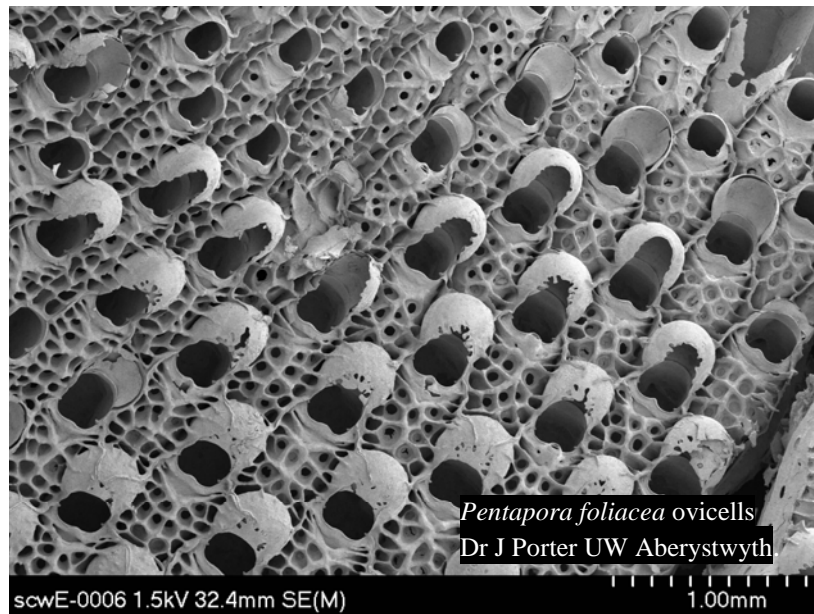


**Skomer Marine Nature Reserve
Project Status Report 2005/06
CCW Regional Report CCW/WW/05/9**

**K. Lock, M. Burton, L. Luddington &
P. Newman. March 2006**



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SYNOPSIS

The fourth project status report produced by the Skomer Marine Nature Reserve summarises the progress and status of monitoring projects in the Skomer MNR in 2005. A summary of all established projects in the MNR is provided in a table format. For each project that was worked on in the 2005 field season a detailed account is given including a history and summary of the results so far.

Title: K. Lock, M. Burton, L. Luddington & P. Newman. (2006). Skomer Marine Nature Reserve project status report 2005/06. CCW Regional Report CCW/WW/05/9.

CRYNODEB

Mae'r pedwaredd adroddiad ar statws prosiectau, a luniwyd gan Warchodfa Natur Forol Ynys Sgomer, yn crynhoi cynnydd a statws y prosiectau monitro yng Ngwarchodfa Natur Forol Sgomer. Ceir crynodeb o'r holl brosiectau sydd wedi hen sefydlu o fewn Gwarchodfa Natur Forol Ynys Sgomer ar ffurf tab. Ar gyfer yr holl brosiectau yr aethpwyd i'r afael â nhw yn ystod tymor maes 2005, rhoddir mwy o fanylion, gan gynnwys eu hanes a chrynodeb o'r canlyniadau hyd yn hyn.

Teitl: M. Burton, K. Lock, L. Luddington a P. Newman. (2006). Skomer Marine Nature Reserve project status report 2005/06. Adroddiad CCW/WW/05/9, Ardal y Gorllewin, Cyngor Cefn Gwlad Cymru.

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1 INTRODUCTION

This is the fourth project status report produced by the Skomer Marine Nature Reserve. It summarises the progress and status of monitoring projects in the Skomer MNR in 2005. The project status table in section 2 provides a summary of all established projects in the MNR in 2005. Section 3 details projects that were worked on this year and where possible includes a summary of the results so far.

Notable events in the 2005 field season:

- The territorial fish volunteer project was successfully run involving over 40 volunteers surveying 10,170m² of seabed. Methods were modified and re-locatable sites established to enable comparable repeat surveys in the future.
- MNR and CCW HQ staff completed the algal communities project fieldwork in August and a herbarium of the samples was prepared. Analysis of the data and evaluation of current field methods is being completed by a contractor. They will be providing recommendations for future algae community monitoring in the Reserve and a report will follow in 2006
- A sample of *Pentapora foliacea* was taken each month from May to September to examine for ovicell presence and evidence of reproduction. The September sample showed a line of ovicells, just two to three rows of zooids back from the growing edge. This indicates a reproduction event, possibly in late August or early September.

2 SKOMER MNR PROJECTS STATUS SUMMARY TABLE

	Brief description	Year sets	Sampling frequency	Report	Data summary
PHYSICAL					
Meteorological data	Wind, rain, sunshine, temp, humidity, radiation. Automatic station logging 10 minute means.	1993 – ongoing (station removed Oct 05)	Continuous	No	Yes-Skomer MNR office
Wave data	Height, period, etc. Automatic station logging every 10mins.	1993-1998	Continuous	No	No - raw only
Seawater data	Temp, salinity, conductivity, suspended sediment. Data collected by a range of methods.	1992 - ongoing	Weekly (May -Sept) Temp continuous all year round (since 99)	No	Yes-Skomer MNR office
Seabed sedimentation	Auto sampler	1994-1998	Continuous	No	Yes-Skomer MNR office
	Sediment trap	1994 - ongoing	Every 14 days (April-Oct)	No	Yes-Skomer MNR office
	Idronaut Turbidity logger	2001 - ongoing	Continuous	No	No - raw only
Bathymetry	Sidescan & Multibeam (SAC)	2001		Longdin & Browning 2002	No
ACTIVITY					
Recreation activities	Boats, divers, anglers recorded in the Reserve	1989 - ongoing	Weekly (May -Sept)	Skomer MNR annual reports	Skomer MNR annual reports
Commercial fishing activities	Pot buoys and fishing net positions	1989 - ongoing	Weekly (May -Sept)	Burton 2002 SMNR annual reports	Yes-Skomer MNR office
Tankers in St Brides bay	Number and names of tankers and movements	1994 - ongoing	Daily	No	Yes-Skomer MNR office
BIOLOGICAL					
Littoral communities:					
Macro scale (view point photographs)	Time series photos/digitised.	1992 - ongoing	Annual	Internal report – Daguett 2000	Yes-Skomer MNR office
Meso scale (transects)	6 Transects. Time series photos/digitised. 9 sites established in 2003 including 3 Marclim sites. Site marking completed in 2004.	1992 – 2002	Annual	Adams 1979/ Bunker 1983/ Crump 1993/96 Hudson 1995.	Yes-Skomer MNR office
		2003 - ongoing	Annual	Burton & Crump 2004	Yes-Skomer MNR office

	Brief description	Year sets	Sampling frequency	Report	Data summary
Sub littoral communities:					
Rocky reef communities	Time series stereo photos.	1982 - ongoing	Annual	Bullimore 1986 & 1987	Yes-Skomer MNR office
Algal communities	Survey and report completed Survey and report completed	1999 2005	Every 4 years Next survey planned 2009	Hiscock, S 1983 & 1986 Scott 1994 Broodie 1999/2000 Luddington <i>et al</i> 2006 in prep	
Sponge assemblages	Time series mono-photo/digitised. Species recording.	1994 - ongoing 2002/3	Annual Every 4 years Next survey planned 2006	Bunker <i>et al</i> 1992	Yes-Skomer MNR office
Infaunal sediment	Surveys and reports completed	1993/1996/ 1998/ 2003	Every 4 years Next survey planned 2007	Rostron 1994 & 1996 Barfield 1998 & 2003	Yes-Skomer MNR office
Epifaunal sediment	Survey and report completed	1995/ 2001 & 2004	Every 4 years Next survey planned 2008	Rostron 1996 Moore 2002 Moore 2005	Yes-Skomer MNR office
Flora:					
<i>Zostera marina</i>	Extent of NHV bed & density distribution.	1997/2002 (boundary maps for 2000, 2002 & 2004)	Every 4 years Next survey planned 2006	Jones & Hodgson 1980 & 1981, Jones <i>et al</i> 1983, Lock 1998 & 2003	Yes-Skomer MNR office
Fauna:					
<i>Eunicella verrucosa</i>	101 colonies, time series mono-photo/digitised. 4 colonies, stereo-photo.	1993- ongoing 1982- ongoing	Annual	Bunker <i>et al</i> 1985, Bullimore 1986 & 1987 Gilbert 1998	Yes-Skomer MNR office
<i>Alcyonium glomeratum</i>	Time series stereo-photo/digitised. North wall 5 transects (% frequency) North wall East, Thorn rock & Rye rocks.	1984- ongoing 2002 new transects	Annual	Bullimore 1986 & 1987	Yes-Skomer MNR office

	Brief description	Year sets	Sampling frequency	Report	Data summary
<i>Parazoanthus axinellae</i>	6 sites, time series mono-photo/digitised.	2001- ongoing	Annual	Burton <i>et al</i> 2002	Yes-Skomer MNR office
<i>Pentapora foliacea</i>	3 sites, time series mono-photo/digitised. New sites established 2002 & 2003.	1994- ongoing	Annual	Bullimore 1986 & 1987 Bunker/ Mercer 1988 Gilbert 1998	Yes-Skomer MNR office
<i>Balanopyllia regia</i>	Time series @ thorn rock stereo-photo/digitised The Wick. 3 transects	1984 – 2002 2002 - ongoing	Annual	Bullimore 1986 & 1987	Yes-Skomer MNR office
<i>Cayophyllia smithii.</i>	Counted from sponge project quadrats (stereo-photo/digitised)	1993 - ongoing	Annual	No	Yes-Skomer MNR office
<i>Pecten maximus</i>	UCS survey, Survey completed, 3 sites- 2000 Survey completed, 7 sites 2004.	1979/80, 1979-82 2000 2004	Every 4 years Next survey planned 2008	Bullimore 1985 Jones 1979 & 1980 Lock 2002 Luddington <i>et al</i> 2004	
Nudibranch species	Various surveys MNR survey completed.	1975-1991 2002	Every 4 years Next survey planned 2006	Bunker <i>et al</i> 1993, Luddington 2002	
Territorial fish	Survey methods developed. Survey completed.	1997 2001/2002 2005	Every 4 years Next survey planned 2009	Lock 1998 Lock <i>et al</i> 2006 in prep	Yes-Skomer MNR office
Atlantic Grey Seal	Surveys and reports.	1976- ongoing	Annual	Grey Seal breeding census, Skomer Island 1992-2005, Skomer MNR annual reports.	Yes-Skomer MNR office
Echinoderm Survey	Abundance of <i>Echinus esculentus</i> in Skomer MNR using volunteer survey methods. Data for <i>Marthasterias</i> , <i>Crossaster</i> & <i>Luidia</i>	2003	Every 4 years Next survey planned 2007	Luddington, Lock <i>et al</i> 2004	Yes-Skomer MNR office

3 SKOMER MNR BIOLOGICAL PROJECT SUMMARIES

LITTORAL COMMUNITIES AND ASSEMBLAGES (CMS code: RB03/02 & RB03/01)

STATUS Ongoing. Annual photographic sampling. Annual quantitative survey.

PROJECT RATIONALE

Littoral communities are susceptible to impacts from the water and the air. They occupy a harsh niche with an extreme range of environmental conditions. Salt tolerant terrestrial species exist within metres of truly marine species. These factors coupled with the relative ease of fieldwork compared to sub-littoral habitats make littoral communities useful for a wide range of environmental monitoring. There is a wealth of literature on the biology of rocky shores to provide guidance and support information for littoral monitoring projects.

LITTORAL COMMUNITIES MESO SCALE - SHORE TRANSECTS (CMS code: RB03/02)

OBJECTIVES

To monitor the littoral communities on bedrock shores over the continuum of exposure and aspect ranges.

