

MARINE BIODIVERSITY AND CLIMATE CHANGE

MARCLIM

END OF PHASE 1 REPORT - AUGUST 2001

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OVERVIEW

Steps have been taken to secure access to historic data. The rocky shore intertidal datasets of S.J. Hawkins, A.J. Southward and the Coastal Surveillance Unit (CCW) have now been secured. The stewards of data collected by the Orkney Marine Biological Unit, Shetland Oil Terminal Advisory Group, the Rocky Shore Surveillance Group (J. Lewis), D.J. Crisp and H. Barnes have been approached. Datasets are continuing to be placed on spreadsheets and databases as they come available. M.A. Kendall and M.T. Burrows have recently resurveyed sites in the north west of Scotland. S.J. Hawkins, R.C. Thompson and M.J. Genner have visited sites throughout south-west England and, when the opportunity arose, other shores around the UK.

To date, contributions of £540,295 have been agreed for the UK section of the project. Advertisements have been placed in *Nature* for a full time postdoctoral researcher and a full time project-dedicated technician. The University of Plymouth are to co-fund a PhD studentship with the Marine Biological Association on MarClim related research. An Irish open competition call for a post-doctoral researcher is expected to be published in September 2001 with the successful organisation informed by Jan 2002. A start date of within 6 months of February is anticipated.

The first meeting of the MarClim Advisory Group took place on the 15th June. It was decided that in order to ensure that the outputs of the project address both policy and scientific questions, an *ad-hoc* Policy Working Group is to meet and clearly define these goals. In addition a Data-Management Group will assemble periodically to deal with technical aspects of data handling and access. It has been agreed that additional funding for extension of the MarClim programme should be sought from industrial sources.

Ancillary project proposals complementing and giving added value to MarClim are currently being developed, including a Europe-wide parallel initiative due to be submitted during October 2001. Information on MarClim has been disseminated in presentations made at the '*Detecting Environmental Change - Science and Society*' conference in London on July 17th and the Sir Alistair Hardy Foundation for Ocean Science symposium in Edinburgh on the 7th August 2001.

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2. Module Progression

Module 1 – Data rescue, assembly and collation; Module 2 – Archiving and databases

The following data sets have been identified. Data are continuing to be entered as and when they become available.

Category	Geographic coverage	Original collector	Steward (s)	Years in record	Access status	Database entry status
Intertidal organisms	SW England, Isle of Man	A.J. Southward	A.J. Southward	1950-1987	Secured	On Paradox database
Intertidal organisms	UK, France and Portugal	S.J. Hawkins	S.J. Hawkins	1980-2001	Secured	Approx. 40% entered
Intertidal organisms	UK N. France	Rocky Shore Surveillance Group (J.R. Lewis)	R. Bowman M.A. Kendall J.R. Lewis	1964-1987	Partially secured	Trochid data entered
Intertidal organisms	Anglesey	Coastal Surveillance Unit (E. Jones)	M. McMath CCW	1974-1984	Secured	On Paradox database
Intertidal organisms	Southern England	R. Herbert	R. Herbert	198?-2001	To be approached	-
Intertidal organisms	Shetland	Shetland Oil Terminal Advisory Group	L. Kingham, J. Moore & B. Ritchie	1978-2001	To be approached	On Access database
Intertidal organisms	UK / Europe	D.J. Crisp	A. Young A.J. Southward	TBC	Awaiting response	-
Intertidal organisms	UK / Europe	H. Barnes	M. Barnes	TBC	Awaiting response	-
Intertidal organisms	Orkney	Orkney Marine Biology Unit	A. Jones A. Simpson	TBC	Awaiting details	-
Inshore fish (power stations)	UK	CEGB	P. Claridge P Henderson	1981-2001	Being approached	-
Hydrography Plankton and Fish	Plymouth	MBA	A.J. Southward S.J. Hawkins	1903-1987	Secured	Entered
Sea Temperature	Plymouth	T. Richards	T. Richards	1967-2001	Secured	Entered
Hydrography	Port Erin	D.J. Slinn, J.R. Allen, T. Shammon	R.G. Hartnoll, T. Shammon	1904-2000	Secured	Entered
Sea Temperature	Guernsey	R. Sendall	R. Sendall	1988-2000	Secured	Entered
Sea Temperature	Worldwide	Hadley Centre	Hadley Centre	1880-2001	Secured	Entered

Access to the following datasets from Ireland will be also sought:

- Cork: Lough Hyne, Bantry Bay, Kinsale Harbour, Sherkin Island.
- Wexford: Carnsore Point.
- Mayo: Clare Island.
- Northern Ireland: Strangford Lough and Portaferry.

