MarClim Sampling Protocols 2008

Before you start at each site, record:

1. Site name and grid reference
2. County/Area
3. Date
4. Recorder
5. Lat long of access point (e.g. car park) and lat long of centre of survey area (e.g. midshore)
6. Exposure scale of the shore
7. Weather at the time of the survey, especially the visibility
8. Mark site on an OS Map

At each site: Semi-Quantitative Data

1. Identify area to be sampled (this might be up to 100m or more in extent)
2. Photograph approach to site
3. Photograph general view of the sample site
4. Photograph specific features of interest and any rare organisms/new records
   Photographs MUST be catalogued as you take them: date, site location and aspect (and zone if relevant)
5. Walk the whole of the sampling area and using the checklist allocate each of listed species listed to a ACFOR category (see Appendix). Use one or two quick quadrat counts to help in placing in the ACFOR category.
6. It is important to record *apparent* absences and the ACFOR category should be based on the locality in which the species is most abundant, this might be as small as 10m x 10m. DO NOT spend more than 30 minutes searching for species unless at a range edge. If more than 30 minutes is spent searching, record the time.
7. Use the notes section of the form for other species of interest..
8. Use GPS to record
   Midshore of the area sampled/searched
   Location of areas sampled for particular species (if different)
   Location of key features visible in the photographs
9. Note major features of the shore; bedrock, cobbles, boulders, sand scouring etc.

At each site: Quantitative Data

1. Replicated counts of limpets, barnacles, trochids will be made on each shore visit. If time is short and we are visiting a shore that has not been previously surveyed then trochids should only be recorded by ACFOR.
2. Avoid areas of heavy human disturbance.

Site selection and counting methods
Counting Barnacles

1. Count barnacles at *low, mid* and *high* shore levels. High shore is defined as that area 1m below the very top of the barnacle zone, mid shore in the middle of the barnacle zone, low 1m above the bottom of the barnacle zone
2. Use a 5 x 2cm or 2 x 2cm quadrat where barnacle cover is $\geq$ 50%. In areas where barnacles are sparse, 5x5cm or 10x10cm quadrats may be used. Or take digital photographs using the standard camera quadrat 5x5cm frame.
3. Take at least 20 samples in 2 independent patches at *each* shore height; the number should be consistent with habitat heterogeneity. True random sampling is unrealistic on a broken rocky shore hence samples should be stratified to encompass the full range of shore slopes. At midshore do two separate clusters of counts if time. If digital photography is used, back up by doing quick counts for SACFOR scores.
4. Place the quadrat and record % cover of bare rock and record any evidence of hummocking. Count and record the total number of:

Adults	**Recruits**
Semibalanus (1+ group)	*Semibalanus*
Chthamalus montagui	
Chthamalus stellatus	*Chthamalus* (Total)
Elminius modestus	*Elminius modestus*
Balanus perforatus	
Balanus crenatus	

5. The project will trial use of digital photography and image analysis for barnacle counting/identification. Photographs MUST be catalogued in the field so that shore levels (low, mid and high) can be separated.

Counting Limpets and Associated Fauna & Flora

1. Count limpets at both *low* and *mid shore* levels
2. Use a 0.5 x 0.5 cm quadrat. Where possible this should be strung at regular intervals to facilitate counting and estimation of % cover of barnacles.
3. Take at least 10 samples but not more than 20 at *each* shore height; the number should be consistent with habitat heterogeneity. True random sampling is unrealistic on a broken rocky shore hence samples should be stratified to encompass the full range of shore slopes
4. Areas with heavy shade, with pools and those that are heavily fissured should be avoided

5. Place the quadrat and record % cover of barnacles mussels, dominant algae and bare rock. Record the number of individuals of *Osilinus lineatus, Gibbula umbilicalis* and *Nucella lapillus* present in the quadrat.
6. Count the total number of limpets >10mm. Recount to estimate the abundance of the less common species. Ticking animals using chalk is a simple way to ensure that counts and species identification are accurate and consistent. Confirm the identity of *Patella depressa* through checking all features (white tentacles, black foot, shell morphology). Where rare (i.e. at range edges) take reference photographs.

Counting Trochids

1. Count Osilinus lineatus and Gibbula umbilicalis in the region of the shore that they are most abundant. *Osilinus lineatus* occurs **upshore** of *Gibbula umbilicalis* for a large part of the year.
2. The aim is to record abundance/ structure of populations. As adults and year classes 0-2 often live in slightly different habitats a detailed search is required
3. Make 5 replicated timed counts of 3 minutes duration at each shore.
4. Select a small area in the region of the shore where the species is most abundant. Pick all individuals off visible surfaces and sample under stones and in cracks and crevices for the juveniles. Search using this method for 3 minutes and place all individuals into a bag. Remember to write the length of the search time on the form. Count the number of individuals and measure the basal diameter to the nearest 0.1mm using dial calipers.
5. In shores where there is a relatively uniform distribution of rocks < 30cm it is possible to use a $1m^2$ quadrat to sample trochids. If this sampling method is used the operator moves across the quadrat and collects all animals on the visible surfaces. Once done, each rock is turned over and a separate search is undertaken for the younger animals that seldom move far from damp locations. A substantial proportion of the population may well be under stones. Again count the number of individuals and measure the basal diameter to the nearest 0.1mm.In addition, up to five random 0.5x0.5m quadrats can be thrown randomly to provide backup for SACFOR estimates.