SITES

- North Haven
- South Haven
- South Stream
- The Lantern
- The Wick
- Double Cliff
- Inside of Pig Stone. New 2003
- Jacksoun / Wooltack. New 2003
- Martins Haven. New 2003
- Hopgang (North Marloes Peninsula) Lichen station only

METHODS

Transects with permanent, fixed position quadrats were established in 1992. The quadrats extend from spring low water into the splash zone at regular height intervals. Species abundance was recorded using the semi-quantitative SACFOR abundance scale (Hiscock 1990) and photographs taken of each 50 x 50cm quadrat. In addition a selection of close up photographs of 10 x10cm quadrats were taken within the main quadrat.

RESULTS

1982 – Bunker *et al.* surveyed 22 sites in the MNR as a baseline littoral survey.

1992 – 6 permanent transects were established in the MNR and surveyed/ photographed (Crump, 1993).

1992 – 2002 Photographs of the 6 permanent transects were taken and stored.

1996 – Following the Sea Empress oil spill (Feb 1996) the 6 transects were resurveyed and a lichen monitoring site was set up at Hopgang (Crump, 1996). The littoral shores around Skomer showed no significant changes after the Sea Empress oil spill, with the exception of lichens at Hopgang, which showed signs of necrosis.

2001 - Slide photographs from 1992 – 2000 were reviewed and abundance estimates from the photographs compared with abundance records from Crump 1992 & 1996 field data. Photograph quality was insufficient to allow accurate abundance estimates.

2001/02 – Digital imaging was tested to obtain pictures of permanent quadrats. Image quality was improved, however estimates of species abundance were still inaccurate due to difficulties with identification of species and individuals from the images. This method cannot replace collection of data in the field for quantitative assessment.

2003 – New quantitative methods were tested at the 6 original sites and 4 additional sites were established.

2004 – Methods established in 2003 were continued. All site marking was completed and all results collected.

2005 – All the sites established in 2003 were resurveyed except for the lower shore at Pig Stone.

Littoral community monitoring methods 2004

(see Crump & Burton 2004 for full details)

At each site samples were taken from 4 heights on the shore:

Lower shore – 1.8m Above Chart Datum (ACD)

Middle shore – 4.2m ACD

Upper shore – 6.0m ACD

Splash zone ~ 9.0m ACD (selected sites only. To include Hopgang)

At each shore zone:

- Four 1 x 1m quadrats were placed in homogenous areas of inclined rock (avoiding rock pools and large fissures)
- Presence / absence recorded for all species using a 25 cell grid.
- Digital photographs were taken of the whole quadrat
- Limpets were counted in 5 randomly selected cells
- Photographs of barnacles from 5 randomly selected cells using a 5 x 5cm quadrat
- % cover of barnacle species estimated in 5 random 20 x 20cm cells
- % cover of lichen species recorded in 50 x 50cm quadrats at selected sites

Counting protocols:

- Aggregate rough winkle species
- Aggregate *Verrucaria spp* other than *V. mucosa*
- Only counted limpets > 10mm and aggregate to *Patella spp* (species are separated in the MarClim methodology)
- Aggregate barnacle species for cell frequency counts
- Presence/absence of barnacle *spp* in 1m quadrat; barnacles were identified to species level from close up photographs

Barnacle monitoring

From each quadrat in the lower, middle and upper shore 5 photographs were taken using a 5 x 5cm quadrat from random locations within the quadrat on flat areas of bedrock. This provided a total of 20 samples from each shore zone. Species counts were carried out for all individuals > 2mm. All photographs were taken at all sites to obtain a complete record for future use, however the number of sites analysed depended on the time involved in analysing the photographs. So far only the Marclim sites have been analysed.

Limpet monitoring

At all shore levels counts of limpet species were made from 5 random cells (20 x 20cm) from within each quadrat giving a total of 20 cell counts.

In the middle shore only, the first 200 limpets were measured to the nearest mm.

In areas of low density at least 100 limpets were measured.

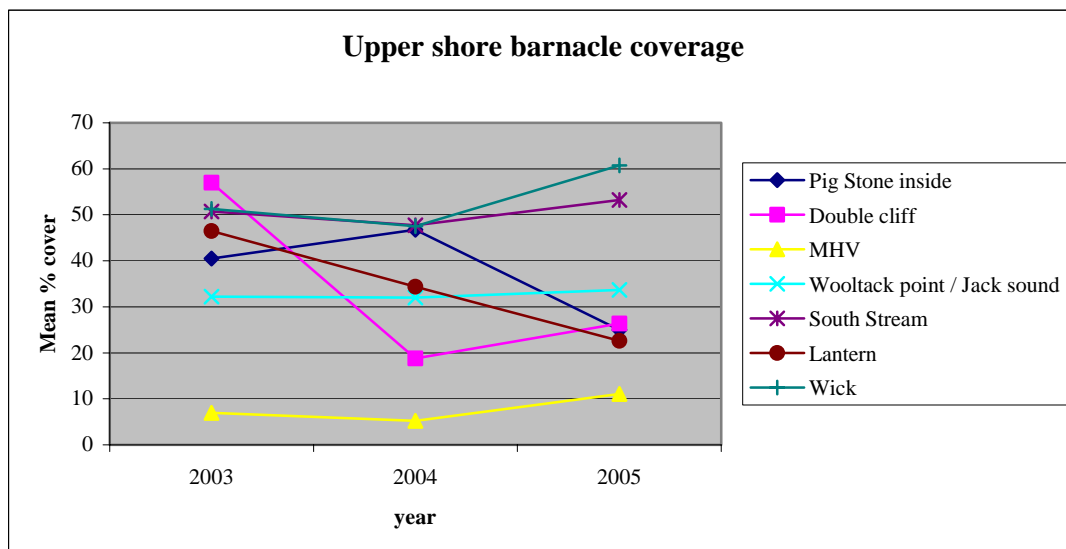
MarClim methodology

The MarClim project (Plymouth Marine Laboratory) offers an opportunity to compare the Skomer shores to the rest of the UK and contribute to the assessment of the effects of global warming.

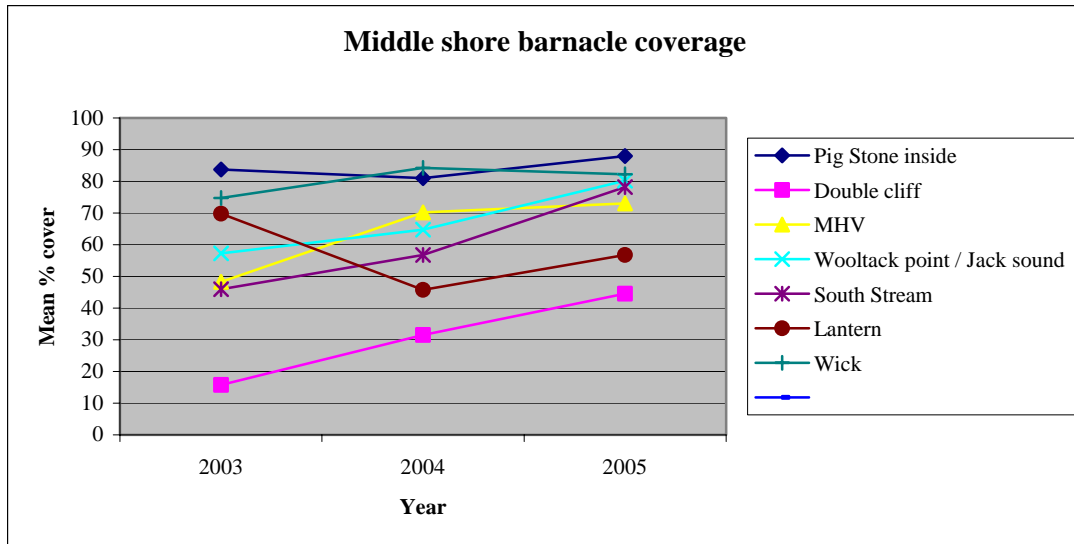
The MarClim methodology was used at Martin's haven, North Haven and South haven (see Mieszkowska *et. al.* 2002). This involved recording abundances for a selected list of edge of range species, counting barnacles in 5 x 5cm quadrats and limpets in 50 x 50cm quadrats. Timed searches were conducted for *Osilinius lineatus* and *Gibbula umbilicalis* and individuals measured to the nearest mm.

RESULTS

Mean % cover of barnacles

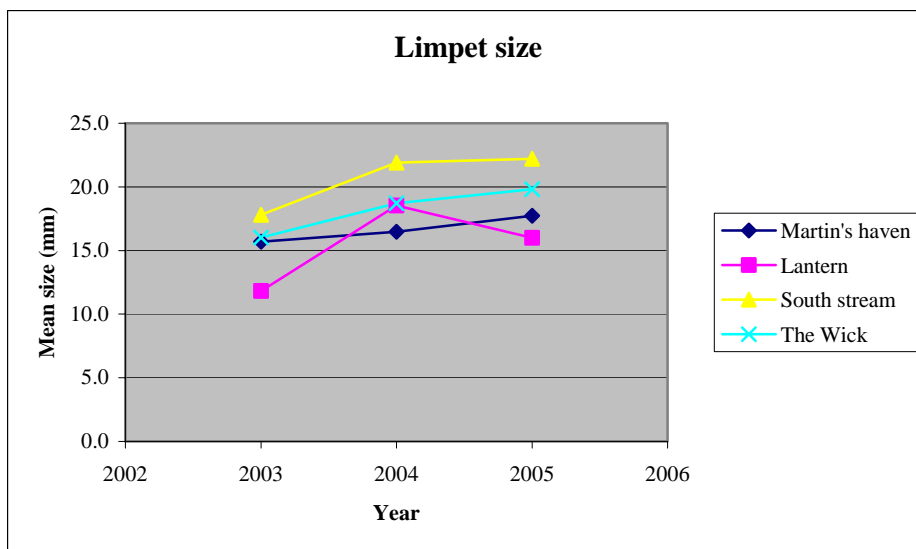


Barnacle coverage in the upper shore appears stable over the 3 years but variable between sites.

