ANNUAL REPORT AND ACCOUNTS 2001 - 2002

DEFRA
Department for
Environment,
Food & Rural Affairs

CEFAS
The Centre for Environment, Fisheries & Aquaculture Science

STATEMENT OF PRESENTATION
OF ACCOUNTS

CEFAS ANNUAL REPORT AND ACCOUNTS 2001 - 2002

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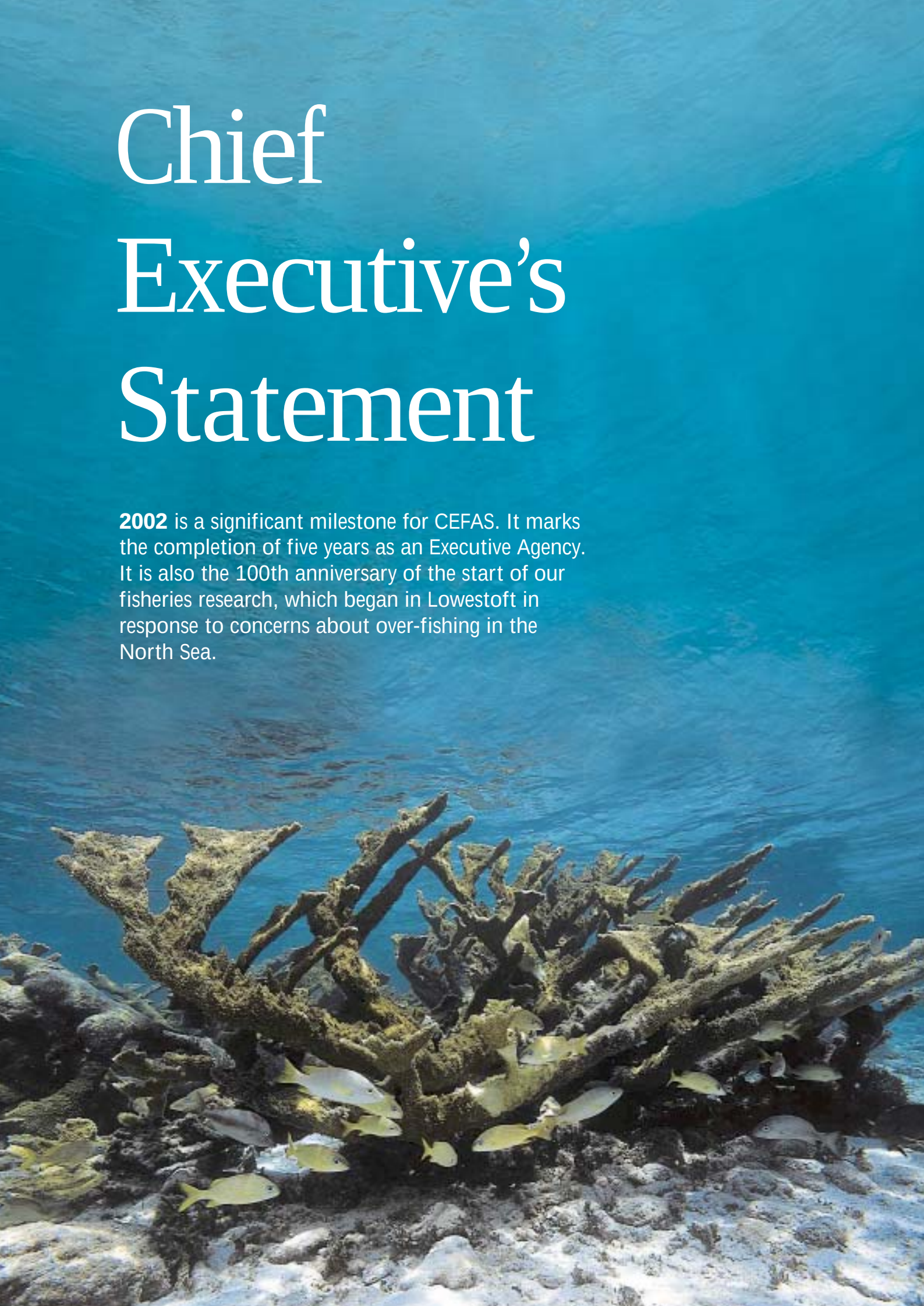
Chief Executive's Statement

2002 is a significant milestone for CEFAS. It marks the completion of five years as an Executive Agency. It is also the 100th anniversary of the start of our fisheries research, which began in Lowestoft in response to concerns about over-fishing in the North Sea.



The year was dominated by two unplanned events. The outbreak of foot and mouth disease last year affected the Agency through the secondment of several staff to help with disease control operations in SW England. Also, restrictions on access to farmland meant that our programmes of fish health inspection, and several research projects were interrupted. Nevertheless, CEFAS managed to fulfil the key scientific commitments.

The replacement of the Ministry of Agriculture, Fisheries & Food (MAFF) by the new Department for Environment, Food and Rural Affairs (DEFRA) in June 2001 has major implications for CEFAS. The Department's Objectives are focused on Sustainable Development, which is already the basis for most of CEFAS's work, on the conservation and rational management of fish stocks, the impact of human activities on the marine environment, and protection of human health from aquatic contaminants.

We are working closely with our colleagues in DEFRA by providing the necessary scientific contributions for the policies behind the Sustainable Development theme. CEFAS scientists supported Fisheries Minister Elliot Morley at the December EU Fisheries Council, where the Minister secured UK fish quotas for 2002 that foster fish stock conservation and sustainable fisheries. We were able to argue for cuts in quotas where stocks are threatened, yet persuaded the European Commission that some proposed cuts were unjustified, such as the valuable prawn stocks.

CEFAS helped in the preparation of the first Marine Stewardship Report, launched by Secretary of State Margaret Beckett on 1 May 2002. This includes a strong commitment to the importance of indicators of the quality of the marine environment, and the need for long-term monitoring, which CEFAS is leading through chairmanship of the UK's Marine Pollution Monitoring Management Group. We continue to provide research-based improvements to the methods used in monitoring, through our active role in international quality assurance schemes for chemical and biological measures.

Commitment to the policy needs of our customers in DEFRA, the Food Standards Agency (FSA) and other government departments means that it is increasingly difficult for staff to make time to publish the results of research. This year, regrettably, the output of peer-reviewed papers in the scientific press has declined, although we continue to produce high-profile publications, including papers this year in 'Science' and 'Nature'. With renewed emphasis in DEFRA on the importance of science, we hope to be able to increase the volume of both research and applied science outputs. A current review of the role of all DEFRA's agencies is an opportunity to clarify what is expected of CEFAS and to secure the Department's commitment to support the necessary scientific base.

We continued to develop innovative approaches to the wider commercial aspects of our work. Three joint ventures with private sector partners were consolidated, and we set up a wholly-owned limited company to help manage the financial arrangements. This provides us with the skills and experience to take full advantage of the opportunities for exploiting the Agency's Intellectual Property.

This Report outlines some of the many areas in which CEFAS scientists have made progress this year. They have done so despite many competing pressures and unexpected demands. As ever, none of it would happen without the dedication and professionalism of the Agency's staff. I am grateful for everyone's contributions this year, particularly during the months that I was away from CEFAS on foot and mouth work, when the Agency continued to operate very effectively under Vic Bye's temporary leadership.

I hope that you find this report interesting, and a stimulus to enquire further about the work of CEFAS.

Dr Peter Greig-Smith Chief Executive of CEFAS

Left Page: Fish under a coral reef in the Caribbean. *Reproduced with permission of Rohan Holt.*

CEFAS Aims and Objectives

"Conserve and enhance the aquatic environment. Promote rational management of its natural resources. Protect the public from aquatic contaminants"

CEFAS's Purpose

We seek to be the prime source of high quality science used in:

Conserving and enhancing the aquatic environment
Promoting rational management of its natural resources
Protecting the public from aquatic contaminants

CEFAS science is thus at the heart of the Sustainable Development agenda.

Our nine objectives support these activities

1. Delivery of Science

To deliver outputs according to standards of quality, time and cost, as agreed with customers.

2. Public accountability

To conduct CEFAS's activities in accordance with public sector rules and standards, complying fully with codes of practice on accountancy, propriety, health and safety and employer's responsibilities.

Left Page: Long spined sea urchin in the Buccoo Reef, Tobago. *Reproduced with permission of Lawson Wood.*

3. Strong Science

To maintain and enhance the strength of science in CEFAS, achieving the respect of scientific peers, and playing a leading role in national and international activities within our fields of science.

4. Customer focus

To be valued by customers and be the scientific contractor of choice in our fields, as a result of meeting or exceeding customers' expectations, and developing close partnerships to address their needs.

5. Reputation

To increase public awareness of CEFAS as a leading centre of scientific expertise.

6. Commercial business development

To achieve long-term viability for the Agency through business opportunities that contribute to maximum utilisation of skills and facilities, generate funds for investment, and are relevant to governmental objectives including the exploitation of research outputs.

7. Concern for people

To make CEFAS a satisfying place to work by investing in staff development, fair rewards and equal opportunities, and high standards of management, so that staff are content, productive and committed to the organisation.

8. Efficiency

To run CEFAS as an efficient organisation by developing internal processes that are simple, reliable and provide value for money relative to benchmark standards.

9. Business planning

To prepare and achieve realistic annual and strategic plans that optimise the balance between the priorities of science, business and people.

CEFAS is structured into six science areas to provide a clear focus for our science activities. The following chapters outline some of our main achievements this year to illustrate our capability to deliver high quality science.

Environmental Management

The Environmental Management Science Area provides scientific advice and technical services related to assessment of the impacts of human activities on the aquatic environment.

The core business is support for UK Government advising on regulatory activities, Research and Development to underpin these activities, the derivation of performance measures and monitoring programmes to determine the effectiveness of regulatory controls.

Marine Consents

CEFAS provides advice to DEFRA on applications made under part II of the Food and Environment Protection Act (FEPA) 1985, the Coast Protection Act (CPA) 1949 (As Amended) and the Harbour Works (EIA) Regulations 1999.

FEPA licences are required for the sea disposal of material dredged from ports, harbours, marinas and navigable channels. Wherever possible, material is deposited for environmental benefit, for example beach replenishment or salt marsh feeding. 106 applications were assessed and issued in 2001/02, involving a total of 33 million tonnes of dredged material, for beneficial use or sea disposal.

CEFAS also assessed 228 FEPA licence applications for constructions placed below the Mean High Water Mark, including four large-scale developments which have been in the process of assessment for the majority of the year, at Harwich (Trinity and Bathside Bay), Southampton (Dibden Bay) and London (Shellhaven). All of these developments are at the stage of, or about to go to, Public Inquiry, and involve a complex mix of dredging, construction, land reclamation and sea disposal and are all in environmentally sensitive areas. Construction licences are also needed for the development of offshore wind farms and CEFAS has produced a set of guidelines for developers for use in the production of Environmental Impact Assessments.
www.cefas.co.uk/publications

Left Page: Assessing environmental impact of shipping and port activities

Sampling dredged material from a dock

Brominated Flame Retardants

There are some seventy different brominated flame retardants (BFRs) in current use worldwide. BFRs are a diverse group of chemicals made up of several different chemical classes that are used to reduce flammability in a wide variety of products in industrial and domestic applications, including everyday articles such as textiles and electronic equipment such as television sets and personal computers.

Despite the number of BFRs in use, the market is dominated by three groups of compound: decabromodiphenyl ether (DBDE), tetrabromobisphenol A (TBBP-A) and hexabromocyclododecane (HBCDD). The current market for BFRs is estimated to be 300,000 tonnes per annum worth approximately 2 billion Euro.

We have been studying the distribution and fate of polybrominated diphenyl ethers (PBDEs) in the marine environment of England and Wales which have been detected routinely in marine sediments, fish and shellfish and marine mammals. Recently we have also detected residues of HBCDD and TBBP-A in sediments, porpoises and cormorant liver samples.

There is a growing body of evidence that these three groups of BFRs are persistent in the marine environment and there are numerous reports of residues from Western Europe, Japan, North America and Canada. Although time trend data is sparse there is some evidence of an increasing trend in residue levels.

> “There is evidence that certain Brominated Flame Retardants are persistent in the marine environment”

Dr Lindsay Murray
EM Science Area Head
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Tarballs are rolled ashore by currents and tides

Copper in the marine environment

Following on from the marine environmental problems caused by Tributyltin (TBT) anti-fouling paint, attention has switched to the other major component of anti-fouling paints, copper. Formulations may contain up to 50% of copper and usage has increased following the ban of TBT on small boats.

Some countries have now introduced bans on anti-fouling paints containing copper because dissolved copper concentrations in water found in certain sites are above national Environmental Quality Standard (EQS) limits. The usual method used to analyse for copper includes all forms of the element, but only the free ions Cu+ and Cu2+ are actually toxic to marine life and these rapidly combine with organic and inorganic substances present in the water. It is not possible to measure directly the toxic fraction but theoretical models predict that in the marine environment, less than 1% of the dissolved copper present is harmful to marine life.

> “Some countries have introduced bans on anti-fouling paints containing copper”

CEFAS has been asked by a consortium of copper manufacturers to validate these models. We are conducting seasonal surveys in a selection of harbours, estuaries and marinas in the UK, measuring the dissolved copper, electrochemically labile copper (mainly inorganic copper containing the toxic forms) and certain co-factors in the water and sediments. Further work will consider the likely toxicology of the concentrations of labile copper found this year. Next year, surveys will be conducted in European marine waters.

Emergency Response

CEFAS provides advice to both DEFRA and the Food Standards Agency (FSA) in the event of oil and chemical spills at sea. The scope of this advice can extend from a simple assessment of likely fate and effects of the spill to a full-scale monitoring programme lasting a year or more.

There were no major incidents in 2001/02, although some small incidents required assessment. Notable amongst these were two incidents only a mile or so and a month apart, near Plymouth. In January the petroleum product tanker MV *Willy* was blown ashore from

anchor in Cawsand Bay, and in February the abandoned and drifting timber carrier the MV *Kodima* ran ashore in Whitsand Bay. Both were subsequently refloated without significant pollution.

> "There were no major emergency response incidents in 2001/02"

MV *Kodima* aground in Whitsand Bay. *Reproduced with permission of the Maritime and Coastguard Agency.*

During the summer and autumn of 2001, large numbers of tarballs came ashore periodically on beaches around the Irish Sea. Computer modelling showed that in each case, strong winds had begun 1-2 days before the appearance of the tarballs, and the focus of the trajectories was concentrated in an area to the south and east of the Isle of Man. Despite this study, no source has yet been located for the tarballs.

CEFAS has also been involved in the establishment of standing environment groups around the coastline of England and Wales. The establishment of these groups was recommended by Lord Donaldson in his report following the grounding of the tanker *Sea Empress* in Wales in 1996, the intention being that they "stand ready", and can more quickly be activated when required.

Oil Field Chemicals

Recent changes to Oslo and Paris Commission (OSPAR) regulations now require the use and discharge of chemicals used in offshore oil and gas exploration and processing to be subject to statutory regulation. Hazard Quotients (HQs) will now be used to rank chemicals used by the offshore industry and operators will be actively encouraged to substitute high-risk chemicals with lower risk products where appropriate.

> "CEFAS has developed new procedures to calculate Hazard Quotients"

CEFAS has developed new procedures to electronically calculate HQs for all suitable products (both new applications and those already covered by the existing Revised Offshore Chemical Scheme). The system also generates a series of ranking lists for different chemical functions and process streams, which are published on the CEFAS website at:
www.cefas.co.uk/ocns

Left: Sieving a benthos sample on board ship

Environment and Food Safety

The Environment and Food Safety Science Area provides surveillance, assessment and research to improve food safety, particularly as it relates to seafood and freshwater fisheries and its contamination with radionuclides, micro-organisms and chemicals.

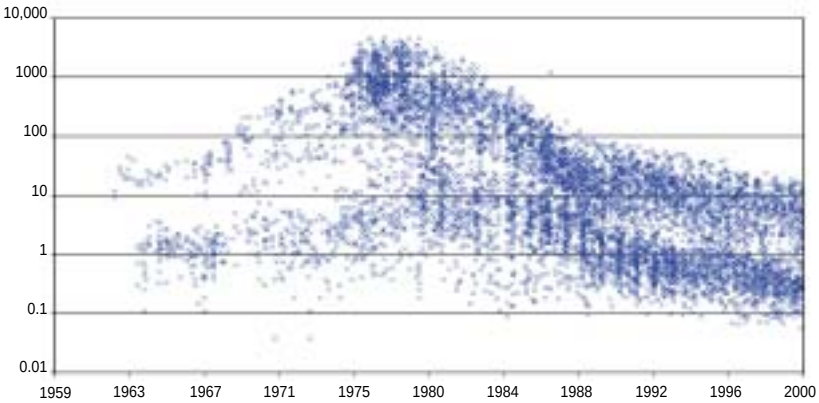
Research is directed to understanding and modelling the behaviour of contamination in the environment, determining the risks of various sources of pollution and improving methods of surveillance and analysis.

Radioactivity - applying policy

UK policy on radioactive discharges is undergoing significant change to reflect the agreement reached by the OSPAR convention at Sintra, Portugal, in 1998. Whilst conforming to the principles of sustainable development, the policy commitment has to include practical definitions of what can be achieved in terms of discharges and levels in food and the environment.

Over the last year CEFAS has been working with policy makers in DEFRA to define the relevant levels and indicators in food and the environment against which the success of the UK can be judged. CEFAS has also used modelling skills in collaboration with the National Radiological Protection Board to make predictions of future levels to assess different discharge scenarios. Our radioactivity advice, based on extensive spatial and temporal datasets, has been used by the OSPAR Radioactive Substances Committee to help reach an international consensus on what is acceptable in the 21st century.

Of international concern has been the continuing impact of the current and historic discharges of technetium-99 from the reprocessing plant at Sellafield. CEFAS's research in this area has been directed at establishing the transport mechanisms throughout North European waters.



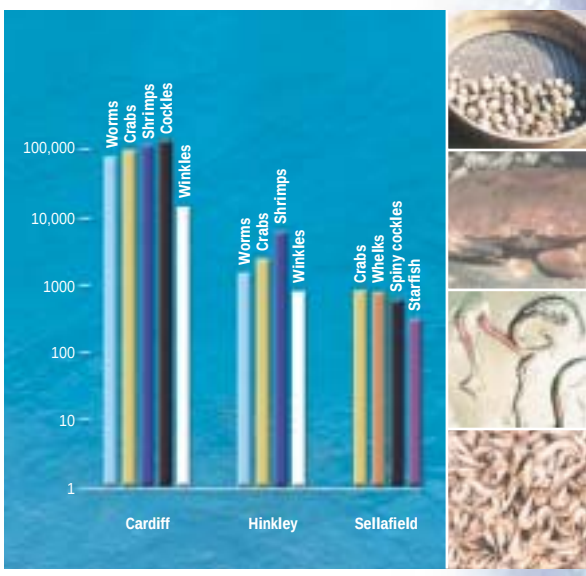
Caesium (^{137}Cs) in sea fish

Radioactivity - demonstrating food safety

CEFAS has maintained survey programmes around all UK nuclear installations and these have demonstrated high levels of protection. We also completed site-specific risk studies aimed at identifying key target groups of consumers affected by radioactivity in food at seven sites in England and Scotland.

