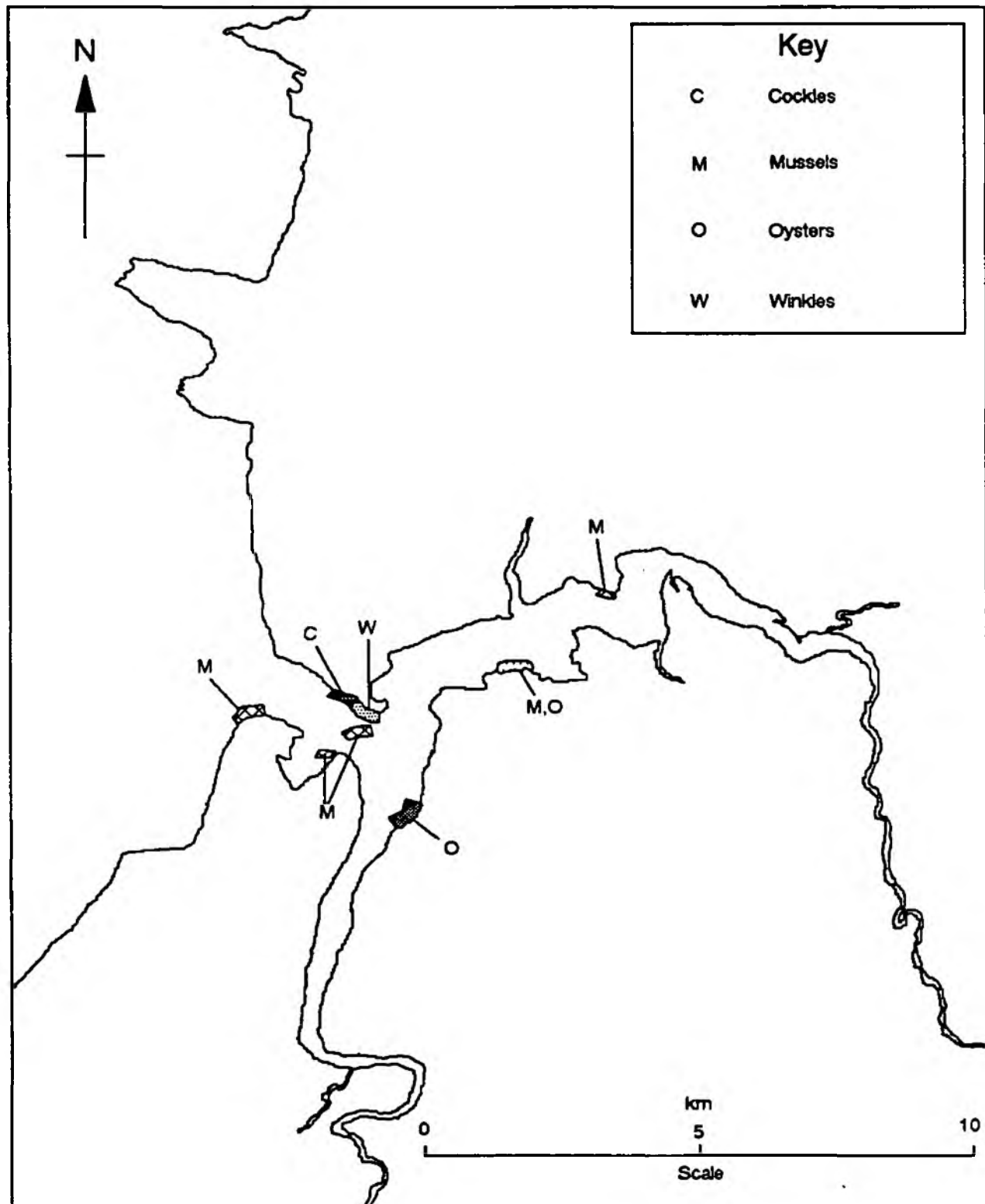
Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

Fisheries:

Adequate fish stocks are required to sustain the fishery.

The Taw-Torridge Estuary

COMMERCIAL HARVESTING OF SHELLFISH



3.9 COMMERCIAL HARVESTING OF SHELLFISH - TAW/TORRIDGE ESTUARY

3.9.1 General

This use relates specifically to the maintenance of shellfish species within the estuary, ensuring they are fit for processing and/or marketing prior to human consumption.

3.9.2 Local Perspective

Small commercial collections of mussels are made in the Torridge estuary. They are also collected for local consumption in the combined section of the estuary although this is limited due to the need to cleanse the mussels before consumption.

Oysters and cockles are also collected locally and commercially on a small scale. Winkles are picked for local consumption only.

3.9.3 Environmental Objectives

To maintain and, where appropriate, improve water quality such that commercial shellfish shall be acceptable for human consumption.

3.9.4 Environmental Requirements

Water Quality:

Water Quality Suite 5 : Shellfish Flesh Criteria.

(see Appendix 8.1.5)

Water Quality Suite 6: Shellfish Water Criteria (Tidal Waters)

(see Appendix 8.1.6)

No crude sewage discharges.

Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

Fisheries:

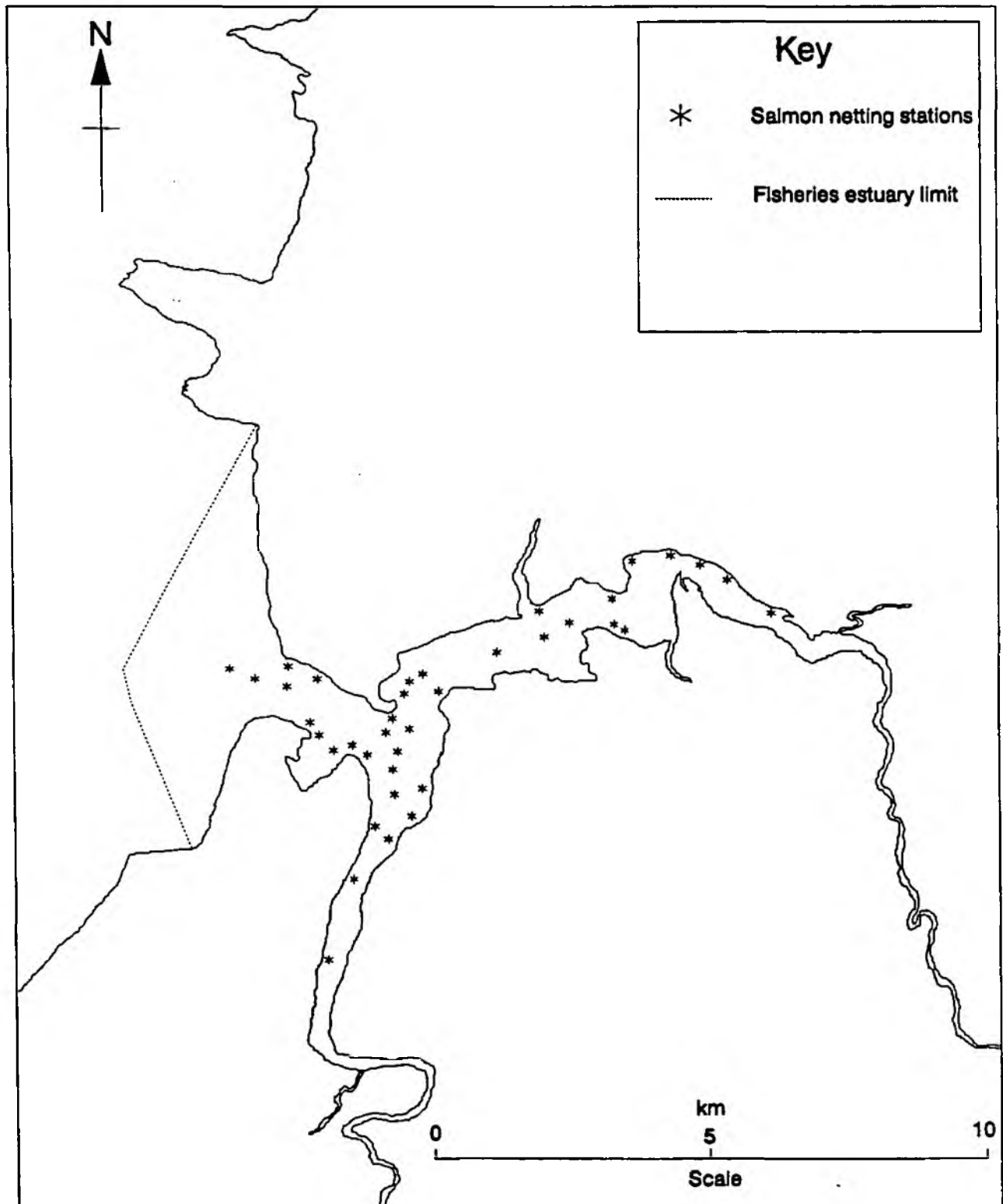
Adequate stocks of shellfish are required.

Estuarine Features:

Maintenance of areas of suitable substrate is necessary for a productive fishery.

The Taw-Torrige Estuary

NETTING OF FISH



3.10 NETTING OF FISH - TAW/TORRIDGE ESTUARY

3.10.1 General

This use relates to the maintenance of estuarine conditions to allow exploitation of the salmonid fishery by commercial fishermen. The fish and other organisms are protected under the uses: General Ecosystem Conservation and Salmonid Fishery.

3.10.2 Local Perspective

The net fishery for salmon and sea trout in the joint estuary is currently suspended by agreement and the 14 licensed netsmen are being compensated as part of the rehabilitation measures. The long term annual average catch is 2529 salmon and 3954 sea trout.

3.10.3 Environmental Objectives

To maintain and, where appropriate, improve water quality, water resources, fisheries and estuarine features so as to provide suitable conditions for successful netting.

3.10.4 Environmental Requirements

Water Quality:

These are listed under General Ecosystem Conservation and Migratory Fishery.