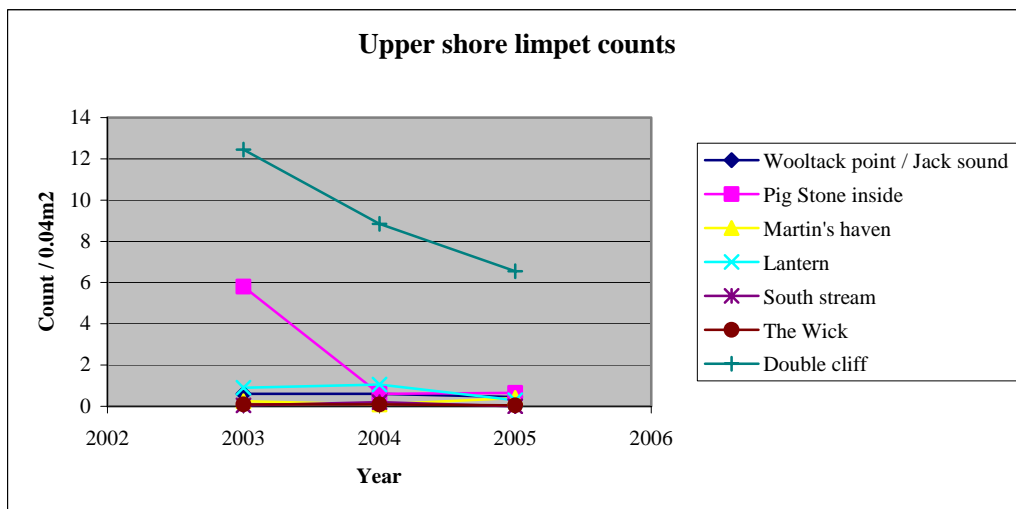


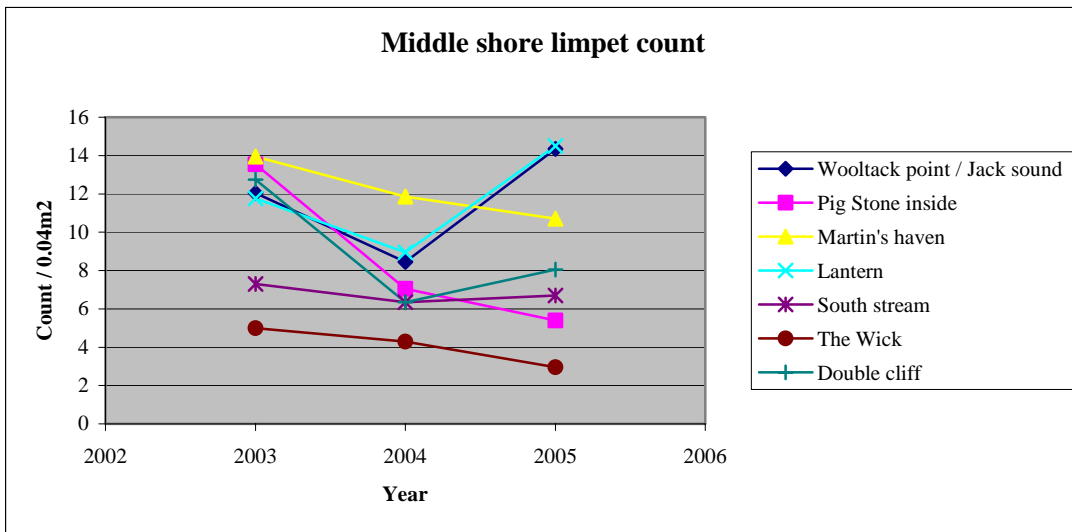
There appears to be an increasing trend in barnacle coverage on the middle shore across most sites. Barnacle and fucoid coverage is known to fluctuate.

Size of limpets on the middle shore (mm)

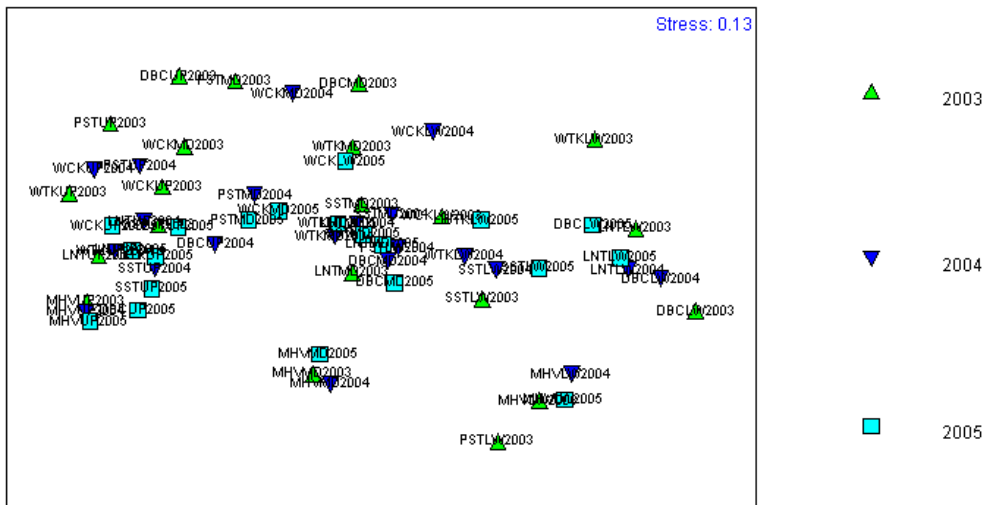


Counts of limpets from 5 (20 x 20cm) quadrats





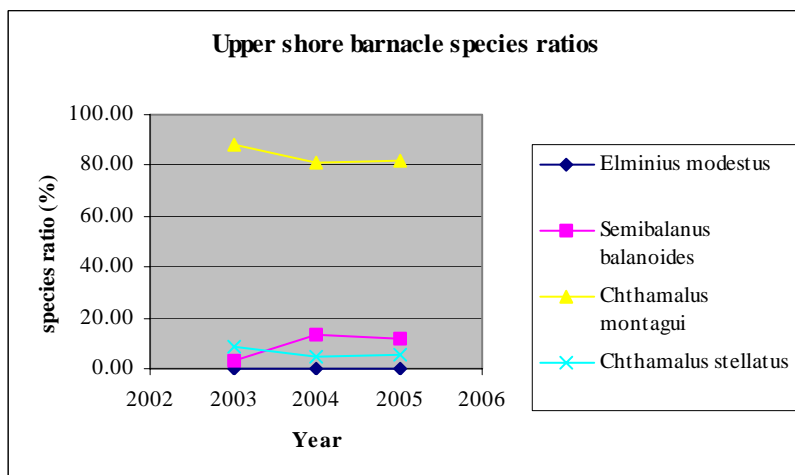
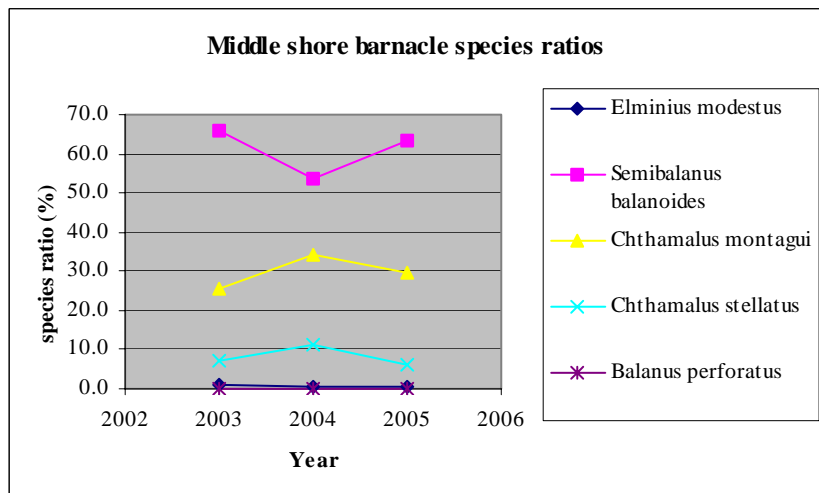
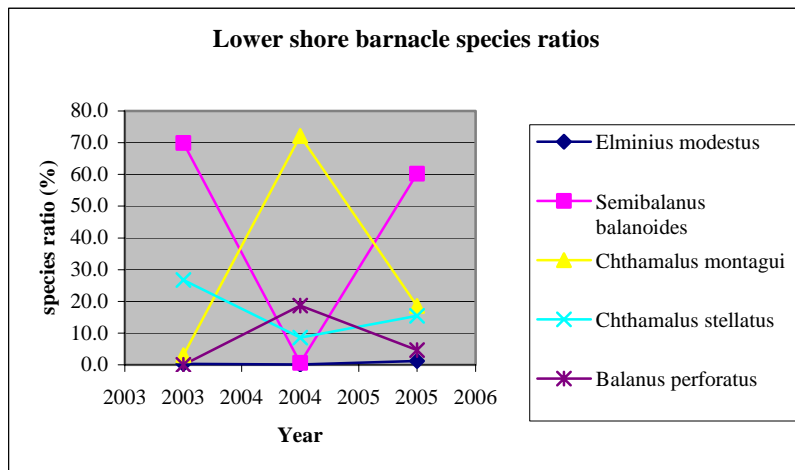
MDS plot of quadrat data for 2003 - 2005 (PA transformation)



The MDS plot is difficult to interpret but suggests that 2004 and 2005 data sets are similar to each other. The 2003 data set is much more disparate. This could be due to the recording protocols being refined and standardised in 2004/5.

Barnacle species ratios

Results from the 3 Marclim sites. Derived from photographs of 5cm X 5cm quadrats.



Upper and middle shore ratios show small changes in relative abundance. The lower shore has undergone some dramatic changes over the 3 years with *Semibalanus balanoides* declining and being immediately replaced by *Chthamalus montagui*. This may be due to a poor settlement of *Semibalanus balanoides* spat in the winter of 2002/3 (possibly linked to mild sea temperatures) *Chthamalus montagui* individuals will then benefit from a lack of competition. Similar patterns to this have been seen in the historic data studied by the MARCLIM team.

ALGAL COMMUNITIES (CMS CODE: RF43/01)

STATUS Ongoing. Last survey in 1999, methodology under review.

PROJECT RATIONALE

Monitoring of sublittoral algal communities around the Skomer Marine Nature Reserve has been taking place since 1982 (Hiscock, 1983). Since this time a variety of habitats have been studied in a number of different ways (Scott, 1994, Brodie & Watson, 1999 and Brodie & Bunker, 2000). Brodie & Bunker (2000) established a monitoring protocol during a survey in 1999 and a repeat survey was planned for August 2005. Due to financial constraints species lists only were obtained from bedrock sites (Skomer Head, Mewstone, North Wall and Wick) and pebbles collected for analysis.

OBJECTIVES

To compare species lists from both bedrock and pebble sites between years

To compare historical results of *in situ* observation and collection of pebble communities at Garland Stone

To investigate species diversity using Taxonomic Distinctness analysis

SITES

- Skomer Head
- Mewstone
- North Wall
- Wick
- Wick Basin Garland Stone
- Martins Haven

METHODS

Methods in the 2005 survey followed those described by Brodie & Bunker (2000):

Bedrock

Between the 8th and 10th August 2005 the algal species composition was recorded for the sublittoral fringe (SF), upper infralittoral (UI), lower infralittoral and upper circalittoral (UC) sub-zones at 3 undisturbed bedrock and large boulder sites and 1 disturbed bedrock and boulder site: North Wall, Skomer Head, The Mewstone and The Wick. Identification and location of the sublittoral sub-zones is explained in Brodie & Bunker (2000). Stations were permanently marked with pitons during the 1999 survey to aid site relocation. These were relocated in 2005 and pitons replaced or extra markers added where necessary.

Surveyors recorded presence/absence of species at each sub-zone prompted by a list of species recorded at the same sub-zone by Brodie & Bunker (2000). Where species could not be identified *in situ* a specimen was collected for later identification.

Cobbles & pebbles

With the aid of GPS, the permanent marker at Garland Stone was relocated during a reconnoitre dive and marked with a surface buoy. Wick Basin was dived prior to the survey to relocate an area suitable for the collection of pebbles and marked with a shot line and surface buoy. At Martin's Haven divers descended the Skalmey mooring and swam east until suitable habitat was encountered.

At each sub-zone at each site, three 25 cm x 25 cm quadrats were randomly placed by divers. All surface pebbles/cobbles up to fist-size were collected from each quadrat and placed in separate bags. These samples were sent to Prof. Christine Maggs, Queens University Belfast for identification of crustose coralline algae, crustose non-coralline algae and any other macro- or

microscopic foliose algae attached to the pebbles. Data from the 2005 survey was not available for analysis at the time of writing.

RESULTS

Analysis of results and report are in progress.

TARGETS

To establish a monitoring protocol for the future that is both achievable and worthwhile

CURRENT STATUS

Undetermined

RECOMMENDATIONS

In progress

REFERENCES

Luddington L. & Bunker F. (in preparation)

SPONGE ASSEMBLAGES (CMS code: RM13/01)

STATUS Ongoing. Annual sampling of stereo photograph quadrats (1993-ongoing). Species surveyed every 4 years (next due 2006).

PROJECT RATIONALE

Skomer MNR's sponge communities have been identified as rich and diverse with over 80 species. Six are nationally scarce species and eight near their limit of distribution. Sponges are filter feeders and therefore reliant on water quality which makes them susceptible to changes in sediment deposition. They are therefore useful biotic indicators of changes in suspended sediment and surface sedimentation rates, the cause of which might include dredge spoil dumping.