Other data from Ireland include those of A.J. Southward the algae distribution records of M. Guiry & J. Cullinane. Additionally, it is hoped that CEFAS owned data sets on demersal fish will be analysed in a complimentary research project for which a proposal has been submitted to DEFRA (former MAFF). We also hope to undertake some work on the SEPA Firth of Forth fish series, along with newly discovered Channel trawl data from MBA archives.

Module 4 – Resurvey of historical monitoring sites

Mike Kendall and Mike Burrows surveyed intertidal rocky shores in North West Scotland during July 2001. These sites have not been visited since 1987. The following observations summarise changes observed in species that have been identified as being susceptible to climatic variability.

- There appears to have been several successive heavy settlements of the northern barnacle *Semibalanus balanoides* on exposed rocky shores at Clashnessie and Stoer. Few *S. balanoides* were older than 18 months and the majority were recent recruits. The latter were at such a density that self-elimination was already underway. It is assumed that this pattern of heavy settlement and self elimination had happened last year (2000) and perhaps in previous years
- The heavy *S. balanoides* settlement extended upshore and into the zone occupied by the warmer water species *Chthamalus montagui*. In this zone there were few *C. montagui* recruits from 2000 and only a small number from 1998 and 1999.
- Examination of the population of the southern trochid gastropod, *Gibbula umbilicalis* at sites close to its northern geographic limit suggest that appears to have had a number of years of moderate recruitment. This is in contrast to populations observed during the period of earlier studies in 1970s and 80s where size-frequency distributions were often biased towards older animals.
- The population of *Gibbula umbilicalis* at Skerray, once the most northerly known site for the species was more abundant and contained more juveniles than in the past.

Steve Hawkins, Richard Thompson and Martin Genner resurveyed A.J. Southward / D.J. Crisp sites in Devon, Cornwall and Dorset during April - June 2001 (Hartland Quay, Bude, Trevone, Newquay, St Ives, Porthleven, The Lizard, Looe, Wembury, Prawle Point, Brixham, Lyme Regis, Portland, Swanage). Proportions of northern and southern barnacle and limpet species were surveyed, in addition to rapid assessment of other indicators.

Following the Advisory Group meeting in Edinburgh, the opportunity was also taken to survey shores of St Baldreds, Cradle and Dunbar. Other sites visited on an opportunistic basis included Dornoch, Hayling Island, Elmer, New Brighton and the Isle of Man (Port St. Mary, Port Erin, Scarlett). Of considerable interest was the discovery of *Patella depressa* and *P. ulyssiponensis* (*P. aspera*) at Hayling Island on an artificial stone groyne 15km further east than their previous known extent in the English Channel.

Module 6 – Prediction and modelling of climate change scenarios

Mike Burrows has developed a spatial cellular automata model of dispersal and colonisation of coastal species around UK shores. This ‘foundation’ model can now be developed further to incorporate higher degrees of biological realism, and the impact that climate may have on dispersal, recruitment and mortality.

Module 8 – Communication

A oral paper entitled: ‘*Response to Climate Change by Marine Organisms: A Century of Research in the Western English Channel*’ with Steve Hawkins, Martin Genner and Alan Southward as co-authors was presented at the ‘*Detecting Environmental Change - Science and Society*’ conference in London on July 17th 2001. A resultant reviewed publication will be

submitted shortly to appear in a special forthcoming issue of *The Science of the Total Environment*.

