

Sports Diver Theory Lesson – ST1

SPORT DIVING

Lesson Objectives

This lesson outlines the Sports Diving Course, which includes understanding the varied diving conditions likely to be encountered, learning additional rescue skills and use of additional equipment to support diving in different conditions and dives including decompression stops. The course will add to students' greater awareness of conditions to assist with planning and diving to support extending their depth range to 35m upon completion of the Sports Diver qualification

Achievement Targets

At the end of this lesson students should

- Understand the contents of the Sports Diver Course
- Understand that with skills and experience gained from, or since becoming Ocean divers, that the Sports Diver course develops theory and practical skills to support diving in differing conditions and where extended depths could well be experienced subsequent to qualification
- Understand that different factors affect diving conditions
- Understand that to support a more varied range of diving additional equipment will be needed and will be discussed in later classroom sessions of this course
- Understand that rescue skills will need to be developed and practiced as they are becoming more experienced divers
- Understand that all diving at whatever level requires self-risk assessment to understand personal limitations and considerations to be able to continue enjoyable and safe diving

SPORT DIVING

WHY BECOME A SPORTS DIVER?

Aim of the Course

Extending skills and experience

By doing the Sports Diver course, students will learn additional skills and increase their understanding and awareness when:

- Diving a variety of sites in varying conditions
- Considering additional equipment and gas mixes needed to support the variety of dives being undertaken
- Extending personal rescue skills including resuscitation and, the ability to take a more active role in surface support cover

Perhaps the most important element in extending personal diving skills and future depth range is:

Self risk assessment

Knowing personal limitations

SPORTS DIVER COURSE

Content

Explain that the format of the course comprises a combination of -

- 6 theory lessons
- 1 pool/sheltered water lesson
- 1 dry practical lesson
- 5 open water lessons
- Experience of 5 different diving conditions

It is important to outline the 'domestics' such as when and where students are expected for the training sessions.

Commitment

Emphasise that commitment to the Sports Diver Training programme is important to enable it to run smoothly for themselves and the Instructors.

Self study

Another important element of the course is self-study using:

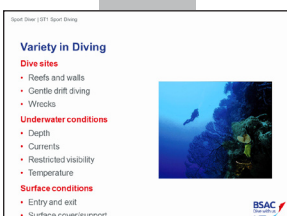
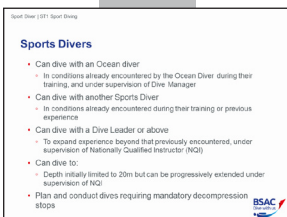
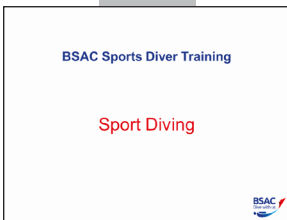
- Student Workbook provided
- The Diving Manual for reference purposes.

VARIETY IN DIVING

Dive Sites

Involve the students by asking them to name the different types of dive sites they have either encountered themselves or heard about. The most common sites will be:

- Reefs and Walls - students' experience may vary from low lying rocky reefs in shallower water or the top of reefs that drop away to greater depths. Wall diving can vary from quarry walls, sea walls around islands or rocky outcrops, to walls that drop away from coral reefs
- Gentle Drift Diving - students may already have encountered gentle water movement on dives
- Wrecks - probably most of the wrecks encountered so far will be fairly disintegrated due to their position in shallower waters and the effects of weather and wave action



Underwater Conditions

Having drawn out ideas from students on dive sites, the next section is to get them to think about underwater conditions they have experienced themselves, or heard about from other divers, and relate these to potential dive sites they may encounter as Sports Divers.

- **Depth**

Reefs/Walls - can drop away to offer deeper and sometimes quite spectacular scenic diving.

Wrecks - are littered over the seas of the world at varying depths. What will be available to Sports Divers will be wrecks that will be more intact as being deeper they are less susceptible to weather/wave damage.

- **Currents**

Students may have already experienced feeling a current or done gentle drift diving. As Sports Divers, they can experience a more exciting feeling of 'flying when diving' - more commonly known as drift diving - going with the flow of the current.

