

RNLI DIVER SEA SURVIVAL WORKSHOP



Instructor Manual

The RNLI is the charity that saves lives at sea
Royal National Lifeboat Institution, a charity registered in England and Wales (209603) and Scotland (SC037736).
Registered charity number 20003326 in the Republic of Ireland



RNLI Diver Sea Survival Workshop

Contents

Outline of course, Aims, Instructor Venue and Equipment Requirements, Administration, Costs

Theory Lessons

Instructor Kit List;

Charts, Chart 5011, chart plotter, tide tables, access to weather forecast or printed forecast, DSMB and reel, folding flag, whistle, signalling mirror, VHF radio, strobe, chemical glow stick, torch, buddy line, SMB and tables

Practical Lessons

Instructor Kit List;

Full dive kit, DSMB and reel, folding flag, whistle, signalling mirror, VHF radio, strobe, chemical glow stick, torch, buddy line, SMB and tables.

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RNLI Diver Sea Survival Workshop

This workshop has been developed alongside the RNLI to improve diver safety at sea. It will refresh safety skills as well as teach some techniques for improving your chances of being found at the surface.

Workshop Aim

To improve chances of survival and location in an emergency situation whilst out at sea.

Course Overview

- 7 Theory Lessons / Discussions (105 Minutes)
- 1 Dive Planning Session (60 Minutes)
- 2 Dives (180 Minutes)

Entry Level

Entry requirement for this workshop is at least BSAC Ocean Diver or equivalent.

Course Registration

Courses do not need to be registered with HQ.

Instructor Requirements

The lead instructor should be a BSAC Open Water Instructor or higher. Any BSAC qualified instructor, or assistant instructor supervised as specified in the DTP, can teach on the workshop.

Student: Instructor ratio

For practical sessions appropriate surface support is required and a maximum of two students to one instructor is advised. Appropriate account should be taken of prevailing in water conditions and the qualifications and experience of students.

Equipment

Full diving kit (Enough breathing gas for two dives). DSMB, SMB.

Venue Facilities

The venue can be any fresh or salt water, open water site that offers easy access to an appropriate area at no more than 15 metres to fulfil the practical requirements and to allow for subsequent entries and exits. Course members and their instructors will be expected to enter and exit the water several times during the in-water practical course.

Administration

Instructor Notes, Visual Aids, and Course Notes may be downloaded from the BSAC website. Each student must be given a printed copy of the Course Notes and an application form for the qualification card. The Qualification Card Application Form can be downloaded from the BSAC website. The student gets their Diving Officer or Lead Instructor to sign it and then sends it to the BSAC Shop with the appropriate remittance. The course attendance form should also be filled in and returned to the Diver Resources Team at HQ.

Costs

There is a charge for qualification cards, payable to HQ at the time of ordering. Current prices can be found from the BSAC Shop. All other materials for this course are free of charge.

The workshop is intended to be run and managed 'in-house', in which case any costs must be borne by the branch and its members. It may also be run regionally, in which case expenses will be passed on to students in line with normal Skill Development Course procedures.

RNLI Diver Sea Survival Workshop



Introduction

(2 Minutes)

Aims of the course and local administration.



Play introduction video:

(1 Minute)

This workshop is to make sure divers are fully prepared for diving in the sea in the UK and Ireland. The aim is to reduce serious incidents and fatalities at sea.

Covering dive planning, rescue skills, sea survival and calling for help at the surface.



The workshop will include two dives which will cover key UK diving skills as well as the basics of sea survival techniques. Divers will have to plan dives thoroughly; we will cover other topics like how to call for help as well as how to increase visibility on the surface in a lost diver situation.



The workshop has been developed by the RNLI in association with the British Diving Safety Group (BDSG). The BDSG is formed from all the major training agencies as well as the Health and Safety Executive (HSE), Diving Disease Research Centre (DDRC), Ministry of Defence (MOD) and the Coastguard.

We hope it will provide not only a refresher of key safety aspects but also teach divers skills.



Lesson 1 - Dive Planning Workshop

(43 Minutes)

Lesson Objectives

This lesson gives students a basic introduction to the role of the Dive Manager, basic planning using charts and weather. Information obtained from charts and tide tables helps anticipate conditions that might be found at the chosen dive site and assess potential risks.

Dive Planning Workshop

The Dive Manager
Charts
Weather
Dive Planning



Achievement Targets

At the end of this lesson students should:

- Understand the role that dive planning and management plays in making diving safe and enjoyable.
- Understand the role of the Dive Manager.
- Understand how information from Charts and Chart 5011 can contribute to dive planning and risk assessment.
- Know where to get appropriate weather information and the importance of weather in planning and risk assessment.
- Have worked through an example identifying potential risks and limitations of diving.
- Have had an opportunity to ask any remaining questions.

The role of the Dive Manager

Appointed by the Diving Officer
Planning
Risk Assessment
Delegation



The Role of the Dive Manager

Management of diving and related activities.

The Dive Manager's role on the day, having already completed the planning and organisation, becomes that of an overall manager.

- **Appointed by the Diving Officer**

The Diving Officer will consider the experience of available Dive Managers in the branch to appoint the right person as their delegated representative to manage a particular dive. As development of diving skills is progressed incrementally, so too should be the development of the experience of branch Dive Managers.

- **Planning**

The importance of Dive Planning - the Dive Manager has to be prepared for the dive day.

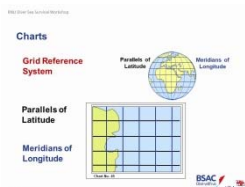
- **Risk Assessment**

The Dive Manager should have all the background information to support them in risk assessment, decision-making or adaptations that may need to be considered.