OBJECTIVES :

- To monitor the sponge assemblages in the MNR.
- To identify natural and anthropogenic fluctuations.
- To identify the presence of rare, scarce and edge of range species in the MNR.

SITES

- Thorn Rock (transects & species survey)

METHODS

Transects: Four fixed transects are located at Thorn Rock. Photographs are taken from fixed positions along the transects using a stereo camera set up on a 50 x 70cm frame. The slides are analysed using a stereo viewer to count the abundance of sponge species and morphology types.

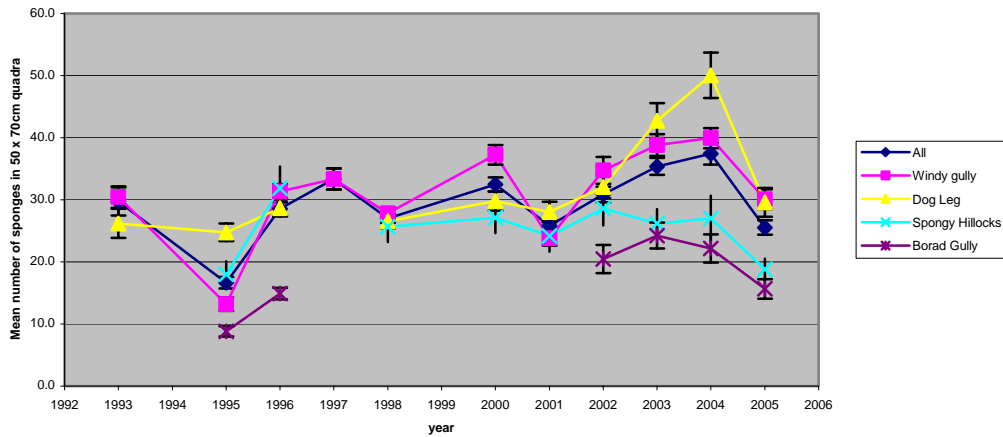
Species survey: All sponge species identified in 16, 50 x 70cm quadrats. Species photographs taken in the field and samples taken, where necessary, for spicule preparations.

RESULTS

Data gathered from Thorn Rock sponge transects:

YEAR	No of samples	TRANSECTS
1993	24	Windy Gully
1995	77	Windy Gully, Spongy Hillocks, Broad Gully, Dogleg
1996	72	Windy Gully, Spongy Hillocks, Broad Gully, Dogleg
1997	20	Windy Gully
1998	60	Windy Gully, Spongy Hillocks, Dogleg
2000	63	Windy Gully, Spongy Hillocks, Dogleg
2001	62	Windy Gully, Spongy Hillocks, Dogleg
2002	81	Windy Gully, Spongy Hillocks, Broad Gully, Dogleg
2003	79	Windy Gully, Spongy Hillocks, Broad Gully, Dogleg (Species survey for Windy Gully & Spongy Hillocks)
2004	80	Windy Gully, Spongy Hillocks, Broad Gully, Dogleg
2005	80	Windy Gully, Spongy Hillocks, Broad Gully, Dogleg

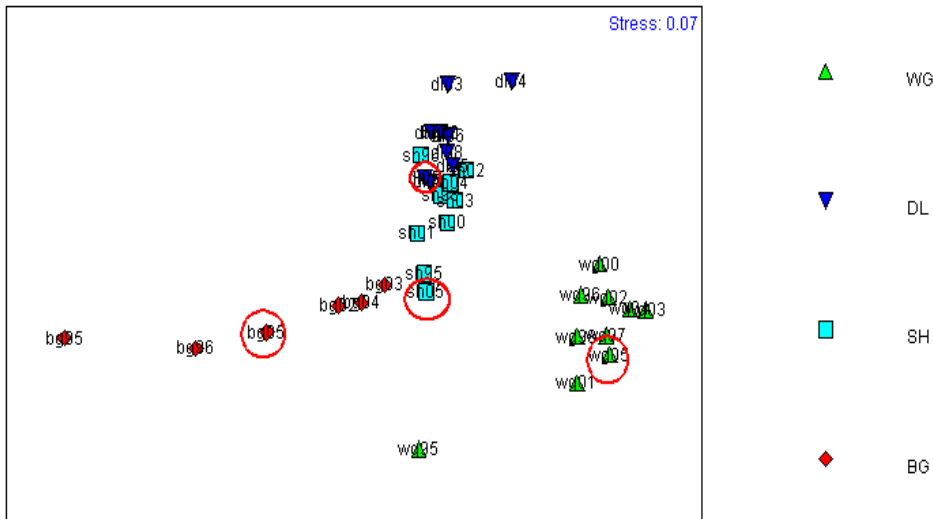
number of sponges / quadrat



Bell & Barnes (2001) describe a morphology method for assessing the diversity of sponge communities. This method has proved very useful in analysing the stereo slides. The results are suitable for multivariate analysis using the Primer statistical software package (Clarke & Warwick 2001). A paper summarising the results is in preparation for intended publication in 2006.

MDS plot of the sponge communities at Thorn Rock.

WG – Windy gully, DL – Dogleg, SH – Spongy hillocks BG – Broad gully



2005 results are marked with a red circle.

In September 2005 a series of permanent quadrat locations were established using fixed bolts at Broad Gully, Spongy hillocks and Dogleg (5 x 1m² quadrats at each site). A study starting in 2006 by Dr James Bell from University Wales Aberystwyth will use these sites to assess the effects of seasonality on sponge communities.

In 2005 sponge species identification work was completed from the 2002/03 species survey. Scanning electron microscope techniques were used on unidentified samples.

TARGETS

- To monitor changes in the sponge assemblages and identify natural and anthropogenic fluctuations.
- To maintain the current species richness and diversity as well as the presence of rare/scarce species and species nearing their distribution limit.

CURRENT STATUS

2005 shows a decrease in sponge abundance. The communities at Windy gully and Dogleg appear to have returned to their previous levels while Broad gully and Spongy hillocks show signs of shifting away from their normal composition.

RECOMMENDATIONS

The Morphology method could be used to survey a greater area of the Reserve to get a better idea of the diversity of sponge assemblages inside and outside the Reserve. Seasonality of sponge assemblages needs further investigation and Dr James Bell will be setting up a seasonal surveillance project in the Thorn Rock area in 2006.

REFERENCES

Picton & Morrow 1993, Bell & Barnes 2001, Clarke & Warwick 2001.

***EUNICELLA VERRUCOSA*: POPULATION AND GROWTH RATE (CMS Code: RM23/01)**

STATUS Ongoing. Annual sampling.

PROJECT RATIONALE

The pink sea fan *Eunicella verrucosa* (Pallas) is a Lusitanian anthozoan soft coral nearing the northern limit of its distribution in North Pembrokeshire. It is a UK Biodiversity Action Plan Species on Schedule 5 of the Wildlife and Countryside Act 1981. Sea fans are slow growing; erect species susceptible to permanent damage. Recovery and reproduction rates are thought to be very slow.

OBJECTIVES

To monitor numbers and condition of the recorded sea fans in Skomer MNR and to expand the monitored population.

SITES

- Bernie's Rocks (East and West)
- Bull Hole
- The Pool
- North Wall East
- Sandy Sea Fan Gully
- Thorn Rock
- Way Bench
- Rye Rocks
- South Middleholm
- West Hook

METHODS

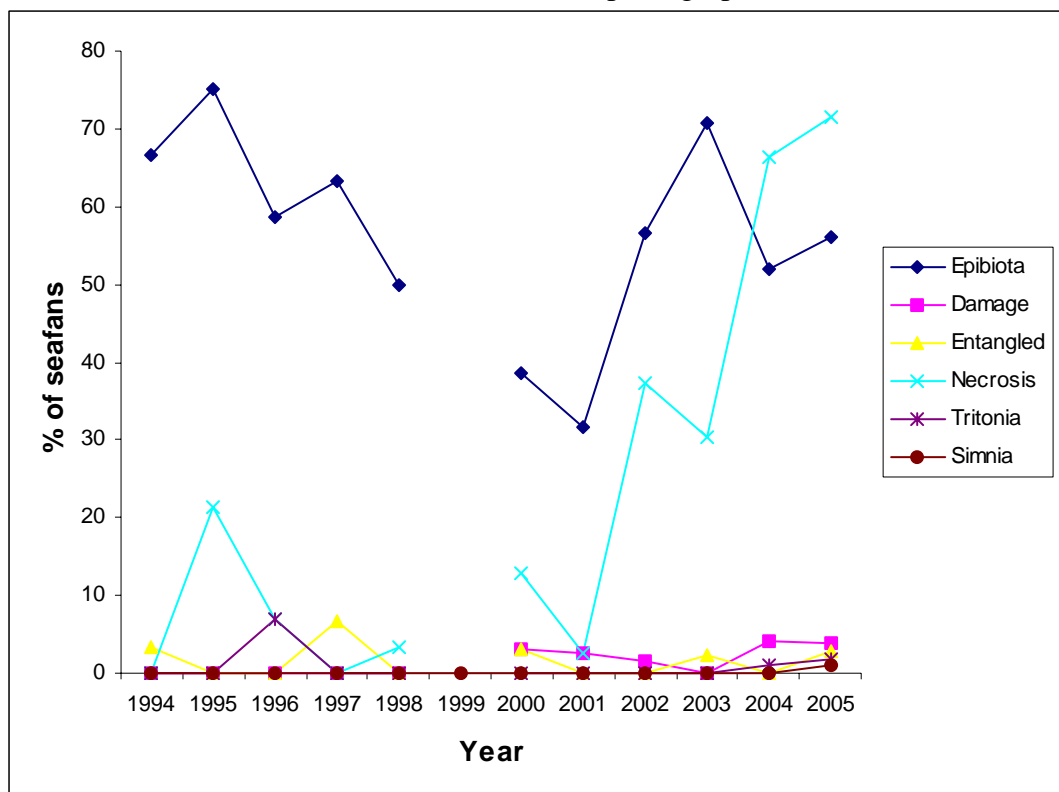
Photographic monitoring using a single camera on a 50 x 70 cm frame with a black grid board as a background. Both sides of the sea fan are photographed and each fan is visually inspected for damage, fouling by epibiota, entanglement with man-made materials, necrosis (loss of living tissue) and the nudibranch *Tritonia nilsodhneri* Marcus, 1983 and *Simnia patula* (Pennant, 1777).

RESULTS

Sampling effort

Year	Number Recorded	No of fans analysed	Missing or lost sea fans
1994	33	29	0
1995	32	28	Way 9
1996	33	29	0
1997	37	28	0
1998	37	28	0
1999	4	0	0
2000	55	26	0
2001	54	35	Trk1& Way 12
2002	74	64	0
2003	102	94	0
2004	105	101	Bho23
2005	105	105	NWA 7

Condition of sea fans in the Skomer MNR observed from photographs



CURRENT STATUS

- **Numbers:** 5 losses in 12 years (1994-2005); one unknown colony found detached at Rye Rocks in 2003 and two unknown colonies found detached at RRK and WHK during 2004. Colony 7 was lost from North Wall East in 2005.
- **Condition:** 3 records of entanglement in 2005. Epibiotic fouling in 2005 was higher than in 2004 but did not reach the peak observed previously in 2002. The number of sea fans with necrotic areas has increased since 2004.
- Single specimens of *Tritonia nilsodhneri* and *Simnia patula* were at Sandy Sea Fan Gully and Waybench respectively in 2005.

RECOMMENDATIONS

- Continue annual photographic monitoring programme
- Complete field records for each colony, recording damage, entanglement, necrosis, levels of epibionts and numbers of *Tritonia nilsodhneri*
- Search for new recruitments at established sites
- Monitor sea temperature and suspended turbidity levels to provide background data for the biological monitoring
- Support research work on the biology of sea fans (e.g. Species Challenge Fund)
- Observe persistence of biotic fouling/entanglement e.g. Greater spotted dogfish eggs
- Differentiate between drift algae and epibionts in field records.