- **Restricted Visibility**

It could be the local conditions, - wind and wave action, river outflow - that have reduced the visibility, or other divers. Restricted visibility generally reduces light levels and even shallow dives can be dark dives

Another restricted visibility low light level type of dive, that students may have encountered, is night diving

- **Temperature**

Students have probably experienced varying water temperatures, either seasonal variations or traveling to different parts of the world. Some may also have felt the decrease in temperature with depth.

Surface conditions

- **Entry and Exit**

Surface conditions may be a limiting factor with too much effort getting in or out of the water spoiling a dive. More importantly, if entry or exit is tiring because of adverse conditions, loss of control can endanger the diver's safety. Even though conditions may be good underwater, getting in and out needs to be as easy as possible

- **Surface cover/support**

As will have been experienced by students, having surface cover and support before, during and after diving, is important should any problems arise. Sports Divers, with their increased experience and knowledge will be able to take a more active role in surface support cover

Small inset box titled "Underwater Conditions" with text: "The same site - conditions vary" and "Anticipation as part of planning". It includes two small underwater photos and the BSAC logo.

UNDERWATER CONDITIONS

The same site - conditions vary

Conditions on any one dive site will vary not only on a month-by-month or day-to-day basis, but also on an hour-to-hour basis.

Anticipating as part of planning

Understanding what causes conditions to vary will help divers prepare for them as part of their dive planning.

Small inset box titled "Depth - Tides & the Moon" with text: "Moon's gravity pulls ocean towards it", "Bulge of high water", "Bulge on opposite side of Earth", "Sun's gravity also has an effect", "Neap (small) tides", "Spring (large) tides", "Tide cycle approx. 12 hours", "Moon (Lunar) month = 28 days". It includes a diagram of Earth and Moon showing tidal forces and the BSAC logo.

DEPTH - TIDES & THE MOON

All over the world, the sea level rises and falls - the tides. In some areas this is hardly noticeable, but in many others the difference between the rise and fall can be clearly seen with an expanse of shoreline exposed at low water that is then completely covered at high water.

The tides are caused by the Moon and, to a lesser extent, the Sun.

- **Moon's gravity**

The water on the Earth's surface is rather like a loose skin on the fairly solid crust of the Earth. The effect of the Moon's gravity causes a pull on the ocean creating a bulge of high water with a balancing bulge on the opposite side of the Earth

- **The Sun's gravity**

This also has an effect on the oceans, but although the Sun is a more massive body than the Moon, it is much farther away and so has a much weaker pulling force

- **Neap (small) tides**

If the Moon and Sun are at right angles to each other, the Sun's small gravitational pull conflicts with that of the Moon and reduces its 'pull' effect on the sea. The resulting rise and fall of the sea is known as Neap (small) tides

The face of the Moon seen from earth will appear to be half illuminated but as only one half side of the whole Moon faces the Earth, it is only one quarter of the whole Moon that is actually seen. This is why Neap tides are referred to as coinciding with the "quarters" of the Moon

- **Spring (large) tides**

If the Moon and Sun are in line, which occurs at the New and Full Moon, both their gravitational pulls combine causing a big rise and fall of the sea level. These are known as Spring (large) tides

- **The tide cycle**

The tide cycle, in most places, is approximately 12 hours - from high water through low water and back to high water. In a 24-hour period there are therefore two tide cycles - two high waters and two low waters

- **Moon (Lunar) month**

Spring and Neap tides occur twice during the Moon's orbit of the Earth, which takes around 28 days (a lunar month)

As the sea surface rises and falls with the pull of the Moon, it is the Earth's crust spinning beneath the skin of seawater that gives an observer standing on one piece of land the impression that the tide is rising and falling. On a perfect sphere, the water would remain almost stationary. But, as the world is not a perfect sphere and with the shape of the land and seabed affecting the way the water distributes itself, the rise and fall of the tides is accompanied by horizontal water movement in many areas of the world.

DEPTH - TIDES

As the tide rises and falls then the depth over a site will vary.