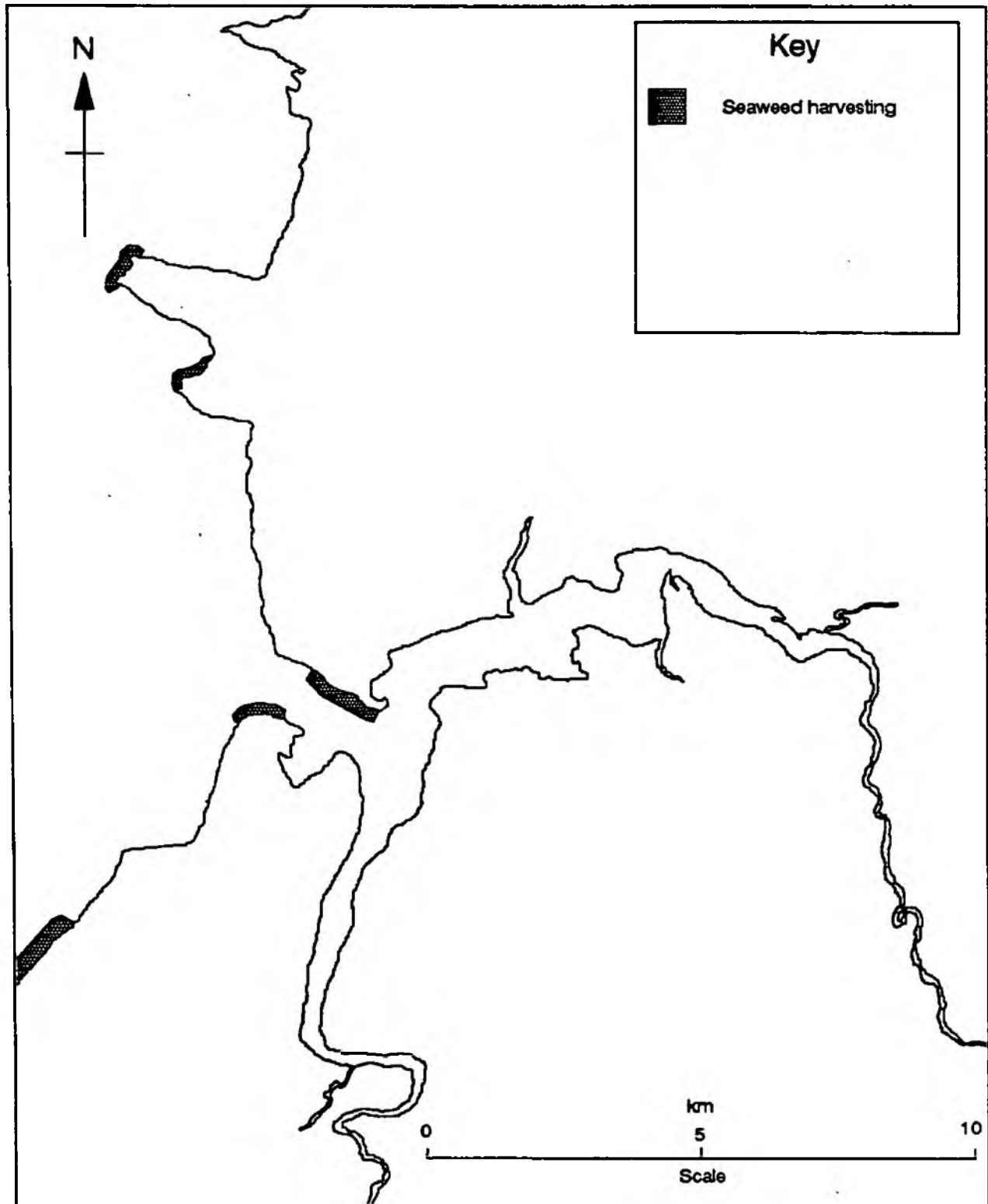
Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

Fisheries:

Adequate fish stocks are required to sustain the fishery.

The Taw-Torr ridge Estuary SEAWEED HARVESTING



3.11 SEAWEED HARVESTING - TAW/TORRIDGE ESTUARY

3.11.1 General

The objective is to maintain water quality such that edible species of seaweed may be harvested from specific parts of the estuary and be fit for human consumption.

3.11.2 Local Perspective

The seaweed is harvested from sites within and outside the estuary limit. It is sold as laver bread at the Barnstaple market for local consumption.

3.11.3 Environmental Objectives

To ensure water quality is sufficient to maintain beds of edible seaweed.

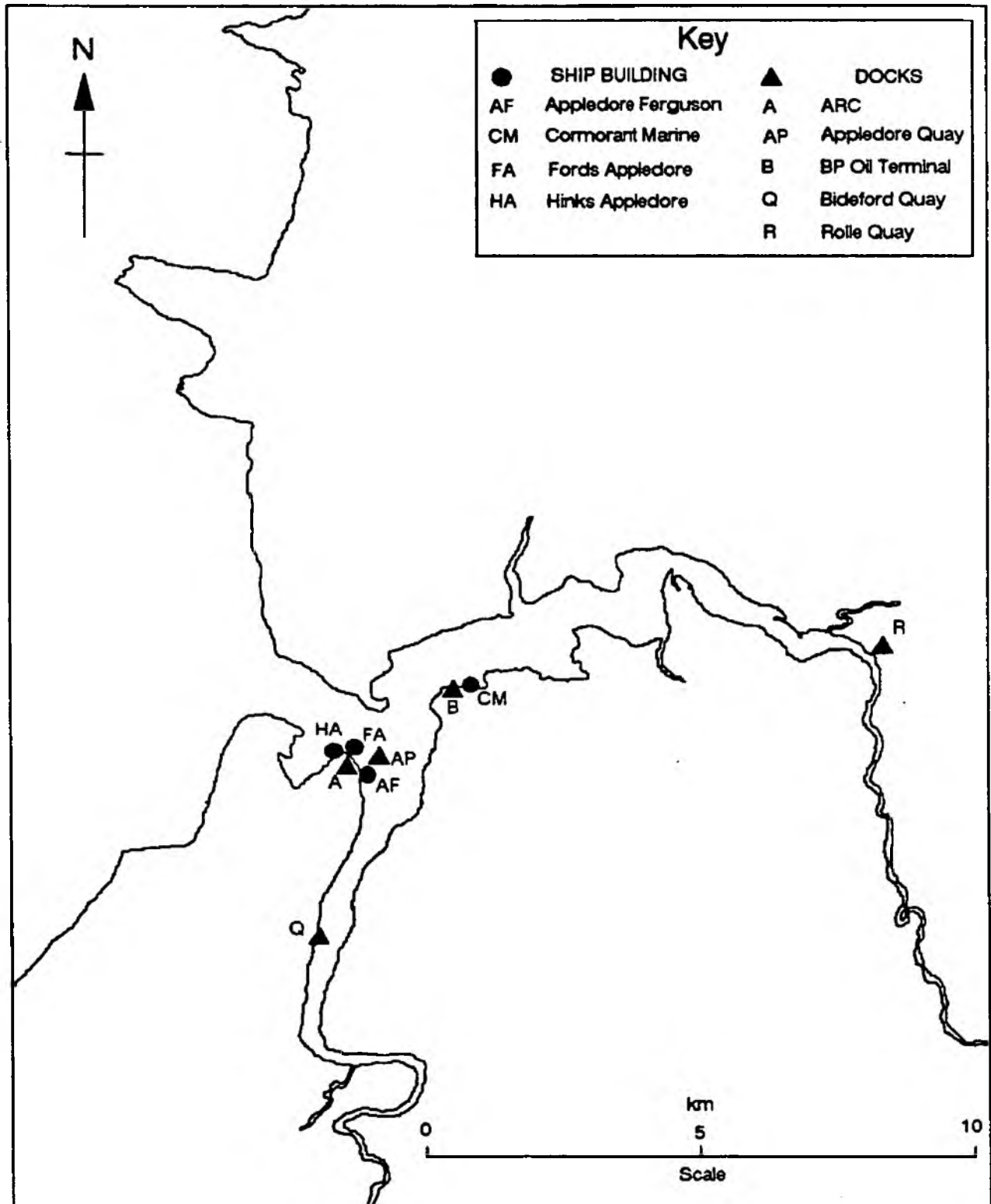
3.11.4 Environmental Requirements

Water Quality:

No standards are currently available.

The Taw-Torrige Estuary

SHIP BUILDING AND MAINTENANCE



3.12 SHIP BUILDING AND MAINTENANCE - TAW/TORRIDGE ESTUARY

3.12.1 General

This use relates to the promotion of a successful shipping industry in the estuary whilst ensuring that the activities of the local ship builders' yards and docks do not cause unacceptable impacts on water quality and aquatic organisms.

3.12.2 Local Perspective

There has been a decline in the magnitude of the shipbuilding industry within the Taw-Torridge estuary in recent years although a number of yards still function on a reduced scale.

Rolle Quay at Barnstaple is a loading/unloading point for sand. Ball Clay is transported to and from Bideford Quay. ARC, who also transport dredged material, are based at Appledore. The local fishing fleet operates from Appledore and Bideford Quays. Bideford Quay is also a ferry terminal for Lundy Island.

Dredging to maintain navigation channels may have an adverse effect on the local ecology and shellfishery interests. Dredging operations are controlled by the appropriate harbour authority, whilst the disposal of dredge spoil is licensed by MAFF under the Food and Environmental Protection Act 1985.

3.12.3 Environmental Objectives

To support the needs of the shipping industry whilst maintaining water quality to such a condition that :

- (i) it supports a variety of aquatic life and dependent organisms;
- (ii) fish and shellfish are protected;
- (iii) it supports a benthic fauna essential to sustain the marine fishery;
- (iv) public nuisance arising from visual and smell problems is prevented.

3.12.4 Environmental Requirements

Water Quality:

These are listed under General Ecosystem Conservation and Basic Amenities.