Posters were presented at the SAHFOS 'Symposium on the Occasion of the 70th anniversary of the Continuous Plankton Recorder Survey of the North Atlantic' on the 7th August 2001. The first outlined the MarClim background and objectives; the second summarised long-term MBA research into climate-related ecological changes in the Western English Channel.

It was agreed at the 1st Management Group meeting in Plymouth on the 9th August that a MarClim website should be established by the end of August 2001. The website will be a fit-for-purpose noticeboard for MarClim consortium members hosting password-protected up to date documentation including downloadable reports and a calendar of events (including invoice dates). Upon establishment of the website a mailshot will give details of the site address and passwords.

Module 9 – Policy Application

A September 2001 meeting of an ad-hoc Policy Group is currently being arranged. The primary aim of the meeting will be to compile a list of key policy objectives, thereby enabling project outputs to be tailored towards specific policy needs of consortium members.

3. FUNDING / STAFFING UPDATE

Direct funding of £582,960 has been applied for the UK budget, with contributions of £543,000 agreed to date. DEFRA (former MAFF) are currently in process of obtaining reviews on a proposal submitted before agreeing to contribute the remaining £39,960. It is projected that direct costs of £540,295 are required to fulfil the project specification, including £40,000 contingency. It is planned that remaining contingency funds will be directed towards examining temporal changes in fish assemblages using time-series data collected from power station intake screens, or analysing other data sets as and when they become available.

UK funds agreed

	01-Apr-01 31-Mar-02	01-Apr-02 31-Mar-03	01-Apr-03 31-Mar-04	01-Apr-04 31-Mar-05	01-Apr-05 30-Apr-05	TOTAL
Countryside Council for Wales	5,000	10,000	10,000	-	-	25,000
The Crown Estates	-	60,000	30,000	30,000	-	120,000
Worldwide Fund for Nature	5,000	-	-	-	-	5,000
Scottish Natural Heritage	25,000	25,000	25,000	25,000	-	100,000
States of Jersey	2,500	2,500	2,500	2,500	-	10,000
Joint Nature Conservation Committee	3,000	-	-	-	-	3,000
English Nature	37,500	37,500	37,500	37,500	-	150,000
Environment Agency	7,500	7,500	7,500	7,500	-	30,000
Scottish Executive	15,000	15,000	15,000	15,000	-	60,000
DEFRA (former DETR)	5,000	10,000	10,000	10,000	5,000	40,000
DEFRA (former MAFF) *	9,990	9,990	9,990	9,990	-	39,960
TOTAL	115,490	177,490	147,490	137,490	5,000	582,960

* Awaiting proposal review

- Advertisements for a full time MarClim post-doctoral researcher and project-dedicated technician have been placed in *Nature* and advertised on the jobs.ac.uk and MBA web sites. Interviews will be held shortly after the closing date of August 17th; a start date of October 2001 is envisaged.
- A tender for the Irish side of the project will be published in September. The successful party will be informed by January 2002 and the post-doctoral fellow will start within 6 months of February 2002. The funding will be for three years.
- The University of Plymouth and MBA have co-funded a three-year full time PhD studentship to work on MarClim related research on intertidal rocky shore organisms. Richard Thompson, Steve Hawkins and Prof. Mike Depledge will be supervisors. The deadline for applications has now passed and interviews will be held shortly; a start date of January 2002 is predicted.

4. PROJECT MANAGEMENT AND EXTERNAL LIAISON

1ST ADVISORY GROUP MEETING

A meeting of the MarClim Advisory Group, chaired by John Baxter of Scottish Natural Heritage, took place at the offices of the Scottish Executive in Edinburgh on Friday June 15th

Attendees were informed that UK funding was now largely in place. The purpose of the meeting was to initiate the management of the project and ensure that the science that was carried out was appropriate to the policy needs of funding organisations

All bodies represented at the meeting expressed their willingness to support the aims of the project as set out in the project specification although concern was expressed that in a large project of this nature there was a need for a clear management structure. The Advisory Group was seen as being the body that gave the project direction and assured the quality and appropriateness of its products. It was agreed that the Management Group and any corresponding members of the scientific community should report to the Advisory Group. In view of the increase prominence of the Advisory Group it was further agreed that the Management Group might better be termed the *Project* Management Group and be restricted to those concerned with the day to day running of the science. The Project Management Group would be chaired by Dan Laffoley and would consist of John Baxter and representatives of the Marine Biological Association, Scottish Association for Marine Science and University College Cork and a secretariat.