- **Delegation**

The Dive Manager, although responsible for overall diving, should not be expected to do absolutely everything. Delegating some areas of responsibility will be necessary such as:

- An Assistant Dive Manager to give backup support to the Dive Manager and allow the DM to dive
- Boat Officer or Coxswain if the dive includes the use of branch boats
- Equipment Officer if the branch divers are using branch kit and, depending on the dive site, other people can become involved, such as booking accommodation if required, offering to tow and fuel boats



Site Selection – Risk Assessment

Charts

Road or Ordnance Survey maps give a coded representation of how the land would look, with its features of towns and roads drawn to a scale. Charts are similar but concentrate on the seabed, coastal topography, particular features, such as potential hazards to navigation. What are hazards for large ships are often the sites that are of interest to divers using smaller boats. For example, large ships need to avoid wrecks and reefs at certain depths, but these may provide a good dive site. Chart makers face the problem of representing the seas of the world on a flat piece of paper. As the world is a sphere (for purists it is oblate, slightly flattened at the poles), transferring its shape to a flat surface will always mean distortion. However, chart makers have allowed for this by drawing charts as 'projections' using mathematical formulae. As maps use a grid reference to be able to locate a position, so do charts and these grid lines are referred to as the parallels of Latitude and meridians of Longitude.

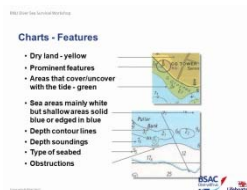


Charts - For planning

There is a lot of information given on a chart that covers the area of a sea dive site, which is important when dive planning and can give information to contribute to a risk assessment.

Chart 5011 - Identifies all features on a chart. The definitions of the symbols and abbreviations on any chart are too numerous to add to the chart itself, so another chart, Chart 5011, is needed to identify features. Although referred to as a chart, Chart 5011 is in book format. Looking at a chart from a diver's perspective, and to use it as a planning tool, the major areas of interest are:

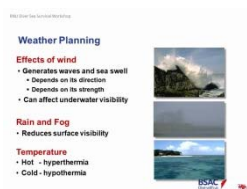
- Prominent coastline features. These are noted on charts as they can be seen from the sea to help identify position.
- Depth contour lines and charted 'soundings' - depth information.
- Seabed information - helps in anticipating underwater conditions
- Hazards - some should be given a wide berth but others can sometimes be good dive sites.
- Tidal flow information - determines when the best time to dive is with least tidal movement, slack water.



Charts - Features

The instructor should use a chart, preferably one that has a branch's known dive site on, and work with students to identify:

- Dry land - yellow the shaded yellow indicates populated area.
- Prominent land features that can be seen from the sea.
- Areas that cover/uncover with the tide – green.
- Sea areas mainly white but shallow areas solid blue or edged in blue.
- Depth contour lines.
- Depth sounding marked in metres.
- Type of seabed.
- Obstructions.



Weather Planning

For sea and some lake diving, the past, current and future weather situation needs to be considered and its effects on a dive site.

Effects of wind

- Generates waves and sea swell.
The height of the waves and swell depend on the direction from which the wind has been blowing. If the wind has been blowing over open sea towards the land, the wave height could be high, especially as the waves reach shallower depths and begin to break. Quite often, on a sunny calm day, the sea swell will be quite big. This is due to the effects of past wind much further out to sea, but its effects are still felt after the wind has decreased. If the wind is blowing off the land, the sea around the coastline close to shore may be protected, but further out to sea the conditions could be dangerous for a small boat. The height of waves depends on the wind's strength, the stronger the wind the higher the waves.
- Can affect underwater visibility.
The effects of winds and waves can affect underwater visibility. Dive sites closer to coastlines are particularly prone to the effects of wind and waves. The waves, on reaching shallower ground, may cause a groundswell, which stirs up the seabed. Breaking waves will cause more water turbulence and reduction of visibility. Rain and Fog can both drastically reduce the surface visibility and compromise safety by increasing the risk of boat and diver separation.

Temperature

Not only does the weather affect the water temperature but surface temperatures can also have an impact on the comfort of the dive group.

- Hot weather can cause divers to overheat, leading to hyperthermia. Divers will need to be reminded about constant fluid intake to prevent dehydration and protection from the sun.
- Cold weather and wind can create wind chill especially if diving from boats. Planning may highlight the need for extra thermal protection on the surface or underwater to prevent hypothermia.

BSAC Dive Planning Materials

Weather Forecasts

Beaufort Wind Scale
 • Over Force 4 - affects diving comfort and safety on unprotected sites
Shipping/Inshore forecasts
 • UK - BBC Radio 4 (200 kHz)
 • Local radio stations
 • TV
 • Web sites
 • Coastguard



Weather Forecasts

As an important part of planning, listening to weather forecasts will determine whether the dive can go ahead or not. For known dive sites, the branch information will probably include when the wind direction and strength will prevent diving on a known

site. Are there alternative known sites that could be dived?

Beaufort Wind Scale

Students may know or hear the term 'Force' when referring to wind strength, either from other divers or listening to weather forecasts. The Beaufort Wind Scale goes from Force 1, calm conditions, up to Force 12, Hurricane winds. A wind of over Force 4 with the consequent sea state can affect diving comfort and safety on unprotected sites. Shipping or Inshore forecasts and Meteorological offices around the world issue weather forecasts for the 'next 24 hour period'. For worsening weather conditions, special warnings may be issued.

- In the UK, BBC Radio 4, on VHF and LW, issue shipping and inshore forecasts for the next 24 hours. The shipping forecast covers large expanses of sea around the UK and, although mainly for offshore vessels, gives an indication of what coastal areas can expect. The inshore forecast concentrates on coastal waters, where most divers will be diving. The forecasts are given every day at the same time which is listed in radio/TV publications and nautical almanacs.
- Weather Apps can be used to give information relevant to divers
- Local radio stations will also give forecasts, although they may not cover the area of the dive site.
- Television stations, both national and regional, carry weather forecasts generally at the end of their main News programmes.
- Web sites are also available where weather forecasts can be accessed.
- The Coastguard local to the site will also give local weather information if contacted but also broadcast forecasts on marine VHF radio at regular intervals. *(Note: Instructors presenting this lesson outside the UK should replace the UK-based material with corresponding local information and procedures).*

BSAC Dive Planning Materials

Group Exercise

Plan a dive
 Using the Chart Supplied, plan a dive to the specified site.
 Identify any potential risks and how you might mitigate them.
 Prepare a brief for the dive team and identify any extra equipment you might need.