Tidal Range

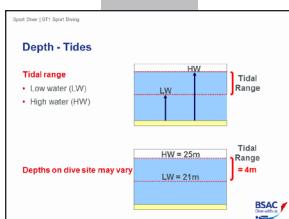
Is the difference between
the low water depth (LW)
and
the high water depth (HW)

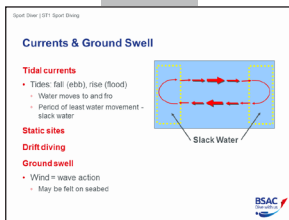
NB It is not necessary to go into chart datum plus tidal range at this stage of students' training - the key message to deliver is that for Sports Divers it is important to understand that:

Depths on Dive sites may vary

- Example, low water gives 21m depth on dive site but high water is 25m. The tidal range will be 4m

The Dive Manager will determine the expected depth on the site using tide tables and give this in their brief for divers to plan their dive





CURRENTS & GROUND SWELL

Tidal Currents

- **As the tide falls (ebb) and rises (flood)**
 - The water moves to and fro horizontally - rather like tipping a tray of water from side to side. Greater tidal range, stronger currents and local conditions govern the speed of the water movement. If the water is squeezed between land areas, forced to move around islands or undersea reefs, it can move very fast
 - As the tide reaches its turning point, there is a time period when the water speed slows and almost stops. This is known as "slack water" - the times at which this happens can vary depending on local land and seabed conditions

- **Static Sites**

Diving on a static site, e.g. a wreck, is a far safer experience if dived on slack water. With all the other considerations of diving the last thing a diver needs is to fight against a current. This can be very hard work; it increases effort and therefore breathing gas consumption and more importantly, can sweep divers off the site. This will make it far more difficult for the surface cover to pick up their divers

The Dive Manager will plan the dive using their knowledge of the site and tidal conditions. But slack water times are predictions and there can be anomalies that may be experienced. If the current is causing divers to work too hard, the dive should be aborted

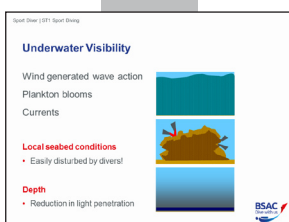
- **Drift Diving**

Diving with the current, drift diving, can be an exhilarating experience and this is looked at in a later lesson

Ground Swell

Although this was covered in Ocean Diver, students may remember or have experienced this:

- Wind causing wave action, may be felt on the seabed below as a backwards and forwards or side-to-side water movement. If seaweed or kelp sway with the movement, it can be quite disorienting for some divers and they may begin to feel queasy so aborting a dive may be necessary



UNDERWATER VISIBILITY

A dive site will experience varying visibility depending on a number of factors:

Weather

- Wind generated wave action can disturb the seabed.
 - The disturbed particles can be held in suspension in the sea for some considerable time after the bad weather has passed. Bad weather can also cause land sediments to drain into the surrounding sea and reduce visibility

Plankton blooms

Microscopic sea plants (phytoplankton) and animals (zooplankton) react much like land plants and animals that require light and nutrients to live and multiply. In Spring, when the sun is bright and the food content of the water is high, the conditions are right for a "bloom" and the phytoplankton/zooplankton may increase a thousand-fold within a matter of days. This attracts other sea life to feed on it but, unfortunately, plankton reduces the visibility and can colour the sea in brown, green or red hues.

Currents

As the tides rise and fall, currents may carry suspended particles from other areas across a dive site and reduce visibility. A quite common occurrence is for river and land sediments to be carried out to sea by tides ebbing from river estuaries. If

there has been a lot of rainfall this can further reduce visibility. A flooding, or incoming tide, in these areas generally produces better visibility.