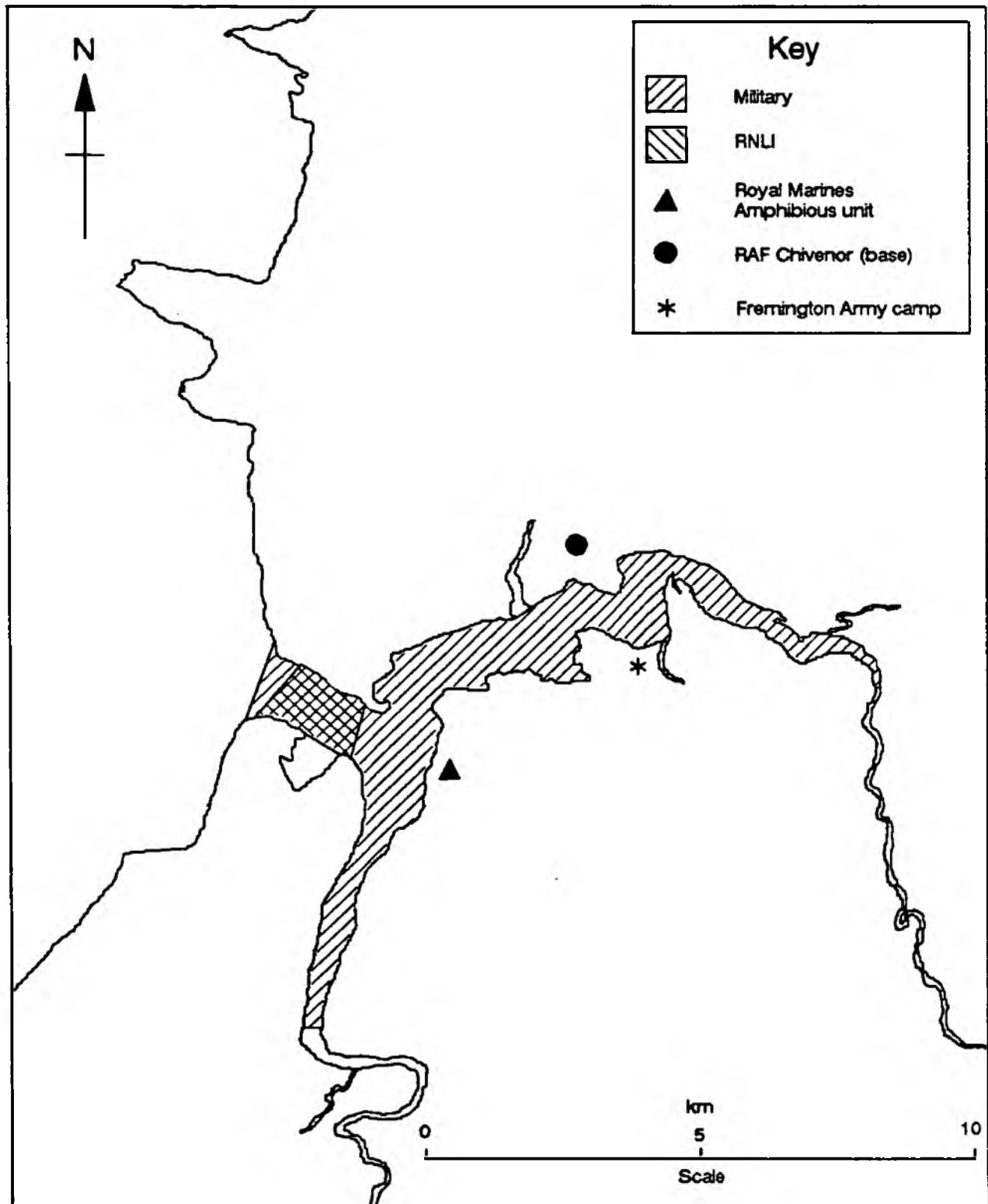
Pollution Control:

Discharges must comply with relevant consents and ship-building and maintenance activities must not lead to pollution of the estuary.

Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

The Taw-Torridge Estuary EMERGENCY SERVICES



3.13 EMERGENCY SERVICES - TAW/TORRIDGE ESTUARY

3.13.1 General

This use relates to the maintenance of the estuary by ensuring that the activities of the 'emergency services' do not cause unacceptable deterioration in estuarine water quality.

3.13.2 Local Perspective

The estuary is used extensively for training purposes by the Royal Air Force (RAF) from their base at Chivenor, the army based at Fremington and the Royal National Lifeboat Institution (RNLI). The Royal Marines have an amphibious training unit at Instow.

3.13.3 Environmental Objectives

To protect water quality so as to prevent public nuisance arising from visual and smell problems.

3.13.4 Environmental Requirements

Water Quality:

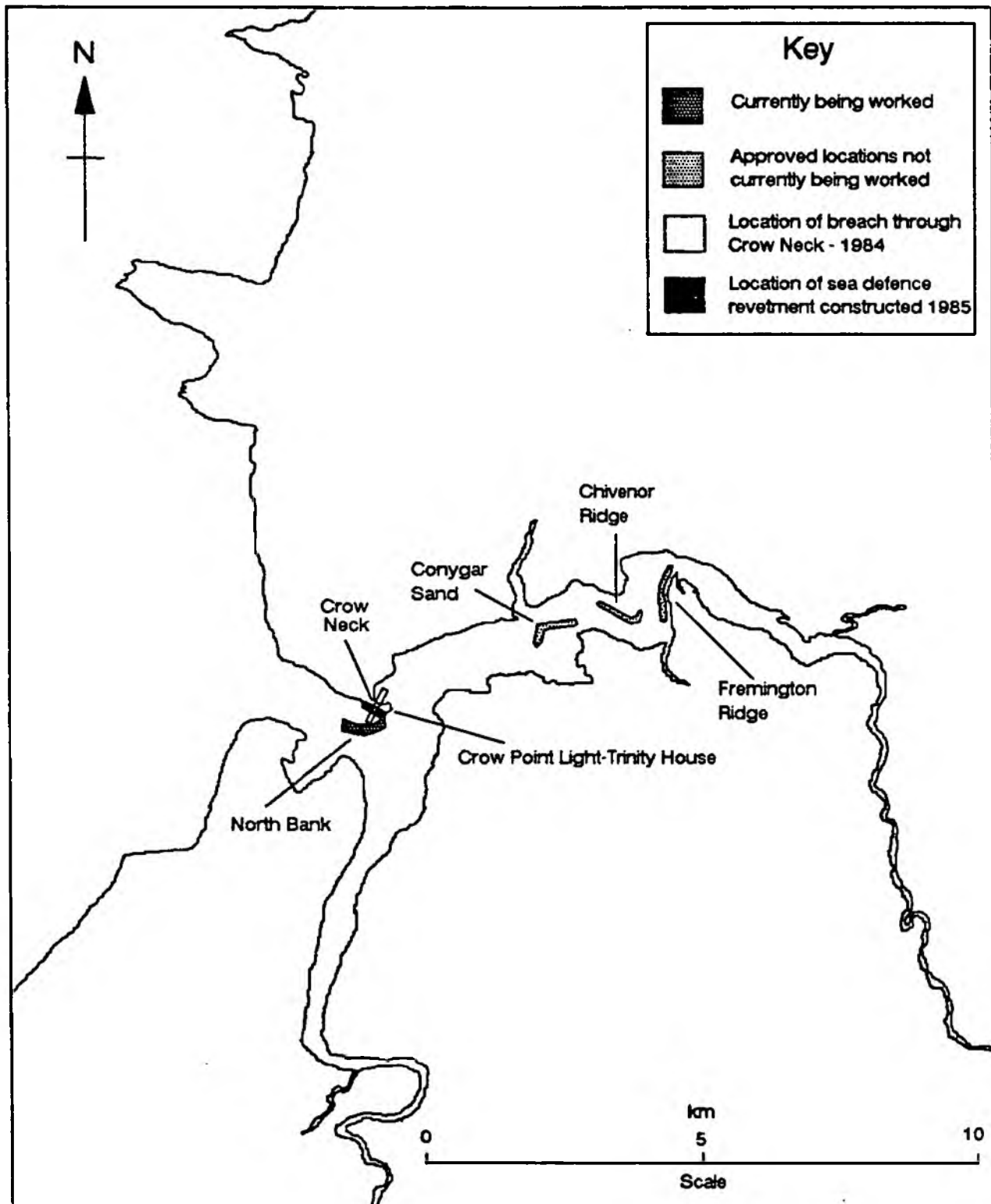
These are listed under Basic Amenity.

Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

The Taw-Torrige Estuary

SAND AND GRAVEL EXTRACTION



3.14 EXTRACTION OF SAND AND GRAVEL - TAW/TORRIDGE ESTUARY

3.14.1 General

Sand and gravel extraction in the Taw-Torridge estuary is controlled by Devon County Council (DCC) as the Mineral Planning Authority under the Town and Country Planning (Minerals) Act 1981.

Planning permissions exist for extraction at four locations within the estuary. Only one of these, at Crow Point, is currently worked. If fully exploited these permissions would permit the extraction of up to 30,000 tons per year.

The planning permission for extraction at Crow Point permits 15,000 tons to be dredged every year for 15 years. This was granted in October 1982 following a public inquiry in 1981 against DCC's refusal to renew the permission. DCC's position was supported at the public inquiry by the Nature Conservancy Council (NCC) on environmental grounds and by South West Water Authority (SWWA) on flood defence grounds.

Braunton Parish Council receives a royalty on the tonnage extracted at Crow Point.

3.14.2 Local Perspective

Sand and gravel extraction may have an undesirable effect on the fluvial or coastal regime. Lowered foreshore or bed levels may undermine flood defences either directly or by altering the alignment of the river channel.