Group Exercise

This brief lesson ends the lesson by setting dive planning and management in the context of making diving the safe and enjoyable sport that it is and assessing potential risks. The key points which the students should take away with them are summarised, course documentation (BSAC risk assessment materials) is handed out, and students are given a final opportunity to ask questions.

The students should break into groups with their instructors. The instructor should give the students a dive site on a chart, specific dive time and weather forecast (the scenario given should be diveable by the group). The group should then identify potential risks for that specific dive and any way those risks can be mitigated by briefing the team/additional equipment.



The purpose of dive planning and management is to help make diving safe and enjoyable for all those taking part and to identify any potential risks and ways to reduce those risks.



Lesson 2 - Dive Preparation

(10 Minutes)

Lesson Objectives

This lesson examines some of the considerations recreational divers planning to dive in the UK in terms of equipment checks and personal dive fitness.

The workshop aims to increase student's awareness of potential equipment issues and what to look for in the planning stages and in a buddy check.



Achievement Targets

At the end of this lesson students should:

- Understand the importance of personal fitness.
- Recognise obvious signs of wear and tear or misuse on SCUBA equipment.
- Understand the importance of following manufacturers and/or industry testing guidelines.
- Appreciate the purpose of a buddy check.



Play video which covers:

(3 minutes)

- Personal Fitness.
It is important for all recreational divers planning to dive in the UK to maintain an appropriate level of fitness. We would suggest having regular health checks to make sure there are no underlying medical conditions that could affect your ability to dive. For diving medical advice go to UKDMC.org or DDRC.org.
- Equipment wear and tear.
Things to check are any obvious signs of wear and tear or misuse, worn webbing and poorly maintained regulators. Look for cracked or bulging hoses or corroded connectors. Check for any weak buckles or clips. Look at the seals on your drysuit to make sure there are no worn

areas or tears. Check the fin and mask straps to make sure they are not going to snap when you put them on. Lastly check the mouth piece for tears and holes. Also check for any damaged lugs on the mouth piece.

- **Manufacturer's maintenance recommendations.**
Have equipment maintained to the manufacturers' recommendations. Cylinders should be tested in line with the current regulations and labelled according to what they can contain. Regulators intended for use in UK waters should be manufactured to EN 250. They should be stamped with their minimum working temperature. The Octopus port should be clearly marked. It's recommended that Oxygen hoses are replaced every 5-6 years and medium and high pressure hoses every 10-15 years – follow manufacturer's guidance.
- **Buddy check.**
It is essential to do a buddy check before every single dive to make sure equipment is working properly and both divers understand how to assist each other if necessary. Check Buoyancy, Air and Releases (BAR), work from the bottom up with releases. Ensure the weightbelt is not tangled with any kit, straps or crotch strap. Make sure your buddy knows how to release your weights. Make sure you know where your buddies Alternative Source (AS) is located, working and how to get to it. Ensure gas is sufficient for the planned dive, is fully turned on and all hoses connected.



Post Video Discussion point

What are the main factors to consider both personally and regarding your equipment before going diving?

Encourage the students to discuss the checks highlighted by the video and why they are important. Simple visual equipment checks can reduce risk and also highlight any essential kit maintenance required. The instructor should highlight the importance of a dry practice of the AS and also position and release of any weight systems.



Summary

Simple checks on the surface can prevent much more serious problems underwater and be prepared to respond effectively to any unforeseen problems.



Lesson 3 - Navigation and Safety Kit for Dive Boats Lesson Objectives (5 Minutes)

This lesson examines some of the navigational and safety equipment used on dive boats

The workshop aims to increase student's awareness of the equipment on boats and its purpose.



Achievement Targets

At the end of this lesson students should:

- Be able to identify navigation and safety equipment on dive boats



Play video which covers:

(3 Minutes)

- Boat brief.
- Lifebuoys.
In case anyone falls overboard, a useful feature is the floating line attached to the one in the video for towing a casualty and another feature identified is the light for darkness / night.
- Handheld VHF's.
In case of failure of the main radio. Batteries need to be checked regularly. It is useful to have a radio procedure and emergency script on board so in an emergency any person on the boat could use the radio easily.
- Flares.
Attracting attention. Flares should be stored in watertight containers. Expiry dates should be checked. They should be disposed of responsibly via the Coastguard.
- Oxygen equipment. Make sure the cylinder is full and set up ready for use.
- Fire extinguisher should be easily accessible.
- Depth sounder.
Tells how deep the water under the boat is to prevent grounding and also to check depth of dive site and help locate the site (especially wrecks).
- GPS.
Locates the dive sites accurately and also gives a position should that information need to be relayed in an emergency.
- VHF DSC radio.
Used for routine traffic to communicate with the coastguard and other vessels and in case of an emergency or assistance. In order to use a VHF radio in the UK you need to be licenced. In an emergency if the Coxswain was not able to reach the radio for some reason then it is perfectly ok for someone else on board to use that radio. There should be instructions on how to use the radio on top of the console for everybody and it is very straight forward. There is a button on the radio marked 16 and if you simply press that it makes you automatically use channel 16 and then you can just pick up the microphone, press the button on top and speak and then let go of the button once you have finished speaking and someone will reply, the coastguard usually. There is also a red flap marked distress which lifts and has a red button underneath. Then you would lift the flap, press the button, press the button again and that sends our position and vessel details to all DSC sets in the area.
- Kill cord.
If the Coxswain/Boat handler goes overboard the boat will stop. All on board should also know where the spare emergency engine kill cord is.
- Lifejackets.

Discussion Point

As a diver, what do you need to know when you go onto a boat in terms of the boat's safety equipment?
What other diver specific safety equipment would you expect to find?

Post Video Discussion Point

As a diver, what do you need to know when you go onto a boat in terms of the boat's safety equipment?

What other diver specific safety equipment would you expect to find?

Encourage the students to discuss the equipment seen in the video in more depth as detailed above. A good boat brief can ensure all divers are familiar with the kit on board and it is all present on board. The instructor should highlight the importance of checking the equipment on the boat and always using the kill cord. You could use a copy of SOLAS V as an aide to the discussion.

