WSF Advanced Freediver - Management

WSF World Series Freediving™

RAID™

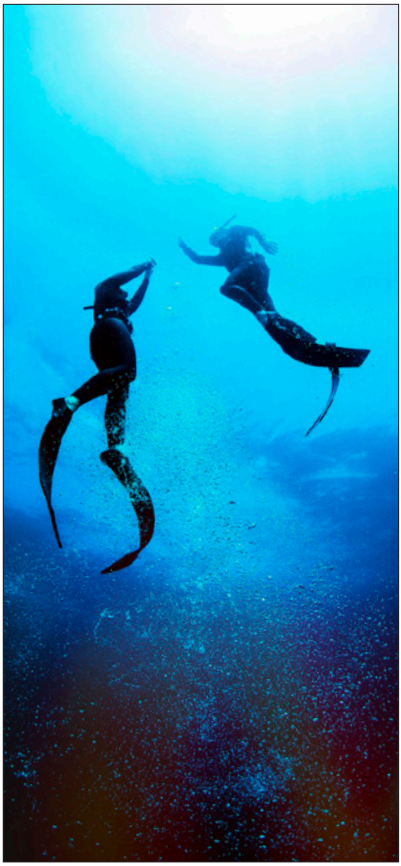
WSF Advanced Freediver - Management

THE 4 FREEDIVING ELEMENTS

1. Conserving Oxygen
2. Equalisation
3. Flexibility
4. Safety

The 5th Element that is key to success is you, the freediver!

INTRODUCTION



The WSF advanced freediver can expect to be hooked on freediving. They will be constantly looking to experience more freediving and will achieve greater depths, times and distances. The advanced freediver will further develop the skills to increase their success with the 4 elements of freediving.

During your advanced course, expect to build on that comfort level and refine the core skills of freediving to mold the type of freediver you will become. Learning the important skill of advanced equalisation and free fall will empower you to overcome barriers and advance safely. The confidence you gain through knowledge and skill development will add to your in-water performance. Expect to explore experiences of static apnea and free falling, and develop your DR to be quicker and stronger, giving you the edge to safely take your freediving career further. The advanced level freediver will gain the experience needed to be a safe, confident and knowledgeable freediver.

REVIEW FROM WSF FREEDIVER

The WSF freediver course covered the following objectives. You should review these sections and objectives from your previous course material and make sure you understand all of the concepts presented. This information is used as the foundation of your freediving knowledge and is important for the next sections of your training.

If you did your entry level freediving through another agency, please ask your instructor for a copy of the WSF freediver manual. Alternatively, you may ask to have a crossover certification where you will purchase the certification and have all the manuals opened for you to complete the section study and final exam. This will be important information for your continuing education with WSF. There will also be some exam questions from this information.

Review objectives:

The 4 elements of freediving

1. Conserving Oxygen O_2
2. Equalisation EQ
3. Flexibility FLX
4. Safety SFE

EQUIPMENT O_2

Objectives:

- List 2 benefits of the low volume freediving mask.
- State the advantage of long bladed fins over short bladed fins.
- List 2 different types of freediving suits.
- State 2 fitting techniques for donning an open cell freediving suit.
- List 2 advantages of the correct freediving weight system.

ENVIRONMENT SFE

Objectives:

- State 3 environmental factors to consider before we plan a depth session.
- List 2 different environmental types of depth sessions.

PHYSIOLOGY – THE DIVING REFLEX (DR) O_2

Objectives:

- List the 4 main parts of the DR.
- List 2 ways to trigger the DR.
- List at least 5 animals that display a DR in nature.

LUNGS AND THE ROLE OF OXYGEN AND CO2 DURING FREEDIVING O_2

Objectives:

- State which gas triggers the urge to breathe.
- Describe the process of diffusion.
- List the main parts of the upper and lower respiratory tract.

PHYSICS – UNDERSTANDING PRESSURE SFE

Objectives:

- State Boyle's Law.
- Calculate the volume of an airspace at any given depth.
- Calculate the pressure and any given depth.

STRETCHING FLX

Objectives:

- Perform 3 stretches that benefit freediving.
- State 2 benefits of stretching for freediving.

LUNG SQUEEZE FLX

Objectives:

- List 3 ways to avoid lung squeeze.
- State the most common cause of lung squeeze in freedivers.

FREEDIVING AND SCUBA DIVING SFE

Objectives:

- State 2 safety protocols we must keep in mind regarding Scuba diving and freediving together.
- State how many hours we must wait after a scuba dive/multi scuba dive days/technical diving, before partaking in freediving.