Local seabed conditions

The seabed around a dive site will generally dictate the general level of visibility on the site. Weather and currents can easily disturb 'soft' seabed types, such as silt, mud or sand. Another factor that can reduce visibility is:

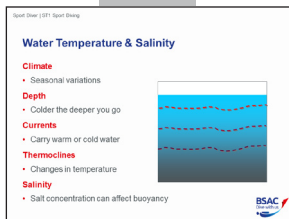
- **Divers disturbing the site**

Wrecks often have a silty deposit layer collected from passing currents so careful finning and movement around a wreck site is strongly advised to prevent lowering the visibility

Depth

- **Reduction in light penetration**

The deeper a diver goes there is a reduction in light penetration through the water. In good visibility, with a dive torch this is not a problem. However, diving at depth when visibility is reduced by any of the above factors needs very careful anticipation and planning



WATER TEMPERATURE & SALINITY

Climate

- **Seasonal variations**

The sun, warming the top layer of the water obviously varies in strength with the seasons, as do diving locations around the world. Diving the same site throughout the year may need additional thermal considerations during the winter months

Depth

- **Colder the deeper you go**

The deeper a diver goes, even in tropical waters, the colder the water becomes. Divers need to consider that thermal protection for shallower depths may not be sufficient for deeper dives

Currents

The ocean current system is complex and in the same area of ocean there may be currents at different depth levels moving in different directions. Many of the surface ocean currents are wind driven around the globe.

- **Currents carry warm or cold water**

This depends on where they originate. Warmer currents circulate north and south from the equatorial regions and colder currents circulate from the poles. The effect of the Gulf Stream current on the UK is that it warms the southern and western coasts above the temperatures experienced around the UK's northern and eastern coasts

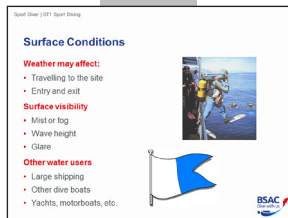
Thermoclines

Divers can experience the change in temperatures as they descend and ascend through the water. These changes in temperature are known as thermoclines. Sometimes the boundary between the layers sparkles or looks slightly oily and sometimes the visibility will differ between the layers.

Salinity

The salt content, or salinity of the water, can vary and affect a diver's buoyancy. Divers weighted for fresh water diving in quarries or lakes will need to add some weight for sea diving. Even in the sea, salinity can vary, as for example, the Red Sea has a higher salinity level than the seas around the UK.

Water conditions can change on a dive site and they are sometimes difficult to predict, as they cannot be seen from the surface. Recent weather, the look of the sea and local knowledge are what the Dive Manager and experienced divers will rely on to predict them but, as with any prediction they are not always accurate. Other divers, having just completed their dives, are often the best "what it is like"



reporters of conditions at the time.

SURFACE CONDITIONS

As these can be seen, assessing whether the conditions are suitable for diving is much easier.

Weather may affect

- **Travelling to and from the dive site.**

The actual dive site may be protected from wind or waves but outside this protection in open water it may be rough water. Even though the sun may be shining and the sky blue, the after effects of recent weather, such as wave height, may prevent the site being reached

- **Entry & Exit**

Even when underwater conditions may be perfect, wave height, either breaking onto the shore or affecting the roll of a boat, may mean entries and exits could become unsafe. On boats it is easy to roll or jump into the water but it's the pick up of divers by the boat that, in a rough sea, can become unsafe

Surface visibility needs to be good

The surface cover must be able to remain in contact with and, if a boat is being used, be able to pick up divers.

- **Mist or Fog**

Rain can reduce visibility but sea mist or fog can become a serious problem. Both increase the risk of divers becoming separated from their surface cover. Driving a boat in fog is risky enough without having to look for divers surfacing

The Dive Manager will have listened to weather forecasts for the area being dived for mist or fog warnings. Diving may have to be cancelled even if it is sunny and clear inland

- **Wave height**

An increase in wave height will make keeping a constant eye on divers or their surface markers more difficult as they rise and fall from view. Listening to weather forecasts and carefully monitoring the sea is of prime concern to a boat's Cox or Skipper in deciding whether diving should take place. If the wave height increases, a constant watch by more than one person should be maintained

- **Glare**

Sun glare off the surface of the water can make it difficult to see divers or their surface markers. Good Polaroid sunglasses, or moving a boat into a position with the sun behind it, will help reduce the effects of glare.

