

Before you head to the coast or sea you need to do some initial planning to make sure that you prepare yourself, are clear about what you want to record, have the right equipment and have a group of willing volunteers to undertake the survey activity. In this section we will cover the basic elements of survey planning.

Anybody interested in community-led marine monitoring in Scotland should read through this section. Undertaking marine survey can be hazardous and it is important that you consider the conditions you will be working in and have the right equipment and people for data to be collected efficiently and accurately. Time spent planning out your survey, using the contents of this resource, will massively improve your likelihood of successfully recording marine data.

This chapter includes:

- Setting up a community monitoring project
- Safety
- Impact on the environment
- Location
- Choosing a survey method
- Survey timing and frequency
- Equipment overview
- Survey planning - common sense checklist
- Quality control

Setting up a community monitoring project

If you want to get involved in monitoring your local marine environment, we recommend you complete a project profile to describe and plan your community monitoring project. Here you can plan your survey interests and explore why you want to get involved and what you want to achieve. We have provided a template for you to get started - see community project profile form in the appendix on [page 89](#).

Once completed, a copy of this should be sent to the community-led marine biodiversity monitoring project officer at communitymarinesurvey@nature.scot.

When setting up a project, these points are key to ensuring a successful survey or monitoring project:

1. Keep it simple

Don't set yourself too many objectives and at too high a difficulty.

2. Time available

Your community monitoring project should be set up considering how much time you have available to spend surveying.

3. Consistency

It's important that you follow the same survey methods each time you survey.

4. Keep it FUN!

Your surveys should be enjoyable and fun to get involved in. We suggest you break-up and rotate more repetitive survey roles. You could make the day more fun by including a social barbeque or a similar get-together at the end or by linking with other events such as a beach clean.

5. Regular monitoring

After deciding how much time you have available, stick to your monitoring regime. This could be weekly, monthly, seasonally or annually.

6. Objective not subjective monitoring

It is important to monitor exactly what is there as it is, with no bias.

7. Knowledge and briefings

It is important that everyone participating knows what they are doing and why and to feedback the results of any work to those taking part.

8. Data lifecycle

Marine monitoring is not just about the fieldwork. Good data management practices will allow your data to be shared within your community and further.

▼ Little Loch Broom Marine Life survey group undertaking a rocky shore survey.
©Caitlin Orr/NatureScot



Safety

What to consider

- Undertake surveys in groups so you have help if anything goes wrong.
- **Carry a mobile phone** so you can make an emergency call. In Scotland, call emergency number 999 for police, ambulance, fire service or coastguard.
- **Inform a designated ‘safety person’ of your survey plan, location and timings.** Check in with them on your return. This person may need to contact emergency services if you don’t return or if something goes wrong.
- **Always check the tide and weather forecast.**
- For using boats, always **follow coastguard recommendations** for safety.
- **Complete a risk assessment** – *template provided in the appendix.*
- Adult supervision is required if children are involved.

Intertidal

- **Check tide times** when you plan your survey. Intertidal survey should be undertaken within two hours before low tide.
- Intertidal habitats often have a complex topography, with algae cover creating an **uneven slippery surface**. Care should be taken, keeping hands free to avoid slipping and falling. Wear sturdy boots and move slowly and steadily.


Subtidal

- For snorkelling or water based activities, a **dedicated supervisor** role is advised to monitor participant safety from the shore. Use a surface marker buoy to ensure you can be seen easily.
- **Check tide times** when you plan your survey. Slack water is the optimum time to undertake surveys (no tidal movement).
- **Find out about local water conditions, including currents and tidal regimes.** In sheltered areas or areas without a significant tidal regime surveying may be possible at any time of day. In sounds and channels currents are likely to be strong at times and surveying should only be undertaken in optimal conditions.

Safety tips

- After touching marine life, **always wash hands before eating.**
- Keep an eye on sea and weather conditions for intertidal or subtidal surveys. Be aware of potentially dangerous waves when on the shore.
- **Always undertake surveys within your experience and limits.** If you are uncomfortable with the survey plans and/or conditions, **DO NOT** undertake any survey work. The survey can be rescheduled for a later date.
- Take water / hot drink and snacks.
- **Wear appropriate clothing and plan for all weather conditions.**
- Have a first aid kit available.