EQUALISATION EQ

Objectives:

- State 2 processes of equalisation for the Eustachian tubes.
- Demonstrate the 5 steps of the Frenzel Manoeuvre.
- State the main difference between Valsalva and Frenzel.
- State the 2 main airspaces that need to be equalised on descent.

BREATHING FOR FREEDIVING O2

Objectives:

- State 2 benefits of proper breathing.
- Demonstrate a proper breathe up for freediving.

FREEDIVING TECHNIQUES O2

Objectives:

- List 3 benefits of proper technique for freediving.
- List the 5 parts of the head-first duck dive.

FREEDIVING BUDDY SYSTEM SFE

Objectives:

- List 3 benefits of the buddy system for freediving.

PROPER BUOYANCY FOR FREEDIVING O2

Objectives:

- List the 3 stages of buoyancy in freediving.
- List 2 benefits of proper buoyancy for freediving.

ADVENTURE FREEDIVING & COMPETITION FREEDIVING SFE

Objectives:

- List 2 adventure freediving activities.
- List 3 pool and 3 depth competition events.
- State the main difference between adventure freediving and competition freediving activities.
- List 2 safety factors for adventure freediving activities.

TRAINING FOR FREEDIVING O2

Objectives:

1. Describe a CO2 training table.
2. List the key safety point for training in pools for freediving.

WSF ADVANCED FREEDIVER KNOWLEDGE SECTION

The lungs and residual volume (failure depth) EQ SFE

Objectives:

1. State the various lung measurements.
2. Calculate your own residual volume depth.
3. Describe failure depth.

Value: By understanding where the failure depth is, you can plan your freediving to be far more safe and successful and avoid lung squeeze or ear barotrauma.

The lungs are a flexible organ. When we freedive and they are full of air, this air is subject to pressures and volume changes (Boyle's Law). The pressure acting on the lungs increases proportionally to depth – as we freedive deeper our lungs compress ever smaller. The lung will eventually compress to the residual volume which is when Valsalva equalisation, or pushing air up from the lungs to equalise, will become difficult and dangerous. The lungs contain many airways of different sizes, which compress down and even close off, so pushing air out of the lungs using muscular forces can cause the possibility of lung squeeze and equalisation failure (barotrauma).

WSF Pro Tip: Freediving below the residual volume of the lungs requires proper preparation and training. The chest and lungs must be adapted to depth and be flexible. The Frenzel equalisation technique must be mastered. Beyond the residual volume, we need to be completely relaxed in the chest area to avoid problems.

Lung Measurements

TLC – Total Lung Capacity – The total volume of the lungs after maximum inhalation.

TV + IRV +ERV + RV

VC – Vital Capacity – The maximum volume of air that can be inhaled and exhaled (excluding the Residual Volume).

TV+IRV+ERV

FRC – Functional Residual Capacity – The amount of air remaining in the lungs after a passive exhale.
ERV+RV

TV – Tidal Volume – The amount of air normally breathed in and out during rest (on average = 500ml)

ERV – Expiratory Reserve Volume – The amount of additional air that can be expired after a passive exhale (forced exhalation).

IRV – Inspiratory Reserve Volume – The maximum volume of air that can be inhaled after a passive inhalation (forced inhalation).

RV – Residual Volume – The amount of air remaining in the lungs after maximum exhalation.

Our residual volume is normally 20%-25% of the Total Lung Capacity. At what depth a freediver reaches RV depends on the ratio between TLC and RV. The smaller the RV, the deeper the failure depth.

At what depth will you reach Residual Volume? If you know your TLC and RV, then the depth at which you will reach RV can be calculated (consider Boyle's Law).

Example: The average male and female have around a 6L and 4L lung capacity, respectively. If we consider the average person to have a RV of 25%, we can start to calculate the depth at which they achieve RV.