Other water users

The reason for flying the 'A' Flag when diving is to warn other water users that divers are down and to stay clear at low speed.

- **Large shipping**

Planning by the Dive Manager for dive sites near to shipping lanes or channels has to be done carefully. For divers it can sometimes be disconcerting to hear the thud of large engines when underwater

- **Other dive boats**

Quite often there will be a number of dive boats on one dive site. With all this boat traffic dropping off or picking up their divers, surfacing after a dive should always be done with caution

- **Other water users**

Divers are not the only recreational users of water; there are yachts, motorboats, jet skiers etc. Good surface cover to protect the diving area,

organised by the Dive Manager, Cox'n or Skipper is therefore important. A good lookout must be kept from a dive boat by using as many pairs of eyes as possible.

LOCAL KNOWLEDGE OF SITES

The Dive Manager/Lead Instructor

As mentioned previously, the knowledge of the conditions for diving will be included in the Dive Manager's or Dive Centre lead instructor's brief. Listening carefully to the brief allows divers to anticipate the conditions, plan and prepare for them.

- **Brief normally includes:**
 - **A site description, or even better, a diagram (a picture tells a thousand words)**
This helps divers visualise the site, its special features and potential areas where caution is required
 - **Anticipated conditions**
The depth, visibility and possible currents
 - **Maximum dive time**
The Dive Manager may give a maximum dive time to each pair of divers. This may be dependent on slack water times. So that all divers can dive the site without too much current, giving a maximum time per buddy pair allows all the buddy pairs to fit into the slack water window.

Dive School or Centre

- **List of known dive sites**

Generally sited in one location, dive schools or centres will have a list of known dive sites and can advise divers of the minimum diver grade suitable for the site. Quite often, diving will consist of a group of divers with a lead instructor or guide, but it is still important to have a buddy and listen carefully to the dive brief

Dive books, guides and magazines

- **Description of sites**

Quite often articles on particular dives give not only the description and illustrations/photos of the dive sites but also the conditions and depth to expect on sites. It is worth remembering that, depending on the date of publication, some of the information may be some years old. When reading about wrecks, depths may have changed due to the natural collapse of the wreck

RISK ASSESSMENT

In thinking about the dive ahead, divers are assessing potential problems, the level of risk to self and buddy and identifying simple precautions to ensure that they can relax and enjoy their diving.

Potential problems could arise with

- **Conditions, depth, breathing gas supply, equipment**
- **Conditions**
 - Separation in reduced visibility
 - Getting cold. Water temperatures decrease the deeper a diver goes. There is a loss of thermal insulation as neoprene wet suits compress. Undersuits for dry suit divers may not be sufficient to prevent heat loss at depth and any leaks in dry suits accelerate heat loss
 - Working too hard underwater, such as fighting against currents or swell together with the increased density of breathing gas at depth, can be tiring and lead to exhaustion - risk of DCI.

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Local Knowledge of Sites

Dive Manager/Lead Instructor

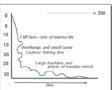
- Brief includes
 - Site description
 - Anticipated conditions
 - May give maximum dive time dependent on slack water

Dive School or Centre

- List of known dive sites

Dive books, guides and magazines

- Description of site



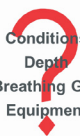
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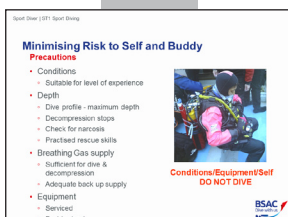
Risk Assessment - Potential Problems

- Conditions
 - Separation
 - Cold
 - Working too hard
- Depth
 - Increases risk of DCI
 - Nitrogen narcosis
 - Incidents - further to surface
- Breathing Gas supply
 - Loss - faulty equipment
 - Depletion - increased effort
- Equipment
 - Faulty
 - None