NCC monitoring of foreshore levels at Crow Neck, adjacent to Crow Point, since 1972 has demonstrated that the foreshore is receding. This record does not establish a causal relationship between the recession of Crow Neck and extraction at Crow Point. Crow Neck is a natural spit which limits wave action within the estuary and which may also limit tidal heights within the estuary. Crow Neck is therefore seen as a significant flood defence feature.

In November 1984 Crow Neck was breached by a storm. £70,000 was spent on a flood defence scheme to reinstate the breach. The cost of this work was supported by grant aid from MAFF and the balance, after grant, was shared between SWWA, North Devon District Council, Trinity House, Property Services Agency, BP Oil and the Central Electricity Generating Board.

Since 1984, there have been negotiations with DCC to revoke the planning permission, either through its terms or by Section 45 of the Town and Country Planning Act 1971. North Devon District Council also has a statutory locus for action through Section 18 of the Coast Protection Act 1949, and has been involved in the negotiations.

Flood defence policy is that sand and gravel extraction should be resisted from any location, such as Crow Point, known to be receding. Only locations known to be accreting can be supported as suitable sites for extraction from the flood defence perspective.

3.14.3 Environmental Objectives

To maintain or improve water quality to such a condition that:

- i) it supports a variety of aquatic life and dependent organisms;
- ii) fish and shellfish are protected;
- iii) it supports a benthic fauna essential to sustain the marine fishery;
- iv) public nuisance arising from visual and smell problems is prevented.

The flood defence objective is that sand and gravel extraction at Crow Point should be stopped as soon as practicable. Unfortunately Crow Point lies outside the main river boundary and the powers to achieve this objective therefore lie with other authorities.

3.14.4 Environmental Requirements

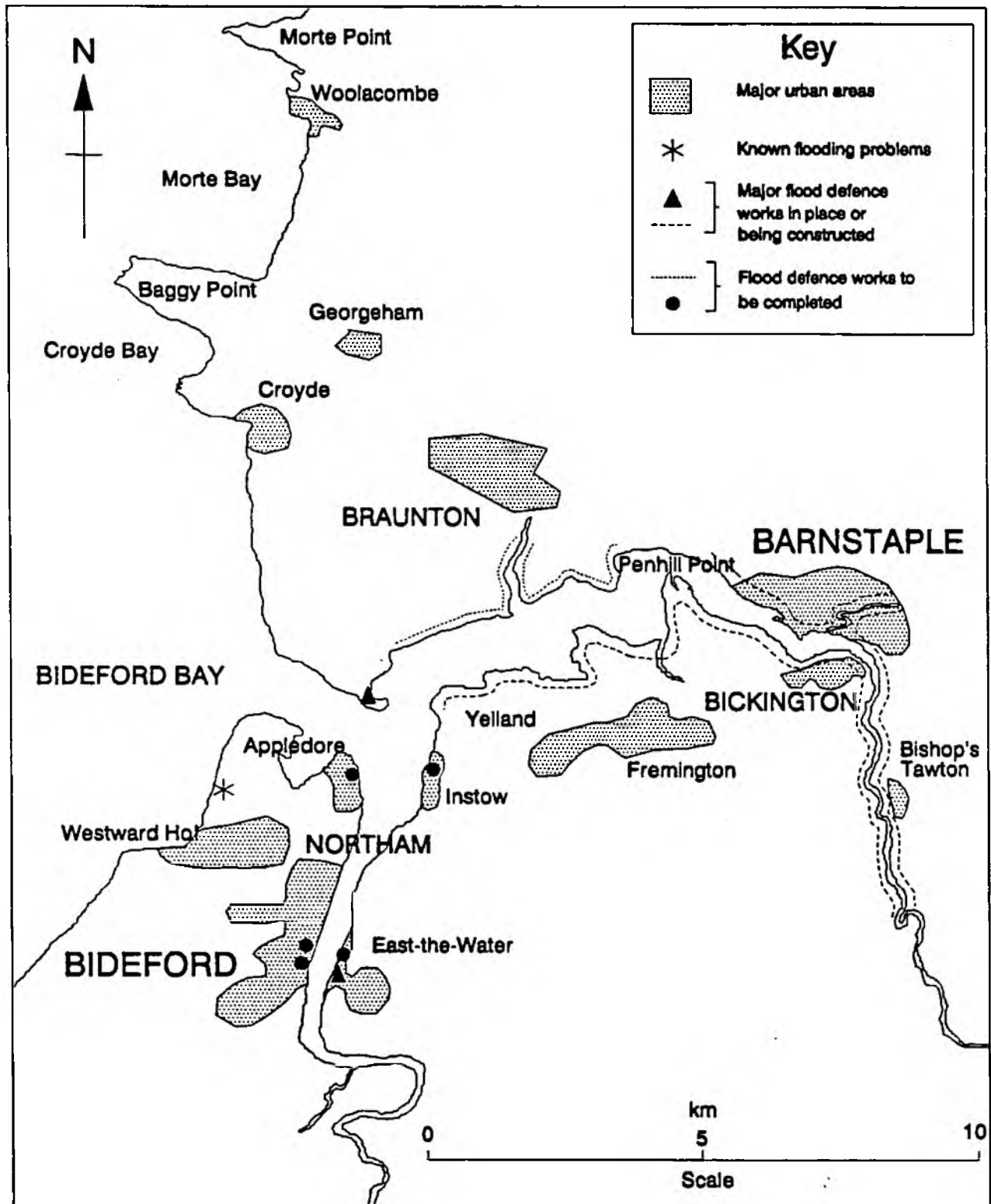
Water Quality:

These are listed under General Ecosystem Conservation and Basic Amenity.

Water Resources:

Abstraction must not reduce the watercourses flowing into the estuary below their Q95 flows.

The Taw-Torridge Estuary FLOOD DEFENCE SCHEMES/PROPOSALS



3.15.1 General

Flood defence management deals with the containment of water within the river channel, particularly at times of high flow, and with its controlled release to the wider flood plain, in order to relieve pressure at more sensitive locations such as towns. Flood flows are described in relation to their return period: the larger the flow, the longer the return period. In built-up areas, flood defences are commonly designed to withstand a flood with a return period of 100 years. Conversely, river defences in agricultural areas could be designed for breaching by, say, a five-year return flood.

For management purposes, only parts of the Taw-Torridge estuary are formally designated as "Main River". On the main river, formal consent is required for all proposals to interfere with the bed or banks of the river or obstruct the flow thereof. The NRA has powers to control actions of others within 7 m of the channel on both sides, and to carry out works on the river. The NRA has powers over all other watercourses where persons wish to culvert them, pipe them or erect dams or other obstructions to flow; again, formal consent is required.

The nature of the works carried out for flood defence means that, in the past, this use has come into some conflict with other river uses - notably conservation and fisheries. However, great progress has been made over the last ten years, in achieving hydraulic performance targets without significant impact to the aquatic habitat.

3.15.2 Local Perspective

There are a number of locations on the estuary at risk from tidal flooding. Widespread damage has been done on several recent occasions, in 1981, 1984, 1989 and 1990. Following the 1981 floods, a major scheme was carried out to protect Barnstaple and work has recently commenced on a comprehensive scheme to protect Bideford. Smaller schemes to protect Appledore and Instow are included in the NRA's 5 year capital programme.

Work has been done to improve the existing tidal banks which protect agricultural land and isolated properties. Only the banks protecting Horsey Island, Braunton and Chivenor remain to be improved.

3.15.3 Environmental Objectives

To ensure that 99% of the properties within the catchment are protected to a 1 in 100 year return period standard.

To ensure that flood defence operations allow the maintenance of water quality to such a condition that:-

- (i) it supports a variety of aquatic life and dependent organisms;
- (ii) fish and shellfish are protected;
- (iii) it supports a benthic fauna essential to sustain the marine fishery;
- (iv) public nuisance arising from visual and smell problems is prevented.

3.15.4 Environmental Requirements

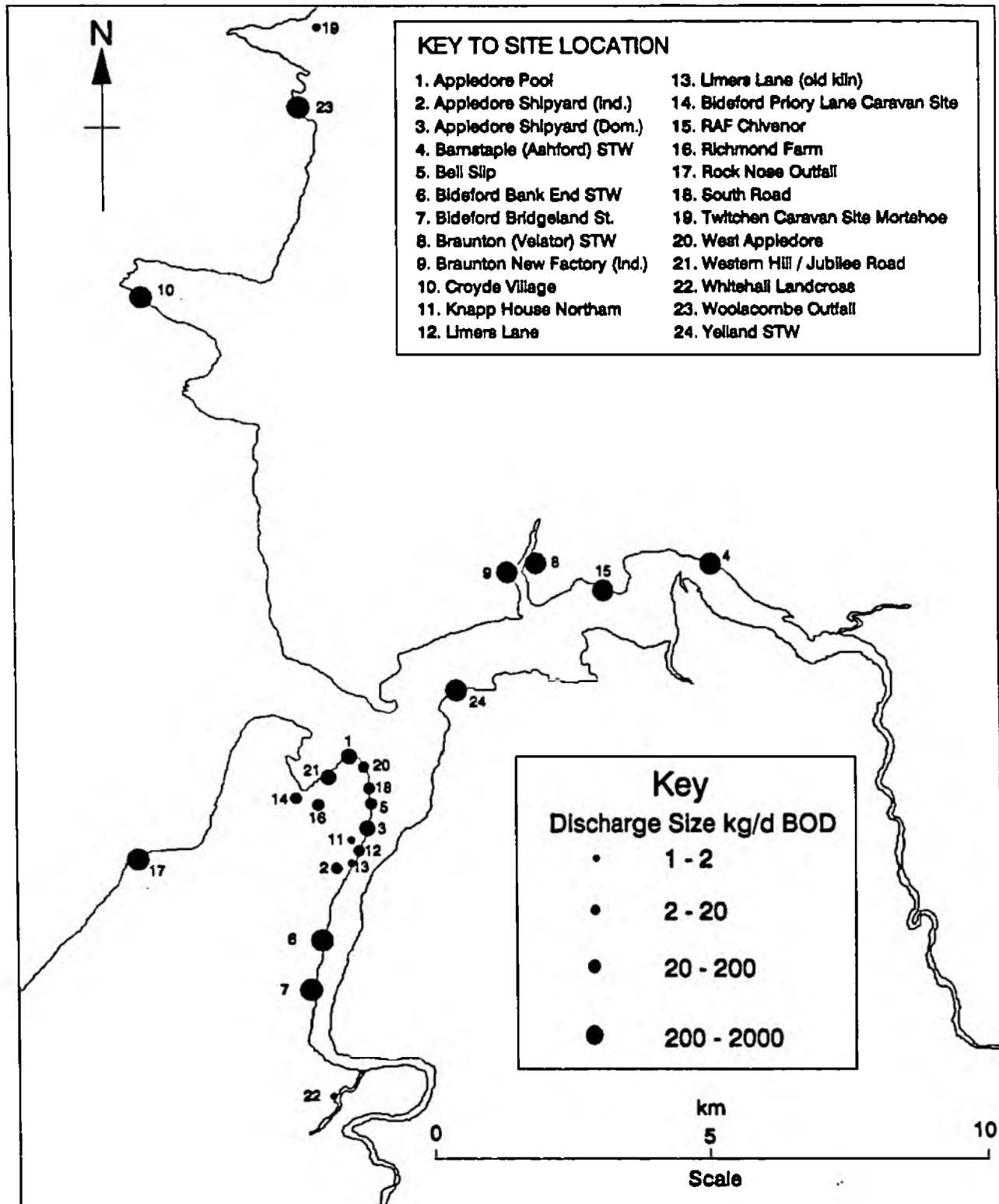
Estuarine Features:

In protected areas, the river bank should not be breached by a flood flow with a specified return period: generally 100 years for built-up areas.

In flood plains, the river bank should be breached by a flood flow with a specified return period.

The Taw-Torridge Estuary

EFFLUENT DISPOSAL



3.16 EFFLUENT DISPOSAL - TAW/TORRIDGE ESTUARY

3.16.1 General

The disposal of effluent is one of the recognised uses of natural waters. However, controls are necessary to limit the quantity and quality of discharges to ensure that prescribed environmental standards are achieved and maintained. These controls are implemented through consenting procedures, the provisions for which are provided in Schedule 12 of the Water Act 1989.

The aim is to limit the discharge of pollutants so that after mixing with the receiving waters, the concentrations comply with prescribed water quality standards appropriate to identified water uses.

3.16.2 Local Perspective

There are a total of 98 continuous discharges of sewage and trade waste to the Taw-Torridge estuary. Approximately half of these are untreated. In addition, there are 49 storm and emergency overflows. The total organic input (expressed as Biochemical Oxygen Demand, BOD) is estimated to be in excess of 8000 kg per day. More than 95% of this pollutant load originates from the 24 discharges identified in the accompanying plan.

Many of the authorised consents were granted for a temporary period and have no specific control. Others have limits which are considered too lax and need reassessing. The consent review exercise is programmed in 3 phases:

untreated continuous discharges

storm and emergency overflows

re-examination of existing treated discharges.

3.16.3 Environmental Objectives

All discharges will be regulated to ensure the following criteria are satisfied:

- (i) target water quality class is complied with;
- (ii) standards related to water uses are achieved;
- (iii) compliance with relevant EC Directives is achieved;
- (iv) water quality is maintained and, where appropriate, improved.

3.16.4 Environmental Requirements

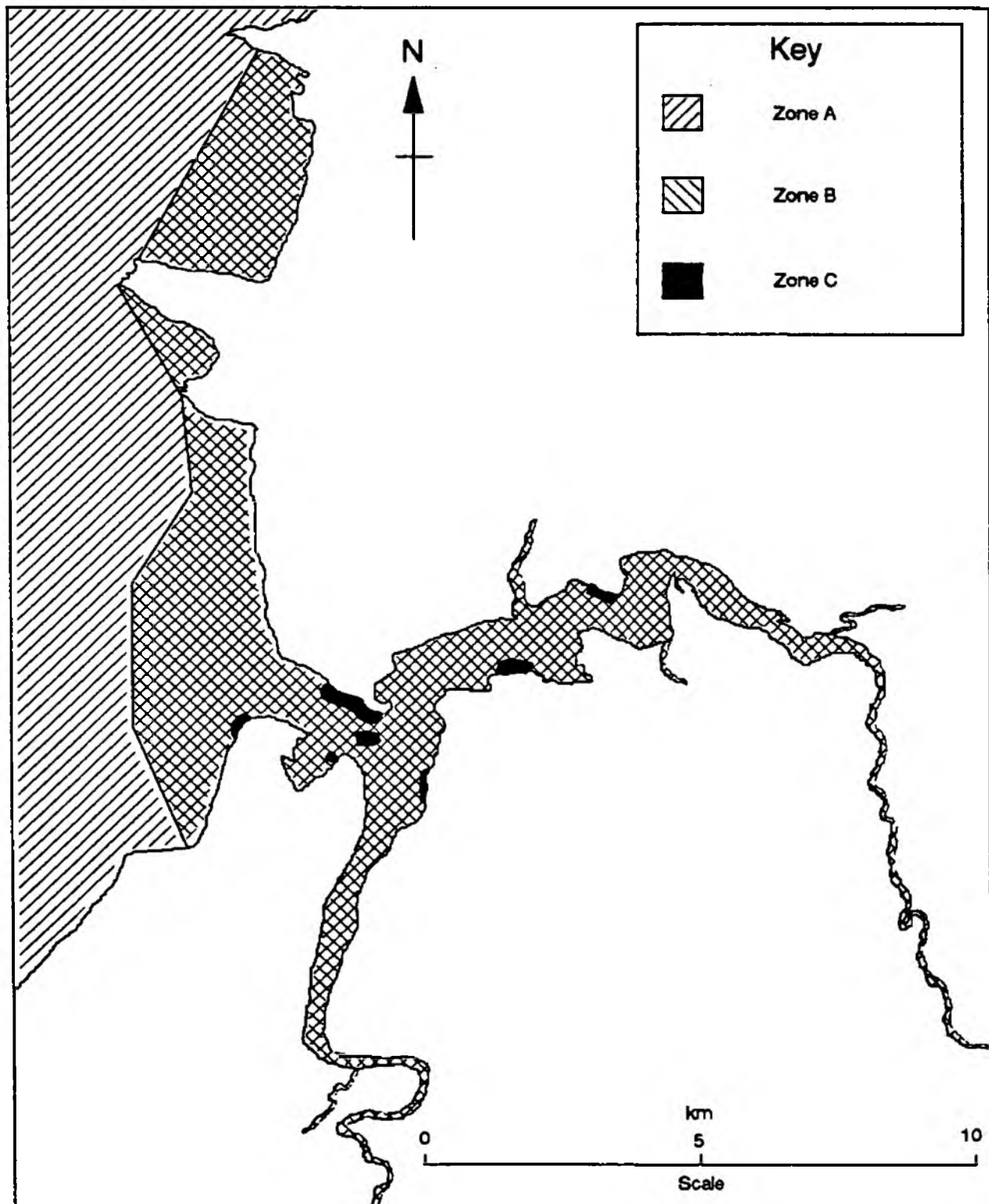
Regardless of the capacity of the receiving water all discharges to estuaries and coastal waters will have a basic set of requirements impressed on them. These are:

the discharge must be submerged at all tidal states.

the effluent must be screened to retain solid matter.

the discharge shall not cause aesthetic nuisance.

The Taw-Torr ridge Estuary WATER QUALITY TARGETS



4.1 WATER QUALITY TARGETS - TAW/TORRIDGE ESTUARY

4.1.1 General

The water quality requirements for all the uses can now be combined to give a single "synoptic map" summarising the targets for the whole of the Taw and Torridge estuarine catchments.

The quality requirement adopted for any given determinand in a particular stretch is the most stringent use-related requirement applicable to that stretch.

4.1.2 Local Perspective

Consideration of the ten different uses listed for the estuarine catchments generates three zones (which are not necessarily continuous), where the following water quality requirements apply. The requirements (or Environmental Quality Standards) to achieve the water quality targets are included in Appendix 8.1.

	Water Quality Zone		
	A	B	C
Water Quality Suite 1 Aesthetic Criteria	*	*	
Water Quality Suite 2 List I Substances (Tidal Waters)	*		
Water Quality Suite 3 List II Substances (Tidal Waters)	*		
Water Quality Suite 4 Bathing Water Criteria		*	
Water Quality Suite 5 Shellfish Flesh Criteria			*
Water Quality Suite 6 Shellfish Water Criteria (Tidal Waters)			*
Ammonia un-ionised <0.021 mg N/l	*		
Dissolved Oxygen >5mg/l (95 percentile)	*		
ZONE	USE APPLIED WITHIN THE ZONE		
A	General Ecosystem Conservation, Migratory Fishery, Basic Amenity, Commercial Harvesting of Fish.		
B	Bathing, Immersion Sports.		
C	Commercial Harvesting of Shellfish.		