Summary

Identify Navigation Equipment
Be able to locate Safety Equipment
Understand VHF Radio use in an Emergency



Summary

It's important to make sure the boat equipment is stored safely and in good working order before leaving. Further information can be found in SOLAS V regulations.



Lesson 4 - Out of Gas Emergencies

(5 Minutes)

Lesson Objectives

This lesson examines the importance of an Alternate Source (AS).

The workshop aims to emphasise the importance of knowing how to use the buddy's AS and buddy monitoring.

Out of Gas Emergencies

Understand the Importance of an Alternative Source
Understand the Importance of following Manufacturers Guidelines
Understand the Importance of a Buddy Check



Achievement Targets

At the end of this lesson students should:

- Understand the importance of an AS.
- Understand the importance of following manufacturers and/or industry guidelines.
- Appreciate the importance of a buddy check in regards to AS.



Play video which covers: (1 Minute)

- Purpose – an AS is really important because if your buddy does ever run out of gas your buddy needs to be able to take your alternative source.
- Buddy conduct - staying close to your buddy in all conditions but you may need to consider how to keep in contact in low visibility if you there is an increased risk of separation important in case the AS is required.
- Configurations - There are a whole range of different AS configurations. You can use an octopus, a pony cylinder, twin set with a long hose, a side slung or other combinations. The important consideration is that the AS is accessible and useable by an OOG buddy.

- Practice -In order to ensure this make sure you practice this skill regularly to avoid skill fade, recognise your buddy's specific configuration and that you can use it. Do a dry run on land, use your buddy check to ensure you know how the drill will work with your buddy.

Discussion

What are the various ways of giving an alternative air supply?
What is BSAC's recommended technique for Alternate Source (AS)?
What are the important factors for a stowed Alternate Source (AS)?

Post Video Discussion

What are the various ways of giving an alternative air supply?

Alternate Source take, Primary Donate, Pony cylinder, redundant sling cylinder

What is BSAC's recommended technique for Alternate Source (AS)?

The instructor should highlight the points raised in the video about practice and staying close to a buddy in different conditions. The instructor should also raise the EN250 guidelines at this point.

The instructor should be aware the wording in the video is that of the RNLI and highlight that we teach Alternate Source 'take' not donate (or 'give'). BSAC's recommended technique is AS take. The instructor should explain that this is because in an emergency the recipient is able to go straight to the alternate supply and take it rather than being reliant on the donor giving them the alternate source.

What are the important factors for a stowed Alternate Source (AS)?

It is easily identifiable and easily released.

Alternate Source and EN 250 – BSAC Communication

In 2014 revisions were made to the standards specified for the manufacture of diving regulators.

The main change that may ultimately impact on recreational divers concerns the fitting of auxiliary breathing sources (ABS), (octopus, Air2 etc.) which are not recommended for use below 30m. This is consistent with existing advice in BSAC Safe Diving where an independent supply is strongly recommended below 30m.

Manufacturers will in the future need to clearly mark their regulator port with an 'A' if it is considered suitable for connecting an Octopus (or other ABS). Manufacturers are also required to provide clear guidance on the suitability of their equipment for any relevant use (temperature, depth etc.). The changes impact on the regulator manufacturers but they do not immediately need to comply with the new standards for equipment they are already manufacturing to the previous EN250 standard.

There is currently no indication that existing equipment on the market is currently not suitable for continued use in the configurations commonly used as long as divers follow the precautions advised in BSAC Safe Diving.

BSAC will continue to monitor the situation and update our guidance as appropriate but strongly recommends the use of and independent gas supply for dives below 30 metres

and that divers ensure that any regulator sets they are purchasing are suitable for their intended use by checking the manufacturer's guidance on use of the equipment.

Summary

Understand the Importance of an Alternative Source
Understand the Importance of following Manufacturers Guidelines
Understand the Importance of a Buddy Check



Summary

It's important to make sure that divers are familiar and comfortable using the AS configuration of their buddy and that the configuration is suitable for the dive and being used within the manufacturer's recommendations.



Lesson 5 - Calling for Help and Visibility on the Surface

(15 Minutes)

Lesson Objectives

This lesson examines the different options available for signalling on the surface of the water and the benefits of different equipment.

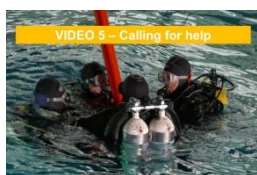
The workshop aims to inform divers of the equipment available so that they can choose appropriate equipment for signalling on the surface of the water.



Achievement Targets

At the end of this lesson students should:

- Understand the importance of visibility on the surface
- Be aware of the different types of equipment available and it's uses
- Understand the impact of surface conditions on visibility



Play video which covers:

(9 Minutes)

- SMB is used to mark your position on the surface to the dive boat or in an emergency to aid rescuers in detecting you. Generally, these are inflatable, which makes for easy storage in dive kit bags. When inflated they will be of a size that can be easily seen by surface cover but not be unduly affected by surface wind or currents. They come in various shapes from round to cylindrical and are brightly coloured. They should support a weight of between 10-20 kg, as it is important that the diver cannot inadvertently pull them underwater, particularly when ascending or using the line to hang from at safety or decompression stops.
- DSMB is inflated at the end of a dive and released so that it surfaces to mark the position of a pair of ascending divers for the cover boat to monitor them. Usually they are sausage shaped so that, because of their height out of the water when inflated, they are more visible to the cover boat than a small circular float. This is beneficial because, unlike a SMB which can be monitored throughout the whole dive, the cover boat will not know exactly where the DSMB will surface and hence will need to locate it. Most DSMB's are at least 1m long and have a buoyancy of about 20-25 kg when inflated. They can be inflated by an AS, inflation gun, CO2 canister or separate dedicated cylinder – care should be taken in colder water when inflating with an AS to avoid a freeflow.
 - Reflective tape could make it easier to be spotted if stuck on the buoy.
 - A torch could be used to light up inside buoy.
 - Colour, most DSMB's are orange as this is a highly visible colour on the surface of the water. Yellow DSMBs are used for a specific purpose by technical divers to indicate an underwater emergency.