CEFAS's assessment protocols have now been extended to consider the impacts at an individual level, including children and adults and relevant age-dependent data. All possible modes of exposure are taken into account.

The data show how important it is in studies of human risk not to rely on generic data describing the behaviour of people. Individuals with exceptional habits are clearly at significantly more risk than most. CEFAS hopes to take these studies further over the next few years and incorporate formalised techniques for evaluating uncertainty.



Tritium (^{3}H) levels found in samples
Cockles – *Cardium edule*
Crab – *Cancer pagurus*
Worms – *Arenicola marina*
Shrimps – *Crangon crangon*

Bill Camplin
EFS Science Area Head
Email: w.c.camplin@cefas.co.uk

Left Page: Oysters – *Ostrea edulis*

Ecosystem effects

It is Government policy, as set out in the Environment Act 1995, that radioactive wastes should be managed so that, both now and in the future, the environment is protected in order to meet the objective of sustainable development.

In the past, measures taken to protect humans have been assumed to protect other species from radiation exposure arising from contamination of the environment. This paradigm is increasingly being questioned and with support from a joint European Union/Environmental Agency (EA) funded programme we have been collaborating with the few laboratories worldwide which have the necessary expertise to establish new systems for protection which consider the environment explicitly.

Good progress has been made in establishing a consensus of our understanding of radiation effects. The programme will now work towards making recommendations on the system of control, taking into account the large uncertainties that exist in dose response relationships.

The 3-year experiment to investigate the effects of alpha radiation on the fish species *Danio rerio* (zebrafish) was completed this year. The initial findings have been used to place upper bounds on the damage to the fecundity to this species from this highly damaging type of radiation.

Monitoring tritium in the Bristol Channel

Standard models used in establishing limits for industrial discharge of tritium suggest low concentrations in fish flesh in the Cardiff Bay area. But the manufacture of radiochemicals used in life science research results in thousands of isotopically labelled organic compounds generated in wastes and discharged into Cardiff Bay. These compounds are believed to enhance the bioaccumulation processes in the Bay and the levels of tritium we measure in fish, shellfish and seabirds are much higher.

CEFAS's research has been aimed at improving the understanding of the bioaccumulation processes that are at play, both to improve regulation of this specific source and to generate sound assessment procedures of other sources of tritium in the environment. Initial findings have been published and these show that there are complex interactions taking place within the sewer prior to release to sea. Further work is planned to resolve the outstanding uncertainties.

Microbiology

Filter feeding bivalve shellfish, for example oysters and mussels, concentrate contaminants and can present a food safety hazard.

> "CEFAS is designated as both the European Community Reference Laboratory and the UK National Reference Laboratory for monitoring bacteriological and viral contamination of bivalve molluscs"

Left: Monitoring radioactivity at low tide

The FSA funds several programmes at CEFAS aimed at protecting the consumer from such hazards. CEFAS co-ordinates, on behalf of the FSA, the work of local authorities towards the microbiological classification of shellfish harvesting areas according to pollution risk as required by a European Directive. CEFAS also performs technical inspections of shellfish purification plants to ensure that they comply with the relevant legal requirements.

CEFAS is the designated UK National Reference Laboratory (NRL) for bacteriological and viral contamination of bivalve molluscs. In this capacity we advise and coordinate the activities of UK laboratories monitoring shellfish for purposes of public health protection. To help in our duties as NRL we have this year set up a web site **www.nrlcefas.org** to provide technical information to interested parties.

Shellfish rearing trestles

This year CEFAS has initiated a new area of work relating to surveillance for toxins associated with naturally occurring plankton, such as paralytic shellfish poisoning, which can accumulate in shellfish and present a health hazard. CEFAS now conducts, on behalf of the FSA, the surveillance programmes for marine biotoxins in harvesting areas in England and Wales.

On board a mussel dredger

Over recent years CEFAS, in collaboration with DEFRA policy divisions, has sought to bring more focus to bear on the underlying water quality problems in many shellfisheries in England and Wales. CEFAS has worked with DEFRA Water Quality Divisions and the Environment Agency towards the designation of most shellfisheries in England and Wales under the Shellfish Waters Directive. This is a welcome development and should lead, in time, to improvements in water quality in many shellfisheries. CEFAS continues to champion the importance of good water quality in bivalve shellfisheries under 'joined up government' initiatives and we expect to see further developments in this area.

CEFAS is the designated European Community Reference Laboratory for bacteriological and viral contamination of bivalve molluscs. A number of European initiatives are under active consideration and CEFAS will work with NRLs designated by Member States, and with the European Commission, towards implementing these throughout Europe. A meeting of NRLs to discuss progress took place at CEFAS Weymouth in May 2002. Progress will be posted on our dedicated website **www.crlcefas.org**

In support of these various issues CEFAS also runs an active research programme mainly funded by the FSA. Over recent years important developments have been made in methods for detecting viruses in shellfish. This year has seen a significant breakthrough in our ability to quantify the amount of such contaminating virus using sophisticated molecular techniques such as real-time, polymerase chain reaction (PCR). This is important in studies on the removal of viruses during commercial treatment processes such as shellfish purification.

> "CEFAS continues to champion the importance of good water quality in bivalve shellfisheries"

We are also applying these techniques to the study of removal of the Norwalk-like virus during sewage treatment processes. Our results suggest that although Norwalk-like virus is more resistant to removal than conventional bacteriological indicators (*E. coli*) its behaviour could be modelled by use of commonly occurring bacteriophage. Such insights help influence policy decisions on how best to target investment towards improving the pollution status of bivalve shellfisheries.

Environmental Quality

The Environmental Quality Science Area provides scientific advice for the conservation of ecosystems and surveillance of human and natural disturbance of the aquatic environment.

Our focus is on research into the behaviour and effects of nutrients and hazardous substances to predict likely impacts on ecosystems and to monitor the effectiveness of environmental management systems.

Monitoring the health of our seas

The Marine Pollution Monitoring Management Group (MPMMG), chaired by Dr Mike Waldock from CEFAS, represents UK Government Organisations with statutory obligations for marine environmental protection. This year the MPMMG was given the mandate by Ministers to undertake the development of a comprehensive marine environmental monitoring strategy. The objectives are to draw together existing monitoring in the UK to make best use of data and resources to enable integrated assessments of the marine environment, and to provide a single all encompassing monitoring programme to fulfil all national and international reporting requirements.

This initiative forms part of the strategy for marine stewardship recently published by DEFRA and announced by the Secretary of State on 1 May 2002 - Safeguarding our Seas - a strategy for the conservation and sustainable development of our marine environment (ISBN 0-85521-005-2). CEFAS scientists will be playing a key role in delivering the new strategy and working towards publication of a State of the Seas report in 2004 as a first step in developing an ecosystem approach to environmental management. Further information on this important new initiative can be found at **www.defra.gov.uk/news/latest/2002**

Rivers in the Ocean

By combining new observational techniques and computer simulations, CEFAS oceanographers have identified and described distinct and continuous jet-like circulations that transport water for up to 1000 km across the continental shelf seas during summer months. Present in the Irish, Celtic and North Seas the flows are typically 20 km wide, 60 m deep and move at mean speeds of the order 6 km per day. They transport a volume of water equivalent to that discharged by the world's largest rivers. In many cases these 'Rivers' skirt the coastal zones of the UK before either moving water offshore or acting as closed circulatory gyres. Associated with distinct boundaries between water masses, the flows occur in zones of high primary production and are often where the larvae and juveniles of many fish species are found. This new perspective on shelf seas oceanography is being considered in the context of concerns regarding contaminant movement, impact of nutrients on the marine environment and fisheries production.

Laying current meters

Dr David Morris
EQ Science Area Head
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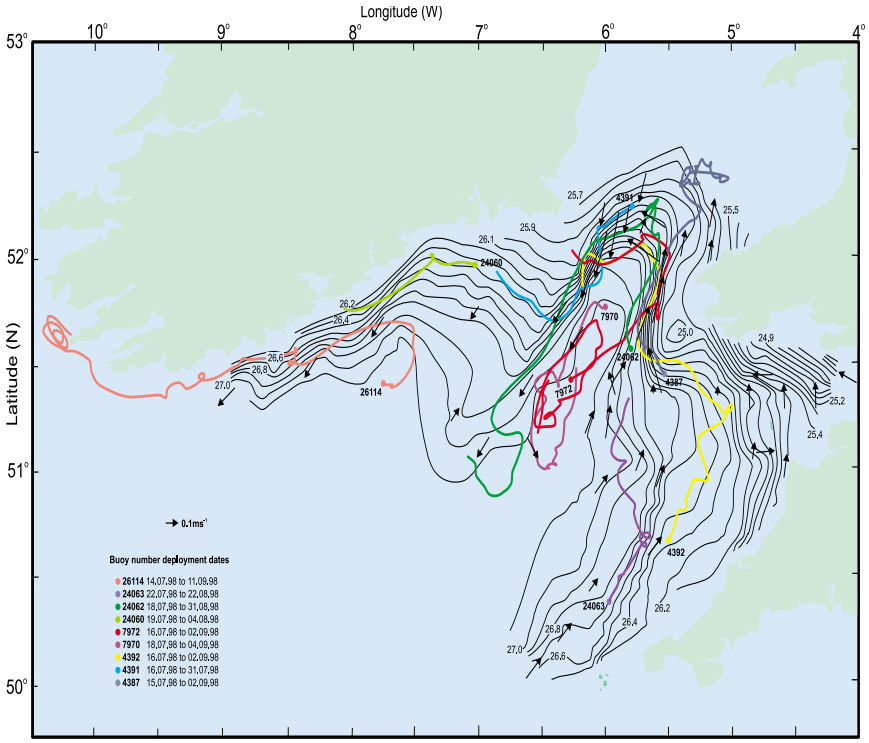
Left Page: CEFAS Aqualander being deployed from an oil rig

The Oceans Arteries are changing

Most computer simulations of the ocean system in a climate with increasing greenhouse-gas concentrations predict major changes to the deep circulation of the oceans as the seas become fresher and warmer at high latitudes. We have found through the analysis of long-term hydrographic records that the ocean system that ventilates the deep Atlantic has steadily changed over the past four decades, and that this has already led to a prolonged and widespread freshening of the deep ocean. These sorts of change are thought to have major implications for our climate.



Summary of the May to October circulation in the Celtic Sea

ICES Workshop on New Perspectives in Understanding and Predicting Eutrophication

Dr Stephen Malcolm, CEFAS Science Director

CEFAS scientists attended a gathering of international scientists and policy makers in the Netherlands in March hosted by the International Council for the Exploration of the Sea (ICES). (**www.cefas.co.uk/eutwork**). The workshop, jointly funded and organised by the Netherlands Rijkswaterstaat and DEFRA/CEFAS, was co-chaired by Dr. David Mills of CEFAS and Prof. Ted Smayda of the University of Rhode Island. The meeting was attended by 45 invited participants from 15 countries with 33 papers presented including CEFAS papers from Drs Mills and Malcolm.

The workshop is the first ever assembly of biologists, chemists, modellers and regulatory agency representatives gathered to focus on coastal water eutrophication, its role in altering ecosystem processes with special emphasis on the plankton. The conference proceedings, to be published in a special issue of the International Journal of Sea Research, will be a unique contribution to the study of eutrophication.

By presenting case studies on the effects of eutrophication from around the world in one publication, scientists and managers will have access to a unique resource for assessing evidence and mechanisms of eutrophication.

In his keynote presentation Dr Malcolm put eutrophication in the context of sustainable development highlighting the environment protection issues against a need for economic growth. The growing pressure on the coastal zone around the world will keep eutrophication close to the top of the Sustainable Development agenda.

A Deep Water Observatory

Over recent decades appreciable changes in fisheries and their environment have been observed in UK coastal seas. These changes are both natural and caused by human activities - the difficulty lies in being able to distinguish between the two so that appropriate management measures can be taken.

CEFAS instrumentation package below the surface, attached to the ODAS buoy

The effect that climatic changes in the North East Atlantic off the shelf break have on natural variability in UK coastal seas is poorly understood. To address this a deep water observatory with a capability for surface and sub-surface monitoring and long term data acquisition is being developed under a DEFRA-funded collaborative project.

In the first phase of the three-year project, CEFAS is modifying the existing sensor and satellite telemetry system used in the SmartBuoy, our automated multi-parameter recording platform for marine environmental monitoring. The modifications will enable us to construct a deep ocean environmental sensor package and install it on a Met. Office Open Ocean buoy. The buoy will make surface meteorological measurements and also near surface measurements of temperature, salinity, nitrate-nitrogen and phytoplankton. Sub-surface measurements will be carried out at high frequency (1 hour – 1 day) with sub-samples of data returned by satellite and published on the SmartBuoy Marine Monitoring internet website **www.cefas.co.uk/monitoring**

New GIS mapping functionality has recently been added to the website. Users can now select an area of sea and establish which deployments have been carried out in that area, and choose to display various graphical representations of the data.

The Met. Office Marine Automatic Weather Station network will provide the basic infrastructure for the proposed observational system.

> “ CEFAS is constructing a deep ocean environmental sensor package ”

Meteorological Office ODAS buoy

Fisheries Management

The Fisheries Management Science Area provides advice on the regulation and management of fisheries based on monitoring, assessment and modelling of fish and shellfish stocks, studying their response to exploitation, and conducting research on the environments in which they live and species with which they interact.

Dr Andy Payne
FM Science Area Head
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The Marine Finfish Assessment and Advisory Programme

Fishing vessels in England and Wales land fish worth annually some £143 million at first sale. These fish are taken from many of the main stocks in the waters of Norway and the European Community. The future of the stocks depends primarily on developing sustainable harvesting regimes under the EU Common Fisheries Policy.

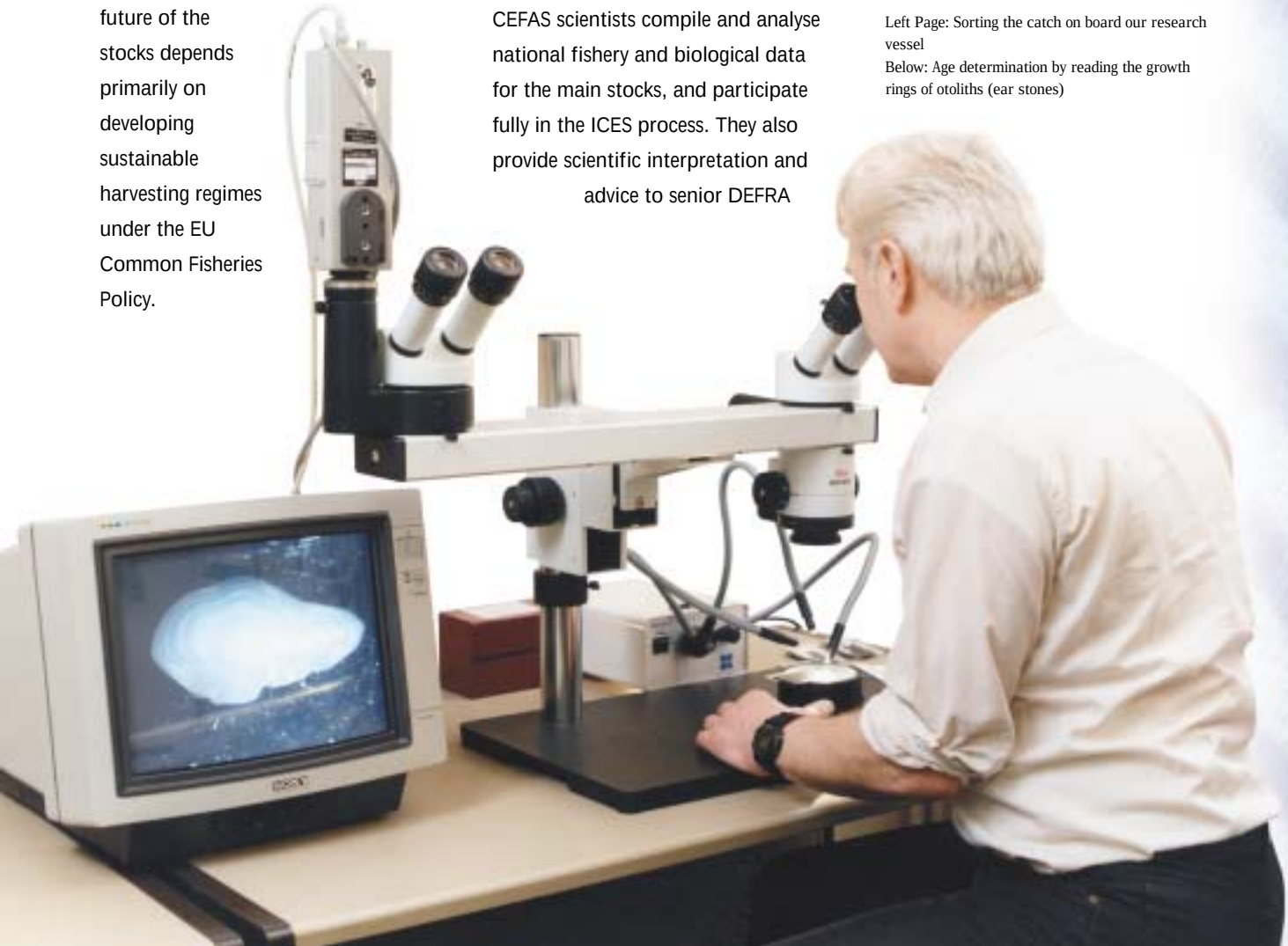
Proposals for managing Community fish stocks are based on independent scientific advice from the International Council for the Exploration of the Sea (ICES). ICES working groups assess the stocks every year using national data on fishery landings, fishing effort, and the age structure, growth and maturity of the stocks.

> "CEFAS scientists are at the forefront of developments to address current fisheries management problems"

CEFAS scientists compile and analyse national fishery and biological data for the main stocks, and participate fully in the ICES process. They also provide scientific interpretation and advice to senior DEFRA officials for fisheries meetings in the EU and the North East Atlantic Fisheries Commission, and during the development of national fisheries policy.

To monitor and assess the stocks, CEFAS scientists have processed 400,000 length measurements and 70,000 age determinations this year, and spent 139 research vessel days at sea on stock surveys (crucial to the stock assessment process in yielding fisheries independent data to supplement the commercial data). They attended 20 ICES assessment, methods, and biological working groups, and carried out supporting scientific studies on growth, maturation, and egg production. They are at the forefront of developments of, and in applying assessment methods to, current fisheries management problems.