Surface	TLC 8 pints/4 L	TLC 13 pints/6 L	TLC 19 pints /9 L	TLC 23 pints /11 L
33ft / 10m (2 Atm)	4 pints/2 L	6 pints/3 L	8 pints / 4 L	11 pints / 5 L
66ft / 20m (3 Atm)	2.81 pints/1.33 L	4 pints/2 L	6 pints / 3 L	7.74 pints / 3.66 L
99ft / 30m (4 Atm)	2.11 pints/1 L	3.2 pints/1.5 L	4.76 pints/ 2.25 L	5.81 pints / 2.75 L
In all examples above "Residual Volume" is reached at 99 ft / 30m, 25% of TLC.				
Lets re-calculate considering we have reduced our Residual volume to 20% of our TLC by training or stretching for Freediving.				
Surface	**TLC 8 pints /4 L**	**TLC 13 pints /6 L**	**TLC 19 pints /9 L**	**TLC 23 pints /11 L**
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66ft / 20m (3 Atm)	2.81 pints/1.33 L	4 pints / 2 L	6 pints / 3 L	7.74 pints / 3.66 L
99ft / 30m (4 Atm)	2.11 pints/1 L	3.2 pints / 1.5 L	4.76 pints / 2.25 L	5.81 pints / 2.75 L
131ft / 40m (5 Atm)	1.7 pints/0.8 L	2.56 pints /1.21 L	3.83 pints /1.81 L	4.65 pints /2.2 L
In all examples above "Residual Volume" is reached at 131ft / 40m, 20% of TLC.				

THORACIC STRETCHING FLX

Objectives:

1. State 3 benefits of thoracic stretching.
2. Perform a thoracic stretching session.

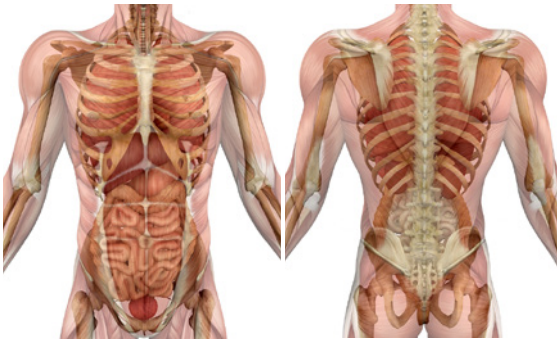
Value: By regularly keeping the body and chest flexible, you will naturally adapt better to the pressure exerted on the body when at depth.

Flexibility is one of the 4 key elements for freediving, the 5th element is you! By keeping the body and chest flexible, we are better prepared to deal with pressures exerted on us at depth. The lungs/thoracic area need to flexible enough to handle the depth of your freediving. The best way to adapt and be flexible for freediving is to practice freediving frequently, but sometimes, with work commitments and other duties, this is not possible and you may find you can only manage to plan freediving sessions on weekends or holiday periods.

By using stretching techniques on dry land when we are not freediving, we can remain flexible and prepared for when we do go freediving.

Stretching prior to freediving is also great as a warm up technique, preparing you for the session.

The thoracic stretching routines we practice in freediving borrow heavily from Yoga poses, centred around the muscles in the thoracic area (focusing on the intercostal, diaphragm, chest and back muscles) (see picture). This prepares the entire chest area for the compression that will be experienced at depth (Boyle's Law).



Stretching the thoracic area has many benefits

- As preparation for a freediving session (warm up).
- Lower the residual volume (RV), and increase the Vital Capacity (VC).
- Help to adapt the chest area for compression at depth (flexibility).
- Helps to avoid lung squeeze.

By having a smaller RV, the flexible freediver's lung can compress more easily, making the depth at which RV is reached greater and equalisation easier. The larger Vital Capacity means that we can inhale more air with less effort. Remember that our approach to freediving should be that of least resistance and stress. Relaxed and flexible freedivers will achieve greater success.

We practice thoracic stretching in 3 different ways to maximise effect:

1. Passively – while breathing normally, we practice the stretches until we feel flexible and confident.
2. On inhalation – we inhale and hold our breath and practice the stretches until we feel more flexible and confident.
3. On exhalation – we exhale and practice the stretches until we feel more flexible and confident.

WSF Pro Tip: Remember that flexibility will take practice. Do not overly inhale or exhale too much that you are uncomfortable with the stretching routine. Keep the stretching routine within the relaxed freediving philosophy and flexibility will come naturally. With this approach you will avoid unnecessary muscle injury.

Your WSF freediving professional will guide you through a full thoracic stretching session during your course.

FREE FALL O_2

Objectives:

1. List 3 stages of buoyancy during a freedive.
2. State what the recommended minimum depth for neutral buoyancy in freediving is.
3. State the correct buoyancy for freediving when on the surface.

Value: By having the skills and knowledge to use free fall when freediving, we can save precious 02 and energy, thus experiencing much more relaxed and safer freediving.

Free falling has been described by many as the most enjoyable part of freediving – gliding down effortlessly into the depths without use of energy or any propulsion techniques, using science itself as our buoyancy changes from positive to neutral to negative, the freediver transitions from finning or swimming into the motionless free falling position.

Why free fall?