4.1.3 Pollution Control Targets

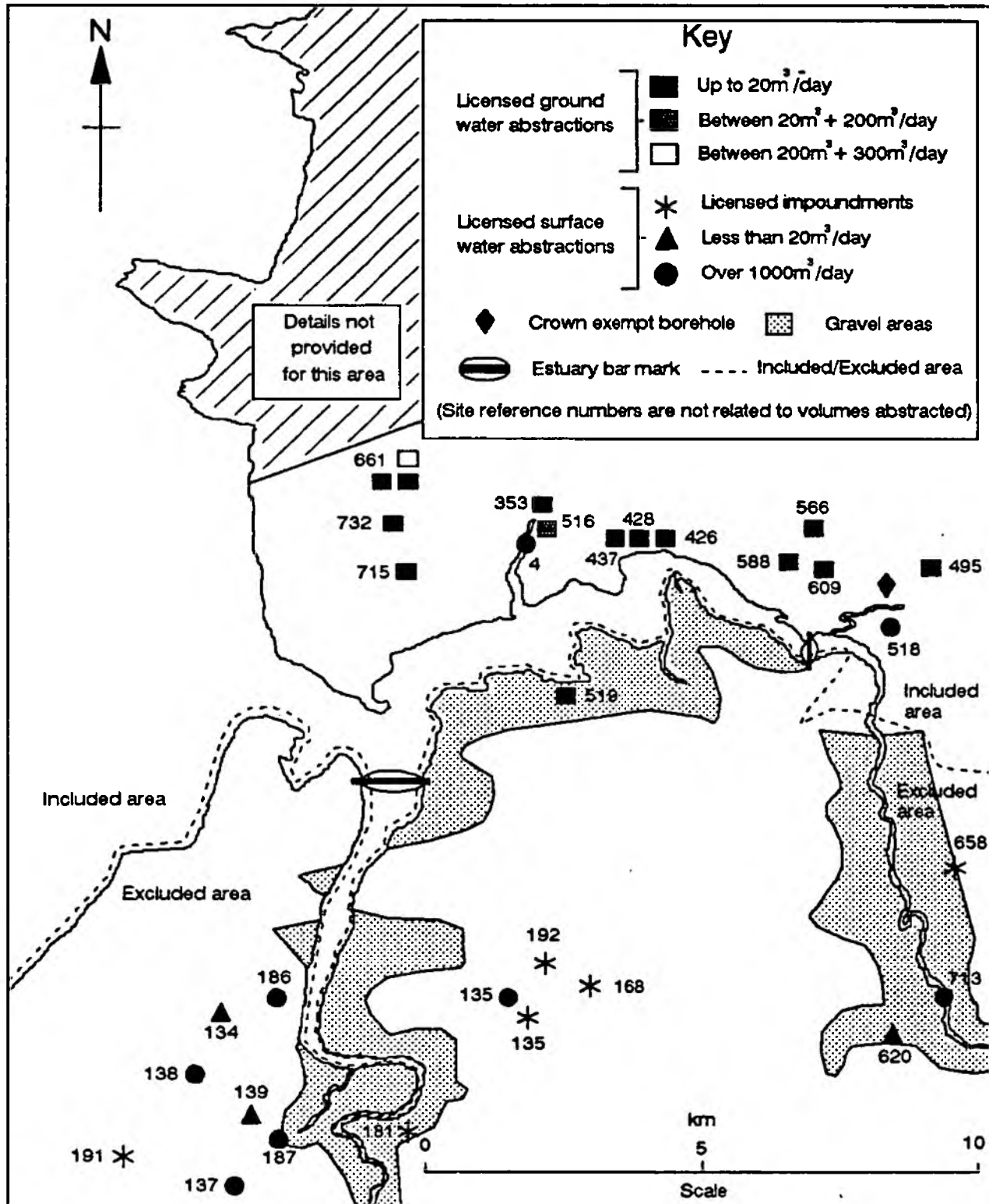
In advances of national targets, regional targets have been adopted.

To reduce the number of serious pollution incidents affecting underground and surface waters by the development of pollution prevention campaigns such as the farm campaign.

To encourage connection to foul sewer when long sea outfall schemes are in operation.

To enforce the pollution law in accordance with the national guidelines for prosecution.

The Taw-Torrige Estuary WATER RESOURCES



4.2 WATER RESOURCE TARGETS - TAW/TORRIDGE ESTUARY

4.2.1 General

As with water quality, the water resource targets for the whole estuary can now be summarised.

- (a) Abstractions must not reduce the watercourses flowing into the estuary below their Q95 flows.

The general water resources targets for the whole estuary are straight forward, since the estuary is tidal in nature and subject to a significant flushing effect.

They are therefore:

- i) to limit or regulate abstractions so that detrimental impacts are not caused to conservation interests by reduced flows in watercourses or by reduced groundwater levels, or to migratory passage of salmon, sea-trout or eels;
- ii) to regulate impoundments to ensure their design and construction will allow for the migratory passage of salmon, sea-trout and eels.

4.2.2 Local Perspective

It is unlikely that either abstractions or impoundments will be proposed within the estuary that will have an impact on estuarine features or interests.

Surface water abstractions downstream of the indicated bar marks are outside regulatory control.

The south side of the estuary lies within the area covered by Devon River Authority Exemption From Control Order, 1970, which excludes from licensing control all groundwater abstractions except those falling within the indicated gravel areas.

Major proposals, such as a barrage scheme, would require significant studies including a full Environmental Impact Assessment (EIA).

4.3 FISHERIES TARGETS - TAW/TORRIDGE ESTUARY

4.3.1 General

The overall objectives for the estuary fishery are as follows:-

- i) the maintenance of satisfactory populations of shellfish and fin fish to allow their continued survival and exploitation;
- ii) the continued protection of migratory fish (particularly salmonids) to aid in the recovery of stocks to support commercial and sport fisheries and allow sufficient escapement for optimum natural production.

4.3.2 Local Perspective

The following targets are proposed for estuary fisheries:-

- (i) Ensuring that juvenile sea fish stocks are given maximum protection;
- (ii) Enforcement of the Bass Nursery Regulations within the estuary;
- (iii) A redefinition of the boundary of the estuary white fish trawling exclusion area to allow more effective enforcement of this legislation;
- (iv) Maintaining adequate monitoring of fish stocks;
- (v) Ensuring that shell fish management is carried out effectively to prevent overcropping;
- (vi) Continued control of the commercial netting of salmon and sea trout including a complete closure of the net fishery for the five years 1991-1995 and a retention of a Net Limitation Order of 14 licensed nets;
- (vii) Monitoring sea fish catches to assess the need for an estuary closure byelaw, preventing the netting of sea fish as a further aid to the conservation of salmon and sea trout;
- (viii) Establishing adequate enforcement measures to protect fish stocks in the estuary and allow the free passage of migratory fish through the estuary;
- (ix) Ensuring that sufficient dilution is given for effluents, particularly in sea fish nursery areas and to prevent the inhibition of the movements of migratory fish.

4.4 FLOOD DEFENCE TARGETS - TAW/TORRIDGE ESTUARY

4.4.1 General

Because of the predominantly rural nature of the catchment there are limited flooding problems.

It is intended to investigate all urban locations shown as liable to flooding under the Section 24(5) survey carried out under the Water Act 1973, and to promote schemes for flood defence where these are economically justified. Promoting of schemes within the capital programme is determined by the Regional Flood Defence Committee according to a points rating system.

4.4.2 Local Perspective

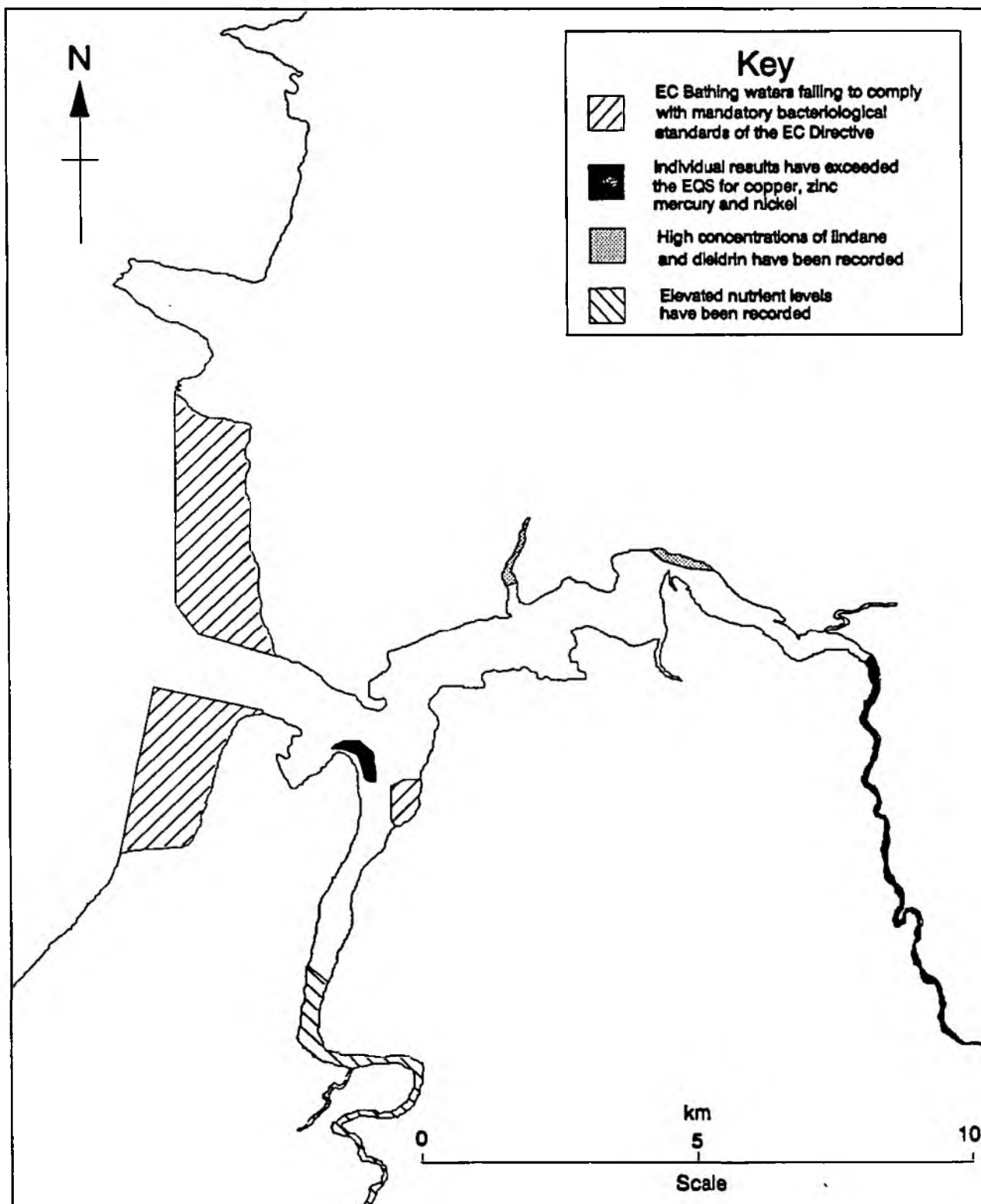
In protected areas, the river bank should not be breached by a flood flow with a specified return period: generally 100 years for built-up areas.