Despite its central role, it was noted that from time to time the Advisory Group would need specialist support and provision should be made within the management structure for the establishment of *ad hoc* groups. The establishment of a group to advise on the broad range of outputs needed to meet UK and European policy needs was seen as a high priority. This group would ensure that a comprehensive list of output requirements would be provided for guidance of MarClim project managers. It would also define the formats that would be most appropriate to end-users. Richenda Connell was asked to chair the group.

A sub-group to address issues of data management was established with Steve Wilkinson (English Nature). This group would also contain representatives of the Marine Biological Association, Scottish Association for Marine Science and University College Cork and would formulate conditions for data access, would determine technical specifications for data input and address IRP issues.

Summary of action points:

- Mike Kendall to contact remaining data owners/stewards and negotiate data access.
- Mike Kendall to place relations with press on agenda for next AG meeting.
- Martin Genner to produce a budget based on secured funds for the next meeting.
- Martin Genner / Mike Kendall to present an inventory of the data at the next AG meeting.
- John Baxter will make contact with UKOOA.
- Tony Murray to contact wind energy organisations.
- Steve Hawkins to contact Associated British Ports and Isle of Man organisations concerning funding.
- Richenda Connell to establish policy group and hold a meeting within 10 weeks.
- Steve Wilkinson to set up an information technology group that should meet before the next AG group meeting.

In addition the following policy and management related meetings have been attended:

Steve Hawkins and Dan Laffoley attended a meeting with the UK Climate Impact Programme on 23 May 2001 in London to discuss MarClim physical data requirements

Mike Kendall and Steve Hawkins attended the DEFRA (former DETR) meeting on '*Developing the Research Agenda for Climate Change Impacts on Biodiversity*', 17 July 2001 in London.

Mike Kendall, Dan Laffoley and Steve Hawkins met with Dr Jack Lewis in Peterborough 8 August 2001 to discuss the project scientific direction, management, targets and access to the Rocky Shore Surveillance Unit historic data.

Dan Laffoley chaired the first MarClim Project Management Meeting in Plymouth on 9 August 2001. In attendance were Steve Hawkins, Mike Kendall, John Baxter, Mike Burrows, Ruth O'Riordan and Martin Genner.

5. ASSOCIATED INITIATIVES

- As outlined in the MarClim specification, a multi-partner pan-European EC Framework V project proposal to examine the impacts of climate change on marine rocky shores is currently going through the development stage and will be submitted by the 15th October 2001. The proposal will be submitted to the '*Energy, environment and sustainable development*' research programme addressing the key actions '*Global change, climate and biodiversity*' and '*Sustainable marine ecosystems*'. Research groups from Norway, Germany, Netherlands, UK, Ireland, Portugal, Spain and Italy have confirmed their willingness to participate. As a broad outline, the proposal will investigate:
 1. climatic patterns and links to nearshore oceanography
 2. associated changes in biodiversity / communities
 3. individual-level responses (physiology, reproduction, behaviour and recruitment)
 4. consequences for populations (includes genetic components)
 5. societal impacts / management

This project will represent considerable added value to the MarClim consortium, and enabling not only much enhanced geographic coverage, but processes to be examined in addition to patterns and predictions. No additional financial contributions are to be sought from consortium members to further support this initiative. The Advisory Group will be asked to endorse the project upon sending out of a summary document prior to submission.

- A joint CEFAS / MBA / Aberdeen Marine Lab proposal has been submitted to DEFRA (former MAFF) to examine the effects of climatic fluctuations change on the distributional limits and migratory behaviour of demersal fish using historic datasets recently compiled by the partners.
- The MBA have submitted a proposal for a NERC small grant to examine the effects of climatic variability on the timing of demersal fish and squid movements in the English Channel.