Left Page: Sorting the catch on board our research vessel
Below: Age determination by reading the growth rings of otoliths (ear stones)



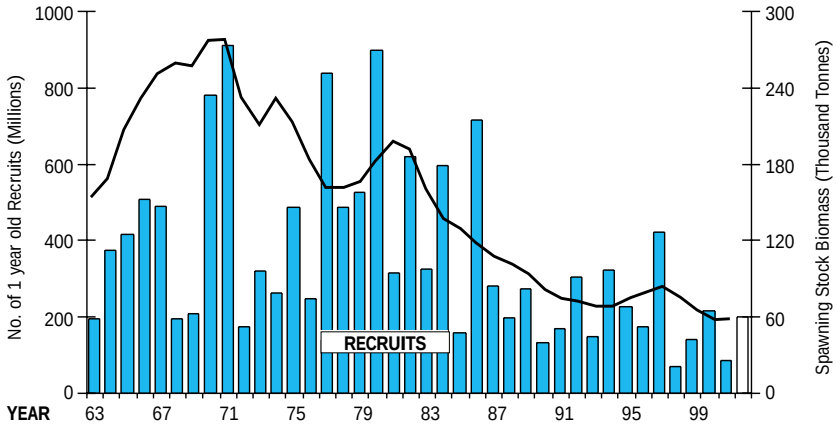
Sustaining Fish Stocks and Fisheries

To sustain stocks and fisheries in the long term, managers are urged to follow a precautionary approach and to maintain stocks within biologically safe limits, corresponding to a low risk that the annual production of young fish ('recruitment') will be impaired.

Describing how recruitment can vary raises fisheries, biological and statistical issues. For example, throughout the 1980s and 1990s, fishing pressure on North Sea cod was >50% per annum, and there was a marked decline in the biomass of mature females. (see graph)

Since the late 1980s the number of young cod entering the stock each year has also declined, coinciding with a severe reduction in spawning biomass, but also with a recent warming of the sea in mid-latitudes, which may be affecting the survival of young cod. ICES scientists are now increasingly worried that the cod stock could collapse, because the age structure has become diminished to one containing mainly fish that are either immature or are young spawners producing relatively few eggs.

CEFAS scientists are addressing the question of reproductive capacity of cod, and its effect on the viability of the stock. They are also working on a method for identifying statistically the spawning biomass when recruitment becomes impaired. The method is called segmented regression, and it has been applied to the data on spawning biomass and recruitment for North Sea cod.



Trend in spawning stock biomass (SSB) and in recruitment of one year old cod

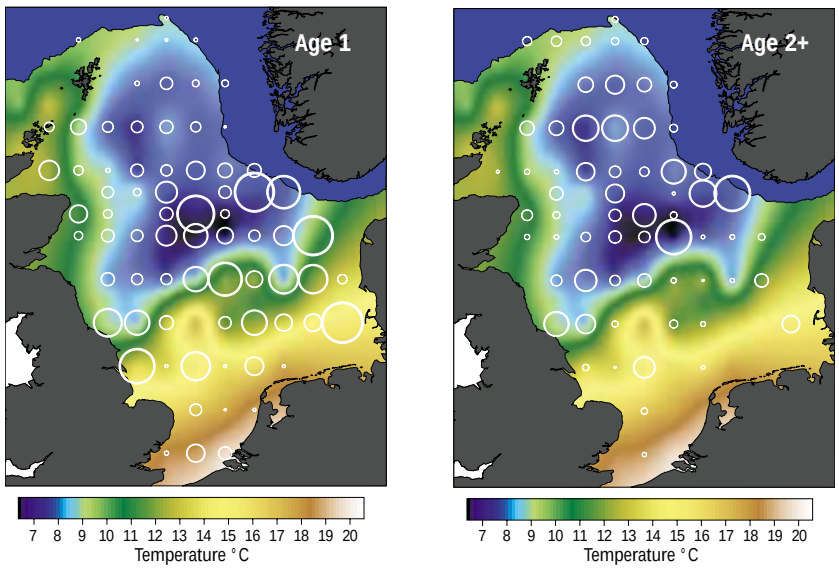
The spawning stock below which the production of young cod declines corresponds to just above 150,000t, the minimum biomass required to ensure the sustainability of the stock on the basis of past observations.

This approach to the estimation of a precautionary biomass limit has been presented as a working paper to an ICES Study Group.

The Distribution of North Sea Cod in Relation to Temperature

Because of recent increases in the temperature of the seas around the British Isles there is particular interest in whether this may affect the distribution of fish. CEFAS scientists are investigating how temperature affects different life stages of commercial fish species such as North Sea cod. The figure below shows how the average catch rates of cod in the North Sea compare to average near-bottom seawater temperature in the same area for the years 1994-1998. These data are collected during CEFAS groundfish surveys, carried out every August.

The shallower southern North Sea is much warmer in summer than the deeper, northern North Sea. 1-year-



The average catch rates of cod age 1 and 2 and older (circles) in relation to the average near-bottom water temperature in the North Sea during August (colour contours) over the period 1994-1998.

old cod are found all over the North Sea, but catch rates are highest in the central and southern North Sea. In contrast, cod aged 2 years and older (2+), are mainly found in the deeper colder areas, and are almost absent from the warmer southern North Sea. It is not yet understood why cod are distributed in this way, and whether these distributions have changed through time, but further investigations are in progress.

Simulating Long Term Management Scenarios

In 1998, ICES first applied the precautionary approach to fish stocks in the North Atlantic. For each stock, scientists identified a minimum spawning biomass and a maximum fishing rate representing the point at which recruitment is likely to become impaired and where management action needs to be taken.

Many North Atlantic stocks were overfished before the precautionary limits were introduced and had already suffered from severe decreases in recruitment. Recovery plans to begin rebuilding certain stocks have been developed by the EU, with CEFAS scientific involvement in an advisory context.

Currently, Total Allowable Catches (TACs) vary from year to year as the stock size changes, but managers and scientists are interested in the possibility of limiting these variations. However, a more constant TAC would generate a more variable harvest rate and stock biomass, potentially increasing the danger of the stock falling outside safe limits. The EU has therefore contracted CEFAS scientists to use simulation modelling to investigate the potential for implementing multi-annual TAC scenarios as part of longer-term management plans.

A specialist CEFAS team has developed a model to simulate a 'real' stock and its changes through time, using flatfish stocks as examples. The simulated real stock is then 'sampled' and assessed to give a perception of its status. Constrained management controls are then applied, and their consequences evaluated.

> "CEFAS has developed a 'real' fish stock simulation model"

This approach is powerful because it includes variation in the biology of the stocks, sampling error, estimation error attributable due to the assessment process, and imperfect compliance with the management measures. A large number of simulations are run, and the results are expressed as the probability of a stock being above or below safe limits for different combinations of fishing rate and TAC constraint. CEFAS scientists and their ICES colleagues are at the forefront of developing these computational approaches.

Recovery Plans for Cod

Key UK fish stocks are at such low levels that EU Fisheries Ministers have agreed to Recovery Plans. Theatened stocks include cod in the North Sea, West of Scotland and the Irish Sea, and the widespread stock of hake. CEFAS scientists have collaborated with fishermen and managers to produce a package of technical measures and quota cuts which should ensure eventual recovery. Innovative modelling of quota management schemes was commissioned from CEFAS by the EU, to plan for the longer term management of these, and other, fish stocks.

Cod (*Gadus morhua*)

Fisheries Biology

The Fisheries Biology Science Area performs the science necessary to assess the impact of human activities and natural factors on freshwater and marine fauna and ecosystems. The results support advice given on the management and regulation of marine and freshwater fisheries.

Electronic tags for studying fish behaviour

CEFAS's Electronic Design Unit supports the study of fish behaviour, using leading edge technologies and specialist expertise in miniaturised electronics to provide unique data acquisition systems.

In this first year of a new collaborative agreement, CEFAS has developed two new ranges of innovative fish tags. The tags store environmental data, of pressure, temperature and light, and from these measurements calculate the daily position of the fish. The first range of tags provides long life data storage, up to ten years. The second range is a miniaturised version, allowing detailed research to be undertaken on younger fish, and smaller species. The tags will be manufactured and marketed by Lotek to scientists worldwide. The first tags are already on test, and they will be in full production later this year.

The latest generation of electronic Data Storage Tags (DST) developed jointly between CEFAS and Lotek Inc. (Canada). These devices are designed to be placed internally, therefore external yellow tags inform the fishermen that the fish contains a tag.

Dr Ted Potter
FB Science Area Head
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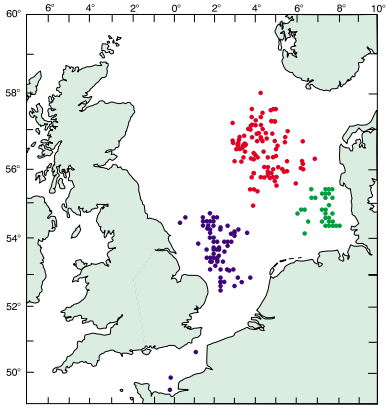
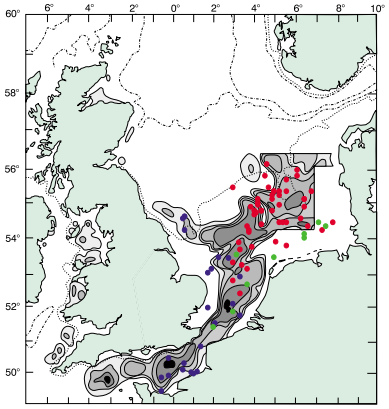
Plaice movement and population structures

CEFAS has recently completed a four year EC/DEFRA funded project in which 484 plaice were tagged with CEFAS's state-of-the-art electronic data storage tags to study their behaviour and geographical movements over extended periods at liberty. By the close of project, the movements of 145 free-ranging plaice had been reconstructed, ranging from 2 to 512 days in length, and yielding a total of 20,403 days of fish behaviour data.

> "CEFAS has shown seasonal subdivision of the North Sea plaice population into three geographically distinct feeding aggregations"



Three distinct plaice summer feeding groups



Spawning dispersal of the three groups

Our results have revealed seasonal subdivision of the North Sea plaice population into three geographically discrete feeding aggregations during the summer, which dispersed onto spawning grounds in the German Bight, the Southern Bight and the Eastern English Channel in winter. Mixing of the feeding groups on the German Bight and Southern Bight spawning areas preclude that these form genetically distinct sub-populations.

Left Page: Fish larvae

The number of plaice leaving the North Sea to spawn in the eastern English Channel is over three times greater than previous estimates based on analysis of conventional tagging data. We have also proved our prediction that plaice in the central and northern North Sea, where tidal currents are slow, migrate by directed swimming. This is different from the situation in the fast-flowing tidal currents of the southern North Sea where plaice use selective tidal stream transport to aid their migration.

Plaice *(Pleuronectes platessa). Reproduced with permission of B. Picton*

The genetic diversity of cod stocks

The recent development of sensitive molecular markers has stimulated a renewed interest in the analysis of fish population structure. These microsatellites, which are rapidly mutating regions of nuclear DNA, allow us to detect a higher degree of genetic structuring than had previously been possible.

In collaboration with researchers at the University of Hull, we have identified four genetically distinct populations of cod in the North Sea, which contradicts previous assumptions that the North Sea cod population was composed of a single homogeneous stock.

> "In collaboration, CEFAS has identified four genetically distinct populations of cod in the North Sea"

This conclusion, which is supported by earlier evidence of cod population structure obtained from tagging studies, provides new challenges for the monitoring of exploited populations, and the maintenance of genetic diversity.

Genetic identification of cod eggs

Plankton surveys can be powerful tools for mapping the spawning locations of fish. However, their application to gadoids common in UK waters has been limited by an inability to discriminate the eggs of cod, haddock and whiting. CEFAS, in collaboration with the University of East Anglia has just completed a project to identify genetic markers which can achieve this.

This has involved analysing genetic variability in the DNA of these species throughout their geographical range, identifying suitable sites within the DNA which can be used to discriminate between the species and designing probes based on these DNA sequences. The probes are then used in a polymerase chain reaction (PCR) which can amplify the tiny amounts of DNA which occur in even very young fish eggs.

Leading bait attractant research

Ultrabite Ltd. is a Joint Venture between CEFAS and KIOTECH Ltd., which was launched in September 2001 offering a range of species-specific fish bait attractants in the UK. The Ultrabite attractants, which include a pheromone patented by CEFAS, are initially targeted at the angling and sports fishing markets. Recently, CEFAS has identified two new pheromones for use in the lucrative US black bass sports fishing industry.

Left: Plaice tagging on board our research vessel

Right: Lowestoft fish dock at the turn of the century. *Reproduced with permission of Studio 161, Lowestoft.*

Auction at Lowestoft fish dock 2001

An active R&D programme is being established at Lowestoft to develop and market sustainable products for commercial fishing and the aquaculture industry. New products are currently being tested for use in the tuna and intensive crayfish aquaculture industries in Australia and the long-line commercial fishing industry in Norway.

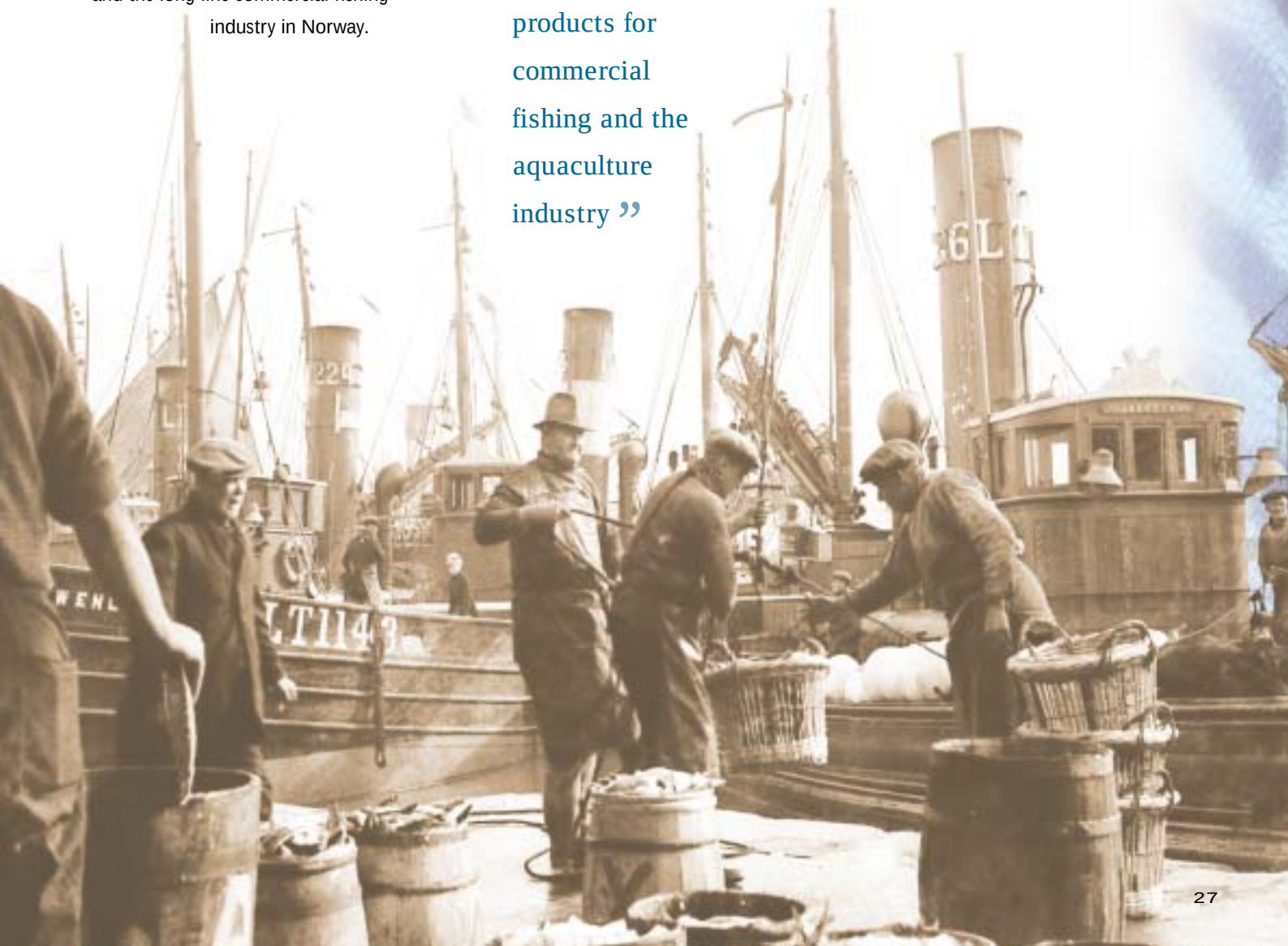
At present Ultrabite is sold in over 24 countries and distribution rights are being negotiated in the US, Australia and Norway. Further details are available at **www.ultrabite.com**

New uses for old data

Recent analysis of 100 year-old fish catch records from English research vessels has given us an insight into what the fish community may have looked like at the start of the 20th Century. At that time, when fishing effort by steam powered trawlers was beginning to increase rapidly, large sharks, skates and rays were relatively abundant, and the demersal fish catch was dominated by large-bodied fish of commercial importance such as cod, whiting and plaice.

> “Further R&D by CEFAS will support the development of sustainable products for commercial fishing and the aquaculture industry”

Evidence from recent surveys suggests that skates are now very rare and the proportions of small, non-target species in catches has increased significantly. In order to further describe the patterns of change, a detailed catalogue of historic fish catch data from almost 2,500 logbooks has been prepared. These will provide detailed time-series datasets which will allow a more sophisticated analysis of the cause of these trends, and the role of other factors such as climate change.



Aquaculture and Fish Health

The Aquaculture and Fish Health Science Area provides scientific advice and services related to the development of sustainable aquaculture practices and the protection of wild and cultivated stocks from disease.

Dr Bari Howell
AFH Science Area Head
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Fish health inspections

CEFAS's Fish Health Inspectorate is responsible for the implementation of fish and shellfish legislation in England and Wales. This involves programmes of inspection and disease testing at farm sites, licensing and monitoring of imports, the investigation of mortalities and the placement of controls on sites or areas where notifiable diseases are discovered.

Despite the inspection programmes being severely disrupted by the foot and mouth disease outbreak in 2001, we were able to meet the required standard to maintain Great Britain's status as an approved zone for VHS (Viral haemorrhagic septicaemia) and IHN (infectious haematopoietic necrosis).

There were no significant outbreaks of any notifiable disease, and fewer than usual fish mortality events to investigate during the year. Only one notifiable disease, Spring Viraemia of Carp, was detected, at 2 sites. Follow up actions at contact sites enabled us to prevent a more significant outbreak developing.