***ALCYONIUM GLOMERATUM* POPULATION (CMS code: rm23/03)**

STATUS Ongoing. Annual sampling.

PROJECT RATIONALE

Alcyonium glomeratum (red sea fingers) is a Lusitanian species nearing its northern limit of distribution. Colonies are long-lived and possible indicators of climate change.

OBJECTIVES

To monitor colony area and to look for damage and disease.

SITES

- North Wall Stereo (established 1982)
- North Wall (established 2002)
- Thorn Rock (established 2002)
- Sandy Sea Fan Gully (established 2002)
- North Wall East (established 2002)
- Rye Rocks (established 2003)

METHODS

North Wall Stereo: three quadrats (50 x 40cm) are photographed using stereo photography.

At all other sites photographs (mono) are taken using a 50 x 70cm framer. Each sites follow either a sequence of photos or transects that are prescribed in site relocation proforma.

Site	Sequence
North Wall “Al glom” wall	five vertical transects
Thorn Rock mooring	two fixed position quadrats
Sandy Sea Fan Gully	two vertical transects
North Wall East	two vertical transects
Rye Rocks	one transect

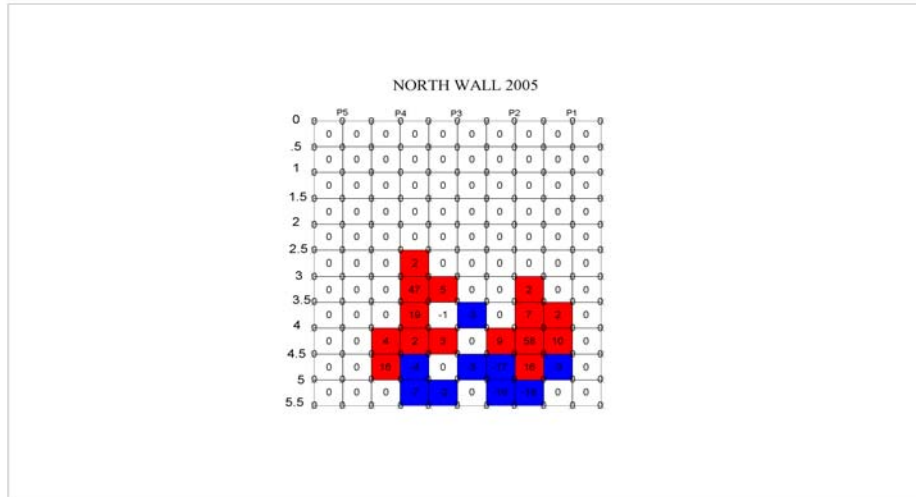
The colonies are “wafted” before photographing to make them retract in an attempt to control the variability in colony size.

The images are analysed by overlaying a 5 x 5cm grid and recording presence/absence of *A. glomeratum* within the grid squares. See Burton, Lock & Newman 2002 for details.

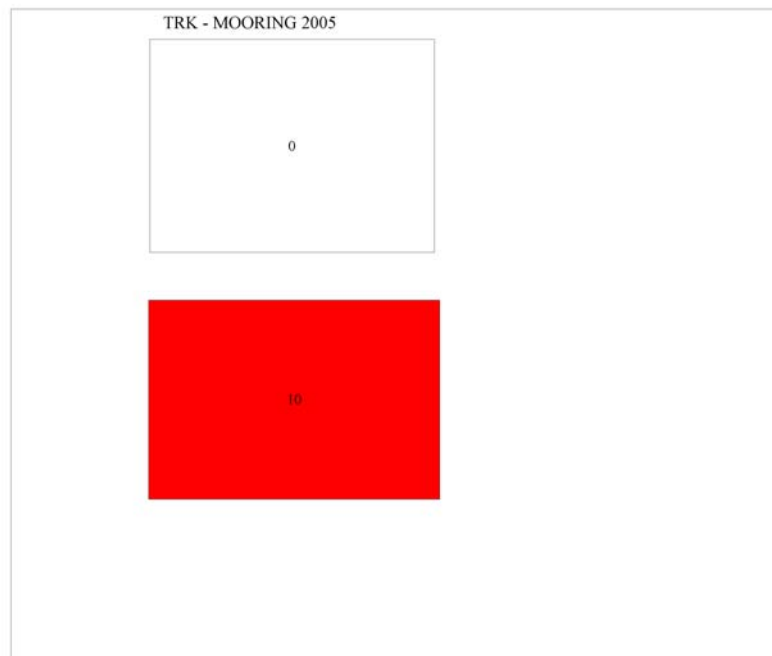
RESULTS

North Wall Stereo: The three quadrats have a steady abundance of *A. glomeratum* of approximately 50% since 1984. Quadrat 2 and 3 show some evidence of an increase in abundance.

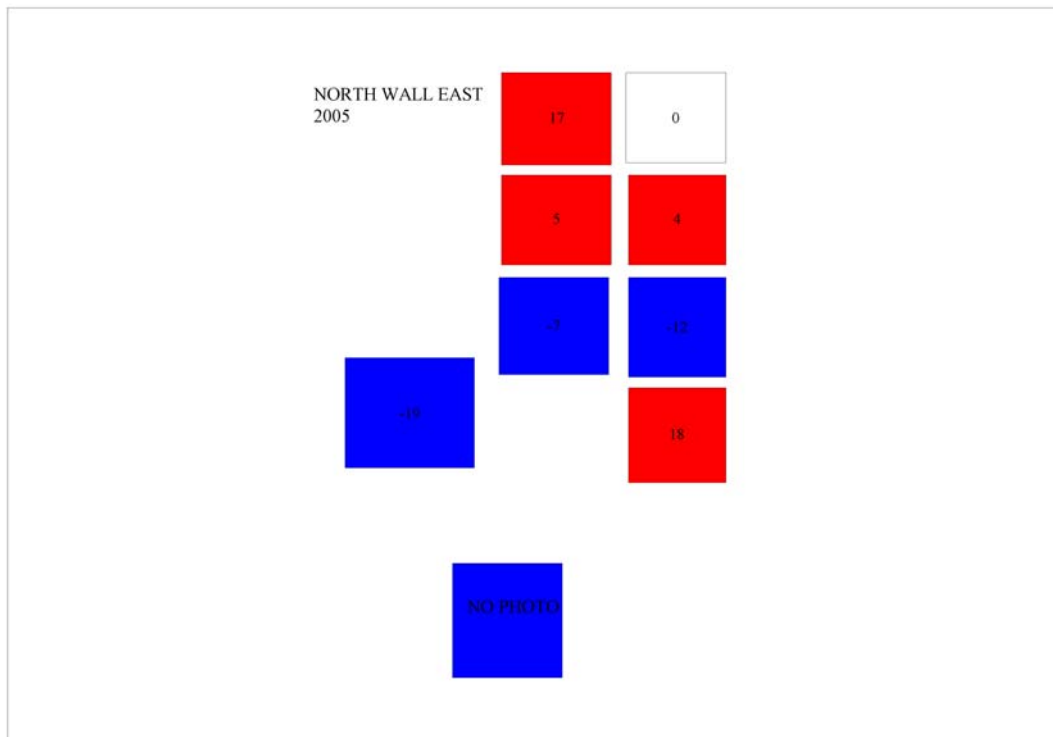
North Wall: Difference in frequency of *A. glomeratum* between 2004 & 2005 (Red boxes indicate an increase in abundance in 2005, blue boxes indicate a decrease in abundance).



Thorn rock mooring: Difference in frequency of *A. glomeratum* between 2004 & 2005



Sandy Seafan gully: The 2005 photographs were very poor quality, therefore no analysis was possible.

North Wall East: Difference in frequency of *A. glomeratum* between 2004 & 2005

Rye Rocks: The 2005 photos did not match up sufficiently with 2004 to allow analysis.

CURRENT STATUS

The colonies in the North Wall stereo quadrats have shown no evidence of damage or disease and the population appears stable.

The colonies need further surveillance to assess their status.

RECOMMENDATIONS

Continue with monitoring.

Improve site marking to allow accurate relocation of quadrats.

PARAZOANTHUS AXINELLAE POPULATION (CMS code: RM23/05)

STATUS Ongoing, annual sampling.

PROJECT RATIONALE

The population of *Parazoanthus axinellae* (yellow trumpet anemone) is an important feature of Skomer MNR. *P. axinellae* is a Lusitanian (south-western) species nearing the edge of its range and may act as an indicator of climatic change.

OBJECTIVES

Monitor *P. axinellae* colonies for changes in polyp density and colony area.

SITES

- Sandy Sea Fan Gully
- Thorn Rock (3 colonies)
- Way Bench (2 colonies)

METHODS

Density estimates: Close up photographs are taken and polyps are counted using GIS image analysis techniques.

Area of the colony: A series of transects are placed through the colonies. Photographs are taken using a 50 x 70cm framer. The images are analysed by overlaying a 5 x 5cm grid and recording presence/absence of *P. axinellae* within the grid squares. See Burton, Lock & Newman 2002 for details.

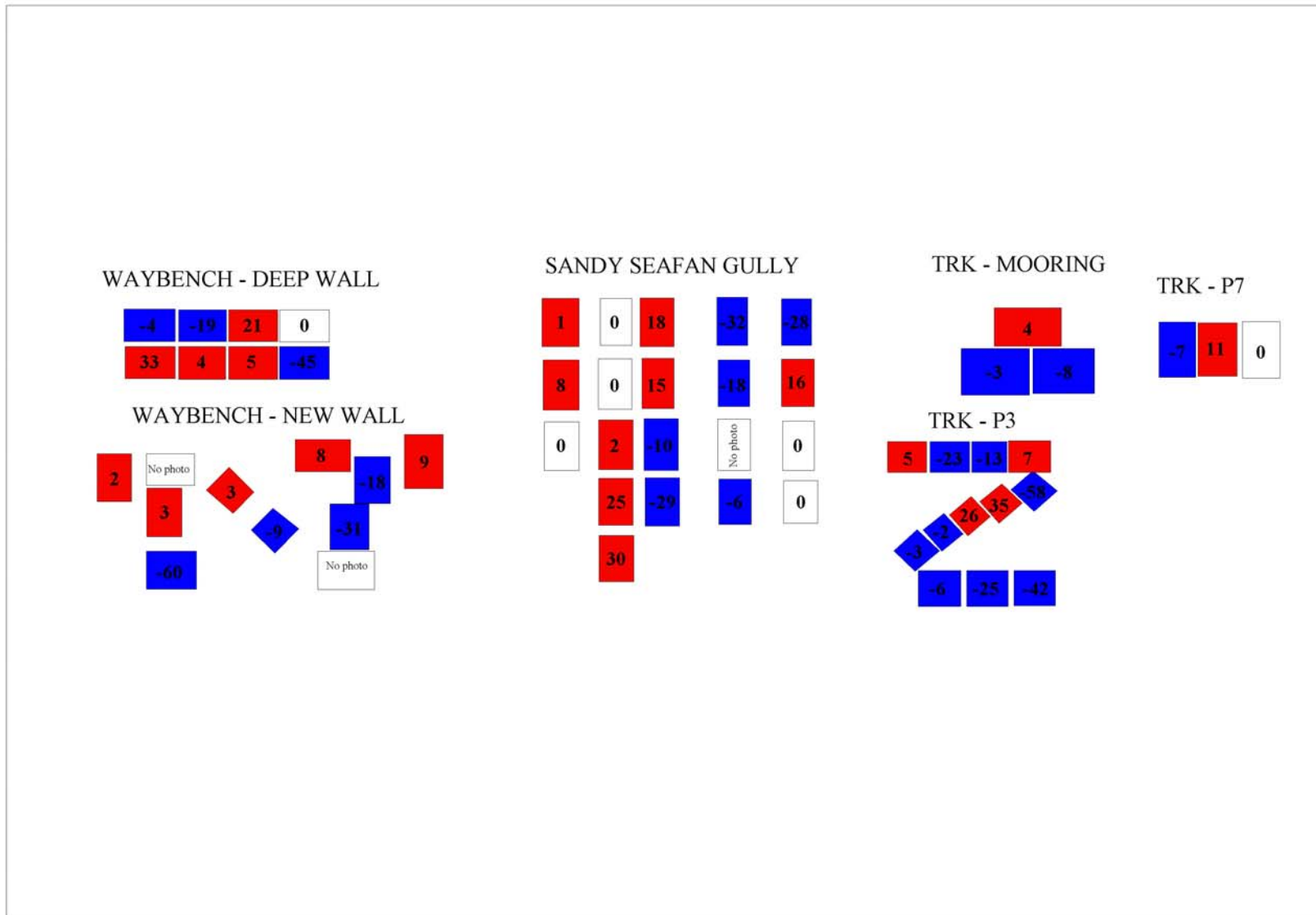
RESULTS

2005 fieldwork completed:

COLONY AREA		DENSITY
SITE	INDEX OF AREA	CLOSE UP PHOTOGRAPHS
Sandy Sea Fan Gully	5 transects (20 samples)	Yes
Waybench – <i>New Wall</i>	11 re-locatable samples	Yes
Waybench – <i>Deep Wall</i>	2 transects (8 samples)	Yes
Thorn Rock – <i>Piton 7</i>	3 re-locatable samples	No
Thorn Rock – <i>Mooring</i>	3 re-locatable samples	No
Thorn Rock – <i>Piton 3</i>	3 transects (12 samples)	Yes

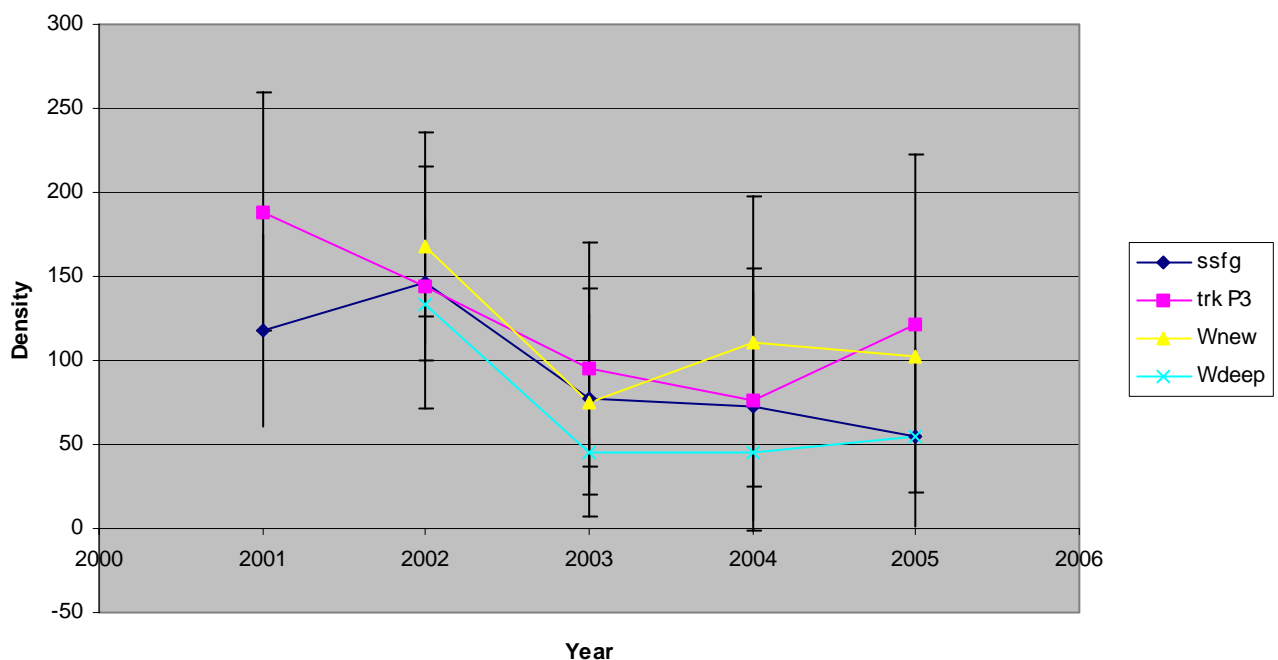
RESULTS OF COLONY AREA TRANSECTS FOR 2005

Changes in frequency between 2004 and 2005 (blue shows a loss in frequency red shows an increase)



Density estimate results (number of polyps / 0.03255 m²)

Site		2001	2002	2003	2004	2005
SSFG	Mean	118.0	146.2	77.3	72.5	54.2
	STDEV	57.4	36.9	50.6	67.9	52.9
	n	25	16	32	32	28
TRK P3	Mean	188.2	143.5	94.9	76.5	121.8
	STDEV	70.8	72.4	75.1	77.9	100.4
	n	17	18	24	33	26
Way New	Mean		167.7	75.4	111.1	102.3182
	STDEV		73.7	67.5	67.7	86.5461
	n		16	34	31	22
Way Deep	Mean		133.5	45.1	44.8	54.7
	STDEV		60.9	41.9	50.3	48.6
	n		16	30	36	27

Density of polyps 2001 - 2005

In 2005 Dr Joanne Porter from University of Wales, Aberystwyth collected a small sample of *Parazooanthus axinellae*. Professor John Ryland, University of Wales Swansea is currently conducting the following analysis:

1. Analyse the types of cnematocyst present for taxonomic clarification
2. DNA sequencing to see where *Parazooanthus* fits in the molecular phylogeny of the Zooanthidea.

CURRENT STATUS

With only 4 complete years of data it is too early to draw any firm conclusions from the project. The frequency results do suggest that there has been a decrease in colony sizes in 2004 & 2005 compared to 2003. The density method used in 2003 was repeated again in 2004 & 2005 and the results suggest that polyp density has remained stable.

RECOMMENDATION

Continue monitoring.

Continued research is needed on the biology of *Parazoanthus axinellae*.

REFERENCES

Bullimore B. (1986). Burton, M, Lock, K & Newman, P (2002). Brown, A. (2001). Garrabou J. (1999). Gilbert S.E. (1998). Hiscock, K. (1998). Holt R H F. (1998) Hughes R.N. Cancino J.N. (1985). Jackson JBC. (1977).Lindenbaum, C. *et al* (2002). Manuel R.L. (1988). Newman P & Lock K (2000)

PENTAPORA FOLIACEA (ROSS CORAL) POPULATION (CMS code: RM63/01)

STATUS Ongoing. Annual survey.

PROJECT RATIONALE

Colonies of the bryozoan; *Pentapora foliacea* are fragile structures thought to be moderately slow growing, and long lived. They are important microhabitats for mobile species and are regarded as useful indicators of anthropogenic activity such as mobile fishing gear and anchoring.

OBJECTIVES

To monitor the numbers and growth rate of Ross coral colonies.

To monitor the amount of damage occurring to the colonies.

SITES

- North of the Neck (2002- onwards)
- North wall (1984 – 2002)
- Way bench (1993/4 restarted 2002- onwards)
- Bernie's Rocks (2 sites 1995 onwards)
- South of Middleholm (2003- onwards)

METHODS

Photographs are taken using a single or stereo camera set up on a frame. Gilbert (1998) tested various image analysis methods for assessing growth rate but concluded that a 3D method would be most suitable. Colonies can be put into size classes using base area (cm²) however this is only an approximate measure of colony size.

RESULTS

Number of colonies at each site:

Site	1993	1994	1995	1997	1998	2000
North of Neck						
Waybench	53?	?	?	?	?	?
Bernie's Rocks Deep			17	8	2	0
Bernie's Rocks Shallow		10	14	9	4	8

Site	2002	2003	2004	2005
North of Neck	11	14 (2 lost 5 new)	14 (2 lost 2 new)	16 (2 new)
Waybench	17	17 (3 lost 3 new)	14 (5 lost 2 new)	10 (4 lost)
Bernie's Rocks Deep	0	2	9	12 (3 new)
Bernie's Rocks Shallow	10	13	25	29 (4 new)
South Middleholm		12	19 (2 lost 9 new)	16 (3 lost)

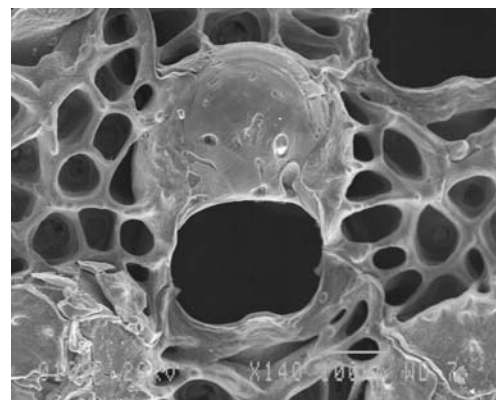
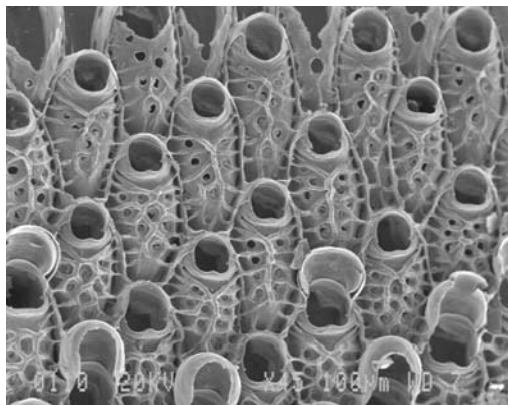
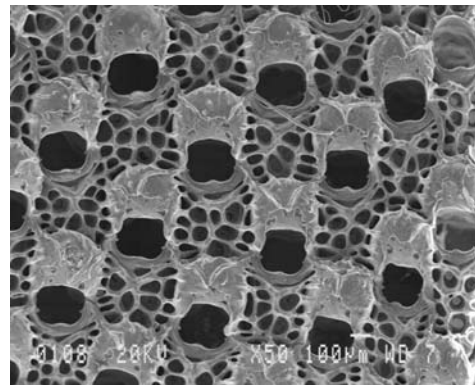
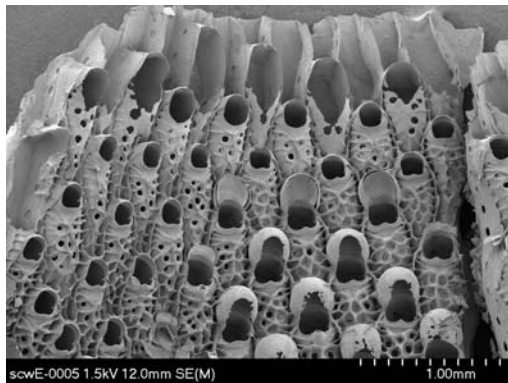
The growth of *Pentapora* colonies varies dramatically; one colony showed an increase in base area of over 800cm² in one year, whilst other large colonies have all but disappeared. In general colonies that survive tend to grow whilst other colonies of all sizes can just disappear in the space of a year. This suggests that colonies are either being physically destroyed or rapidly disintegrate rather than just slowly decrease in size by slow wastage. In 2005 base area

measurements were not completed due to inaccuracies in the method. Alternative growth measurement methods are being investigated as described below.