If snorkelling or wading never enter the water alone and ensure you have a dedicated survey supervisor on watch. Use a surface marker buoy (SMB) when snorkelling so you can be clearly seen. Ensure snorkelers are strong swimmers and have previous experience snorkelling in Scotland before task loading while undertaking a survey. GPS devices should be stored in a waterproof bag and towed when snorkelling, this can be attached to the SMB. Never attach any equipment to your person - this is a hazard that can lead to you becoming entangled. **Complete a risk assessment.**

 **Undertake snorkelling at your own risk.**

Bad weather - conditions to stop surveying

Thunder and lightning storm

Strong water currents (presence of any current should be avoided for snorkelling or kayaking)

Reduced surface visibility (heavy rain)

Strong wind

Large swell or waves

Poor underwater visibility

Extreme cold

▼ Winter storm and crashing waves. Harris Bay, Isle of Rum NNR, Scotland.
© John MacPherson/NatureScot



Impact on the environment

Seashore etiquette

- Tread lightly. Try to avoid trampling marine life, such as walking through seagrass beds.
- If you remove any marine life for identification, please return the plants or animals to where you found them. This includes returning them to the same conditions (i.e. under an algae canopy, under a rock or within a rock pool).
- When overturning stones or boulders, it's vital that they are replaced as you found them.
- Leave only footprints and take only photographs. Please ensure you take all your belongings and rubbish away.
- See any debris in the sea or shore? Why not give a little back to our seas by removing any plastic or debris and recycling it. However, if an animal has made a glass bottle its home, best leave it there!

Boats

- Ensure adequate water depth to avoid damage to benthic habitats due to contact with the bottom of the boat or propeller.
- Ensure that anchors and/or chain do not impact on sensitive benthic habitats (e.g. shellfish beds, maerl and seagrass).
- Don't allow waste to enter the water.

The Scottish Marine Wildlife Watching Code

If you are out surveying and looking for marine life you should follow the Scottish Marine Wildlife Watching Code. Please see www.nature.scot/marinecode for more information.

Principles



**The Scottish Marine
Wildlife Watching Code**

Be aware. Before you go wildlife watching, learn about the animals you might encounter. Understand how your actions could affect them. Be alert to the signs that animals make when they feel threatened. Be observant, patient and sensitive to the interests of the wildlife you are watching.

Take responsibility for your own actions. Constantly assess the wildlife's reaction to your presence and, if you see signs of disturbance, move away quietly. Consider how much time you spend watching animals. The presence of people over long periods can be disturbing, however careful you may be.

Have respect for other people, wildlife and the environment. Use your right of responsible access wisely. Respect the privacy and livelihoods of those who live by the sea. Leave the environment as you find it.

The Code provides more details about animal behaviour, how to recognise signs of disturbance, and how to minimise the impacts of your activities, as well as information on marine wildlife and the law.

Biosecurity

Avoid spreading non-native species – thoroughly wash all kit following Check Clean Dry biosecurity principles. Whenever you leave the water or coast, remember to Check Clean Dry. Visit www.nonnativespecies.org/checkcleandry for more information.

STOP THE SPREAD

Invasive plants and animals harm the environment and block waterways. They can be small and hard to spot so are easily spread on damp clothing and equipment.

Protect the environment you enjoy:

CHECK

Check your equipment, boat, and clothing after leaving the water for mud, aquatic animals or plant material. Remove anything you find and leave it at the site.

CLEAN

Clean everything thoroughly as soon as you can, paying attention to areas that are damp or hard to access. Use hot water if possible.

DRY

Dry everything for as long as you can before using elsewhere as some invasive plants and animals can survive for over two weeks in damp conditions.

Find out more about invasive plants and animals and how you can help to stop the spread at:

nonnativespecies.org/checkcleandry



Location

You can get involved in survey and monitoring of marine life anywhere around our coastlines and inshore waters. Understanding Scotland's marine environment and recording changes to it are important wherever you are in Scotland.