Before leaving, have one last walk around the sample site to confirm first impressions and please check that all equipment and cameras have been collected from the shore

A: MarClim Recording Forms

Site name:	……	Grid reference:	……
County:	……	Lat long of access point:	……
Date:	……	Lat long of centre of survey area:	……
Recorder:	……		
Weather conditions:	……	Exposure	……
Visibility	……	Low shore availability	……

Species	S	A	C	F	O	R	Not seen	Comments
Codium spp.								
Laminaria hyperborean								
Laminaria digitata								
Saccharina latissima (L. saccharina)								
Laminaria ochroleuca								
Alaria esculenta								
Himanthalia elongata								
Sargassum muticum								
Ascophyllum nodosum								
Pelvetia canaliculata								
Fucus spiralis								
Fucus vesiculosus								
Fucus serratus								
Fucus distichus								
Fucus indet.								
Cystoseira spp.								
Halidrys siliquosa								
Bifurcaria bifurcate								
Mastocarpus stellatus								
Chondrus crispus								
Lichina pygmaea								
Undaria pinnatifida								
Halichondria panacea								
Anemonia viridis								
Aulactinia verrucosa								
Actinia fragacea								
Actinia equine								
Sabellaria alveolata								
Chthamalus stellatus								
Chthamalus montagui								
Semibalanus balanoides								
Balanus crenatus								
Balanus perforatus								
Elminius modestus								
Mytilus spp.								
Campecopea hirsuta								
Clibanarius erythropus								
Haliotis tuberculata								
Tectura testudinalis								
Patella vulgate								
Patella depressa								
Patella ulyssiponensis								
Patella pellucida								
Gibbula umbilicalis								
Gibbula pennanti								
Gibbula cineraria								
Osilinus lineatus								
Calliostoma zizyphinum								
Littorina littorea								
Littorina saxatilis agg.								
Melarhaphe neritoides								
Nucella lapillus								
Onchidella celtica								
Crassostrea gigas								
Crepidula fornicate								
Asterias rubens								
Leptasterias mulleri								
Paracentrotus lividus								
Strongylocentrotus droebachiensis								

B: Barnacle count photographs

Site name:	…….	Grid reference:	…….
Quadrat size:	…….	Recorder:	…….
Survey site habitat	…….	Biotope classification code:	…….

Methodology

1. 10 replicate barnacle photographs should be taken at High, Mid and low shore. High shore is defined as the area 1m below the very top of the barnacle zone, mid shore in the middle of the barnacle zone, low 1m above the bottom of the barnacle zone
2. Digital photos should be taken where barnacle cover is ≥ 50% with the camera in macro mode. Images are best taken using a frame fixed to the camera with a 5cm × 5cm grid square field of view. Where this is not possible a 5cm × 5cm grid should be placed on the rock to create scale for the digital photograph. As a final resort a coin can be used to indicate scale.
3. Photographs taken must be catalogued in the field so shore levels can be separated.

Analysis of barnacle photographs to be recorded in section H of form.

Other site photos taken

Photo Number	Field comment	Final photo name

B: Barnacle count

Barnacle Count: Recorder: ………………….

Quadrat size: …………………. Lat long of centre of survey area: ………………….

Quadrat	Shore Height	% Cover barnacles	Adult count (1+)					Recruit count (O)			
			SB	CM	CS	EM	BP	SB		Total C	EM
								Cy	Sp		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Recorder: ………………….

Quadrat size: …………………. Lat long of centre of survey area: ………………….

Quadrat	Shore Height	% Cover barnacles	Adult count (1+)					Recruit count (O)			
			SB	CM	CS	EM	BP	SB		Total C	EM
								Cy	Sp		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Recorder: ………………….

Quadrat size: …………………. Lat long of centre of survey area: ………………….

Quadrat	Shore Height	% Cover barnacles	Adult count (1+)					Recruit count (O)			
			SB	CM	CS	EM	BP	SB		Total C	EM
								Cy	Sp		
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

C: Limpet Count

Shore height: …… Recorder: ……

Quadrat size: …… Lat long of centre of survey area: ……

Quadrat	x slope	% barnacles	% mussels	% algae	NL	OL	GU	Count		
								P. vulgata	*P. depressa*	*P. aspera*
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Shore height: …… Recorder: ……

Quadrat size: …… Lat long of centre of survey area: ……

Quadrat	x slope	% barnacles	% mussels	% algae	NL	OL	GU	Count		
								P. vulgata	*P. depressa*	*P. aspera*
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

D: Trochid count

Trochid Count: Recorder: ……

Quadrat/Timed Count: …… Lat long of centre of survey area: ……

Sample	Shore Height	Total Count	
		Osilinus lineatus	*Gibbula umbilicalis*
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Notes:

F: Trochid size structure (measure basal diameter to the nearest mm)

Osilinius lineatus

Site name; …….. Grid reference: …….

Shore height …….. Quadrat size/ time of count …….

Habitat search undertaken: ……..

***Osilinius lineatus* basal diameters**																			
Sample 1				Sample 2				Sample 3				Sample 4				Sample 5			

Gibbula umbilicalis

Site name; …….. Grid reference: …….

Shore height …..... Quadrat size/ time of count …….

Habitat search undertaken: ……..

***Gibbula umbilicalis* basal diameters**																			
Sample 1				Sample 2				Sample 3				Sample 4				Sample 5			