In 2005 Dr Joanne Porter from University Wales Aberystwyth collected samples of *Pentapora foliacea* from the Reserve to complete biological research, a summary of results to date are:

1. Genetic work: To study the genetic make up of colonies and populations, dispersal between known locations as well as smaller scale dispersal events within the MNR. The samples were heavily calcified which made it very difficult to get pure DNA and the work is on-going. The focus of the DNA work is to look at: 1) How closely related are *Pentapora foliacea* colonies growing closely together at North Wall? 2) What bacteria are associated within the tissues of *Pentapora foliacea*?
2. Anti-microbial zone assays: To examine if *Pentapora* itself, or bacteria living symbiotically within it, produce anti-microbial chemicals. Initial results have shown that *Pentapora* does appear to have some form of anti-microbial action (see photographs). This work is in early stages; more complex bacterial assays need to be completed. There is clearly potential for further work in this area.
3. Reproduction: A Sample of *Pentapora* was taken each month from May to September to examine for ovicell presence. Ovicells were found at the end of the season in the September sample. A small piece of the sample was taken for SEM and the ovicells can clearly be seen in a line, just two to three rows of zooids back from the growing edge, indicating a recent reproduction event, possibly in late August, early September.

Pentapora foliacea ovicells, September 2005:



During 2005 Dr Joanne Porter and students from UW Aberystwyth commenced work analysing Blaise Bullimore's time-series slide collection of *Pentapora* colonies at North Wall (1985-1989). The slides have been digitally scanned and the images are being analysed for:

1. Damage Assessment, following the methodology of *Cocito et al* (1998) on the related Mediterranean species *Pentapora fascialis*.
2. Growth measurements: It has been possible to reconstruct a 3D model from the stereo pairs however a vertical measurement of height is needed to allow further progress in order to calibrate the model. Height measurements of colonies are planned in 2006.

CURRENT STATUS

RECOMMENDATIONS

Needs continued surveillance to establish the longevity of the colonies and their response to damage.

Continued research is needed on the biology of *Pentapora foliacea*.

Collect vertical height of colony data.

REFERENCES

Bunker & Mercer 1988, Bullimore 1987, Gilbert 1998.

CUP CORAL POPULATIONS; *BALANOPHYLLIA REGIA* AND *CARYOPHYLLIA SMITHII* (CMS code: RM23/04)

STATUS Ongoing. Annual sampling.

PROJECT RATIONALE

Cup corals are slow growing filter feeders, which are susceptible to changes in water quality and planktonic food supply.

Balanophyllia regia is a Lusitanian species; Skomer MNR is close to the northern edge of its range in the UK.

Caryophyllia smithii is a common feature of the sub-littoral benthic community of western Britain.

OBJECTIVES

Monitor the population for changes in densities and to look for evidence of recruitment.

SITES

- Thorn Rock
- The Wick

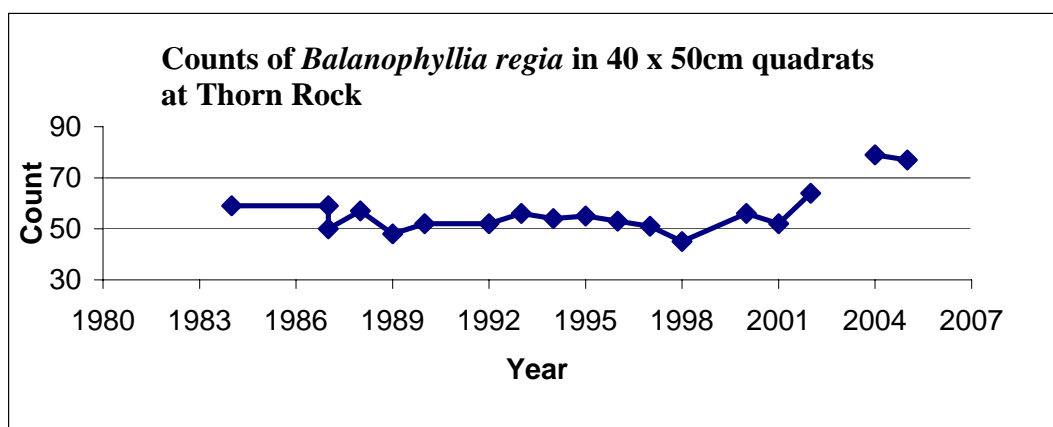
METHODS

Balanophyllia regia: five fixed position quadrats at Thorn Rock have been photographed since 1985 and in 2002 three transects with 51 quadrats were established at The Wick. Photographs are taken using a 50 x 40 cm quadrat and counts are carried out using GIS techniques (see Burton, Lock & Newman 2002).

Caryophyllia smithii: approximately 70 quadrats have been analysed on a yearly basis since 1993 from photographs taken for the sponge community project at Thorn Rock. Photographs are taken using a 50 x 70cm framer and counts are carried out by eye using a loupe.

RESULTS

Balanophyllia regia: At Thorn Rock individuals have been traced for 18 years. Some evidence of recruitment has been observed, however surface sediments obscure small individuals.



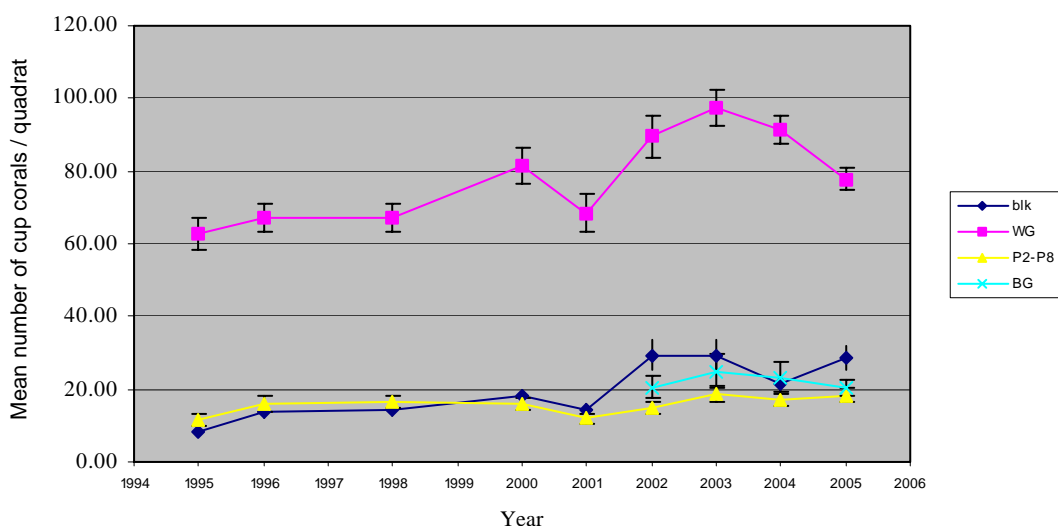
At the Wick the average number of cup corals has increased but there are no significant differences in densities observed between the 3 years for transects A, B or C .

Abundance of *Balanophyllia regia* in The Wick

Site	Year	2002	2003	2004	2005
WCK A	Mean	40.5	50.4	55.0	68.8
	stdev	26.8	43.1	47.2	55.7
WCK B	Mean	64.6	71.9	95.3	79.4
	stdev	36.3	39.3	40.1	44.7
WCK C	Mean	53.1	49.9	59.6	50.3
	stdev	33.4	42.5	57.7	50.2

Caryophyllia smithii shows changes in mean abundance that maybe due to variable levels of surface sediment affecting the actual numbers visible during recording.

Abundance of *C. smithii* from 3 sites at Thorn Rock 1995 – 2004



CURRENT STATUS

Ongoing. Variability in numbers is partly due to varying levels of surface sediment. The populations appear stable although there is no firm evidence of recruitment.

RECOMMENDATIONS

Records of surface sediment levels may help determine whether reduced abundance of cup corals is significant or due to recording inconsistencies.

Review photographs to test the possibility of tracing individuals from year to year.

TERRITORIAL FISH POPULATIONS (CMS code: RA33/01)

STATUS Ongoing, sampling every 5 years.

PROJECT RATIONALE

Fish have received little attention and are poorly described in the survey literature. There is a need to improve knowledge of the diversity and distribution of territorial fish species.

OBJECTIVES

To assess the distribution and abundance of territorial fish species and to describe their key habitats;

Nine territorial fish species were selected based on common occurrence in the MNR.

Wrasse species:	Ballan wrasse	<i>Labrus bergylta</i>
	Cuckoo wrasse	<i>Labrus mixtus</i>
	Goldsinny	<i>Ctenolabrus rupestris</i>
	Corkwing wrasse	<i>Crenilabrus melops</i>
	Rock cook	<i>Centrolabrus exoletus</i>
Benthic species:	Butterfish	<i>Pholis gunnellus</i>
	Tompot blenny	<i>Parablennius gattorugine</i>
	Sea Scorpion (short spine and long spine)	<i>Myoxocephalus scorpius/Taurulus bubalis</i>
	Leopard spotted goby	<i>Thorogobius ephippiatus</i>

SITES

Sites are selected from a range of locations around the North Marloes peninsula (NMPE) and from around the North side of Skomer Island.

METHODS

The methods involve recording sightings of the target species along a 30m transect (from within a 2m wide strip). The methods have been designed for use with volunteer divers and are fully described in Lock 1998.

In 2005 methods were modified to allow improved statistical analysis be completed. The changes allowed some comparison with the 2001 and 2002 surveys. The study sites were marked and GPS positions taken, allowing for replicate transects to be completed and relocation of sites for future surveys. Two depth zones were surveyed 15m and 10m bcd. The transect length was increased to 45m (50m tapes used but the first 5m not surveyed to allow for diver disturbance at the start of survey)

A speed of 3m/min was maintained to allow consistency of recording and thorough recording of all fish species. Seasearch methods were used for competing seabed substrate and habitat recording at all transect locations. The revised methods are fully described in Lock et al 2006.

RESULTS

2001, 2002 and 2005 data was compared:

Average number of fish (all species / 90m²) at each site, 2001, 2002 and 2005.

Geographic area	Year/Site	2005	2002	2001
Skomer	Pool & Poolb	13.1	16.1	4.2
Skomer	North wall	15.3	8.9	3.08
Skomer	North Castle	13.6	Not surveyed	Not surveyed
Skomer	Rye Rocks	11.5	Not surveyed	5.10
NMPE	Low Point	5.83	Not surveyed	3.00
NMPE	High Point	6.3	9.4	0.75
NMPE	East Hook	7.5	Not surveyed	1.17
NMPE	Martins Haven	4.3	9.2	Not surveyed
NMPE	WTB	Not surveyed	6.0	Not surveyed

The data from all the years was entered into PRIMER. The 2001 and 2002 data was standardised to 90m² ($\sqrt{1.5}$ transformation) so that it was comparable with the 2005 data. The results showed that the 2001 data was different to the 2002 and 2005; the survey was carried out during a dense plankton bloom making the results unreliable. 2001 data has therefore been eliminated from any further analysis.

Distribution and abundance of all fish species in 2002 and 2005 both showed that more fish are found at Skomer sites than NMPE sites.

Example distribution map generated by MapInfo GIS:



The effect of observer skills on fish abundance was tested. Results showed by aggregating all the species data into two broad categories (wrasse and other) produced similar patterns to full

species list when analysed using PRIMER. This suggests that mistakes in species identification between species would make little difference to the overall patterns.

The effects of depth, seabed substrate and geographic area on fish abundance were analysed. The aggregated fish data can be used to provide a simplistic overview of the trends seen.

Average abundance of wrasse species and other species for each substrate type and each geographic area.

SUBSTRATE	WRASSE	OTHER
Inclined reef	2.45	0.5
Broken reef	1.065	0.48
Boulders	1.65	0.40
Mixed ground	1.45	0.40
AREA	WRASSE	OTHER
SKOMER	2.48	0.43
NMPE	0.93	0.41
DEPTH	WRASSE	OTHER
15m BCD	2.05	0.55
10m BCD	1.26	0.26

The trends seen are as follows:

- Wrasse are more abundant than other territorial fish species.
- There are more wrasse on the North coast of Skomer than on the North Marloes Peninsula.
- There are more fish at 15m than at 10m

TARGETS

To assess the natural distribution and abundance of territorial fish species within the Reserve.