The Marine Protected Area (MPA) network covers approximately 22%* of Scottish waters so you may find your local area is within a designated site. Whether your local marine area is inside the network or not, there is amazing marine life to be discovered. Collecting data on what's in our waters is vital to improving our understanding and management of Scotland's marine environment.

Want to find out if there is a community monitoring site established in your area? Check out what marine survey community groups are active in your area. A good place to start is www.nature.scot/communitymarinesurvey. Alternatively; get in contact with the community monitoring project officer at communitymarinesurvey@nature.scot.

Intertidal

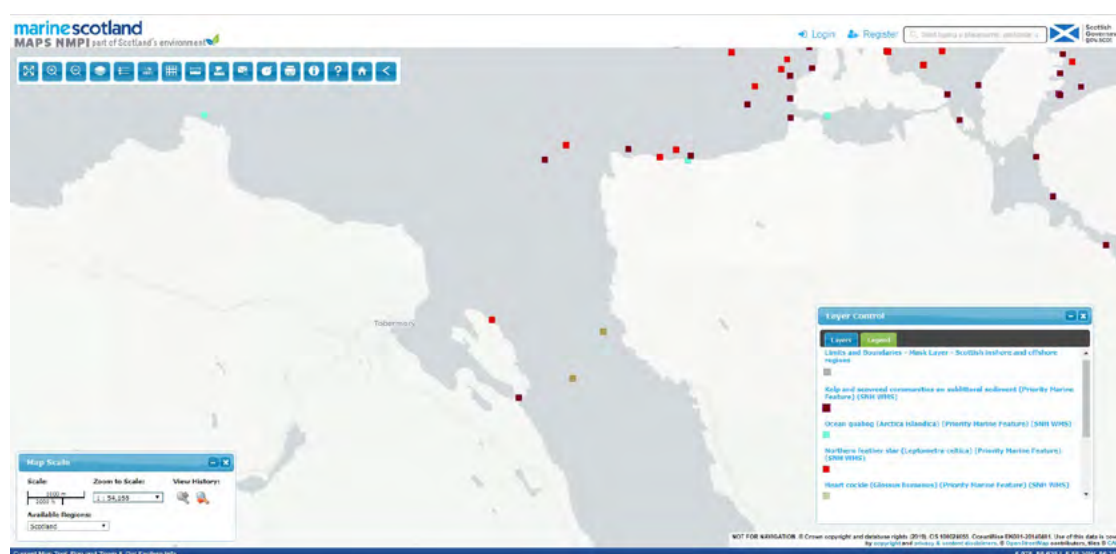
- Before you decide where to go, investigate what surveys have already been done in the area. If you are looking for a shore to survey, check if there is already a monitoring station established in your area. You may be able to add to work that is already taking place.
- If there are no established survey sites in your area, we recommend doing some background research on the known species and habitats, what the environmental conditions are, and what human activities have or are currently taking place in the area.
- Think about the accessibility of the shores you are interested in looking at and the practicalities of getting to and surveying them.

Subtidal

- The subtidal seabed is more difficult to access than our coastline and hence we know less about what is under the surface of the water. Scotland's seas cover an area greater than 400 000 km², over five times the size of Scotland's land mass. It is of great value to explore areas of the seabed where there are knowledge gaps.
- Resurveying areas where we have existing records is equally as important to detect any changes in the presence, extent and condition of marine habitats.
- If you are planning a subtidal survey, research what data is available for the area.

Check out Marine Scotland's [National Marine Plan interactive](https://www.gov.scot/policies/marine-environment/marine-protected-areas/) to display marine data (including species and habitat data, MPA boundaries and much more.). See data layers within the 'Healthy and Biologically Diverse' layer options.

*22% MPA coverage in Scottish waters, Scottish Government, <https://www.gov.scot/policies/marine-environment/marine-protected-areas/>.



▲ Screen grab of Marine Scotland's National Marine Plan interactive (NMPI).