Left Page: Development of an enzyme linked immunosorbent assay (ELISA) for cod vitellogenin

PKD Research

Proliferative Kidney Disease (PKD) is among one of the most important parasitic diseases affecting wild and cultured salmonid fish in Europe, Canada and the USA. Although the disease has been recognised for about 100 years, it has only been in the last three years that the life cycle has been elucidated by our scientists working in collaboration with colleagues at the Universities of London and Reading.

Further to the discovery of the role of bryozoans as the alternate host for the parasite, it has been demonstrated for the first time that the parasite enters the fish host via the mucous cells. This significant finding will allow more targeted studies on host/parasite interactions and on potential chemotherapeutants or vaccines to combat the disease.

> "This significant finding will allow more targeted studies on host/parasite interactions"

Sex control in halibut

Atlantic halibut is a species that is relatively new to the marine farming sector in the UK. The natural slower growth of males than females after the male matures limits productivity and so there would be a significant commercial advantage if all-female stocks of fish could be produced.

It is essential that the methods developed are environmentally friendly and so direct treatment of the fish with sex hormones is discounted. Alternative methods depend on understanding the sex determining mechanism and the production of gynogenetic (originating from maternal genetic material only) fish is one approach to generating this information.

Good progress has been made towards defining conditions that allow the induction diploid gynogenesis. Exposure of the eggs to u/v-irradiated sperm initiates development without contributing any genetic material and the diploid (two sets of chromosomes) status restored by subjecting the eggs to high pressure.

Eleven day old halibut embryos

The refinement of these procedures will allow these diploid gynogens to be reared to the point when their sex can be determined and thereby provide valuable information on the nature of sex determination in this valuable species.

> “Good progress has been made towards generating information on sex determination in this valuable species”

The stickleback as a biomarker for environmental androgens

CEFAS is developing and validating of a novel *in vivo* biomarker test for water-borne androgens and anti-androgens. The test is based on production of spiggin, the glue protein by the male three-spined stickleback during breeding. Spiggin is a glue protein produced in the kidney and is used as a building material for constructing nests. It has been shown that spiggin production is under the control of androgens and so far is the only androgen-regulated protein known in teleosts.

In the past three years we developed an Enzyme-linked Immunosorbent Assay (ELISA) for spiggin and demonstrated its application to the measurement of spiggin in the kidneys of female sticklebacks that have been exposed to androgens in

Male stickleback *(Gasterosteus aculeatus)* during breeding

the water. Female sticklebacks that were exposed to pulp mill effluent, a long-suspected androgenic effluent, also produced spiggin in their kidneys.

The novel assay can be adapted to detect anti-androgens. In this way we have shown that flutamide, an anti-androgen used in the treatment of prostate cancer, inhibited or reduced spiggin production in androgen-treated female sticklebacks.

Currently an ELISA for stickleback vitellogenin (a biomarker used extensively for the detection of xenoestrogens) is being validated in our laboratory. This could allow the simultaneous assessment of androgenic and oestrogenic xenobiotics in the environment, which are known to reduce the reproductive capacity of fish.

Koi Herpes Virus

During 2000 and 2001 ornamental fish wholesalers and retailers in the UK suffered mass mortalities in imported koi carp following outbreaks of gill disease. The causal agent, a herpes virus, was first isolated in the UK at the CEFAS Weymouth laboratory in 2000. A diagnostic assay based on the detection of viral DNA was used to diagnose the viral infection at sixteen sites around the country in 2001. Further molecular virology techniques have been developed and used to provide important information on virus pathogenicity and confirm the existence of a highly infectious disease, which poses a serious threat to the world-wide ornamental carp trade. These studies have also

Right: Fish Inspector at work

allowed CEFAS virologists to provide advice on control of the disease and also to assess the impact of the herpes virus on native carp populations.

Welfare research

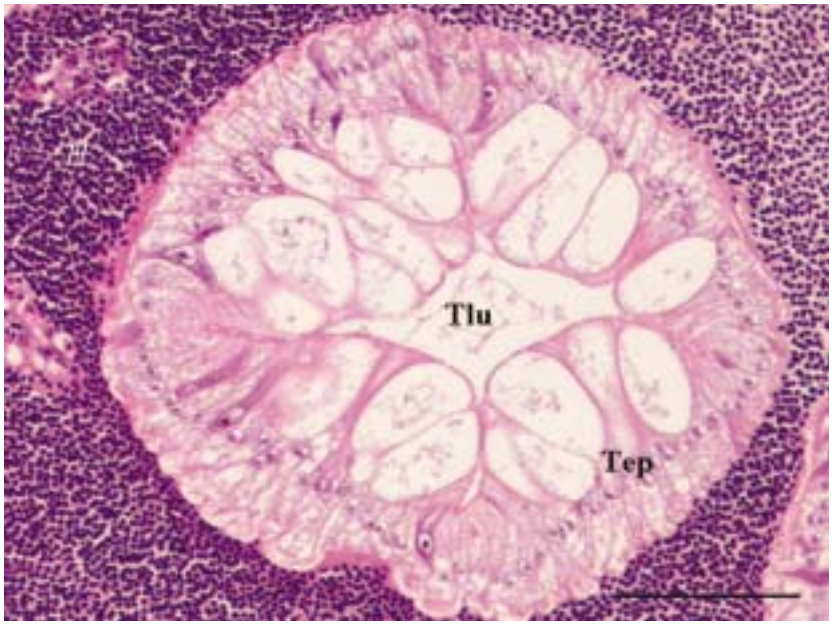
Animal welfare is fast becoming an important issue for the fish farming industry. Welfare status is, however, a difficult concept to quantify, and it is acknowledged that objective indicators are needed in this new field. We are therefore developing a non-invasive stress assay to measure the amount of cortisol (the classic stress hormone) in the water, rather than in the blood.

Results to date have shown that water cortisol levels relate as expected to stressor severity, temperature, fish size and dilution rates. This novel methodology indicates that crowding (high stocking density) *per se*, is not a stressor to rainbow trout.

A yeast-like infection in crabs

Through routine monitoring of the health status of aquatic animals, pathologists at CEFAS have described for the first time, a yeast infection in commercially important stocks of the European edible crab (*Cancer pagurus*) and the velvet crab (*Necora puber*).

Significantly, the yeast has been found in crabs which are already infected with the parasite *Hematodinium*. It is thought that a compromised immune system (a common feature of animals living under stressful conditions such as during parasite infections) facilitates the development of secondary infections such as this. The discovery of this yeast infection has implications for the development of similar infections in cultured crustacean species.



Hepatopancreas of velvet crab infected with *Hematodinium* sp.

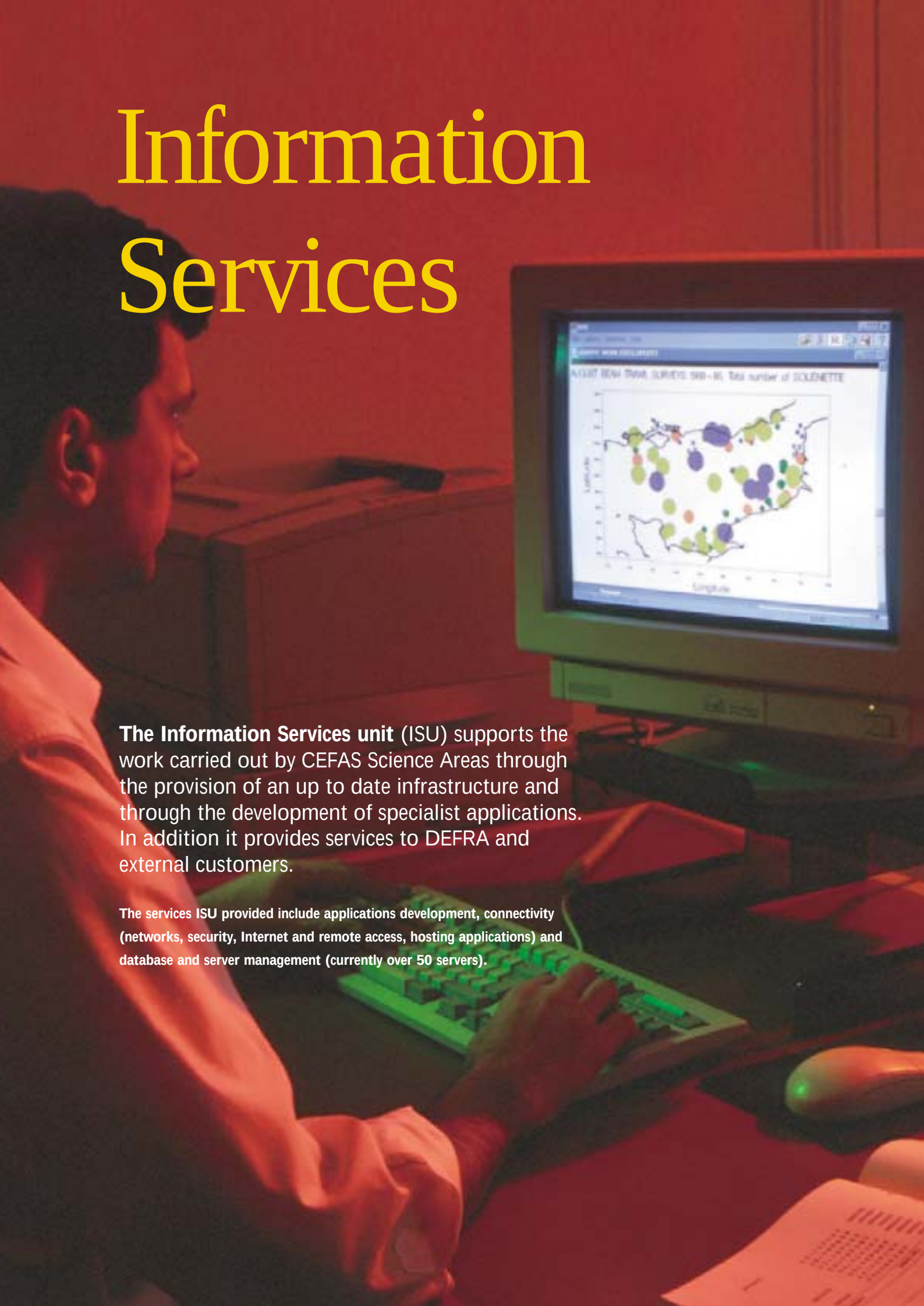
> “This discovery has implications for the development of similar infections in cultured crustacean species”

Identifying new species of parasites on marine gobies

During studies on the parasite community structure of gobies as a potential biomarker of contamination, we have identified five new species of *Gyrodactylus* monogeneans from the skin of three species of inshore gobies. Descriptions of these parasites have been prepared in conjunction with Dr Andrew Shinn (Institute of Aquaculture, University of Stirling) and submitted to a peer-reviewed journal. Currently, there are only five species of *Gyrodactylus* known from gobies worldwide, despite there being over 400 species of gobies recognised.

Gyrodactylid sp. attached to the skin of it's host. *Reproduced with permission of Dr Andrew Shinn.*

Information Services



The Information Services unit (ISU) supports the work carried out by CEFAS Science Areas through the provision of an up to date infrastructure and through the development of specialist applications. In addition it provides services to DEFRA and external customers.

The services ISU provided include applications development, connectivity (networks, security, Internet and remote access, hosting applications) and database and server management (currently over 50 servers).

John Bumpus
Head of ISU
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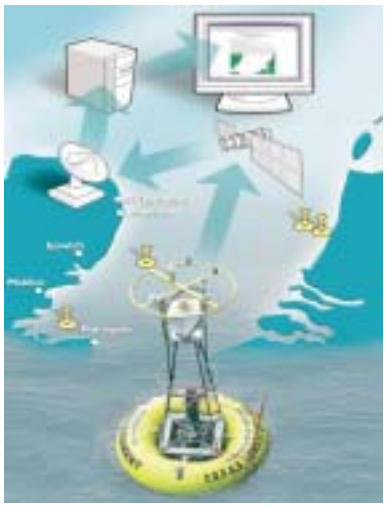
Information Services

A Helpdesk offers support via telephone or e-mail to all customers, monitored by Service Level Agreements. The Lowestoft site also offers provision for disaster recovery.

The ISU currently serves over 800 individuals including CEFAS internal customers, DEFRA and external customers. Software currently in use by customers includes:

Live Fish Movements - A system for applying the controls on fish movements in England and Wales, employing GIS techniques.



Real-time environmental data on the internet (www.cefas.co.uk/monitoring)

Left Page: Working up scientific data on screen

Sea Fisheries Management Systems - The systems are used by DEFRA and other Fisheries Departments in the UK for managing the Common Fisheries Policy (CFP). Information on fishing catch and effort for all recorded commercial landings into England, Wales and Northern Ireland is held. The systems provide information needed by DEFRA to allocate, monitor and control uptake of fishing quotas, and also support CEFAS's fish stock assessment work.

Biological Sampling - The system supports the work of CEFAS scientists on stock assessment of fisheries, facilitating the storage, quality control and processing of fishing survey data collected on research cruises. ISU is also responsible for the installation of databases onto the shipboard computer system prior to a cruise and the unloading of the databases onto the land-based system on return.

Marine Consents Management System - Used by DEFRA and other UK departments to administer legislation applying to the marine environment.

ISU has new customers this year outside the UK including the following projects:

Consultancy with the Government of Latvia on IT systems for the management of the CFP - The CEFAS IT Applications team is involved in an EU Twinning project to strengthen the ability of Latvia to meet the requirements of the Common Fisheries Policy, as part of its planned membership of the EU, under the enlargement process. CEFAS is providing expertise based on our experience in developing and operating the UK's Ministry of Agriculture, Fisheries and Food (now DEFRA)'s integrated fisheries management information systems.

Fish measuring on board our research vessel

Shared Gear Selectivity Database for European fisheries laboratories - The objective is to deliver a shared database, hosted at Lowestoft, to be shared via secure internet access by the 13 partner fisheries laboratories in Europe. The components will be a Selectivity Database including a Database Management System, a portable remote Data Entry Program and Secure User Logon and Authentification System.

The selectivity characteristics describe the ability of fishing gears to retain the larger sizes of fish and release the smaller sizes. For towed gears these characteristics depend largely on the mesh sizes in the compartment retaining the catch. The information is used to appraise the fishing mortality (e.g. the proportion of fish removed from a stock) of fishing gears. Data is gathered among research institutes in Europe and the database should enable a more efficient retrieval and selection of these data for reference and analyses purposes.

efishbusiness

This project is the development of a website for business and others involved in trade and/or movements of live fish. This site **www.efishbusiness.com** has brought together for the first time all the related information on the controls that apply to live fish movements, both nationally and internationally.

Information and guidance on the legislative controls and all relevant application forms are provided. Further information on preventing illegal imports of live fish is now available on this site.

efishbusiness web site

Ministerial launch of award-winning live fish movements database

Fisheries Minister Elliot Morley visited the CEFAS Weymouth Laboratory on 14th November 2001 to launch the new state-of-the-art Live Fish Movements Database.

The theme for the day was 'Protecting wild fish and the environment – facilitating legal movements of fish through joint action.'

Dr Peter Greig-Smith welcomed the Minister, the press and representatives of other government agencies from Northern Ireland, Wales and Scotland. The project was funded by the Treasury's Invest to Save Budget (ISB).

The database allows officials from the agency partners, CEFAS, EA, DEFRA and National Assembly for Wales Agricultural Department (NAWAD) to view each other's records and provides a facility to monitor and regulate all live fish movements in England and Wales. It will assist in the process of identifying illegal movements, including illegal imports. It incorporates an impressive mapping system, which can highlight all fish farms, fisheries and opens rivers and waters across England and Wales. In the event of a major outbreak of fish disease this facility will help in tracking the disease and in identifying vulnerable areas and premises, and enable the authorities to respond quickly and effectively to any emergency.

The merits of this project have been recognised by two awards. It was adjudged to be runner-up in the 'best joined-up service' category of the Government Computing Innovation Awards 2001, designed to acknowledge leading innovators in the electronic delivery of public services. The project was also short-listed for the prestigious ISB Progress in Partnership Awards 2001. These awards recognise schemes that show high levels of fresh, creative thinking and deliver concrete benefits, providing a model for other agencies to follow.

The Minister praised the work of CEFAS and the EA in bringing the new system into being. He also sought to draw public attention to the ongoing problem of illegal imports of live fish, which has the potential to cause immense damage to our indigenous fish stocks, and have a detrimental effect on the environment and ecology of our waters. Mr. Morley emphasised the high health status of the UK's fish stocks and added that every effort must be made to protect our fish against diseases that are common on the Continent.

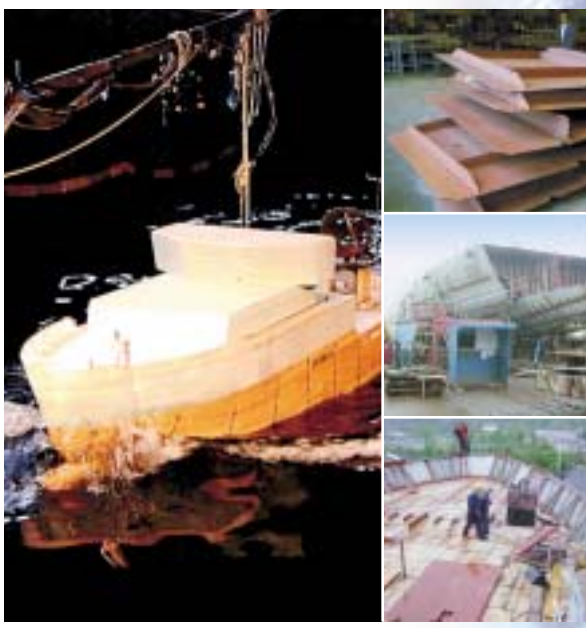
A New Research Vessel

Work on a new £23 million research vessel for CEFAS is on course for completion with over 98% of its steel weight already erected when going to press. The naming ceremony for the 3,000-tonne ship will be in June 2003.

The vessel has been constructed under cover in 117 units, that have been brought out and assembled on the building berth.

The new vessel, being built by Ferguson Shipbuilders, Port Glasgow, will work alongside the *Corystes*, one of CEFAS's two current operational craft. It replaces the 32-year old *Cirolana* and will ensure the continuity of our programmes to gather data on fish stocks and assessment, marine environment protection, including monitoring water quality, the safety of seafood, and research on fish biology and ocean circulation.