CURRENT STATUS

Baseline survey completed.

RECOMMENDATIONS

Continue with the volunteer survey methodology as established in 1997 with modifications made in 2005 to produce a time series of comparable data.

Surveys to be repeated every four years, next survey 2009.

REFERENCES

Lock 1998. Lock et al 2006 (in prep).

ATLANTIC GREY SEAL (*HALICHOERUS GRYPUS*) POPULATION (CMS code: RA03/01)

STATUS Ongoing. Annual survey.

PROJECT RATIONALE

Grey seals are a protected species of conservation importance, which live and breed in the Skomer MNR. The West Wales population is the largest in SW Britain and a feature of the Pembrokeshire Marine SAC.

OBJECTIVES

To monitor the number of seal pups born in the MNR as an indication of the state of and the survival rate the whole population.

SITES

All pupping beaches and caves in the MNR.

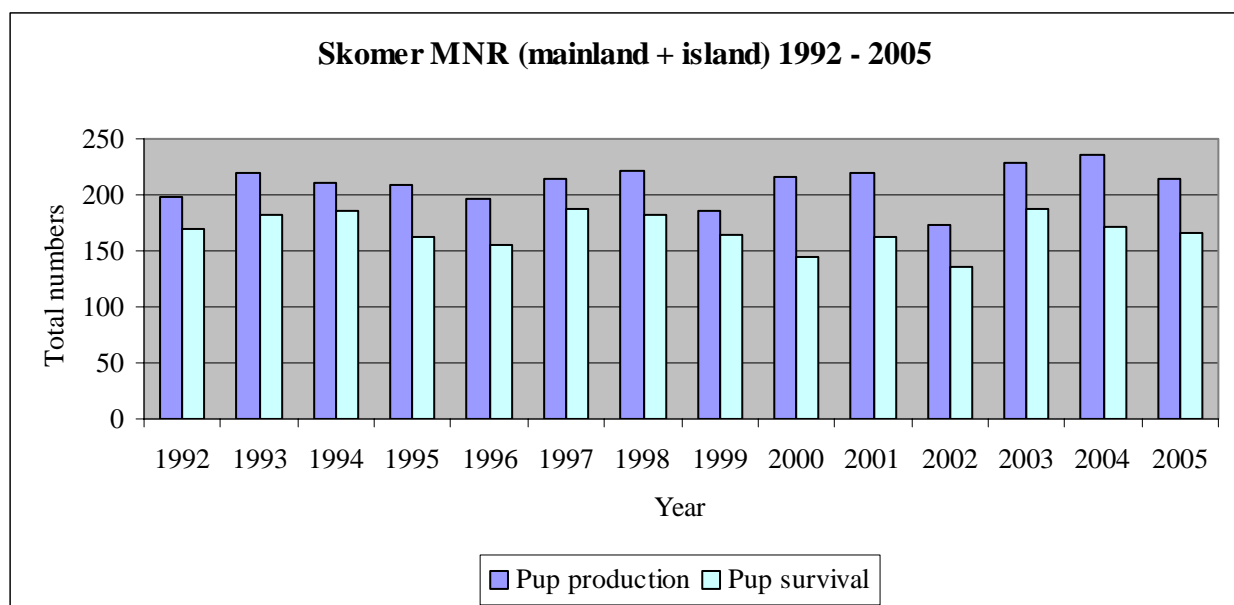
METHODS

The pups are recorded from birth through to their first moult using the “Smith 5 fold classification system” (Poole 1996). Reason for death is recorded if possible. Additional behavioural observations are recorded for the Island seals (Full method described in ‘Grey Seal Monitoring Handbook’ Poole 1996).

RESULTS

Regular recording began on Skomer Island in 1974 and surveys have been completed annually since 1983.

From 1992 onwards a standard protocol has been adopted to record the pupping success on both the island and the mainland each year.



1998 Provision of information about seal watching and current pup numbers at sites around the Marloes Peninsula was commenced at the MNR Visitor Centre.

2002 Methods to study seal disturbance at mainland sites were tested and a further survey in 2003 by placement students from Pembrokeshire College, (Bettridge 2002, Pegg 2003). A trial MNR 'seal watching' leaflet was produced and distributed at the National Trust car park at Martins Haven. The leaflet included information about how to behave whilst watching seals. The 2003 survey completed a questionnaire on the usefulness of the leaflet. The leaflet was a success and was published officially ready for the 2004 season and a full report on the seal disturbance study was completed, Lock 2004.

2004 A project to identify individual seals was started for mainland sites by a placement student from Pembrokeshire College; this followed methods in the 'Grey Seal Monitoring Handbook' Poole 1996 and tested photo and video methods. This was continued in 2005.

2005 Photo methods were also introduced to the adult seal identification project on Skomer (Matthews 2006).

A project student from Pembrokeshire College, Liz Coutts, carried out a study on the behaviour of bull seals at two island sites. Following an initial pilot study in September, bull seals were observed for 6 hours per day from October 3rd to November 21st 2005. A project report is being prepared.

TARGETS

- Number of pups born greater than 190 (170 in any 4 year period, provided numbers recover to over 190 in the following year)
- Percentage survival of pups greater than 70% (67% in any 4 year period, provided survival recovers to over 72% in the following year)

CURRENT STATUS

2005 pup numbers reached 215, 5 pups higher than the average for the last 14 years. Pup survival 77% an increase to 2004 but 4% lower than the average. There were relatively few periods of harsh weather and little sign of disease, the majority of deaths were caused by abandonment or separation. 56% of births occurred in September. The most prolific period was week 37 (10th – 16th September) when 40 pups were born. This corresponds exactly with the peak week in 2004 when 47 pups were born.

RECOMMENDATIONS

1. To continue annual survey following the 'Grey Seal Monitoring Handbook' Poole 1996.
2. To continue recording seal disturbance at mainland and island sites.
3. To continue the adult seal identification project following methods developed in 2004 (mainland) and 2005 (island).
4. Provide visitors with information about Atlantic grey seals both in the Visitor Centre and through the distribution of the 'seal watching' leaflet developed in 2002.

REFERENCES

Information on grey seal breeding, behaviour and haul-outs on Skomer Island is documented in a series of reports dating from 1976 (Davis & Davis 1976; Alexander & Alexander 1985; Hellawell, 1987, 1988; Sutcliffe, 1989; Orsman, 1990, 1991; Poole, 1992 - 1999; Field, 2000; Pillsworth, 2001, Duffield, 2002, Matthews 2003 -2005). Less information is available for the mainland and is on pup production only until 1992. (Anderson 1977; Cullen 1978; MNR records 1992-2005). Poole 1996. Grey Seal Monitoring Handbook.

SPECIES RECORDING (CMS code: RB06/01)

STATUS Ongoing, annual recording.

PROJECT RATIONALE

There are many species in the Marine Nature Reserve that do not have a dedicated monitoring project. It is important that species lists are maintained, particularly for Phylum that are under recorded. Recording of unusual, rare, scarce or vagrant species are also maintained.

RESULTS

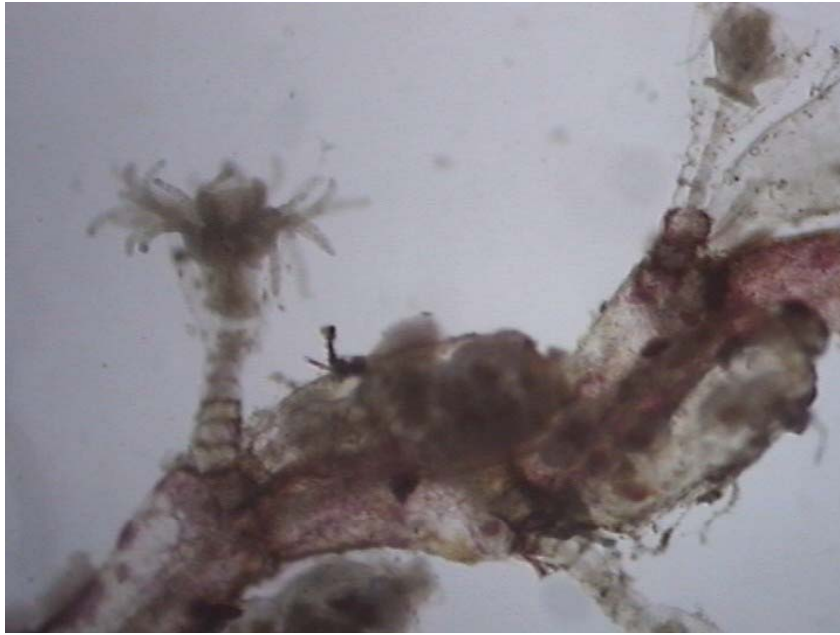
Dr Joanne Porter from University Wales Aberystwyth :

Bryozoans: Several random samples of scallop valves, broken shell and red algae, *Cellaria* clumps were taken at intervals through the year, in order to assess the diversity of Bryozoa in the MNR. The current list is provided below (52 species to date):

<p>CYCLOSTOMATIDA <i>Crisia denticulata</i> <i>Crisia eburnea</i> <i>Crisidia cornuta</i> <i>Disporella hispida</i> <i>Eurystrotos compacta</i> <i>Filicrisia geniculata</i> <i>Plagioecia patina</i> <i>Tubulipora liliacea</i> <i>Tubulipora lobifera</i> <i>Tubulipora plumosa</i></p>	<p>CTENOSTOMATIDA <i>Alcyonidium diaphanum</i> <i>Alcyonidium gelatinosum</i> <i>Alcyonidium hirsutum</i> <i>Alcyonidium mytili</i> <i>Bowerbankia imbricata</i> <i>Flustrellidra hispida</i> <i>Nolella pusilla</i></p>
<p>CHEILOSTOMATIDA <i>Aetea anguina</i> <i>Aetea truncata</i> <i>Bugula flabellata</i> <i>Bugula plumosa</i> <i>Bugula turbinata</i> <i>Callopora craticula</i> <i>Callopora dumerilli</i> <i>Callopora lineata</i> <i>Callopora rylandi</i> <i>Cauloramphus spinifera</i> <i>Cellaria fistulosa</i> <i>Cellaria sinuosa</i> <i>Cellepora pumicosa</i> <i>Celleporella hyalina</i> <i>Celleporina hassalli</i> <i>Conopeum reticulum</i> <i>Copidozoum tenuirostre</i></p>	<p><i>Cribrilina cryptoecium</i> <i>Cryptosula pallasiana</i> <i>Electra pilosa</i> <i>Escherella immersa</i> <i>Fenestrulina malusii</i> <i>Flustra foliacea</i> <i>Haplopoma graniferum</i> <i>Hippoporina pertusa</i> <i>Membranipora membranacea</i> <i>Microporella ciliata</i> <i>Omalesecosa ramulosa</i> <i>Pentapora foliacea</i> <i>Phaeostachys spinifera</i> <i>Schizomavella cristata</i> <i>Schizomavella linearis</i> <i>Schizomavella sarniensis</i> <i>Schizomavella teresae</i> <i>Umbonula littoralis</i></p>

Valerie Morse from Darwin Science Festival is completing a PhD study of *Obelia geniculata* supervised by Dr Anthony Campbell. Samples have been collected from within the Skomer MNR at Martins Haven contributing to this study. The study includes looking at the bioluminescent reaction of *Obelia* and its chemical components. The *Obelia* samples are being cultured in tanks to study its life cycle and feeding patterns.

The image shows a sample of *Obelia geniculata* collected at Martin's Haven. Photographed after 1 hour when hydranths are still visible. Gonotheca housing medusae are also visible.



(MORSE AND CAMPBELL 2005 UNPUBLISHED)

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