DSMB - USE & PRECAUTIONS

Buoyancy control

- Once the buoy is completely straight, add further gas to provide buoyancy. Do not over inflate as the gas will expand on ascent. Where the reel cannot be secured to anything, beware of problems with your own buoyancy control.
- Where the DSMB is being deployed mid-water, do so from a couple of metres below the deepest decompression stop to provide a safety margin in case of buoyancy control problems. Keep hands and equipment clear of spinning reel. Check DSMB has reached surface. The buoy's ascent may be erratic and not always straight up towards the surface. This affects the line tension and can give a misleading indication that the buoy has reached the surface. If the buoy hasn't reached the surface, attempting to lock the reel could lift the diver upwards. When the line slackens, do not immediately lock off the reel but wait until you are sure that no more line will run out. This will indicate that the buoy has indeed reached the surface and the ascent can be commenced. Keep line under tension. Once the buoy has reached the surface, the line should be kept under tension during the ascent and any decompression stops so that the buoy will be held upright, otherwise it will lie flat on the water surface and be difficult for the surface cover to see.

When planning to use DSMBs, in case of diver separation, it is essential that:

- Each diver is equipped with a DSMB
- Each diver is capable of deploying a DSMB unassisted. Practice - Practice – Practice, like any other skill. Deploying a DSMB needs to be constantly practiced if competence is to be retained. Don't leave it until you have to use one to find out whether you are still capable of doing so.



Discussion

When should a Delayed Surface Marker Buoy (DSMB) be used?

Instructors should encourage the students to highlight the uses of a DSMB to mark the position or in combination with a second buoy and the importance of colour.

Additional Surface Aids

There are some additional items that divers can also use to attract attention if separation from the boat cover occurs. They include:

- Nautilus Lifeline VHF radio.
The Nautilus is a portable VHF DSC radio. It is a handheld radio in a waterproof container with an emergency DSC button. This allows you to make radio contact with a vessel within range as well as sending out a digital message to boats within range. This radio needs to be worn on you in person and needs to be manually operated in an emergency.
- Personal Location Beacons,
PLB's can greatly assist in the search for a diver. PLB's must be worn on your person and although they are waterproof they cannot be taken to depth so need to be stored inside a waterproof container whilst diving. To set off a PLB you must be on the surface. You would need to remove the PLB from the canister and then follow the manufactures instructions to manually set it off. These are a recognised global maritime distress signal and can be used worldwide.

- **Automatic Identification Systems or AIS devices**
These are another radio based distress signal that can be used. Depending on the manufacturer some are able to be taken at depth without having to use a waterproof canister. These again need to be kept on you in person and have to be manually activated on the surface. An AIS device once activated sends out an alert to any vessels within a 5 nautical mile radius which has an AIS receiver unit. This will then show up on the vessels screen and help them locate you.
- **Dive Flags**
These are made up from pieces of tubing that, when folded down, can be attached by bungee cords or large rubber bands down the side of a cylinder. When deployed, the tubes telescope out to form a rigid pole with a flag that can be displayed at some height above the divers. If diving in open water or when there is a swell, the extra height of the flag allows the boat cover to see the diver's position on the surface more clearly.
- **Strobe Lights**
These are small flashing waterproof lights. They can be switched on both underwater and at the surface but a flashing light on the surface means distress, so they should only be used in an emergency.
- **EPIRBS (Emergency Position Indicating Radio Beacons)**
These waterproof units, when activated by the diver, will relay a signal to satellites linked to the Global Maritime Distress and Safety System (GMDSS). These are small versions of EPIRBS used by boats in life threatening situations. For obvious reasons they should only be used if divers are separated from their boat and lost on the surface.

Other surface aids include:

- **Whistles**
Many BCs are sold with a simple whistle to attract attention. Also available are gas operated whistle units that can be connected to a BC's inflator hose,
- **Mirrors**
Small reflecting (stainless steel rather than glass) mirrors can be used to attract attention by reflecting sunlight.

Discussion

Which calling for help equipment is most appropriate for you?

Instructors should get students to discuss the type of diving they are doing and locations to identify suitable surface signals in an emergency.



Summary

Divers should each carry a selection of equipment to enable them to be seen on the surface. It's important that the surface support is aware of any equipment and specific surface signals and their meanings.



Lesson 6 - Sea Survival Techniques

(10 Minutes)

Lesson Objectives

This lesson examines the basic procedures to follow to best ensure survival at sea.

The workshop aims to inform divers of the procedures to follow should they be on the surface of the water with no contact with their surface cover.



Achievement Targets

At the end of this lesson students should:

- Know what to do should they find themselves lost on the surface of the water
- Understand the techniques for sea survival



Play video which covers:

(6 Minutes)

Procedure

If you are lost at sea, then stop and consider how best to ensure your survival.

- Dump your weight to establish positive buoyancy and to maintain a vertical position in the water. Consider keeping one weight to attach to the bottom of your DSMB to keep it vertical and ensure your visibility.
- Huddle together and try to curl up for warmth, support and also to increase your visibility.
- Turn your back to the waves to protect yourself from inhaling spray. If necessary cover your mouth with your hand to keep spray out.
- If you have a PLB, AIS device or Nautilus lifeline radio now would be the time to use it. Use your arms / DSMB to wave to attract attention.

Prevention

To help avoid getting lost on the surface:

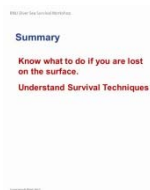
- You need a clear dive brief.
- Clear dive plan.
- Undertake good dive practices at all times.
- Be prepared if you do become lost.



Discussion

What are the main points that you will take away from this session?

Instructors should ask the students to relay the procedures seen in the video and any other ideas they may have.



Summary

It's important to make sure that divers are aware of changing weather conditions and carrying suitable equipment to maintain visibility at the surface of the water.