When we free fall we are motionless. We use little energy, thus we use less oxygen, giving us a greater safety barrier and deeper, longer dives. When we free fall we need only to stay streamlined, equalise and relax.

When to start free falling?

As we learned previously about Archimedes and buoyant forces, we will start to free fall when we achieve negative buoyancy. So the Question is – what depth should we set our neutral buoyancy?

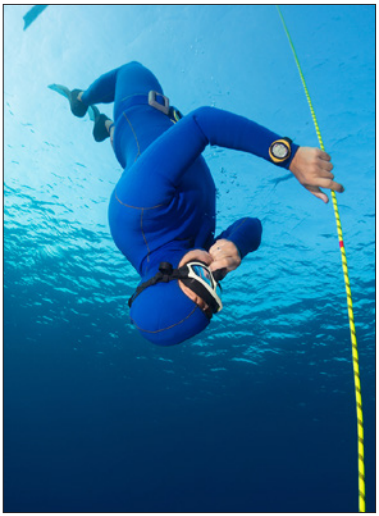
The depth at which we set our neutral buoyancy depends on the target depth. As we dive deeper, we will use less weight and set our neutral buoyancy deeper. As a Guide see below:

- The shallower you set your neutral buoyancy, the easier your descent will be and the harder your ascent will be from depth.
- The deeper you set your neutral buoyancy, the more difficult your descent will be and the easier your ascent will be.

WSF Pro Tip: As a recommendation, never set your neutral buoyancy point shallower than 10 metres as this will make breathe-up on the surface difficult as you will fight to stay afloat when breathing. Also, on ascent you will not achieve positive buoyancy until almost at the surface. As a safety net, you need your positive buoyancy on the surface to remain on your exhale phase of breathing.

As an estimate to help you calculate, you can start by setting your neutral buoyancy at around 1/3 of your target depth, then perfect it from there.

E.g.: Target = 40 m; neutral = 13-15m.



This will enable you to free fall successfully from around 20m all the way to 40m. As you ascend, you will find the workload gets easier as you approach your neutral buoyancy/positive buoyancy depths. If your descent or ascent felt too difficult, you can adjust your buoyancy from this point until your freedive has the perfect balance.

Keep in mind, we overcome the positive and negative buoyant forces by using correct techniques and equipment. By remaining streamlined and displaying good technique, the burden of overcoming the different buoyant forces is made easier.

How to Free fall?

Whether you use a monofin, no fins, or bi fins, the free fall position is the same:

- Remain totally relaxed, you should be slightly curved in your legs and spine, this is a relaxed position (not straight as a rod and forced positioning)
- Head position in-line with rope and relaxed and passive
- Arms by the side, relaxed; EQ arm tucked in under the chin, relaxed on chest

WSF Pro Tip: The free fall position is best explained as the "Old Persons Posture". Try this exercise – stand up straight to attention with legs, body and arms straight in-line, looking forward. Now relax and let the muscles go, slump a little until you feel relaxed. You will find your posture is less tense – this is the correct position for a relaxed free fall.

Transition from movement into free fall – When finning down, you will use good technique and streamlining to overcome the upward buoyant force. As you approach neutral buoyancy, you will feel the effort needed is less. Then, as you pass into negative buoyancy, you will have no need for finning to achieve descent. At this point, stop finning and relax. The skill is to be able to feel where your buoyancy starts to change, then slow your movement into free fall and relaxing (try not to just stop finning directly, make a transition, slow the fining/movement so when you start to free fall it is a gradual stop).

WSF Pro Tip: Proper weighting balance will help you free fall in a vertical position. People have many different body types: some fall in-line very easily, others float in the legs, others sink in the legs. We can use neck weights, and even weight distribution on the belt, to correct these difficulties if they arise. When free falling, it helps to use the lanyard system to connect you to the freediving rope. This affords you the option of closing your eyes and letting go of the rope to aid relaxing while free falling.

There are many benefits to free falling: saving energy and oxygen, and being more relaxed and comfortable. This affords the freediver to concentrate on being relaxed, passive and equalising properly.

Your WSF professional will guide you through practical sessions to help you perfect your free fall techniques.

HENRY'S LAW – THE RISK AND EFFECTS OF DCS IN FREEDIVING SFE

Objectives:

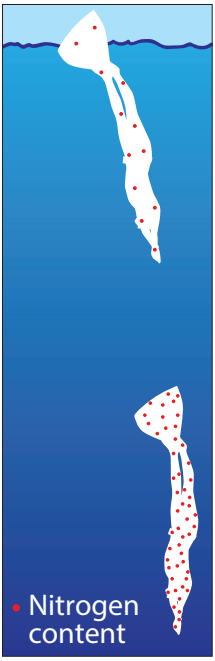
1. State 2 causes of DCS.
2. State 3 signs or symptoms of DCS.
3. State management for DCS.
4. State 2 ways to avoid DCS.