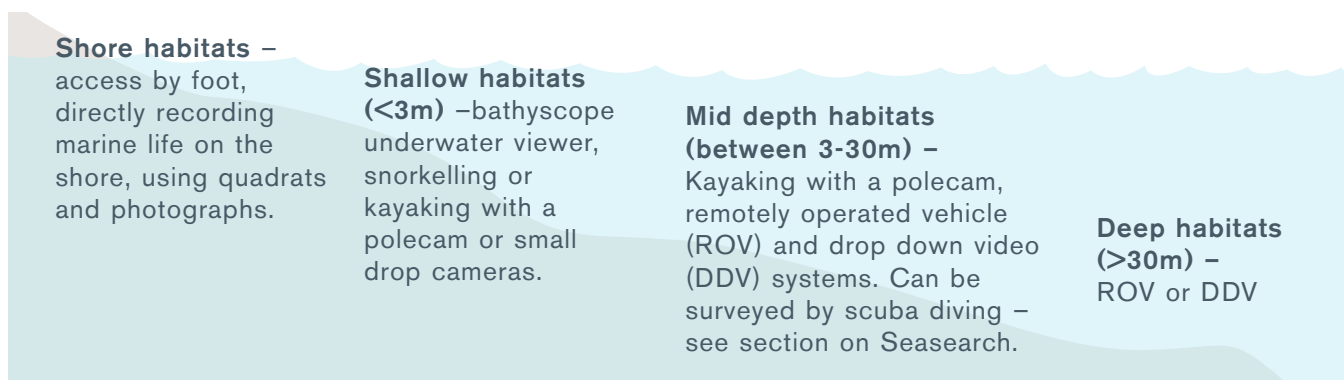
Choosing what to survey

Choosing what to survey will depend on a number of considerations:

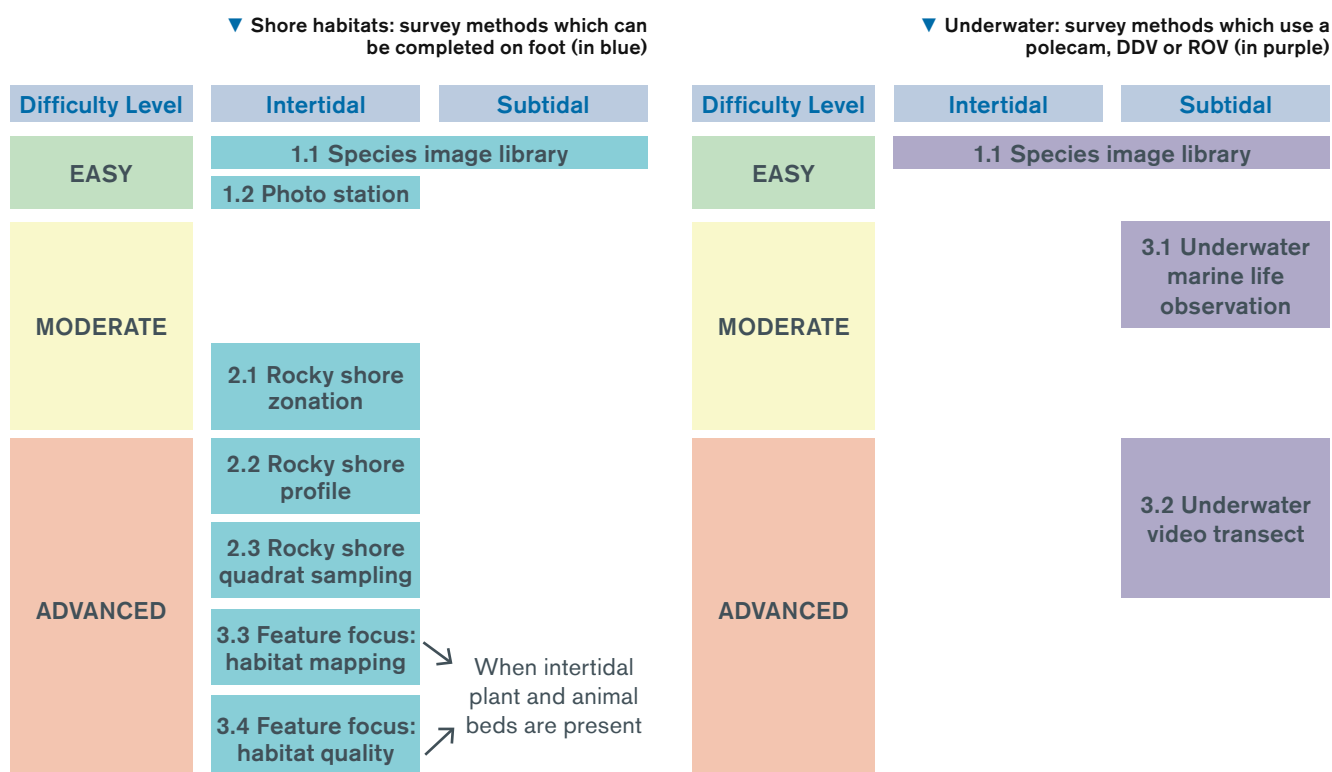
- Do you want to look at the shore (intertidal) or underwater?
- If underwater, what is the water depth?
- How easy or difficult do you want the level of survey to be?
- What type of equipment do you have available?