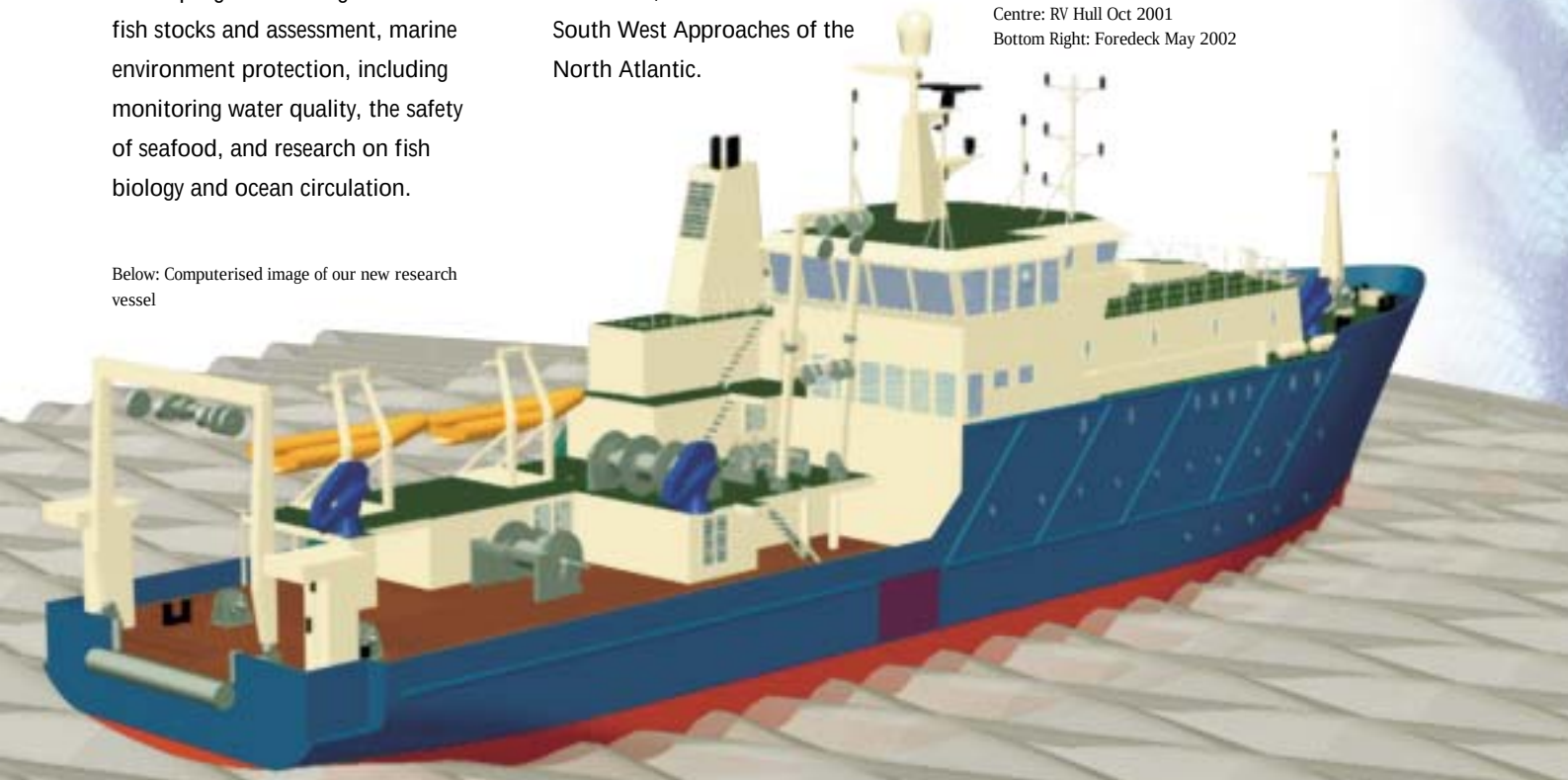
CEFAS project manager Captain Ross Jolliffe said "We are delighted to say the project is on schedule and within cost and moving ahead swiftly". The ship will carry out scientific research for more than 280 days a year and for up to 35 days at a time, with 16 crew and up to 19 scientists. The ship can travel as far afield as Canada and the Arctic, if necessary, but will more typically work in the North Sea, the Irish Sea and the South West Approaches of the North Atlantic.



Above: Seakeeping tests using a scale model of the new RV June 2001

Top Right: First Steelwork June 2001
Centre: RV Hull Oct 2001
Bottom Right: Foredeck May 2002

Below: Computerised image of our new research vessel



Fulfilling our Responsibilities

CEFAS lays great emphasis on ensuring that policy makers, the public, industry and scientists can have confidence in the quality of our work.

Left Page: R. V. *Corystes* Above: CEFAS, Burnham on Crouch Laboratory

Assessing Customer Satisfaction

We maintain regular contact with customers to ensure that we meet their requirements as far as possible. Our larger research programmes with UK Government customers are reviewed at regular progress meetings where outputs are reported and further directions agreed. We also maintain an ongoing survey of customer satisfaction. At the completion of each contract over a threshold value or after 12 months, whichever is sooner, we ask customers to rate our performance in terms of understanding and meeting project objectives, delivering to time and budget, providing value for money and communicating progress. The scores from the survey were good overall. As well as providing us with very important feedback, the results from the surveys are used as a measure of performance under our Ministerial Targets (see page 54).

To further improve our customer service, we have appointed the following Customer Relationship Managers for the identified sectors: Dr Mike Waldock for DEFRA Environment Protection Directorate General; Dr Joe Horwood for DEFRA Food, Farming and Fisheries Directorate General; Dr Stephen Malcolm for DEFRA Rural Affairs Directorate General; Dr Vic Bye for FSA; Brian Robinson for commercialisation; Sean Higgins for engineering consultancy; Dr Geoff Tingley for EC/international consultancy and Deborah Gillatt for foreign governments/international consultancy.

CEFAS Charter

The CEFAS Charter specifies the standards of service we aim to achieve in our dealings with the public, business and non-Government organisations. During 2001/02, the following standards were achieved: 99% letters were replied to within 15 working days of receipt and 100% of visitors were seen within 10 minutes of the appointment time at CEFAS Laboratories. No complaints were received under the Charter.

Under the Code of Practice on Access to Government Information and the Environmental Information Regulations for the period 1 January 2001 to 31 December 2001, no requests were received specifically under the Code of Practice or under the Environmental Information Regulations.

We abide by the provisions of the central and local government Enforcement Concordat, which commits us to effective enforcement policies and practices. The Concordat has direct relevance to inspection programmes for fish health and deposits in the sea.

Environmental policy

During 2001/2002 CEFAS has continued to monitor energy usage and to implement energy efficiency measures where appropriate. One example is the modification to the water header tanks that supply water to the experimental tank facilities at the Weymouth Laboratory. The modifications enable better control over flow rates and it is anticipated that savings of 10% in water use could be made. Water usage surveys have been undertaken in order to identify appropriate benchmarks.

Green Transport Plans have been updated following a staff survey. CEFAS will review the business need for Environmental Standard ISO 14001 in the coming year.

Animal welfare and ethical review

CEFAS uses animals, mainly larval and adult fish, in some of its scientific studies. To ensure acceptable standards of welfare and to promote a 'culture of care' CEFAS has two approved Ethical Review Processes (ERP) in place. The ERPs act through Animal Welfare and Ethical Review Committees that comprise scientific staff and lay members from CEFAS and the local community. The Committees meet twice each year and their aims are to promote responsible attitudes towards animal welfare and the use

Processing water samples for non-invasive measurement of stress hormone levels

of animals in scientific work. The committees also review the progress of projects that involve animal use to ensure that aims are being achieved and that the use of animals continues to be appropriate and effective. In addition, a cross-site CEFAS committee met once to consider ethical issues on an Agency-wide basis.

Although it is not possible to avoid the use of live animals in some studies, our aim is to refine methods and reduce numbers. At Lowestoft, for example, the Committee has continued to focus on developing statistically rigorous methods for identifying the most effective sample sizes for scientific experiments. This will ensure that animals use is minimised, but without compromising the need to demonstrate statistical significance.

Health and Safety

The establishment of DEFRA triggered a further review of our Health and Safety Policy during the year. Staff were actively encouraged to participate in the review process and feedback direct input to Safety Panels and our Health Safety and Quality Team (HSQ).

The CEFAS Management Board endorsed a training programme beginning at Board level, on the legislative basis and updates on health and safety at work. Resources were also committed to enhancing the competence of the HSQ Team through professional qualification, practical training to reduce risk of road traffic accidents and combating ill health from computer work and stress.

The Occupational Health review commenced with the first round of self-surveillance and assessment of the findings being completed. A further exercise is planned for the coming year to establish a firmer baseline and trends to support our objective of keeping staff healthy through *inter alia,* optimising their work and providing support for their timely return after ill health absences.

Quality management

This year we maintained our status as a Laboratory operating in compliance with Good Laboratory Practice Regulations 1999 administered by the UK Department of Health for safety testing of veterinary medicines at our Weymouth Laboratory. We also upgraded our accredited operations administered by the United Kingdom Accreditation Service (UKAS) to the new international standard ISO 17025 at Lowestoft for radioanalytical testing on environmental samples, and at Weymouth for our microbiology work and for the detection of marine biotoxins. Scientists at our Burnham laboratory are leading on a European programme to develop Quality Assurance methods for biological effects monitoring.

Accredited radiological operations are recognised by the European Commission which undertakes a separate auditing process of UK surveillance facilities under the terms of the Euratom Treaty to which the UK is a signatory. Our Weymouth accredited work provides a further demonstration of our

Sample preparation for radioanalysis in the laboratory

endeavours to provide sustained quality services as European Community Reference Laboratory for microbiological contamination of shellfish.

Facilities and equipment

A joint Facilities Management/ Research Vessel Management contract was awarded to Caxton FM Ltd and Smit International (Scotland) Ltd with effect from 1 April 2001. The arrangements have proved to be very successful, and despite the uncertainties leading up to contract award and their subsequent transfer to Smit employment, the Research Vessels' crews have reacted positively and continue to work very well with CEFAS's scientific staff.

Finance procedures

CEFAS has successfully completed a second year as an Agency operating under the Net Accounting regime.

During the year a new Audit Committee was put in place, chaired by an external member of the Ownership Board. This Committee now meets regularly and provides advice to the CEFAS Accounting Officer and Management Board on the adequacy of internal and external audit arrangements, as well as on the implications of assurances provided in respect of internal control and risk management.

Associated with the formation of the new audit committee internal audit services have now been outsourced to PricewaterhouseCoopers with effect from April 2001. These services operate under contract to CEFAS, to standards defined in the Government Internal Audit Manual. Based on analysis of the risks to which CEFAS is exposed, a comprehensive Strategic Audit Plan for this and future years has been developed by PricewaterhouseCoopers, and endorsed by the Audit Committee.

Improvements were also made to internal systems, in particular for planning and controlling the human resource requirements of contracts, enabling more efficient project management.

Fish smugglers caught

In May 2001, CEFAS mounted an operation against one of its main target offenders who was suspected of illegally importing live ornamental fish from Italy, an area where the disease Spring Viraemia of Carp is widespread.

Firstly, an inspection of the suspect's site was made, which resulted in the company being reported for offences including keeping specified species without the requisite licence under the Import of Live Fish Act. Then CEFAS staff maintained surveillance on the same site resulting in the interception of a delivery of more than one tonne of live fish to the site. The fish had not been health-checked in Italy as is required under European and UK regulations, and no movement document accompanied the consignment.

At a later court appearance the managing director of the company pleaded guilty to the offences and was ordered to pay a record £29,808.97 in fines and costs. It is hoped that the subsequent publicity surrounding these convictions will send out a clear warning to others who may be contemplating similar smuggling ventures.

Enhancing our Reputation

"We are committed to increasing public awareness of CEFAS as a leading centre of expertise for advice and the science underpinning it"

One of the the winning paintings in CEFAS's Lowestoft Fish Fayre 2001 painting competition, by Amy Satchell, aged 6

Representation

CEFAS scientists participate in a large number of expert groups. They also represent the UK in national and international fora, and provide science support to national delegations. Some of the representative roles are listed below.

Internationally -

The International Council for Exploration of the Sea (ICES) is an intergovernmental organisation co-ordinating marine science and advice for the North Atlantic and adjacent Seas. CEFAS represents the UK on its Council and on its three advisory committees: the Advisory Committee on Fishery Management; the Advisory Committee on the Marine Environment; and the new Advisory Committee on the Ecosystem. CEFAS also represents the UK on its Science Committees, and provides the Chair of the Resource Management Committee.

CEFAS represents the UK on the EU's Scientific, Technical and Economic Committee for Fisheries (STECF), and Chairs the sub-group on review of stocks and the Expert Working Group on Fleet Dynamics.

OSPAR is an intergovernmental organisation responsible for management of the marine environment in the North-East Atlantic and adjacent Seas. CEFAS takes several key roles, *inter alia*, the Chair of the Environmental Assessment and Monitoring Committee, the vice-Chair of the Eutrophication Committee and Chair of the Seabed Working Group. CEFAS scientists are also delegates to OSPAR's Radioactive Substances Committee, the Biodiversity Committee, and a number of other committees.

CEFAS participates in the Article-37 Group of Experts, established under the Euratom Treaty, to advise the EU Commission on acceptability of proposals for new nuclear plant and modifications to existing plant.

CEFAS represents the UK on the Scientific Group of the London Convention, which is an international agreement regulating disposal of wastes at sea.

CEFAS provides science support for the UK at the International Whaling Commission, and represents the UK at specific meetings such as the expert group that considered the practical implementation of a supervision and control scheme necessary to regulate any resumption of commercial whaling.

CEFAS also provides science support for the UK at the North Atlantic Salmon Conservation Organisation and represents the UK on their science committees.

Our scientists also represent other international bodies. CEFAS currently holds the post of Secretary General of the Fish Diseases Commission (FDC) in the world organisation for animal health (OIE), which sets standards for health assurance for international trade in aquatic animals. As such, CEFAS represents the OIE and FDC at expert meetings with other intergovernmental organisations such as the UN Food and Agriculture Organisation (FAO) and the Network of Aquaculture Centres in Asia-Pacific.

Sperm Whale
(*Physeter macrocephalus*)

We represented STECF at the Resources Working Group of the Advisory Committee for Fisheries and Aquaculture, and in an EU-Iceland dialogue on future challenges in fisheries. CEFAS also represented a scientific consortium and presented the results of simulations on multi-annual fishing strategies to STECF. A number of CEFAS scientists participate in working groups of PIANC, the Permanent International Association of Navigation Congresses which provides authoritative guidance and best practice documents on matters relating to navigation, for example, dredging and disposal of dredged material.

> “Our scientists are particularly valued for their ability to apply their knowledge and expertise in the context of national and international policy development and application”

Nationally - CEFAS scientists take significant roles within national fora as, *inter alia*, the Marine Pollution Monitoring Management Group (MPMMG); the National Marine Monitoring Programme Working Group (NMMP); the Fisheries Dredging Liaison Group; The Fisheries Conservation Group; the UK Eutrophication Steering Group; Water Framework Directive; and the NMMP Classification Task Team.

Scientific communications

Though falling short of our target, CEFAS scientists published 84 articles in the peer-reviewed scientific press and participated in a considerable number of UK and international conferences to present papers and posters describing aspects of our work. In addition, CEFAS has been involved in organising several conferences and training workshops, and produced a variety of publications in printed and electronic format. These included CEFAS series reports, EU and contract reports, Trout News and Shellfish News. Most of these publications are available on the CEFAS website.

Events with the general public

CEFAS is committed to enhancing its reputation with the general public through a number of regular and one-off events such as participating in fish festivals, school science fairs and giving talks to community groups. Some highlights of this year’s activities are recorded here.

The annual **Lowestoft Fish Fayre** took place on the 23 June 2001 and attracted approximately 15,000 visitors with CEFAS sponsoring the event for the first time.

This important local event continues to attract a growing crowd each year, whilst its aim is to inform the public about the work and lives of those involved in the fishing industry. As part of the Fish Fayre CEFAS ran a highly successful children's painting competition and there was also a Guess the Sea Creature competition at CEFAS's display.

CEFAS contributed to the eleventh **Newlyn Fish Festival**, held over the August Bank Holiday weekend to raise funds for the Mission for Deep Sea Fishermen, and it broke its previous record with an estimated 23,000 visitors to the fish market and harbour. In addition to a display tank with small bass, solenette and pipefish, there was a microscope for looking at otoliths. Live fish displays and their migrations and biology provoked the main interest, in particular a discussion of the early results of the bass tagging programme attracted many people.

Weymouth & Portland Fish Festival held its second one day event in July, organised by the local and county tourism departments, aimed to raise awareness of the local seafood industry and the marine environment. The CEFAS stand concentrated on material relating to aquaculture with live displays of juvenile sole and scallops and a chance to view brine shrimp nauplii through a microscope.

December 2001 saw the fourth annual CEFAS **fish tag lottery draw** for £1,000 take place. The draw was made by Amy Satchell, aged 6, whose painting of seahorses won the 6-11 years category in the 2001 Lowestoft Fish Fayre painting competition. Her artwork was so impressive that it was used as the CEFAS Christmas card last year. In return Amy was presented with a painting box and asked to make the draw for the annual CEFAS fish tag lottery.

Painting competition winner, Amy Satchell, receiving a prize after making the fish tag lottery draw

The lottery was set up as a further incentive to fishermen to return electronic data storage tags (DSTs) to CEFAS. This is one of a number of DEFRA-funded research programmes that involve putting sophisticated DSTs on fish. These tags provide information about the migration and behaviour of a number of commercially important species in the North Sea (plaice, cod, rays). To date more than 850 individual fish tagged with DSTs have been released and a total of 284 tags returned. By returning DSTs fishermen play a valuable part in helping to ensure the long-term sustainable harvest of North Sea fish.

Kirkley High School in Lowestoft hosted a 2-day Science Fair in March 2002, part of a national programme of events held during **National Science Week**. CEFAS together with other local organisations which employ scientists provided hands-on science activities to demonstrate how science is used in industry, illustrating that science is relevant and fun. Ultimately apart from strengthening CEFAS's links with local schools this event helped to raise awareness of careers in science.

A similar event was held in the **Poole Harbour** area where the emphasis was on the wildlife which 'invades' its shores and waters. CEFAS's display included aspects of shellfish hygiene work and assessment of discharges in relation to receiving shellfish water quality and some of the experimental work being done in this area. Other aspects of the display covered shellfish cultivation, including the Manila clam 'invader'.

Left: CEFAS staff at the Weymouth & Portland Fish Festival 2001

Commercial Business Development

Commercial Business Development

CEFAS won contracts from a wide variety of public and private sector customers both in the UK and abroad. We met our income target, including £2,655,000 from work for the private sector, foreign governments and international agencies.