In flood plains, the river bank should be breached by a flood flow with a specified return period.

A national system for evaluating levels of service for flood defence is in preparation. When completed, the catchment will be assessed against the national standards to determine any works necessary to reduce frequency of flooding of agricultural land. Because of the generally low grade of the land involved, it is unlikely that any works will be required and present flooding is likely to be considered acceptable.

The Taw-Torridge Estuary

STATE OF ESTUARY WATER QUALITY



5.1 STATE OF THE ESTUARY: WATER QUALITY - TAW/TORRIDGE ESTUARY ---

5.1.1 General

Having set water quality targets for the estuarine catchments, it is now possible to assess the state of each catchment against these targets. It is not the intention here either to state the cause of any problem, or to suggest possible solutions. The problems are simply identified for future attention during Stage 2 of the Catchment Management Planning Process.

5.1.2 Problems Identified

In general, Environmental Quality Standards (EQS's) are complied with throughout the area but particular problems have been identified in the estuarine catchment.

Many local sewage discharges are untreated, giving rise to extensive aesthetic problems, particularly around Bideford and Appledore.

Failure to comply with the mandatory bacteriological standards of the EC Directive Concerning the Quality of Bathing Water has been recorded for the following identified bathing waters:

Westward Ho!	1986
Instow	1986, 1987, 1988, 1990
Saunton Sands	1986

Intensive studies in the two arms of the estuary have indicated highly variable levels of total and faecal coliforms showing a general increase during the summer months, reaching a maximum in October. The highest levels have been found close to sewage outfalls under conditions of low riverine flow, as would be expected. Bacterial concentrations in the Taw estuary are generally higher than those in the Torridge.

Measurements of salmonella and entero-virus species have provided erratic and inconclusive results, although their presence has been recorded.

Dissolved nitrogen and phosphorus levels are higher in the Taw than the Torridge estuary. Dense phytoplankton blooms have been observed in the Taw but there is no evidence of oxygen depletion. Elevated nutrient levels have also been observed upstream of Bideford in the section of the Torridge estuary where the freshwater/saltwater mixing is most pronounced.

There will always be an area of high turbidity within both arms of the estuary at the point where the freshwater/saltwater mixing process dominates. This is upstream of Bideford on the Torridge and close to Barnstaple on the Taw. The precise location varies according to river flows and tidal condition.

Individual concentrations in excess of the EQS have been recorded for copper, mercury, nickel and zinc in the headwaters of both estuaries. Localised problems have been observed around the Appledore Pool outfall.

Concentrations of gamma-hexachlorocyclohexane (lindane) and dieldrin in the estuary have exceeded the respective EQS's at certain locations. Values found within the Taw are generally higher than those within the Torridge. Particularly high levels have occurred near the River Caen input at Braunton and the Ashford STW discharge at Barnstaple. Peak concentrations are found during the summer months. Other organochlorine pesticides have been found close to major outfall locations, however only limited data are currently available.

5.2 STATE OF THE ESTUARY : WATER RESOURCES - TAW/TORRIDGE ESTUARY ---

5.2.1 General

Having set water resource targets for the estuary, it is now possible to assess the state of the estuary against these targets.

Only a limited degree of abstraction occurs within the estuary and no detrimental impacts are anticipated.

Beam Weir, the impoundment at the freshwater limit of the Torridge, contains a fish pass to allow for passage of migratory salmon, sea trout and eels.

5.2.2 Problems identified

The "flashy" nature of the Rivers Taw and Torridge make them naturally susceptible to extreme dry weather flows. The impact of weather variations and increasing frequency of dry periods may have a significant effect.

A detailed study would be necessary to assess whether these perceived concerns are justified, and whether they are due to increased abstraction, changes in land use or result from climatic variations.

Impacts on fisheries migration will be dealt with under the fisheries section. A parallel study of fish movements at the estuarine limit may be needed.

5.3.1 General

The Taw-Torridge estuary supports the following fisheries:-

- i) Migratory fish including salmon, sea trout and eels;
- ii) Sea fish including bass, mullet, cod, whiting and varieties of flatfish;
- iii) Shellfish including mussels, oysters, cockles and winkles.

The salmon fishery has declined since 1951, although catches of sea trout, whilst showing large annual variations, have maintained a level underlying trend in the past few years. This salmonid fishery has been controlled by Net Limitation Order since 1979, with the number of licensed nets currently restricted to 14. The decline of the salmon fishery is attributable to problems within the freshwater sections of both rivers, although illegal exploitation in the estuary has reduced the number of adult stocks.

The estuary supports both commercial and sport fisheries for sea fish with bass being the most important target species, followed by mullet and flounder. Bass stocks are under severe pressure round the British Isles and this has been reflected by the concern for juvenile stocks in the estuary. A number of bass conservation measures were introduced by MAFF during 1990.

Small-scale collections of shellfish are made in the estuary. As a result of bacterial and viral contamination from estuarine and riverine effluent loads, shellfish from the Taw-Torridge estuary have to be washed in clean water for 24 hrs before being considered fit for human consumption.

5.3.2 Problems Identified

- (i) Declining stock levels of salmonids;
- (ii) Illegal exploitation of adult salmonids;
- (iii) Pressure on both adult and juvenile bass populations;
- (iv) Contamination of shellfish flesh by bacteria and viruses.

5.4 STATE OF THE ESTUARY : FLOOD DEFENCE - TAW/TORRIDGE ESTUARY ---

5.4.1 General

A major scheme has been carried out to protect the urban area of Barnstaple from tidal and fluvial flooding and a major tidal defence scheme has recently commenced to protect Bideford. An extensive programme for improvement of the River Taw tidal bank, protecting mainly agricultural land, commenced in 1980.

5.4.2 Problems Identified

Locations set out below were identified in the Section 24(5) survey carried out under the Water Act 1973 as liable to flooding:

- Barnstaple
- Barnstaple (Sticklepath)
- Bishop's Tawton
- Instow
- Appledore
- Bideford
- Weare Giffard
- Westward Ho!

Barnstaple and Barnstaple (Sticklepath) were protected by the Barnstaple tidal defence scheme carried out in 1982-90. Bishop's Tawton was included in Stage 2 of the River Taw tidal embankments carried out in 1980/82. Schemes are included in the five year capital programme to protect Instow, Appledore and Weare Giffard, in addition to completion of works commenced at Bideford in 1990 and the final two stages of the River Taw tidal embankments at Braunton Marsh and Chivenor.

Some work has been carried out by Torridge District Council on the pebble ridge and sea defences at Westward Ho! but further improvements are required.

6.1 General

Problems have been identified in the following areas and these will be addressed in the Stage 2 Plan.

6.2 Water Quality

Failure to achieve EC Bathing Water Directive standards have been recorded at Westward Ho!, Instow and Saunton Sands.

Crude sewage discharges cause extensive aesthetic problems, most especially around Bideford and Appledore.

Coliform levels in the estuary are highly variable, generally reaching a maximum at the end of the summer.

Nutrient levels are overall higher in the Taw than the Torridge estuary, although elevated levels have been observed in the upper reaches of the Torridge.

Occasional high concentrations of metals have been recorded in the headwaters of both estuaries and around the Appledore Pool outfall.

Elevated levels of lindane and dieldrin have been found in localised areas of both estuaries. Values found within the Taw are generally higher than those within the Torridge. Peak concentrations are found during the summer, around the River Caen input at Braunton and the Ashford STW input at Barnstaple.

6.3 Water Resources

The "flashy" nature of the Rivers Taw and Torridge makes them naturally susceptible to extreme dry weather flows. The significance of these characteristics in relation to the estuary, has not been established.

6.4 Fisheries

Stock levels of salmonids are decreasing. Bass populations are under pressure. Edible shellfish species are contaminated by bacteria and viruses.

This Plan has been written as a pilot scheme, in conjunction with the Torridge Catchment Management Plan, to a format proposed by the Welsh region of the NRA and may not be the format adopted finally by the NRA for the presentation of catchment plans. A national NRA working group is reviewing the benefit and possible format of catchment management plans.

Stage 1

The catchment plan for the Taw-Torridge Estuary consists of two stages.

This document is the Stage 1 part of the Plan which identifies:

- (i) the catchment;
- (ii) the uses made of the aquatic environment;
- (iii) the environmental objectives and requirements for each use;
- (iv) targets to ensure environmental objectives are achieved;
- (v) the present state of the catchment when compared with these targets;
- (vi) known problems and conflicts;
- (vii) information gaps.

It is essential that uses in the catchment are confirmed and agreement is reached on the environmental objectives, requirements and targets set out in this Stage 1 of the Plan before progressing with Stage 2 of the Plan. Consequently, this document is released for public consultation.

Comments on Stage 1 of the Plan are welcomed by the NRA-SW and should be sent to:

Tidal Waters Officer
National Rivers Authority
South West Region
Manley House
Kestrel Way
EXETER
EX2 7LQ

Comments should be made before 30 June 1991. NRA-SW will then consider all comments before producing a final version of the Stage 1 Plan.

The Stage 2 Plan will be developed after the completion of the Stage 1 Plan and will deal specifically with the resolution of those problems which have been identified.