Below we have categorised marine habitats by their water depth and identified the corresponding approaches and equipment you can use to collect marine life data. More information on the equipment can be found in the survey equipment section on [page 11](#).

What to survey by habitat depth:



The next two diagrams show which survey methods could be used if surveying on foot or using underwater survey equipment, together with the level of complexity for the different survey options. For the full list of equipment required refer to the specific information about your chosen survey method. Guidance for the use of the survey equipment is provided within operational guidance on [page 63](#).



The physical environment

This handbook focuses on methods to survey marine biodiversity. If you would like to survey the physical marine environment (such as water temperature, salinity, water clarity etc.) you can undertake measurements while out surveying biodiversity. We don't include further guidance on physical environmental monitoring within this handbook. We recommend doing some research online to find out more.

There are many programmes available to get involved in beach cleans, documenting what plastic you find on our shores and beaches. This is another type of marine survey that can be undertaken to complement your groups' aims and look after the marine environment. We recommend you use the Marine Conservation Society's [Beachwatch](https://www.mcsuk.org/beachwatch/) programme, visit www.mcsuk.org/beachwatch/.



Seasearch

If you want to get involved in marine surveys when SCUBA diving, we recommend the [Seasearch](https://www.seasearch.org.uk/) programme which is coordinated nationally by the Marine Conservation Society.

Seasearch is a project for volunteer scuba divers and snorkelers who have an interest in what they are seeing underwater, want to learn more and want to help protect the marine environment around the coasts of Britain and Ireland.

The main aim is to map out the various types of seabed found in the near-shore zone around the whole of Britain and Ireland. In addition Seasearch divers record what lives in each area, establishing the richest sites for marine life, the sites where there are problems and the sites which need protection.

Visit www.seasearch.org.uk for more information!



▼ Seasearch diver undertaking a survey.
©Ross Bullimore



Survey timing and frequency

Timing

The time when you do your survey will have an impact on what you find. Life in the sea is affected by seasonal changes in the weather and ocean conditions. This results in changes in the diversity of marine communities such as abundance of algae and juvenile animals such as seaweeds, mussels and barnacles. Marine habitats may undergo seasonal change at differing levels, with seasonal effects still not fully understood for all species. To identify long-term changes in marine habitats it is important to recognise the effects of seasonal change on your survey results.

Annual surveys

Surveys can be undertaken annually to get data on the presence and condition of marine habitats over longer time periods. It is important to undertake surveys at the same time of year in subsequent survey years, preferably within two weeks of the original survey date.

Summer species and habitat

The optimal survey window is summer for most habitats and species and it is best to undertake annual surveys during this time of the year. This will allow you to capture the marine life that is present in summer but dies back or hides more in winter.