Planning Session - Dive Planning Exercise

(60 Minutes)

Lesson Objectives

The objective of this session is for the students to plan, in tutorial groups, the two dives for the sea survival course.

Achievement Targets

At the end of this lesson students should:

- Have experienced preparing a dive plan.

Equipment Needed

It is suggested that organisers prepare written briefs for the students to have to plan. Their plans can be compared with this brief (or with the model dive plan prepared by the instructor) during the Dive Plan Discussion session.

Charts, tide tables, dive site maps and reference materials appropriate for the intended open water dive location.

The BSAC publication Safe Diving should be seen to be used and can be downloaded [here](#)

Lesson contents:

Introduction and objectives.

The objective of this session is for the students to plan, in their tutorial groups, a dive that encompasses all the elements of the sea survival course dives. Following the earlier theory lessons, students now have some theoretical knowledge of dive planning. This session will give them hands-on experience of it.

Dive planning exercise.

Instructors set the scene.

- Plan a full days diving.
- Number / grades of actual divers.
- Location of days dive.
- Weather / tides.
- Boats/ Access to site. (Normally available to branch or charter boat)
- Each diver to dive twice.

Instructors guide the discussions. (Following the contents of the classroom lesson)

- Diving objectives.
- Appointment of a Dive Manager / Assistant Dive Managers.(duties)
- Who will be diving: pairing of divers, appointment of boat handlers
- When and where to dive.
- Material required.
- Assess the risks of the dive. Use assessments of the dive site along with the conditions on the day. Use Risk Assessment information and form from BSAC website (www.bsac.com/riskassessment)
- Announce final plans.
- Formulate a written outline plan and timetable covering the above.

Practical Lessons

(180 Minutes)

Lesson Objectives:

The objective of this session is to teach/refresh students in emergency procedures, use of equipment that makes divers visible on the surface and to teach the practical aspects of sea survival and through demonstrations by the instructor, and to give them practical experience in these activities by following the dive plans developed previously. This session also acts as a rescue skills refresher.

Achievement targets

At the end of this lesson students should:

- Understand the role and responsibilities of the dive manager.
- Understand the considerations for safe diving operations at the dive site.
- Understand how to ensure adequate dive monitoring.
- Understand the importance of practicing rescue skills regularly.
- Understand how to use equipment to signal to surface support.

Equipment needed:

Students need full diving equipment, DSMB, reel.

Instructors need to arrange for any boat(s) used to be fully equipped for diving and equipment demonstrations, and for sufficient safety equipment whether shore or boat diving.

Practical lesson one contents:

Introduction and objectives.

For this lesson each diver will need to be equipped with a DSMB. As the exercises involve the use of lines underwater, each diver should also be equipped with an appropriate and easily accessible knife or other line cutting tool. A large dry area will be required for the initial familiarisation with the DSMB and its use. Surface cover should be briefed to expect deployment of a number of DSMBs, one from each diver in the group.

Briefing.

Explain the above objectives and include all the elements of a SEEDS brief. With the involvement of the students, establish the predicted breathing gas requirements to conduct the DSMB exercise and

surface with an adequate reserve, and then explain how the exploratory dive part of the lesson will be managed in line with this requirement.

Dry practice of DSMB use.

Students who have completed Sports Diver will already be familiar with some aspects of the equipment for Ocean Divers the equipment and techniques will be completely new. Dry practice should therefore concentrate on practical use of equipment and technique, particularly those concerned with managing inflation of DSMB and use of lines. A full dry run of the inflation procedure should be performed, wearing gloves if appropriate to local water conditions, so that students can get clear in their minds exactly how they will manage the inflation of the buoy (particularly if it is not self-inflating), while ensuring that the reel is able to run free (but without snagging) as soon as the buoy has sufficient buoyancy. Another student, or an assistant, holding the buoy and exerting a slight pull upwards to represent buoyancy, will give a more realistic representation of the practicalities of the technique.

Kit up and buddy check.

Prior to kitting up, identify a suitable means by which students could carry the DSMB and reel, ready assembled, and secured in such a way that it is accessible but will not dangle free and become a snag hazard. Ideally this would be fully enclosed in a pocket. Once fully kitted and normal buddy check has been completed, check that the DSMB can be deployed from its stowage, adjusting the stowage method as necessary.

AS ascent from 10m. (As Ascents should be conducted at the start of the dive)

This should start from the possible real life situation of both divers swimming along side by side, when one diver's (recipient's) breathing gas supply fails. Recipient makes physical contact with donor to attract attention, signals 'out-of-gas', takes donor's AS from stowage and commences to breathe from it. Recipient and donor take secure hold of each other. Once ready, donor and recipient exchange 'up' signals, ascend at a normal rate to 6m, each controlling their buoyancy as required. At 6m ascent is discontinued, recipient reverts to own demand valve and both descend back to 10m. Donor returns AS to stowage. Perform exercise as both donor and recipient. At the end of this exercise, students should be competent and confident in their abilities to conduct an AS ascent from a depth of 10m as both a donor and recipient and the recipient should be competent in orally inflating their own BCD on the surface.

Exploratory dive lead by student(s) - 20m.

Students lead the dive under the supervision of an instructor. While allowing the students to lead as much as possible, the instructor should, where necessary ensure a successful implementation of the dive plan, interject reminders about buddy checking, correct navigation etc.

- **Buddy monitoring.**
Frequent exchange of 'OK' signals, periodic checks of gas consumption, relative positions enable all divers to see their buddy, distance between buddies appropriate to both underwater visibility and the need to be able to render assistance if required.
- **Navigation.**
Direction managed in accordance with predetermined plan using pilotage if the student is an Ocean Diver, compass or a combination of both if the student is a Sports Diver or above.
- **Depth/time and gas management.**
Management of dive time and profile, observing agreed depth limit and 'turn round' and 'commence ascent' gas values (or, where more than one student is involved, to the values pre-planned for period that they lead).

DSMB deployment from bottom - 10m.