Stage 2

Stage 2 will represent the Plan of Action for the catchment, and the problems will be dealt with in the following standardised way:

The nature of the problem is identified;

The cause of the problem is described;

The solution to the problem, which has been formulated after consultation between the NRA-SW and relevant outside organisations, is presented;

Responsibility for carrying out the remedial work is assigned;

The timetable is given for the work to be carried out.

The Stage 2 Plan will address current problems in the catchment. It must also be recognised that circumstances may change. If the NRA decides that this format is effective the Plan will be updated as major new problems or opportunities arise, and will be reviewed at five year intervals as a routine practice.

Work within the Taw-Torridge Estuary has progressed and action has already been or is being taken on some of the problems identified in the Stage 1 Plan.

- 8.1 Water Quality Suites
 - 8.1.1 Aesthetic Criteria
 - 8.1.2 List I Substances
 - 8.1.3 List II Substances
 - 8.1.4 Bathing Water Criteria
 - 8.1.5 Shellfish Flesh Criteria
 - 8.1.6 Shellfish Water Criteria

APPENDIX 8.1.1 : WATER QUALITY SUITE 1

AESTHETIC CRITERIA

Parameter	Value	Status
AESTHETIC CRITERIA		
Smell	(by olfactory inspection)	no noxious odours
Colour	(by visual inspection)	no abnormal change
Mineral oils	(by visual inspection)	no visible surface film
	(by olfactory inspection)	no odour
Surface-active substances (methylene-blue active)	(by visual inspection)	no lasting foam
Sewage debris, tarry residues, solid floating material, effluent slicks	(by visual inspection)	absent

DISSOLVED OXYGEN

Aerobic conditions ($\geq 10\%$ saturation) should be maintained to avoid effects of deoxygenation, particularly production of hydrogen sulphide, ammonia or methane.

APPENDIX 8.1.2 : WATER QUALITY SUITE 2

LIST I SUBSTANCES (TIDAL WATERS)

Parameter	Units	Value	Status
LIST OF SUBSTANCES			
Mercury (2)	$\mu\text{g Hg/l}$	0.3	AA,D
Cadmium (2)	$\mu\text{g Cd/l}$	2.5	AA,D
Hexachlorocyclohexane (HCH) (2)	$\mu\text{g/l}$	0.02	AA,T
Carbontetrachloride (CTC)	$\mu\text{g/l}$	12	AA
DDT (para-para-DDT isomer) (2)	$\mu\text{g/l}$	0.01	AA
Pentachlorophenol (PCP) (2)	$\mu\text{g/l}$	2	AA
'The drins' (2) (from 1 Jan 1989)	$\mu\text{g/l}$	0.03 (3)	AA,T
Aldrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.01	AA
Dieldrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.01	AA
Endrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.005	AA
Isodrin (from 1 Jan 1994)	$\mu\text{g/l}$	0.005	AA
Hexachlorobenzene (HCB) (2)	$\mu\text{g/l}$	0.03	AA
Hexachlorobutadiene (HCBd) (2)	$\mu\text{g/l}$	0.1	AA
Chloroform	$\mu\text{g/l}$	12	AA
1,2 - Dichloroethane	$\mu\text{g/l}$	5	AA
Trichloroethylene	$\mu\text{g/l}$	10	AA
Perchloroethylene	$\mu\text{g/l}$	10	AA
Trichlorobenzene	$\mu\text{g/l}$	0.4	AA

Proposals have been published for the following List I substances but these have not, so far, been adopted:

trifluralin, endosulphan, simazine, triorganotin compounds (tributyltin oxide, triphenyltin acetate, triphenyltin oxide, triphenyltin hydroxide), atrazine, organophosphorus substances (azinphos-methyl, azinphos-ethyl, fenitrothion, fenthion, malathion, parathion and parathion-methyl, dichlorvos).

WATER QUALITY SUITE 2 CONT'D

- Notes:
- (1) AA: Annual Average; D: Dissolved; T: Total.
 - (2) A 'standstill' provision exists for concentrations in sediments and/or shellfish and/or fish.
 - (3) Maximum of 0.005 for Endrin.

This list will be updated to accommodate future proposals for List I substances.

APPENDIX 8.1.3 : WATER QUALITY SUITE 3

LIST II SUBSTANCES (TIDAL WATERS)

Parameter	Units	Value(1)	Value(2)
LIST II SUBSTANCES			
Lead	$\mu\text{g Pb/l}$	25	AA,D
Chromium	$\mu\text{g Cr/l}$	15	AA,D
Zinc	$\mu\text{g Zn/l}$	40	AA,D
Copper	$\mu\text{g Cu/l}$	5	AA,D
Nickel	$\mu\text{g Ni/l}$	30	AA,D
Arsenic	$\mu\text{g As/l}$	25	AA,D
Boron	$\mu\text{g B/l}$	7000	AA,T
Iron	$\mu\text{g Fe/l}$	1000	AA,D
pH	pH values	6-8.5(3)	95% of samples
Vanadium	$\mu\text{g V/l}$	100	AA,T
Tributyltin	$\mu\text{g/l}$	0.002	T Maximum allowable concentration
Triphenyltin	$\mu\text{g/l}$	0.008	T Maximum allowable concentration
Polychloro Chlormethyl Sulphonamido Diphenyl ether (PCSD's)	$\mu\text{g/l}$	0.05	T 95% of samples
Sulcofuron	$\mu\text{g/l}$	25	T 95% of samples
Flucofuron	$\mu\text{g/l}$	1.0	T 95% of samples
Permethrin	$\mu\text{g/l}$	0.01	T 95% of samples

Notes : (1) National environmental quality standards recommended for the UK.

(2) AA : Annual Average; D : Dissolved; T : Total.

(3) A more restricted range of 7.0-8.5 should be applied for the protection of shellfish.

APPENDIX 8.1.4 : WATER QUALITY SUITE 4

BATHING WATER CRITERIA

Parameter	Units	Value(1)		Status	
MICROBIOLOGICAL		I	G	I	G
Total coliforms	no/100ml	10,000	500	95% of samples	80% of samples
Faecal coliforms	no/100ml	2,000	100	95% of samples	80% of samples
Faecal streptococci	no/100ml	-	100	-	80% of samples
Salmonella	no/1	0	-	95% of samples	-
Enteroviruses	PFU/10L	0	-	95% of samples	-

Parameter	Units	Value	Status
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AESTHETIC CRITERIA

Colour	visual inspection	no abnormal change
Mineral oils	visual inspection	no visible surface film
	olfactory inspection	no odour
	mg/l after extraction and weighing dried residue	≤0.3
Surface-active substances (methylene-blue active)	visual inspection	no lasting foam
	mg/l as lauryl sulphate	≤0.3
Phenols	olfactory inspection	no specific odour
	mg/l	≤0.05
Transparency	m	1
Tarry residues, solid floating material, effluent slicks	visual inspection	absent

Notes : (1) I : Imperative or Mandatory standard.
G : Guideline standard.

APPENDIX 8.1.5 : WATER QUALITY SUITE 5

SHELLFISH FLESH CRITERIA

Parameter	Units	Value
LIST OF SUBSTANCES		
E.coli	no/100g	230 (1)
	no/100g	4600 (1,2)
Salmonella	no/25g	0 (1)
Poisonous Substances		
Radionuclides		
Total Paralytic Shellfish Poison (PSP) Content	$\mu\text{g}/100\text{g}$	80 (1)
Diarrhetic Shellfish Poison (DSP) (3)	-	- (1)

Notes : (1) Source : draft proposal for a Council Regulation on the health conditions affecting the production and the placing on the market of live bivalve molluscs.

(2) May only be sold for human consumption after purification in an approved purification plant.

(3) The Diarrhetic Shellfish Poison (DSP) content shall not exceed levels which may be considered dangerous to human health.

(4) The units refer to concentrations in the shellfish flesh.

APPENDIX 8.1.6 : WATER QUALITY SUITE 6

SHELLFISH WATER CRITERIA (TIDAL WATERS)

Parameter	Units	Value
Silver	$\mu\text{g/l}$	10(2)

- Notes: (1) Standards for all List I and List II parameters also apply - see Water Quality Suites 2 and 3.
- (2) Figure derived from MAFF recommendations specified in the advice document on the implementation of the EC Directive on the Quality Required of Shellfish Waters.

Terms:

AONB	Area of Outstanding Natural Beauty
BENTHIC	Pertaining to flora and fauna found in the sediments of estuaries and coastal waters
BOD	Biochemical Oxygen Demand
DCC	Devon County Council
EC	European Community
EIA	Environmental Impact Assessment
EQS	Environmental Quality Standard
FLASHY	Responding rapidly to periods of rainfall and dry weather (Flashy rivers experience spates in wet weather and very low flows after moderate periods of dry weather)
MAFF	Ministry of Agriculture Fisheries and Food
NNR	National Nature Reserve
NRA	National Rivers Authority
PFU	Plaque Forming Unit
RAF	Royal Air Force
RNLI	Royal National Lifeboat Institute
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SWWA	South West Water Authority (prior to privatisation)
SWWSL	South West Water Services Limited (since privatisation)

Signs, Statistics and Units**Signs:**

- < Less than
- > Greater than
- ≤ equal or less than

Statistics:

Q95	flow exceeded for 95% of the time, on average
Percentile	one of 99 values of a variable dividing a population into 100 equal groups as regards the value of that variable.

Units:

m	metre(s)
km	kilometre(s)
km ²	square kilometre(s)
mm	millimetre(s)
°C	temperature, degree(s) Centigrade
m/km	metre(s) per kilometre

m ³ /s	cubic metre(s) per second
m ³ /d(ay)	cubic metre(s) per day
m ³ p.a.	cubic metre(s) per year
μg/l	microgramme(s) per litre
ng/l	nanogramme(s) per litre
mg/l	milligramme(s) per litre
Ml	Megalitre(s)
Ml/day	Megalitres per day
kg	kilogramme(s)