An example of this is seagrass beds (*Zostera* spp.) which can undergo large annual and seasonal variation. The factors behind these changes are not always clear. Intertidal seagrass beds are often annual and can undergo complete dieback in winter, with recovery dependent on local seed supply.

Optimum survey window for surveying most seabed species and habitats

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Winter			Spring		Summer			Autumn		Winter	

Year round species and habitats

For habitats that are not so affected by the seasons it is possible to undertake surveys of these in winter, but bearing in mind the likely sea and weather conditions. Winter surveys, if appropriate to the species and habitats you are interested in, can make surveying easier, as seaweed that can entangle survey equipment (such as ROVs) will have died back in winter.

An example of a habitat that is suitable for year-round surveying is maerl beds. Although growth occurs mainly in summer, maerl is one of the world's slowest growing plants (around 0.55 mm/year) making it suitable for annual surveys in winter. Maerl beds are often easier to survey in winter because algal coverage in the summer can make it difficult to see the seabed and maerl. However, if you are interested in the other seaweed species associated with maerl beds you would need to survey in the summer when these are present.

Seasonal surveys

Surveys can also be undertaken seasonally to monitor seasonal changes in marine habitats. You can track the natural seasonal variation in a habitat, such as an increase in algae and plant communities in spring and a reduction in winter. However, it is important not to confuse seasonal variation with the effects of disturbance by something other than changing seasons. Surveying seasonally may provide a fuller dataset, which can help detect long-term data trends and help minimise misinterpretation. An example of this is an increased ability to detect changes in algae on a rocky shore that result from a storm event.

Furthermore, while seasonal variation occurs within a year, some marine habitats may undergo natural variation over a longer time period as a result of ecological processes influencing community dynamics. This needs to be considered when interpreting any results from long-term monitoring sites.

Long-term datasets

Undertaking annual monitoring of the marine environment can create long-term datasets that can be used as evidence in reports and raise awareness. The annual [ORCA Watch](#) by the Sea Watch Foundation is an example of a long-term annual monitoring project that has now been running for a number of years documenting orca sightings.

Frequency

Below are recommendations for the frequency of monitoring surveys. You can setup more than one monitoring site and undertake surveys annually or seasonally.

To monitor annual changes within a site:

- One survey every year. Subsequent surveys should ideally be within two weeks of the original survey date.

To monitor seasonal and annual variation within a site:

- One survey within each season every year (winter, spring, summer and autumn). Subsequent surveys should ideally be within two weeks of the original survey date.

Tidal cycle

Selecting a date for surveying must be done in consultation with local tide charts to ensure tidal conditions are appropriate for surveying. Intertidal activities should begin preferably two hours before the predicted low tide (allowing surveyors to work down to the low water line at low tide). However, it is also possible to undertake surveys starting at low tide, surveying from the low tide line up the shore. Subtidal activities should ideally be planned for the predicted slack water where there is no tidal movement (this occurs at the times when the tidal movement changes direction).

Survey equipment



Bathyscope

A bathyscope is an underwater viewer that can be used from a boat or dry land, generally as a clear-bottom viewing cone. It works by eliminating both water surface glare and internal reflection, thereby allowing underwater viewing as far as water clarity and light will permit.



Compass

A compass is required for some surveys in this handbook to help describe site access and to record the direction of transects and features. Survey participants should know how to use a compass. Ensure they are used and stored away from metallic objects.



Drop down video

A drop down video (DDV) system is a video camera set within a robust frame that can be deployed using a rope or winch cable to survey seabed habitats. These systems typically have underwater lights, a depth sensor and sometimes use lasers to provide scale. A DDV system is usually deployed from a boat. The DDV is attached to the surface by a rope or winch and generally a tether is used to provide the live footage from the camera at the seabed. This can be viewed at the surface (on a tablet or laptop) and recorded. The GPS position of the DDV can be obtained from a hand-held device or the GPS system on the boat that it is deployed from.

For more information, please see drop down video system within operational guidance, [page 65](#).



First aid kit

Ensure you carry a first aid kit with you on all surveys.