This exercise comprises four elements, the initial inflation of the DSMB, the deployment of the DSMB, the ascent and a practice decompression stop at 6m. The DSMB line becomes the only visual reference so good buoyancy skills are required; this may be the first time the student has done this if they are an Ocean Diver. This is the realistic scenario for the ascent, including a safety stop, from a wreck dive as slack water ends. Self-inflating DSMBs are the easiest to use, but where another source of inflation is required; this should only be from an AS or a dedicated nozzle, not from a diver's main regulator. Where an AS is used, instructors should closely monitor the student's actions to ensure that it does not become entangled in the DSMB or its line. As instructor and all students will each be deploying a DSMB, instructors should ensure appropriate spacing between all divers to ensure that DSMBs do not become entangled during deployment.

- **Initial inflation.**

Settled on a clear area of the bottom, DSMB removed from stowage, all attachments to diver disconnected. DSMB and reel held clear of diver and equipment, initial small inflation to straighten buoy, reel unlocked during inflation.

- **Main inflation and deployment.**

Once buoy is fully extended, reel unlocked, DSMB inflated further. (Note: It is not necessary to fully inflate a DSMB as expansion during the ascent will cause further inflation. Setting self-inflating DSMB's to inflate slowly makes control easier, other DSMB's should be released as soon as the diver can no longer remain on the bottom while holding on to the DSMB) Reel held unlocked until it has completely stopped rotating (Note: the rate at which the line runs out varies as the DSMB may pursue an erratic course to the surface. It is important to ensure that student's do not allow the reel to lock prematurely).

- **Ascent reeling in line.**

This element provides practice of controlling buoyancy while operating the reel to maintain a slight tension on the line.

- **Practice decompression stop at 6m for 1 min.**

At 6m lock reel, adjust buoyancy to maintain depth using line and reel as a visual reference. At the end of the stop, unlock reel and continue ascent to the surface. Inflate BC at surface. At the end of this exercise the students should be fully competent and confident in their abilities to deploy a DSMB and to conduct an ascent to the surface including a decompression stop using the DSMB line and reel as the only visual reference.

On the surface, practice Foetal position and Huddle position.

Foetal position requires students to draw knees up towards the chest and float on the surface ensuring their head is clear of the water.

To huddle the group come in close and are mindful to conserve energy whilst staying close together on the surface to increase surface area viewable by rescue services and to maximise warmth.

On the surface trial two pre-agreed signalling techniques to the Dive Manager.

Exit as appropriate to local conditions.

Report back to Dive Manager.

Debrief.

Review the students' performance, highlighting areas of good performance and offering constructive feedback where necessary. As with skills learned in the preceding lessons, those learned in this lesson will not be needed on every dive. Periodic practice of these skills will therefore be needed to retain

them, and to enable students to get more enjoyment out of dives when they are needed and to maximise safety.

Adapting this lesson.

The content of this lesson is not dependent upon equipment or previous training and hence the lesson content is applicable to all students.

Skill performance standards.

At the end of this lesson, the students should be sufficiently competent and confident to be able to achieve the following skill performance standards, without supervision, in the water conditions experienced:

- **DSMB use.**
Student removed DSMB from stowage and checked no connections to equipment remained, buoy and reel managed to avoid entanglement of line around either buoy / reel or other equipment. Initial inflation to straighten buoy, reel unlocked. Buoy released during main inflation before increasing buoyancy resulted in student being lifted from the bottom, buoy released cleanly with no entanglement of line around equipment. Reel held unlocked until rotation completely stopped. Appropriate tension held on line during ascent, buoyancy controlled to maintain normal ascent rate. Reel locked at safety stop depth. Buoyancy adjusted to maintain safety stop within the buoyancy standard expected of their diver grade of required depth and accurately timed. Line tension managed during final ascent to surface directly under buoy.
- **AS ascent as donor.**
Donor provides clear access to AS for recipient, takes secure hold of and allows them to establish a stable breathing rhythm. After exchange of 'OK' signals ascends with recipient, venting own buoyancy device as necessary to control ascent. At 6m, ascent terminated and depth maintained while recipient reverts to own demand valve.
- **AS ascent as recipient.**
Recipient makes physical contact with donor to attract attention, removes donor's AS from stowage, clears it of water and commences to breathe from it, takes secure hold of donor, when breathing rhythm stabilised exchanges 'OK' signal with donor and then signals 'up'. Recipient ascends with donor, venting own buoyancy device as necessary to control ascent. At 6m, ascent is terminated, depth maintained while recipient retrieves, clears and resumes breathing from own demand valve.
- **Dive planning**
Conditions checked within previous experience, safe dive profile and accurate times/gas states determined for turnaround point, commencing the ascent, arriving at the decompression safety stop depth, leaving the safety stop depth for the surface and reserve breathing gas. Adequate navigational information (compass bearings, topographical features etc.) identified to define route to ascent point, distance and depth match dive profile, taking into account expected water conditions.
- **Dive leading.**
Dive profile and route managed to observe maximum planned depth and time/gas state (whichever occurred first) at turn-around and commencing ascent points. Route managed to ensure arrival at ascent point at correct time. Frequent exchange of 'OK' signals, periodic checks of own and buddy's breathing gas consumption, buddies position and distance managed appropriate to both underwater visibility and the need to be able to render assistance if required. Ascent managed to arrive at decompression safety stop at correct time. Stop depth maintained to within 1m and correctly timed.
- **Surface procedures.**
Confident with foetal and huddle position.
Able to use different signalling techniques on the surface.

Practical lesson two contents:

Although essential equipment for drift / boat diving, until students have developed the necessary awareness and skills in the use of the SMB, they should not use them in moving water for this first use, therefore, a dive site with no current, or very little, is required.

Briefing.

Include all the elements of a SEEDS brief but with particular emphasis of those aspects relevant to the use of an SMB. Relate the exercise to real diving by reminding students of the circumstances where use of an SMB is advisable. As this lesson involves the use of lines underwater, ensure that all students are equipped with an adequate and easily accessible knife or other line cutting tool.

Dry practice of SMB operation.