Commercialisation of Intellectual Property

In the past year CEFAS has been very active in pursuing new opportunities to commercialise its intellectual property in support of the Government's Wider Markets policy, and our three joint ventures all progressed well. A new collaborative agreement was signed with Lotek Group (see page 25 for more about the innovative fish tags now in production) while Ultrabite Ltd, a joint venture between CEFAS and KIOTECH Ltd, is starting to receive worldwide attention in the sport fishing market with its revolutionary bait attractant. Eco-Sense Ltd, the joint venture with WS Oceans (now WS EnviroTech), attracted international interest in its marine monitoring systems, showcasing its products at Oceanology 2002 in March at the Docklands-based Excel exhibition venue.

CEFAS established a limited company - CEFAS Technology Limited (CTL) in June 2001. CTL gives CEFAS greater flexibility and a wider range of options in deciding its commercial strategy, particularly for exploiting research outcomes. One of CTL's first actions was to acquire shares in the Lotek group, as part of the collaborative agreement with CEFAS.

Developing business with foreign governments and international agencies

CEFAS continued to consolidate its portfolio of international business. CEFAS consultants advised the World Bank on two programmes in Albania. The first involved designing and costing a project to evaluate the cost-effectiveness of a hatchery stocking programme for trout in Lake Ohrid. The second involved an appraisal of mussel farming at Butrinti Lagoon and prospects for its development and an appraisal of existing public health measures for the production of live bivalve molluscs and their equivalence with EU standards.

As part of our long-term co-operative contract agreement with the Kuwait Environment Public Authority (EPA), CEFAS sent three scientists at short notice to Kuwait City in the summer of 2002. Their mission was to help the authorities identify the cause of a major fish kill in Kuwait Bay. In a hectic and intense schedule they visited several institutes, took a number of samples and investigated the bacterial vector directly responsible for the kill. The report confirming the team's diagnosis and the root cause for the problems was subsequently discussed with the EPA at their International Conference on Coastal Zone Management and Development which took place in Kuwait in March 2002.

www.cefas.co.uk

The CEFAS website **www.cefas.co.uk** grew again in 2002, with the number of visitors doubling over the year, and ten new sections added covering a wide range of topics from fishery sensitivity maps to interactive mapping enhancement of marine monitoring data. A searchable publications database with abstracts was added to the site in the summer to help users track down reports and publications issued by CEFAS or scientific papers published by CEFAS staff.

Left Page: CEFAS stand at Offshore Europe 2001

Right: Site visit to Lin Hatchery, Lake Ohrid, Albania

People

CEFAS's Core Values are: Integrity, Excellence, Customer Focus, Concern for People and Continuous Improvement.

"Despite many competing pressures and unexpected demands this year, we have made much progress. This would not have happened without the dedication and professionalism of the Agency's staff. I am grateful for everyone's contributions this year"

Dr Peter Greig-Smith
CEFAS Chief Executive

Rebecca Horn of CEFAS, also captain of the DEFRA swimming team with her trophies

Employee relations

CEFAS management and Trade Union representatives have continued to work together across a wide range of initiatives including the ongoing review of performance management and appraisal processes, and other Modernising Government activities. Also, a total of nine Staff Development Co-ordinators represent staff on a number of task teams to improve training and development, recruitment and introduce a competency framework. Updates are regularly communicated to staff and feedback is actively encouraged.

Annual Staff Survey

An electronic staff attitudes survey is conducted every summer which attracts a high response rate. Overall results are used to drive improvement activities, and although anonymity is protected, individual comments are acted upon wherever possible.

Training & Development

Since the appointment of CEFAS's Training Manager, Kimberley Croucher in January 2001, substantial improvements have been made to CEFAS's corporate training portfolio. 34% of staff completed our specially designed Diversity Awareness workshops last year, and our new induction programme has proved highly successful.

CEFAS is accredited as an Investor In People and is preparing for re-assessment in late 2002. Improvement activities identified through the annual staff survey have included communications, evaluating training and development and further increasing the use of personal development plans.

Diversity Awareness workshop, held at the Lowestoft laboratory

Equal Opportunities and Employment of Disabled Persons

CEFAS is fully committed to recruiting and retaining a diverse workforce and does not tolerate any unfair discrimination or harassment. As an Equal Opportunity employer, CEFAS has policies in place to provide equal opportunities for all staff to develop their potential and use their abilities to the full. Further alterations to the CEFAS sites have provided improved access and facilities for disabled staff and visitors.

A work/life balance study has been completed as part of CEFAS's commitment to the Civil Service Reform programme, and CEFAS has taken the lead in establishing the Waveney Childcare Forum, consisting of representatives from a number of the Lowestoft area's main employers. The Forum seeks to share information and best practice on 'family friendly' issues, and discuss the childcare needs of its employees with local childcare providers.

Leadership Development Programme

CEFAS's Pathfinder programme was launched in 2000 with funding from the Government's 'Invest to Modernise' scheme. This high profile experimental programme was designed to identify and develop future leaders in CEFAS against defined leadership competences. Benefits have already resulted from developing commercialisation ideas and establishing a network of potential future leaders across CEFAS. The six modules of the main programme have been run and the project will be evaluated before a re-launch at the end of 2002.

> "CEFAS is fully committed to recruiting and retaining a diverse workforce"

Recruitment

CEFAS has systems in place to ensure that recruitment is carried out on the basis of fair and open competition and selection on merit. These systems were externally audited on behalf of the Civil Service Commissioners in October 2001. There were no breaches of the Commissioner's code, and all the recommendations have been acted upon, including using alternative methods of completing applications for disabled candidates.

CEFAS is committed to building and maintaining a truly diverse workforce and therefore applications from people of all backgrounds and cultures are very welcome. Part-time working and job share applicants are also welcome. Vacancies are advertised on **www.cefas.co.uk/vacancies** and we are also happy to receive CVs from people wishing to join CEFAS in the future.

Recruitment activity remained at a high level.

The table shows the total number of staff recruited externally during the year.

Grade	Male	Female	Total	Disabled
Senior manager/scientist	2	1	3	0
Middle manager/scientist	8	8	16	0
First line management/scientist	9	12	21	3
Support staff *	15	29	44	1
Total	34	50	84	4

*** - includes all CEFAS Pay Bands 1-3 recruitment**

Ethnic origin questionnaires were returned by 57% of new staff, comprising 91% white origin and 9% minority origin.

In addition, there were approximately 50 staff recruited for short term appointments of less than one year.

Secondments programme

CEFAS successfully completed a 2-year secondments programme supported by the Government's 'Invest to Modernise' fund. Some highlights of this programme are recorded below.

In November 2001 Mike Challiss from CEFAS's Electronic Design Unit completed a two-week secondment to Lotek, the Canadian fish and wildlife monitoring systems company in Newfoundland. The aim of his visit was to learn about Navision (a Management Information System) and how this system could facilitate more efficient transfer of information into the Lotek production facility. Mike received full training in the system and was able to introduce some new ideas on how data formats may be handled within Navision.

Sara Hughes from CEFAS's Business Development Unit spent three weeks in February 2002 working in the Intellectual Property (IP) and Commercial Department of a corporate law firm in Leeds. The objective of the secondment was to provide CEFAS with further professional skills in technology transfer. In addition to specific practical and legal aspects of use and ownership of IP in both the public and private sectors, the overall approach of a specialised legal department in advising their clients proved a useful benchmarking exercise.

Left: Outdoor team building event

Rewarding success

Over 40 people received a special bonus award for 'going the extra mile' in delivering outstanding customer service, completing particularly difficult assignments, excellent teamwork and other exceptional efforts. The bonus panel comprises of Diane Carter, the Director of Staff Development and two Staff Development Co-ordinators and meets at least three times a year to consider nominations.

Chemistry awareness day

An informal gathering of analytical chemists and staff with interests in chemical analysis was held in January 2002 at the Lowestoft Laboratory. This was the second of such events, the previous one being held at Burnham in April 2001.

Approximately 40 staff (from Lowestoft and Burnham) attended the meeting, with speakers and attendees from across 3 Science Areas and 6 teams. The day consisted of a number of presentations on a wide range of analytical and related R&D topics and a tour of analytical facilities.

The event provided staff with an opportunity to communicate their work, find out about ongoing programmes in other parts of the organisation, and identify and discuss areas of mutual interest across groups in a friendly environment. The event organiser, CEFAS's Dr Kins Leonard, said "It was an extremely useful exercise and I would like to express my gratitude to those who contributed".

Roger Hillier from CEFAS's Environment and Food Safety Science Area demonstrating dry sample preparation for use in various radiochemical analyses

100 years of Fisheries Research

Fisheries research at Lowestoft started in November 1902 with the assistance of a research trawler the RV Huxley. In those early years, the emphasis was on making new discoveries in all aspects of the marine biology of the North Sea by carrying out systematic surveys of fish stocks, which produced much of the fundamental knowledge that underpinned the subsequent fisheries research and management strategies.

From our inception 100 years ago as a small fisheries laboratory with a staff of about 10, CEFAS now has over 550 staff. We have expanded our research to include marine environmental protection, aquaculture and fish and shellfish disease and hygiene.

This year sees the celebration of our centenary, and to mark the occasion we are organising, hosting and particpating in a number of events. In February, our first in a series of special Centenary

Lectures was held. Dr Martha Holmes, producer of the BBC's Blue Planet series, gave a presentation to a full lecture hall at our Lowestoft Laboratory on her experiences during the filming of the series.

The local community will also be involved in our centenary celebrations as once again CEFAS sponsored the Lowestoft Fish Fayre. As a special centenary contribution, the RV Corystes was at the Fayre for the first time, and was open to the public. Also, as part of our ongoing Science and Education Partnership programme, we invited local teachers to join us for a Suffolk Science Teacher Forum Professional Development day.

In July we are organising and hosting an international fisheries symposium to address the international approaches to the management of shared stocks. Although the symposium will focus on the future, it will also provide an opportunity to highlight the significance of our centenary and the achievements made during our first 100 years.

Senior Management

Senior Management Structure and Ownership Board

CEFAS Management board
Left to right
Standing: Peter Greig-Smith, Michael Waldock, Brian Robinson, Mark Farrar.
Seated: Joe Horwood, Diane Carter, Stephen Malcolm, Victor Bye.

CEFAS Management Board

The Management Board comprises the following membership:

Dr Peter Greig-Smith
(Chair) Chief Executive
Dr Joe Horwood
Deputy to the Chief Executive, and DEFRA Chief Fisheries Science Adviser
Dr Michael Waldock
Science Director
Dr Stephen Malcolm
Science Director
Mr Mark Farrar
Finance Director
Mr Brian Robinson
Commercial Director
Mrs Diane Carter
Staff Development Director
Dr Victor Bye
Director of Support Services

CEFAS Ownership Board

The CEFAS Ownership Board's role is to oversee the operation of the Agency on behalf of DEFRA. During 2001/02 the Board comprised the following members:

Jenny Bacon
(Chair) DEFRA, Director-General, Animal Health & Environment until September 2001
Mark Addison
(Chair) DEFRA, Director-General, Operations and Service Delivery Sept-October 2001
Stephen Wentworth
DEFRA, Fisheries Director
David Shannon
DEFRA, Chief Scientist
Andrew Burchell
DEFRA, Finance Director
John Ballard
DEFRA, Director, Water & Land
Mike Tas
DEFRA, Head of Agency Ownership Unit
Douglas Georgala
former Director of the Institute of Food Research
Hugh Walker
former Director of Marks & Spencer
Peter Greig-Smith
Chief Executive, CEFAS
Clive Porro
Board Secretary

Note: Mr Paul Elliott, Principal Finance Officer and Mr Dudley Coates, Head of Environment Group, were members of the Ownership Board until June 2001.

The Board was suspended in October 2001, pending revised arrangements resulting from the Review of DEFRA Agencies. Since that date, Anna Walker (DEFRA Director-General, Land Use and Rural Affairs) has been responsible for overseeing the Agency's activities.

Financial Commentary

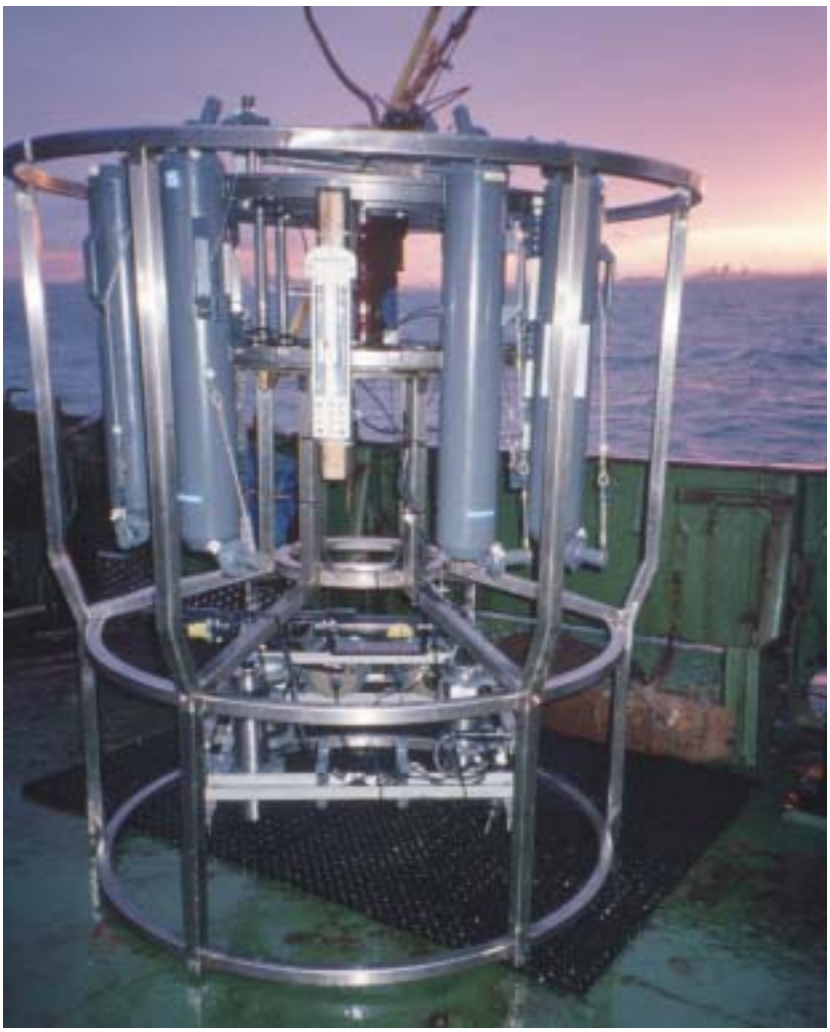
CEFAS has successfully completed its second full year as an Agency under the Net Accounting regime. As such, CEFAS has a continuing requirement to recover the full economic costs of the Agency's services. This target was fully achieved for the year ended 31 March 2002, with an overall recovery level of 100%.

Turnover for the year was £30,632,000, a 6% increase above 2000/01 performance. Following the formation of DEFRA £23,692,000 (77%) of turnover is now sourced from the new department with a further £4,048,000 (13 %) obtained from other UK Government departments or agencies. Tight management of resources ensured expenditure matched turnover and resulted in an overall profit in 2001/02 of £25,000 (2000/01: loss of £651,000).

As part of future investment plans, construction work commenced on a new Fisheries Research Vessel, incurring capital spend of £11,726,000 in 2001/02, with a further £1,259,000 of capital expenditure utilised on scientific and other assets.

In June 2001 CEFAS established CEFAS Technology Limited (CTL) in order to invest in an overseas strategic alliance. The initial CTL capital subscribed for was funded by the sale of intellectual property to the alliance partner in accordance with Government guidelines, and resulted in an equity investment of £150,000 on the balance sheet of CEFAS.

Prompt payment of suppliers is the subject of a separate Government target requiring CEFAS to ensure that settlement is made within 30 days of receipt of goods and services. During the year 95% (2000/01: 95%) of supplier invoices were paid within the stipulated timeframe.



Right: CTD Rosette water sampler

Future Strategy

CEFAS's future plans will be strongly influenced by the outcome of the Review of DEFRA Agencies, scheduled to report by the end of October 2002. This exercise will establish a new picture of the science that is required by DEFRA and other government departments in the areas of CEFAS's operations. Accordingly, it will influence our plans for investment and development of new areas of science, and may affect the Agency's operating conditions.

With this potential for significant change, it is not sensible for CEFAS to make definite plans beyond the next year or two. We also await the outcome of the Spending Review that will determine levels of funding available in Departments for commissioning science.

While yet unable to plan far ahead, CEFAS will proceed with several ongoing initiatives. These include:

Completion and launch of the new Research Vessel

Seeking re-accreditation to Investors in People

Implementing a data management strategy and electronic record management system

Introducing a new, competency-based Staff Appraisal system

In addition, we have reviewed our priorities for developing the Agency's capability, and will focus effort on the following seven goals:

Increasing efficiency by 10% by 2004

Identifying and exploiting markets that will provide a sustainable future

Enabling everyone in CEFAS to deliver in accordance with the Agency's values

Creating career opportunities that match our long-term needs

Strengthening CEFAS's influence on national and international policies

Providing contract managers with the tools to support best practice

Making sure that all of CEFAS's science is of international standard

Left: Soft coral on the Atlantic side of Tobago.
Reproduced with permission of Rohan Holt.

Right: Tropical Ornamental Shrimp.
Reproduced with permission of Rohan Holt.

Performance against key Ministerial targets and milestones

1) Throughput:

To give satisfaction to customers in the way that outputs are provided, taking account of the relevance, timeliness and value for money of outputs and the achievements of ROAME milestones.

1997 - 1998	Target partly achieved
1998 - 1999	Target achieved
1999 - 2000	Target achieved
2000 – 2001	Target achieved

2001 - 2002

Target: To give satisfaction to customers in the way that outputs are provided, as measured by the CEFAS Customer Satisfaction Survey.

Outturn: Target achieved. Responses to the customer satisfaction survey were received from 34 customers on 159 contracts, representing 80% by value of CEFAS's programme. The weighted average score, based on seven aspects of service quality, was 80.0 out of a maximum of 100.

2) Quality:

To maintain a high standard of excellence, based on indicators of scientific and technical quality.

1997 - 1998	Target achieved
1998 - 1999	Target achieved
1999 - 2000	Target achieved
2000 - 2001	Target achieved

2001 - 2002

Target: To make satisfactory progress with the Action Plan resulting from the 1999/2000 Science Audit.

Outturn: Target achieved. The Ownership Board agreed that good progress was made on 9 of the 10 areas for action.

3) Efficiency:

To achieve the savings forecast in the Efficiency Plan.

1997 - 1998	Target achieved
1998 - 1999	Target achieved
1999 - 2000	Target achieved
2000 – 2001	Target achieved

2001 - 2002

Target: Percentage increases in support function costs to be no greater than the percentage increase in revenue.

Outturn: Target achieved. Support function costs grew by 2.7% less than income.

4) Financial Performance:

To recover from Government Departments and Agencies and external customers the full economic costs of the Agency's services.