GPS device

A Global Positioning System (GPS) device is the most effective and accurate way of determining your location. Many electronic devices such as mobile phones now have a GPS system in-built. However, depending on the kind of surveys and frequency, it may be best to purchase a GPS device as these can provide greater accuracy.



© Chris Leahey/NatureScot

Identification guides

Identification guides will be essential to correctly identify the marine life you find when surveying.

There are many identification guides available, some are targeted to a specific group of species, others covering a wide range of habitats and species. Guides are often either aimed at beginners or advanced users.

For intertidal surveys, the Field Study Council's fold out charts are great to use for on a rocky shore.

For subtidal surveys, the Seasearch identification guides are recommended.

It's also useful to refer to the habitat and species information chapter within this handbook, [page 77](#), along with the NatureScot Flickr page for a wide range of habitat and species images at www.flickr.com/photos/naturescot/.

It's best to use a copy of different identification guides together.

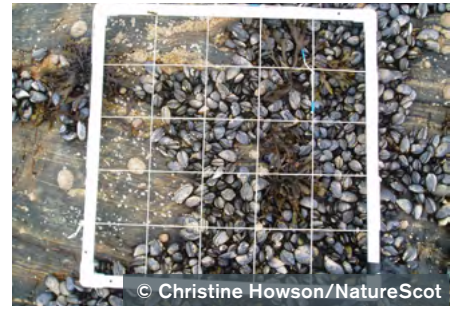


© Caitlin Orr/NatureScot

Polecam

A polecam is a video camera that is deployed on a pole to view and survey the seabed. It can be customised to suit specific survey requirements, such as connecting a cable to the camera and a tablet or smartphone to view the footage in real time at the surface. A video camera can also be deployed on a rope to survey deeper seabed habitats. The GPS position of the polecam can be taken from a hand held device or from the GPS system on the vessel the system is deployed from. Some models of GoPro also have a built in GPS receiver to take the GPS location at the surface during deployment.

For more information, please see polecam within operational guidance, [page 63](#).



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Quadrat

A quadrat is a frame of a set size that is used in surveying to frame a set area to record from. They can be made to any size, but for the survey methods within this handbook we recommend using a 0.5m by 0.5m sized frame.

Quadrats can be easily made at home and from different materials (the size of the quadrat needs to be measured from the inside edge of the tubing or pipe).

- PVC bathroom piping with elbow connectors. This material means that the quadrat will not corrode in salt water and can be disassembled for travel and storage.
- Metal. Depending on the type of metal the quadrat may be prone to corroding. It could be welded together as a square frame or mounted with hinges to allow it to be folded.



© COAST

Remotely operated vehicle

A remotely operated vehicle (ROV) is a video camera set within a frame that has integral motors that enables the system to be piloted around the seabed by someone based at the surface. The ROV is typically controlled using a gaming controller, the pilot directing its movement both vertically and horizontally and the speed through the water. The ROV is attached to the surface by a tether so that the live footage from the seabed can be viewed on a screen (such as a tablet or laptop) at the surface and recorded. Additional positioning equipment can be added to the ROV so that its GPS position relative to mapped features is automatically recorded. This can be expensive so an alternative option is to approximate the position of the ROV from the position of the boat using a series of calculations to determine the position of the ROV relative to the boat. ROVs typically have underwater lights and a depth sensor fitted.

For more information, please see remotely operated vehicles within operational guidance, [page 67](#).

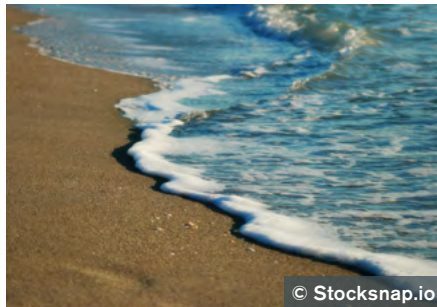


© Owen McGrath/NatureScot

Survey forms

We have created survey forms for each survey method described within this handbook, see survey forms on [page 104](#). Please complete these for your surveys, which will help to ensure all the relevant data is recorded.

We highly recommend that you store electronic copies of the physical survey forms from each survey undertaken by photographing or scanning them.