This is, in effect, an extension of the dive briefing. Explain the operation and use of the SMB and its reel, and allow the students to practice its operation. Explain, and demonstrate where appropriate, the practicalities of using the SMB reel:

- During descent - hold at arm's length to deploy line clear of body, controlling buoyancy.
- At dive depth - appropriate tension to avoid 'tugging' from surface waves on the buoy and to counter effect of wind on the buoy, not too much slack that the line snags, adjustments with changes in depth.
- Avoiding entanglement - monitoring the surroundings (above and/or down current) for potential snags.
- Avoiding separation in low visibility - reel out extra line to act as 'buddy line', buddy holds onto line within range of visibility, buddy holds line to avoid snagging on self or own equipment.
- During ascent - reel line in to match rate of ascent, use line as visual indicator of ascent rate, controlling buoyancy Report dive plan to Dive Manager.

Kit up and buddy check.

After normal buddy check, identify suitable locations on the students' equipment to which the SMB lanyard can be secured during their practice, and from which it can, if necessary, be quickly released under tension. Also check that the knife is carried where it is easily and quickly accessible.

Entry.

Entry as appropriate for local conditions.

SMB use during exploratory dive to 15 - 20m.

For each element, after an instructor demonstration, students should be allowed adequate time to practice to achieve the necessary performance standard. Rushed training usually results in problems using SMBs on subsequent dives and future avoidance of their use in circumstances where they are really needed.

- **Descent.**

Hold reel at arm's length, release catch, vent from buoyancy device to initiate descent. Maintained reel at arm's length to keep line clear of body, control buoyancy using other hand. If descent interrupted (sticky ears etc.), lock reel to prevent excess line in the water until descent re-commenced. If descending down shot or other line, keep reel clear on opposite side of body, monitor deployment of buoy line and maintain sufficient tension to avoid tangling with shot or anchor line.

- **Once on the bottom.**

Attach small torch to the reel and swim away from SMB to see how visible this is in the environment, do not swim out of sight of the item, repeat with strobe and then brightly coloured item such as rolled up SMB to see which is most visible in the diving environment.

- **During dive.**

On reaching the bottom, adjust line tension, lock reel, hold reel or allow reel to be towed behind on the lanyard as conditions allow. Relocate released reel by locating lanyard attachment to divers' equipment, sliding a hand along the lanyard while sweeping a hand out clear of the body to reel. Adjust line length/tension as required for changes in depth.

- **Monitor overhead for potential snag hazards.**

Develop awareness of surroundings by looking all around, including upwards. Periodically visually check line for excess slack and direction.

- **Use of buoy line as a buddy line.**

Reel out sufficient excess line for buddy to hold just within range of visibility. Buddy holds line to keep it clear of self or own equipment.

- **Vertical ascent.**

When used for real, SMBs will often be used for drift diving. Under these circumstances ascents are normally direct to the surface. This element should simulate these conditions as closely as possible by making a direct ascent to the surface. Any slack on line taken up, ascent then initiated by finning upwards as normal. Buoyancy controlled as normal ascent, line reeled in to maintain slight tension on line throughout ascent (Note: buoyancy control takes priority), line used as visual reference to monitor ascent rate, buddy contact maintained. At the end of this exercise the students should be fully competent and confident in their abilities to use a SMB and in their understanding of the impact of its use on their surroundings.

On the surface practice Foetal position and Huddle position.

Foetal position requires students to draw knees up towards the chest and float on the surface ensuring their head is clear of the water.

To huddle the group come in close and are mindful to conserve energy whilst staying close together on the surface to increase surface area viewable by rescue services and to maximise warmth.

On the surface trial two pre agreed signalling techniques to the Dive Manager.

Exit As appropriate to local conditions.

Report back to Dive Manager.

Debrief.

Review the students' performance, highlighting areas of good performance and offering constructive feedback where necessary. Remind students that, like all other skills that are not regularly used, the skills they have just developed will deteriorate. Periodic practice will maintain the skills and enable their use when necessary. This will enable students to get more enjoyment out of their dives.

Performance Standards

At the end of this lesson, the students should be sufficiently competent and confident to be able to achieve the following skill performance standard, without supervision, in the water conditions experienced:

- **SMB use.**

Line deployment managed to remain clear of body, equipment and, where necessary, any fixed line during descent. At dive depth adjust the line to provide appropriate amount

of slack, length adjusted to match variations in depth. Awareness of potential impact of surroundings, particularly above, on buoy line demonstrated. During ascent appropriate amount of tension maintained on buoy line to surface directly under buoy.

- **Dive leading.**

Dive profile and route managed to observe maximum planned depth and time/gas state (whichever occurred first) at turn-around and commencing ascent points. Route managed to ensure arrival at ascent point at correct time. Frequent exchange of 'OK' signals, periodic checks of own and buddy's breathing gas consumption, buddies position and distance managed appropriately to both underwater visibility and the need to be able to render assistance if required. Ascent managed to arrive at decompression safety stop at correct time. Stop depth maintained to within 1m and correctly timed.

- **Surface procedures.**

Confident with foetal and huddle position.

Able to use different signalling techniques on the surface.



Lesson 7 – The Way Forward

(15 Minutes)

Lesson Objectives

This lesson consolidates the skills taught over the course and explains the way forward.

Achievement Targets

At the end of this lesson students should:

- Be aware that they should practise their skills
- Fill in the course form and give to the lead instructor/post direct to BSAC so their record can be updated



Aims

Review the course aims and what was covered.

Check for transfer of knowledge.

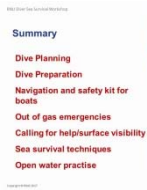
Discussion

Open forum for feedback on the course. Instructors should note feedback and email drt@bsac.com



Next

Students should be encouraged to practise their rescue skills and keep up to date. The instructor should emphasise the importance of returning the course form (it's free) so BSAC can update the student records and this records that they have practised their rescue skills and also allows BSAC to track if the course is in demand or not. A qualification record card can be issued at a cost of £15.



Summary

Review what was covered on the course and check for transfer of knowledge.

- Dive Planning
- Dive Preparation
- Navigation and safety kit for boats
- Out of gas emergencies
- Calling for help/surface visibility
- Sea survival techniques
- Open water practise