1997 - 1998	Target not achieved
1998 - 1999	Target achieved
1999 - 2000	Target achieved
2000 – 2001	Target achieved

2001 - 2002

Target: Achieve full cost recovery of 100%. Fully achieved if cost recovery is 100% or greater, and partially achieved for recovery between 98% and 100%.

Outturn: Target achieved. Overall cost recovery was 100%.

5) Effective Management:

(new target)

2001 - 2002

Target: To manage the Agency in an effective manner including pursuit of commercial exploitation of research outputs.

Outturn: Target achieved

CEFAS Accounts

Foreword to the Accounts

for the Year Ending 31 March 2002

CEFAS was established on 1 April 1997 as an Executive Agency of MAFF (now DEFRA). It is fully accountable to Parliament through Ministers. CEFAS currently operates from four sites; Lowestoft, Weymouth, Burnham and Whitehaven.

Aims and Objectives

CEFAS aims and objectives are given on pages 6 and 7.

Principal Activities

The Agency's principal activities are to deliver an efficient service of specialist scientific and technical support, consultancy and advice in the fields of fisheries management, environment protection and aquaculture. The Chief Executive's Statement on pages 4 to 5, and the sections on delivering science pages 8 to 31, contain further information on the business activities of CEFAS.

Pension Liabilities

Pension liabilities are accrued in total in the year in which the liability arises.

Pension benefits are provided through the statutory Principal Civil Service Pension Scheme (PCSPS). This provides benefits on a "final salary" basis at a normal retirement age of 60, as detailed in note 4 of the accounts.

Accounts direction

The accounts have been prepared under a direction issued by the Treasury in accordance with section 7(2) of the Government Resources and Accounts Act 2000.

CEFAS History and Statutory Background

CEFAS is an Executive Agency of DEFRA that was created on 1 April 1997 from the former Directorate of Fisheries Research (DFR) under the Next Steps programme. The status and legal framework is laid out in the CEFAS Framework Document. Its origins date from 1902 when a research station was established to investigate declining fish stocks as part of the UK contribution to the newly created International Council for the Exploration of the Sea (ICES).

Left Page: Brittlestars (*Ophiura* sp.) mixed with small sole (*Solea solea*) and solenette (*Buglossidium luteum*)

Management

The Minister of State (Environment) with overall responsibility for CEFAS during the year was The Right Honourable Michael Meacher MP.

The Ownership Board's role and composition is given on page 50. External members of the Agency's Ownership Board are appointed by the invitation of the Minister, for a three-year term. Other members of the Ownership Board are appointed directly by the Permanent Secretary on an open-ended basis.

The Chief Executive of CEFAS is Dr Peter Greig-Smith. The composition of the CEFAS Management Board is shown on page 50. The Chief Executive was appointed by the Minister of Agriculture, Fisheries and Food via open competition, for a five-year term. Members of the Management Board are appointed directly by the Chief Executive on an open-ended basis.

The salaries of the Management Board are determined by the CEFAS Performance Related Pay Scheme. The salary of the Chief Executive is performance related and reviewed by the Ownership Board against the key ministerial targets and milestones as agreed at the beginning of the year.

Details of the remuneration are provided in note 4 to the accounts.

Employment of Disabled Persons

CEFAS follows the Civil Service Code of Practice on the Employment of Disabled People. The Agency's policy is to recruit, train and provide career development facilities to disabled persons on the same basis as for other staff and to make every effort to retrain and assist any individuals disabled in the course of their employment.

Equal Opportunities and Employee Involvement

CEFAS follows an equal opportunities policy for fair and open recruitment of permanent staff. Regular exchanges of information with staff take place through formal and informal consultative arrangements at Agency and local level. Such exchanges include Agency objectives, plans and progress and matters relating to the interests of staff.

Payment of Suppliers

CEFAS prompt payment policy is described in note 22 to the accounts.

Auditors

Comptroller and Auditor General,
National Audit Office,
157 - 197 Buckingham Palace Road,
Victoria, London SW1W 9SP

Signed: 

Peter Greig-Smith
Chief Executive

Date: 3 July 2002

Statement of Accounting Officer's Responsibilities

1. Under the Government Resources and Accounts Act 2000 the Agency is required to prepare resource accounts for each financial year, in conformity with a Treasury direction, detailing the resources acquired, held, or disposed of during the year and the use of resources by the Agency during the year.

2. The resource accounts are prepared on an accruals basis and must give a true and fair view of the state of affairs of the Agency, the net resource outturn, resources applied to objectives, recognised gains and losses and cash flows for the financial year.

3. The Department for Environment, Food and Rural Affairs has appointed the Permanent Head of the Agency as principal Accounting Officer of the Agency with overall responsibility for preparing the Agency's accounts and for transmitting them to the Comptroller and Auditor General.

4. In preparing the accounts the Principal Accounting Officer is required to comply with the Resource Accounting Manual prepared by the Treasury, and in particular to:

- Observe the relevant accounting and disclosure requirements, and apply suitable accounting policies on a consistent basis;
- make judgements and estimates on a reasonable basis;
- state whether applicable accounting standards, as set out in the Resource Accounting Manual, have been followed and disclose and explain any material departures in the accounts;
- prepare the accounts on a going concern basis.

5. The responsibilities of an Accounting Officer, including responsibility for the propriety and regularity of the public finances for which an Accounting Officer is answerable, for keeping proper records and for safeguarding the Agency's assets, are set out in the Accounting Officers' Memorandum issued by the Treasury and published in Government Accounting.

6. The maintenance and integrity of the CEFAS website is the responsibility of the Accounting Officer.

Statement on Internal Control

As Accounting Officer, I have responsibility for maintaining a sound system of internal control which supports the achievement of departmental policies, aims and objectives, as set by the Department's Ministers, whilst safeguarding the public funds and departmental assets for which I am personally responsible, in accordance with the responsibilities assigned to me in Government Accounting.

The system of internal control is designed to manage rather than eliminate the risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness.

The system of internal control is based on an ongoing process designed to identify the principal risks to the achievement of departmental policies, aims and objectives, to evaluate the nature and extent of those risks and to manage them efficiently, effectively and economically. This process has been in place for the year ended 31 March 2002 and up to the date of approval of the annual report and accounts and it accords with Treasury guidance.

As Accounting Officer, I also have responsibility for reviewing the effectiveness of the system of internal control. In pursuit of this the Centre for Environment, Fisheries & Aquaculture Science (CEFAS) has established the following processes:

- A Management Board which meets monthly to consider the plans and strategic direction of the Agency.

- An Audit Committee which is a formally constituted committee of the Management Board which first met in July 2001. The committee is chaired by an external member and includes two further external independent members together with three members of the management team. The purpose of the Audit Committee is to give advice on the adequacy of internal and external audit arrangements, and on the implications of the assurances provided in respect of internal control and risk management within CEFAS.

- Regular reports by internal audit, to standards defined in the Government Internal Audit Manual, which include the Head of Internal Audit independent opinion on the adequacy and effectiveness of the Agency's system of internal control, together with recommendations for improvement. Since April 2001, the internal audit service has been provided by PricewaterhouseCoopers, operating under contract to CEFAS. The work of internal audit is informed by an analysis of the risk to which CEFAS is exposed and annual audit plans are based on this analysis.

- Regular risk reviews undertaken by the Management Board to identify and update the risks facing CEFAS.

- A documented risk management plan containing the register of top CEFAS risks assigned to and managed by individual management board directors together with summaries of risk management by local operational managers. CEFAS reports its top risks to DEFRA for inclusion in the Department's Risk Register.

- Written statements from managers on the steps they are taking to manage risk in their areas of responsibility.

- A system of internal financial control based on a framework of regular management information, administrative procedures, management supervision and a system of delegation and accountability.

- Regular review of alliances and partnership ventures by a sub-committee of the Management Board.

- Documented risk assessment procedures in support of tender activity for new business. These procedures were implemented in November 2001 and will be the subject of further review and development during the coming year.

My review of the effectiveness of the system of internal control is informed by the work of the internal auditors and the executive managers within the agency who have responsibility for the development and maintenance of the internal control framework, and by comments made by the external auditors in their management letter and other reports.

I will ensure that the systems of internal control continue to develop, particularly those relating to the management of commercial contracts, in the light of CEFAS's growing involvement in this type of activity.

Signed: 

Peter Greig-Smith
Chief Executive

Date: 3 July 2002

Certificate and Report of the Comptroller and Auditor General to the House of Commons

I certify that I have audited the financial statements on pages 61-76 under the Government Resources and Accounts Act 2000. These financial statements have been prepared under the historical cost convention as modified by the revaluation of certain fixed assets and the accounting policies set out on pages 64-65.

Respective responsibilities of the Agency, the Chief Executive and the Auditor

As described on page 58, the Agency and Chief Executive are responsible for the preparation of the financial statements and for ensuring the regularity of financial transactions. The Agency and Chief Executive are also responsible for the preparation of the other contents of the Annual Report. My responsibilities, as independent auditor, are established by statute and guided by the Auditing Practices Board and the auditing profession's ethical guidance. I report my opinion as to whether the financial statements give a true and fair view and are properly prepared in accordance with the Government Resource and Accounts Act 2000 and Treasury directions made thereunder, and whether in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. I also report if, in my opinion, the foreword is not consistent with the financial statements, if the Agency has not kept proper accounting records or if I have not received all the information and explanations I require for my audit.

I read the other information contained in the Annual Report and consider whether it is consistent with the audited financial statements. I consider the implications for my certificate if I become aware of any apparent mis-statements or material inconsistencies with the financial statements.

I review whether the statement on page 59 reflects the Agency's compliance with Treasury's guidance entitled Corporate Governance: Statement on internal control. I report if it does not meet the requirements specified by the Treasury, or if the statement is misleading or inconsistent with other information I am aware of from my audit of the financial statements.

Basis of audit opinion

I conducted my audit in accordance with UK Auditing Standards issued by the Auditing Practices Board. An audit includes examination, on a test basis, of evidence relevant to the amounts, disclosures and regularity of financial transactions included in the financial statements. It also includes an assessment of the significant estimates and judgements made by the Agency and Chief Executive in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Agency's circumstances, consistently applied and adequately disclosed. I planned and performed my audit so as to obtain all the information and explanations which I considered necessary in order to provide me with sufficient evidence to give reasonable assurance that the financial statements are free from material mis-statement, whether caused by error or by fraud or other irregularity, and that in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. In forming my opinion I have also evaluated the overall adequacy of the presentation of information in the financial statements.

In my opinion:

- The financial statements give a true and fair view of the state of affairs of CEFAS at 31 March 2002 and of the surplus, total recognised gains and losses and cash flows for the year then ended and have been properly prepared in accordance with the Government Resources and Accounts Act 2000 and the directions made thereunder by the Treasury;

- In all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them.

I have no observations to make on these financial statements.

John Bourn
National Audit Office
Comptroller and Auditor General
157-197 Buckingham Palace Road
Victoria, London SWIW 9SP

Date: 5 July 2002

Income and Expenditure Account

For the year ended 31 March 2002

	Notes	2001/02 £'000	2000/01 £'000
Turnover	**2 & 3**	30,632	29,013
Costs of Sales	**4 & 5**	(28,151)	(27,476)
Operating Surplus		**2,481**	**1,537**
Loss on Disposal of Fixed Assets		**(40)**	**(35)**
Notional Interest Payable	**23**	**(2,416)**	**(2,153)**
Net Surplus/(Deficit)		**25**	**(651)**
Percentage Total Cost Recovery		**100**	**98**

Statement of Recognised Gains and Losses

For the year ended 31 March 2002

	2001/02 £'000	2000/01 £'000
Surplus/(Deficit) for the Year	25	(651)
Net Loss on Revaluation of Fixed Assets	(423)	(331)
Total Losses Recognised since last Report	**(398)**	**(982)**

Balance Sheet

As at 31 March 2002

	Notes	£'000	2001/02 £'000	2000/01 £'000
Fixed Assets				
Tangible Fixed Assets	**7**	45,968		36,211
Investments	**8**	150		0
Total Fixed Assets			46,118	36,211
Current Assets				
Stock		86		82
Work in progress	**9**	803		623
Debtors	**10**	7,035		2,320
Cash at Bank and in hand	**16**	3,935		4,491
Total Current Assets		11,859		7,516
Creditors:				
Amounts falling due within one year	**11**	(4,019)		(2,855)
Net Current Assets			7,840	4,661
Total Assets Less Current Liabilities			53,958	40,872
Creditors:				
Amounts falling due after more than one year	**11**		(32)	(43)
Provisions for liabilities & charges	**12**		(836)	(747)
TOTAL ASSETS LESS LIABILITIES			**53,090**	**40,082**
RESERVES				
General Fund			47,722	35,058
Revaluation Reserve			5,343	5,675
Income & Expenditure Account			25	(651)
Total Reserves as at 31 March 2002	**13**		**53,090**	**40,082**

Signed: 

Chief Executive and Agency Accounting Officer

Date: 3 July 2002

Cash Flow Statement

For the year ended 31 March 2002

	Notes	2001/02 £'000	2001/02 £'000	2000/01 £'000	2000/01 £'000
Cash Flow					
Net Cash inflow/(outflow) from operating activities	**14**		12,575		1,679
Net Capital expenditure & financial investment		(13,131)		(4,011)	
			(13,131)		(4,011)
Increase/(Decrease) in cash			**(556)**		**(2,332)**
Reconciliation of Operating Costs to Operating Cash Flows					
Net Operating Cost			25		(651)
Adjustments to working capital other than cash		6,757		(3,986)	
Adjustment for non cash transactions		5,793		6,316	
			12,550		2,330
Net cash inflow/(outflow) from Operating Activities			**12,575**		**1,679**
Analysis of Capital expenditure and Financial Investment					
Purchase of tangible fixed assets		(13,135)		(4,037)	
Proceeds of disposal of tangible fixed assets		4		26	
Net cash inflow/(outflow) from investing activities			**(13,131)**		**(4,011)**
Cash Requirement	**15**		**(556)**		**(2,332)**

Notes to the Accounts

NOTE 1. Statement of Accounting Policies

1.1 Statement of Accounting Policies
These financial statements have been prepared in accordance with the Resource Accounting Manual issued by HM Treasury. The particular accounting policies adopted by CEFAS are described below. They have been applied consistently in dealing with items that are considered material in relation to the accounts.

1.2 Accounting Convention
These accounts have been prepared under the historical cost convention, modified to include the revaluation of fixed assets at their value to CEFAS by reference to their current costs.

1.3 Tangible Fixed Assets
Asset costs are modified annually by the use of indices for current cost accounting as supplied by the Office for National Statistics.

1.3.1 Land and Buildings
Land and Buildings are professionally valued at intervals of no greater than 5 years. The Land and Buildings were re-valued on 30 June 2000 by the Valuation Office Agency, 50 Frederick Street, Edinburgh. The assets were re-valued on an existing use basis. The lives given to the buildings fall in the range of 4 - 41 years. The title to the freehold land and buildings occupied by CEFAS is held by DEFRA.

1.3.2 Vessels
Vessels were professionally valued on 30 November 2001 by E A Gibson Shipbrokers Ltd, PO Box 278, Audrey House, 16-20 Ely Place, London EC1P 1HP. The lives given to the vessels fall in the range of 2-7 years.

1.3.3 Other Fixed Assets
The capitalisation threshold for fixed assets is £3,000. Asset pools exist for items of IT Equipment with individual values ranging from £500 to £3000.

1.3.4 Depreciation of Tangible Fixed Assets
Depreciation is provided on all fixed assets, with the exception of Land, at rates calculated to write off the valuation of each asset evenly over its expected useful life.

Asset lives are as follows:

Buildings	**4 - 41 Years**
Information Technology	**3 - 6 Years**
Scientific and General Equipment	**5 - 10 Years**
Vessels	**2 - 7 Years**
Vehicles	**6 - 8 Years**

1.3.5 Donated Assets
CEFAS holds no Donated Assets.

1.4 Investments
Investments are reported at market value or at cost where market value cannot be readily ascertained.

1.5 Stocks and Work in Progress
Stocks and Work in Progress are valued at the lower of cost or net realisable value.

1.6 Research and Development
Expenditure on Research and Development (Seedcorn Projects) is treated as an operating cost in the year in which it is incurred and taken to the Income and Expenditure Account. Fixed assets, which are acquired for use in Research and Development, are depreciated over their useful economic life.

1.7 Government Grants
Grants are recognised in the same period as their related expenditure; grants towards fixed asset purchases are treated as a deferred credit and recognised as income over the useful life of the asset.

2. Operating Income

Operating Income is shown net of value added tax and comprises fees and charges for services provided to Core DEFRA, external customers, other government agencies and public sector repayment work receipts from the European Union.

3. Capital Charge

A notional charge, reflecting the cost of capital used by CEFAS is included in the Income and Expenditure Account. The charge is calculated at the government standard rate of 6% on the average value of all assets, less liabilities and excluding donated assets.

4. Taxation

No taxation is payable on the surplus generated by CEFAS.
CEFAS is included under the VAT registration of DEFRA. Irrecoverable VAT, excluding that on capital purchases, is charged to the Income and Expenditure Account in the year in which it is incurred.

5. Foreign Exchange

Monetary assets and liabilities denominated in foreign currencies are translated at the rate of exchange ruling at the Balance Sheet date. Transactions in foreign currencies are recorded at the rate ruling at the date of the transaction, all differences being taken to the Income and Expenditure Account.

6. Notional Charges

In addition to the capital charge, the following notional costs borne on the Income and Expenditure Account are charged to the General Fund:

DEFRA Maintenance Charges
DEFRA Central Overhead Charges
Redundancy and Early Retirement
Interest
External Audit Fees

7. Insurance

CEFAS, in common with other Government bodies, does not insure the majority of its assets. Losses and Compensations are charged to the Income and Expenditure Account.

8. Pensions

The provisions of the Principal Civil Service Pension Scheme (PCSPS) cover present and past employees; which is non-contributory and unfunded. Although the scheme is a defined benefit scheme, liability for payment of future benefits is a liability of the PCSPS. CEFAS meets the cost of pension cover provided for the staff they employ by payment of charges calculated on an accruing basis. There is a separate scheme statement for the PCSPS as a whole. For those staff not eligible for membership of the PCSPS, an option to take out Stakeholder Pensions was introduced from 8th October 2001. There is no employer contribution to a stakeholder pension.

9. Provisions

9.1 Early Departure Costs

CEFAS is required to meet the additional cost of benefits beyond the normal PCSPS benefits in respect of employees who retire early. CEFAS provides in full for this cost when the early retirement programme has been announced and is binding on CEFAS. CEFAS may, in certain circumstances, settle some or all of its liability in advance by making a payment to the Paymaster General's Account at the Bank of England for the credit of the Civil Superannuation Vote. The amount provided is shown net of any such payments.