Conditions
Depth
Breathing Gas
Equipment



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- **Depth**
 - Increased risk of DCI
 - Nitrogen Narcosis - the deeper a diver goes the greater the effect
 - If any incidents arise, it will be further to go to regain the surface and safety
- **Gas supply**
 - Loss through faulty equipment
 - Depletion through increased effort, such as finning against currents, getting cold or anxious
- **Equipment**
 - Faulty equipment such as leaking dump valves or sticking inflators
 - New equipment? Use of any new equipment should be practiced so that it is second nature - equipment should not be used for the very first time in adventurous conditions

MINIMISING RISK TO SELF AND BUDDY

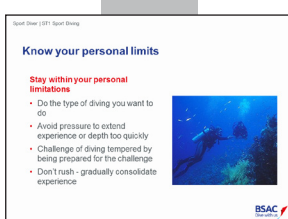
Having identified the potential problems, divers should take the appropriate precautions to minimise the risk - to self and buddy.

- **Conditions**
 - Are the varying conditions that can be present on the dive site, suitable for the level of experience gained so far? If broadening diving skills and knowledge, is the buddy adequately experienced to lead this type of dive?
- **Depth**
 - In all pre-dive plans the maximum depth for the dive is planned as part of the dive profile
 - Increasing depth range may include planning for decompression stops- and these will be covered in the next session
 - Agreeing to check for signs of narcosis - a depth check or gas check signal using fingers can highlight if reactions are slower than normal
 - The greater the depth, the greater the distance to the surface and safety. This requires a high level of competence of diving rescue skills, all of which should be in current practice. It is rare that rescue skills need to be used but if they are called upon, quick reactions will be needed to effect a rescue or recovery
- **Gas supply**
 - Is there sufficient gas to carry out the planned dive and any decompression requirements?
 - An adequate back up supply needs to be carried and the deeper a diver goes the greater this back up should be

Both of these areas are looked at in a later lesson

- **Equipment**
 - Diving equipment should be serviced regularly
 - Conducting a thorough buddy check picks up on any malfunctions or incomplete connections
- **Conditions, equipment, you - not OK**

As a final precaution, if conditions are not suitable, equipment is faulty at the surface, or if for any other reason, you are in anyway uncertain about the dive - don't dive



KNOW YOUR PERSONAL LIMITS

A good diver at any level will know and admit to their personal limits.

The following guidelines can help you stay within your personal limits or comfort factor:

- **Do the type of diving you want to do**

With the variety of diving available to recreational divers, there may be some areas that do not appeal. It may be that a diver does not want to go deeper. Their diving enjoyment comes from shallower dives where there are high-energy marine sites, which are their particular interest

- **Avoid pressures to extend experience or depth too quickly**

There are many pressures to extend diving experience and depth quickly - "its easy, you're a diver so now you can do anything." Remind students that no diver should be pressurised into undertaking a dive they are unsure of, whether due to the dive conditions or their own individual capability

- **The challenge of diving has to be tempered with being prepared for the challenge**

This includes a gradual build up of experience (deeper depths and different conditions etc.), being properly equipped and, as important, knowing how to use that equipment


- **Don't rush - gradually consolidate experience**

Gradually and carefully building experience makes good divers, rushing without preparation makes, at best, divers who are a liability not only to themselves but other divers too

Sport Diver (ST1) Sport Diving

Summary

- Outline of Sports Diver Course
- Factors affecting conditions on a dive site
- Anticipating conditions as important part of dive planning
- Consideration of other factors that could impact on dive safety
- Knowing personal limits



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SUMMARY

This lesson has covered

The aims and outline of the Sports Diver Course

The process of extending experiences and skills:

- Understanding that dive site conditions can vary
- Anticipating conditions - an important part of dive planning
- That risk assessment, minimising the risk by taking precautions and knowing your personal limits are important prior to any dive, so that divers can enjoy and learn to get the most from their diving

This lesson has given a brief outline of the Sports Diver Course. It has considered different factors affecting:

- Conditions on a dive site
- Weighing up the conditions as an important part of dive planning
- Adequate consideration of all other factors that could have impact on dive safety
- Understanding personal limits and managing dives to remain within them will enable you to get the most from your dives