© Stocksnap.io

Tide tables and tidal predictions

Tide tables provide predicted tidal cycles and high and low water tide times. Tide tables for different areas are often available in a small booklet or widely available online (but generally only for 7 to 10 days in advance). Tide tables should be consulted at the time of survey planning. Undertaking surveys at the right time in the tidal cycle as described in the survey methods, such as low tide (intertidal surveys) or slack tide (subtidal surveys), is a particularly important factor in your survey plans.



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Transect line

A transect line is used to measure a set distance of the shore which can then be used for surveys. In general we recommend that a survey using a transect is completed in an area 2m either side of the transect line.

The transect line should be laid out along the shore from the upper shore to the lower shore (nearest the sea).

Transect lines are available in different lengths, we recommend using 30m or 50m tapes (50m for the feature focus: habitat quality survey on [page 125](#)).

The best tapes to use are in an open plastic frame with a simple winding handle; tapes that do not have metal parts will have a longer lifespan in the marine environment.

Survey planning - common sense checklist



- ☐ Have you identified any previous surveys in the area?
- ☐ Are you clear what you want to survey and where?
- ☐ Are you surveying at the recommended time of year?
- ☐ Have you checked tide times and weather?
- ☐ Do you have participants with the right level of expertise and experience for the survey selected?
- ☐ Do you have all the equipment required?
- ☐ Are all survey equipment clocks synchronised to ensure all time stamps match (such as time on a mobile phones, watch, camera equipment and GPS)?
- ☐ Are all batteries charged?
- ☐ Does the camera have space on a memory card and is it on the desired settings?
- ☐ Have you printed survey forms required and you have clipboards and pencils/pens with suitable weather proofing?
- ☐ Do you have species identification guides ready?
- ☐ Have you prepared a 'clapperboard' to help identify video clips or photos during analysis?
- ☐ Have you produced a species checklist? This can be made with the known marine life you are expecting to find, or from previous survey data. Template in appendix, page 100.
- ☐ Do you have the right access permissions to survey the survey site (i.e. is the access site on someone's land)?
- ☐ When a boat is necessary, consider availability and access permissions of harbours and/or launching facilities.
- ☐ Do you have a first aid kit?
- ☐ Have you completed a risk assessment?
- ☐ Have you familiarised yourself with the survey methods?
- ☐ Have the survey participants had a survey briefing?
- ☐ Do you have quality control measures in place?

Quality control guidelines



- 1) Read and familiarise yourself with the methods before the day of the survey. Discuss them with the survey participants and speak to the survey leader if you need further assistance.
- 2) Print the required methods from this handbook and take a copy with you to the survey. Ensure that these are followed closely.
- 3) At the beginning of all surveys, all participants should be briefed on the day about the survey plan. The survey briefing summary provided within each survey method may assist with a survey overview. Make sure everyone is happy with what they are meant to be doing.
- 4) One person in the survey group should be identified as the quality control person – this person is likely to be most experienced with the method and most familiar with the species. This is a role that can be shared by more than one person.
- 5) During the survey, a quality control person can spot check observations and assist with identification.
- 6) Have identification guides available in the field and use as required. No identification guide will have every possible species so we suggest you use a few different guides.
- 7) Only identify marine life within your knowledge and skills, don't feel pressured into identifying species and habitats if you are uncertain.
- 8) Make sure you use a consistent GPS format to ensure you can revisit the exact fixed points on subsequent surveys. The preferred format is WGS84 with the position recorded in decimal degrees (as an example: 57.493723, -4.201847).
- 9) Ensure survey recording sheets are complete.
- 10) Have a team member check your survey recording forms. Make an electronic copy after your survey by photographing or scanning the survey recording forms.
- 11) Enter data into a spreadsheet/database as soon as possible after completing the survey. Check that this has been recorded and entered correctly (i.e. are the latitude and longitude in the right place, does the species recorded inhabit that environment?).

► Anemones (*Sagartia elegans*) growing around a sponge in shallow waters in tidal rapids in Loch Sween.

©Ben James/NatureScot