9.2 Pay Awards and Legal Claims

CEFAS also provides for an employee corporate bonus earned in year and for outstanding litigation.

10. Leases

CEFAS holds no leases where substantially all the risks and rewards of the leased asset are borne by CEFAS. Other leases are regarded as operating leases and the rentals are charged to the Operating Cost Statement on a straight-line basis over the term of the lease.

11. Going Concern

These accounts have been prepared on the basis that CEFAS is a going concern.

Notes to the Accounts

NOTE 2. UK Government Income

	2001/02 £'000	2000/01 £'000
DEFRA	23,692	21,963
DEFRA Agencies	39	15
Other Government Depts	4,009	4,503
Total UK Government Income	**27,740**	**26,481**

Following the machinery of Government changes £740,928 (2000/01 £958,782) of the income from the former Department of the Environment, Transport and the Regions (DETR), is now included under DEFRA

NOTE 3. Non UK Government Income

	2001/02 £'000	2000/01 £'000
UK Public Sector	237	195
UK Private Sector	940	473
EU	1,034	1,572
Non United Kingdom	681	292
Total Non UK Government Income	**2,892**	**2,532**

NOTE 4. Staff Related Expenditure

(a) Staff Costs

	2001/02 £'000	2000/01 £'000
Wages and Salaries	11,394	11,633
Social Security Costs	806	850
Superannuation	1,459	1,385
Total Staff Expenditure	**13,659**	**13,868**

(b) The average number of persons employed by CEFAS during the year was:

	2001/02 No.	2000/01 No.
Scientific Research & Development	389	426
Management/Administration	126	108
Marketing	5	3
Total	**520**	**537**

NOTE 4. Staff Related Expenditure (Continued)

As part of outsourcing the ship management to independent contractors, 40 Marine staff were transferred out of CEFAS on 1 April 2001. These staff were included in Scientific Research and Development.

The 2000/01 figures have been restated to include 19 Information and Technology staff working on the production of new software as Scientific Research and Development Staff previously included in Administration.

(c) Board Remuneration

The salary and pension entitlements of the most senior managers of the Agency were as follows:

Management Board Member	Age	Salary banding including performance pay	Real Increase in Pension at 60	Total Accrued Pension at 60
		£'000	£'000	£'000
Chief Executive **Dr P Greig-Smith**	48	70-75	0-2.5	25-30
Deputy to the Chief Executive **Dr J Horwood**	53	55-60	0-2.5	25-30
Director of Support Services **Dr V Bye**	59	55-60	2.5-5	25-30
Science Director **Dr M Waldock**	48	45-50	0-2.5	20-25
Science Director **Dr S Malcolm**	47	40-45	0-2.5	15-20
Finance Director **M Farrar**	40	45-50	0-2.5	10-15
Commercial Director **B Robinson**	49	50-55	0-2.5	20-25
Director of Staff Development **D Carter**	42	30-35	0-2.5	10-15

Notes to the Accounts

NOTE 4. Staff Related Expenditure (Continued)

No board members were in receipt of any benefits in kind. Pension benefits are provided through the Principal Civil Service Pension Scheme (PCSPS). This is a statutory scheme which provides benefits on a "final salary" basis at a normal retirement age of 60. Benefits accrue at the rate of 1/80th of pensionable salary for each year of service. In addition, a lump sum equivalent to 3 years' pension is payable on retirement. Members pay contributions of 1.5 percent of pensionable earnings. Pensions increase in payment in line with the Retail Prices Index. On death, pensions are payable to the surviving spouse at a rate of half the member's pension. On death in service the scheme pays a lump sum benefit of twice pensionable pay and also provides a service enhancement on computing the spouse's pension. The enhancement depends on length of service and cannot exceed 10 years. Medical retirement is possible in the event of serious ill health. In this case, pensions are brought into payment immediately without actuarial reduction and with service enhanced as for widow(er) pensions.

Salaries include gross salaries, performance bonuses payable, reserved rights to London Weighting or London allowances, recruitment and retention allowances and private office allowances. It does not include the estimated monetary value of benefits in kind.

(d) Superannuation Scheme

Principal Civil Service Pension Scheme

The PCSPS is an unfunded multi-employer defined benefit scheme but CEFAS is unable to identify its share of the underlying assets and liabilties. A full actuarial valuation was carried out at 31 March 2000 and details can be found in the separate scheme statement of the PCSPS.

For 2001/02, normal employer contributions of £1,459,000 were payable to the PCSPS (2000/01 £1,384,000) at rates in the range 12% to 18.5 % of pensionable pay. It has been agreed that contributions will remain at that level for the next two years. Employer contribution rates are reviewed every three years following a scheme valuation by the Government Actuary. The contribution rates reflect benefits as they are accrued, not when the costs are actually incurred; and they reflect past experience of the scheme.

Salaries include gross salaries, performance bonuses payable, reserved rights to London Weighting or London allowances, recruitment and retention allowances and private office allowances. It does not include the estimated monetary value of benefits in kind.

Stakeholder Pension

CEFAS operates a defined benefit contribution scheme for members of staff not eligible for the PCSPS scheme.
The assets of the scheme are held separately in an independently administered fund.
CEFAS makes no payments to this fund.

(e) Early departure costs

Early departure costs in 2001/02 amounted to £183,342 (2000/01 £340,491), exclusive of employer's contributions to national insurance and superannuation, for lieu of notice and compensation for loss of pension.

NOTE 5. Other Expenditure

	2001/02 £'000	2000/01 £'000
Laboratory	3,185	2,984
Depreciation	2,513	2,554
Vessels & Charters	2,317	1,138
Accommodation	2,245	1,137
Rent & Rates	416	402
Vehicles	213	214
Audit	27	27
External Auditors Other Payments	3	1
Hospitality	22	12
Travel & Subsistence	836	781
Training	375	282
IT Costs	709	639
Insurance/Losses	31	46
DEFRA Management Overheads	245	416
DEFRA Estates Overhead	290	1,661
Telecommunications	130	214
Bad Debt Provision	58	(1)
Losses on Revaluation	86	3
Exchange Losses/(Gains)	25	1
Early Departure & Redundancy Costs	183	340
Other Expenditure	583	757
Total Expenditure	**14,492**	**13,608**

On 1 April 2001, direct responsibility for estate maintenace was transferred from DEFRA to CEFAS. These costs are now stated within the accommodation costs, previously in the DEFRA Estates Overhead, £289,584 (2000/01 £1,661,000).

NOTE 6. Segmental Report

	2001/02			2000/01		
	Governmental Bodies £'000	Other £'000	Total £'000	Governmental Bodies £'000	Other £'000	Total £'000
Turnover	27,740	2,892	30,632	26,481	2,532	29,013
Cost Of Sales	(25,949)	(2,202)	(28,151)	(26,858)	(2,806)	(29,664)
Surplus/(Loss) for the Year	**1,791**	**690**	**2,481**	**(377)**	**(274)**	**(651)**
Return on Capital Employed	**4%**	**14%**	**5%**	**5%**	**4%**	**5%**

CEFAS is required to make a 6% return on all government income as part of its financial performance targets.
These figures are produced in accordance with HM Treasury Fees and Charges Guidance.

Notes to the Accounts

NOTE 7. Tangible Fixed Assets

	Land	Buildings	Vessels	Information Technology	Scientific Equipt	General Equipt	Vehicles	Assets In course of Construction	Total
Cost or Valuation	**£'000**	**£'000**	**£'000**	**£'000**	**£'000**	**£'000**	**£'000**	**£'000**	**£'000**
As at 1 April 2001	1,011	24,582	5,138	2,713	6,787	350	309	2,932	43,822
Revaluation	0	0	(4,181)	9	(59)	(1)	0	0	(4,232)
Indexation	77	3,134	(18)	(30)	(184)	(6)	1	0	2,974
Additions	0	39	0	244	731	0	0	11,971	12,985
Transfers	(24)	(226)	0	0	0	0	0	0	(250)
Disposals	0	0	0	(32)	(102)	(11)	(3)	0	(148)
As at 31 March 2002	**1,064**	**27,529**	**939**	**2,904**	**7,173**	**332**	**307**	**14,903**	**55,151**
Depreciation									
As at 1 April 2001	0	(871)	(776)	(1,933)	(3,665)	(182)	(184)	0	(7,611)
Revaluation	0	0	958	0	0	0	0	0	958
Indexation	0	(122)	0	0	0	0	(1)	0	(123)
Provided in Year	0	(1,324)	(222)	(320)	(575)	(38)	(33)	0	(2,512)
Transfers	0	0	0	0	0	0	0	0	0
Disposals	0	0	0	30	66	8	1	0	105
As at 31 March 2002	**0**	**(2,317)**	**(40)**	**(2,223)**	**(4,174)**	**(212)**	**(217)**	**0**	**(9,183)**
Net Book Value									
At 1 April 2001	**1,011**	**23,711**	**4,362**	**780**	**3,122**	**168**	**125**	**2,932**	**36,211**
At 31 March 2002	**1,064**	**25,212**	**899**	**681**	**2,999**	**120**	**90**	**14,903**	**45,968**

Vessels were professionally valued and relifed on 30 November 2001 by E A Gibson Shipbrokers Ltd, PO Box 278, Audrey House, 16-20 Ely Place, London EC1P 1HP. Land and buildings at Conwy were surplus to requirements and were transferred to DEFRA on 1 April 2001, see note 13. Movement on Reserves.

Notes to the Accounts

NOTE 10. Debtors

	2001/02 £'000	2000/01 £'000
Amounts falling due within one year		
Trade Debtors	1,316	935
Provision for Bad Debts	(122)	(98)
VAT	231	128
DEFRA	5,359	891
Prepayments	237	281
Sundry Debtors	14	183
Total Debtors	**7,035**	**2,320**

NOTE 11. Creditors

	2001/02 £'000	2000/01 £'000
Amounts falling due within one year:		
Trade Creditors	1,345	1,055
DEFRA	1,350	940
Other Creditors	257	64
Accruals	227	620
Deferred Income	840	176
Total under One Year Creditors	**4,019**	**2,855**
Amounts falling due after more than one year:		
Deferred income: Grants not yet credited to income	32	43
Total Creditors	**4,051**	**2,898**

NOTE 12. Provisions for Liabilities and Charges

	Early Retirement and pension commitments £'000	Pay Award £'000	Legal Claims £'000	Total £'000
Balance as at 1 April 2001	**579**	**168**	**0**	**747**
Provided in the year	204	187	64	455
Utilised in year	(177)	(168)	0	(345)
Revalued in year	(21)	0	0	(21)
Balance as at 31 March 2002	**585**	**187**	**64**	**836**

NOTE 8. Fixed Asset Investments

	2001/02 £'000	2000/01 £'000
Cost as at 1 April 2001	0	0
Additions	150	0
Disposals	0	0
Provisions		
As at 1 April 2001	0	0
Movement	0	0
Net Book Value		
At 31 March 2002	**150**	**0**
At 1 April 2001	**0**	**0**

On 28 June 2001, CEFAS purchased the entire share capital of CEFAS Technology Limited for £150,000.
In accordance with Government Accounting rules this interest has been treated as a fixed asset investment, and has not been consolidated as it is outside the Departmental boundary.
Details of the investment are as follows:

Name of Company	Country of Origin	Percentage of Ordinary Share Capital held	Nature of Business	Net Assets at 31 March 2002 £'000	Pre Tax loss for the year £'000
CEFAS Technology Ltd	United Kingdom	100	Trading	149	(1)

The company's principal activity during the year was to purchase an investment in Lotek Group Inc., an unquoted Canadian company for which a market value cannot readily be determined. For this reason it would not be appropriate to use market value as a basis of valuation. The Management Board has considered the value of the investment and has recorded the investment at cost, this will be reviewed on a regular basis and provision made for any impairment in value.

NOTE 9. Work in Progress

	As at 31 March 2002 £'000	As at 31 March 2001 £'000
United Kingdom	423	253
European Union	350	355
Other	30	15
Total Work in Progress	**803**	**623**

Notes to the Accounts

NOTE 15. Analysis of changes in cash during the year

	2001/02 £'000	2000/01 £'000
Balance as at 1st April 2001	4,491	6,823
Net Cash Flow	(556)	(2,332)
Balance as at 31 March 2002	**3,935**	**4,491**

NOTE 16. Cash at Bank and in hand

	2001/02 £'000	2000/01 £'000
Barclays	456	386
Office of HM Paymaster General	3,456	4,083
Other	23	22
Total Cash at Bank and in hand	**3,935**	**4,491**

NOTE 17. Capital Commitments

CEFAS has Capital Commitments totalling £10,170,000 (2000/01 £21,774,000).
Of this £10,144,000 relates to the purchase of a new Research Vessel.

NOTE 18. Post Balance Sheet Events

There are no post balance sheet events to report.

NOTE 19. Contingent Liabilities

There are no material contingent liabilities.

NOTE 13. Movement on Reserves

	General Fund £'000	Revaluation Reserve £'000	Total £'000
As at 1 April 2001	34,407	5,675	40,082
Notional Charges	561	0	561
Notional Interest	2,416	0	2,416
Revaluation	0	(332)	(332)
Income & Expenditure Account	25	0	25
Owed by DEFRA	10,411	0	10,411
Transfer to DEFRA	(250)	0	(250)
Provision for Early Departure Costs	177	0	177
Balance as at 31 March 2002	**47,747**	**5,343**	**53,090**

The transfer of the £250,000 to DEFRA took place on 1 April 2001 and refers to the Agency site at Conwy which was surplus to requirements, see note 7. Tangible Fixed Assets.

NOTE 14. Reconciliation of Net Operating Cost to Net Cash Flow from Operating Activities

	2001/02 £'000	£'000	2000/01 £'000
Net Surplus/(deficit) for the year		25	(651)
Adjustment for non cash transactions			
Depreciation	2,513		2,554
Notional Charges	2,977		3,407
Loss on disposal of fixed assets	40		35
Early retirement Liability	0		317
Revaluation losses	86		3
Payments against provisions	177		0
Total		**5,793**	**6,316**
Adjustments for movements in working capital other than cash			
(Increase)/Decrease in Stocks/Work in progress	(184)		88
Decrease in Debtors	(4,713)		3,113
Increase in Liabilities	89		168
Increase/(Decrease) in Creditors	1,154		1,337
Owed by/(due to) DEFRA	10,411		(8,692)
Total		**6,757**	**(3,986)**
Net Cash Inflow		**12,575**	**1,679**

NOTE 20. Operating Leases

Rentals under Operating Leases are charged to the Income and Expenditure Account on a straight line basis over the term of the Lease. At 31 March 2002 the Agency was committed to making the following payments:

	2001/02 £'000 Vehicles	2001/02 £'000 Land	2001/02 £'000 IT Equipment	2000/01 £'000 Vehicles	2000/01 £'000 Land	2000/01 £'000 IT Equipment
Operating Leases which expire:						
Within 1 Year	6	1	92	28	0	0
Between 2 to 5 Years	0	2	362	0	1	27
After 5 Years	0	79	0	0	81	0
Total	**6**	**82**	**454**	**28**	**82**	**27**

NOTE 21. Related Party Transactions

CEFAS has dealings with the Department for Environment, Food and Rural Affairs and its sponsored bodies, notably the Veterinary Medicine Directorate and the Central Science Laboratory.

During the year CEFAS purchased the entire share capital of CEFAS Technology Limited (£150,000).

The shares are held by Dr P. W. Greig-Smith as nominee of and trustee for the Centre for Environment, Fisheries and Aquaculture Science.

No Board Member, members of key management staff or other related parties have undertaken any material transactions with CEFAS.

NOTE 22. Prompt Payment Policy

CEFAS has a duty to meet the CBI 30 day payment policy. During the year 2001/02 the percentage of invoices that met the policy is as below:

		2001/02 %	2000/01 %
	Quarter 1	96	94
	Quarter 2	97	94
	Quarter 3	97	95
	Quarter 4	91	96
Average percentage of invoices paid within 30 days		**95**	**95**

No interest was paid in respect of late payment of commercial debt (2000/01 £0).

Notes to the Accounts

NOTE 23. Notional Interest

	2001/02	2000/01
	£'000	£'000
Fixed Assets	2,405	1,999
Working Capital	11	154
Total Notional Interest	**2,416**	**2,153**

Accounts Direction given by the Treasury in accordance with Section 7(2) of the Government Resources and Accounts Act 2000.

1. This direction applies to The Centre for Environment, Fisheries and Aquaculture Science.

2. The Centre for Environment, Fisheries and Aquaculture Science prepare accounts for the year ended 31 March 2002 in compliance with the accounting principles and disclosure requirements of the edition of the Resource Accounting Manual issued by HM Treasury which is in force for the financial year 2001-02.

3. The accounts shall be prepared so as to give a true and fair view of the income and expenditure (or as appropriate, net resource outturn), total recognised gains and losses (or, as appropriate, recognised gains and losses), and cash flows of the Centre for Environment, Fisheries and Aquaculture Science for the financial year, and of the state of affairs as at 31 March 2002.

4. Compliance with the requirements of the Resource Accounting Manual will, in all but exceptional circumstances, be necessary for the accounts to give a true and fair view. If, in these exceptional circumstances, compliance with the requirements of the Resource Accounting Manual is inconsistent with the requirement to give a true and fair view the requirements of the Resource Accounting Manual should be departed from only to the extent necessary to give a true and fair view. In such cases, informed and unbiased judgement should be used to devise an appropriate alternative treatment which should be consistent with both the economic characteristics of the circumstances concerned and the spirit of the Resource Accounting Manual. Any material departure from the Resource Accounting Manual should be discussed in the first instance with the Treasury.

David Loweth
Head of the Central Accountancy Team, Her Majesty's Treasury

Date 26 February 2002

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Further information about CEFAS, our activities and services, and news of recent developments can be found on our website: www.cefas.co.uk

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Sharing Marine Data and Information

CEFAS is a key player in a number of initiatives aimed at improving access to marine and coastal data and information, including the UK Marine Information Council (UK MIC) and the Inter-Agency Committee for Marine Science and Technology (IACMST)'s Marine Environment Data Advisory Group (MEDAG)

Our W ork with MED AG was the catalyst for the ICZMap project, which was lauched during the year. ICZMap will, for the first time, integrate marine and terrestrial data on the coastal zone to produce digital base maps on which to overlay geographic information.

www.iczmap.org.uk

In the Autumn of 2001, we launched Coast Map News - a newsletter about marine and coastal data and information. By providing an overview of current issues and latest developments in this area, the newsletter aims to promote better integration of initiatives and avoid duplication of effort.

www.cefas.co.uk/coastmap

Information for our customers

CEFAS Insight, a regular business-to-business newsletter, informing customers and collaborators about the latest developments at CEFAS was launched in June 2001 and is distributed to clients and collabotators around the world.

www.cefas.co.uk/news/insight

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