Value: By knowing the correct surface times and protocols to avoid DCS, you will maximise enjoyment and safety.

"At a constant temperature, the amount of a given gas dissolved in a given type and volume of liquid is directly proportional to the partial pressure of that gas in equilibrium with that liquid" – Henry's Law.

In Freediving terms, Henry's law states that as the pressure increases with depth, the partial pressure of oxygen and nitrogen within the body also increases. This allows more molecules of each gas to be dissolved into the blood and tissues of our bodies. This greater saturation of Nitrogen leads to the risk of DCS – more so in Scuba diving than in freediving. The Scuba diver is constantly breathing the gas that has a higher partial pressures of O2 and N2, whereas the freediver is only carrying one breath of air. This does not mean we are immune to the possible effects of Henry's Law though.

A good visual example of Henry's Law are in the many soda drinks you can find in the fridges of convenience stores. Prior to opening, the bottle of soda is calm. The beverage contains dissolved carbon dioxide which remains in solution as the beverage is capped under pressure slightly higher than atmospheric. When the bottle is opened, the pressure is now lowered and the dissolved carbon dioxide comes out of solution in the form of bubbles, creating the familiar hissing sound.



Example: At 1 atm of pressure, the human body contains about 1L/2.1 pints of gaseous nitrogen. On a Scuba dive to 2 atm (10m/33ft), maintaining this equilibrium would require twice as much N2 in solution within the body as was present at surface pressure. When the partial pressure of this gas is reduced (such as when surfacing), the gas must pass out of solution and be expelled through the diver's breathing exhalations. If the ascent is too rapid or sudden, the tissues may contain more gas than they can hold. In cases like this, bubbles may form in the body and create decompression sickness (DCS).

In scuba diving, controlled ascent rates and the completion of safety stops are required in order to avoid problems.

As decompression stops are not practical when freediving, we must take a surface interval between freedives to give the system enough time to eliminate any excess Nitrogen that may be residual from the previous dive.

Although far less nitrogen loading takes place within the freediver's body (as they are not breathing gas at depth), nitrogen loading still takes place so the risk of DCS remains present.

In the past it was thought that freedivers were immune to the susceptibility of DCS. Now we are equipped with more knowledge about the potential risks so must take a look at possible signs and symptoms, and practical steps to avoid DCS.

Causes of DCS:

- Inadequate surface interval (leads to failure to eliminate excess nitrogen).
- Flying or going to altitude too soon after deep freediving.
- Too many deep freedives during 1 day of freediving.
- Dehydration.

- Illness affecting lung or circulatory system.
- Multi day diving (mixing freediving and Scuba diving).

Signs and Symptoms:

- Fatigue, weakness, sweating
- Heaviness of limbs, joint pain, back pain
- Skin rash, itching, numbness
- Shortness of breath, cough
- Loss of vision/blurred vision/ double vision
- Confusion, unconsciousness
- Headache, vertigo
- Vomiting , high heart rate

NOTE: SIGNS AND SYMPTOMS CAN MANIFEST FROM WITHIN 15 MINUTES TO 12 HOURS AFTER FREEDIVING.

Treatment of suspected DCS:

- Administer 100% oxygen while transporting to diving medical expert (they will require a decompression chamber).
- If conscious and responsive, lay on back and administer oxygen.
- If unresponsive and breathing, lay diver in recovery position and supply oxygen.
- If a freediver is not breathing they will require CPR (as per First Aid – alert emergency services).

NOTE: ASK YOUR WSF CENTRE ABOUT THE FIRST AID AND OXYGEN PROVIDER COURSES AVAILABLE.

How to minimise the risk of DCS:

- Stay hydrated (drink plenty of fluids).
- Maintain proper surface time between dives to eliminate excess nitrogen.
- Avoid combining scuba and freediving (keep at least 12 hours in between each activity – this also depends on the depth, times and repetitive dives of your Scuba activities).
- Avoid flying directly after freediving – wait 24 hours minimum.

NOTE: WHEN FREEDIVING, REMAIN HYDRATED AND KEEP SUFFICIENT SURFACE TIMES IN BETWEEN DIVES.

Freediving surface intervals graph		
Depth	**Dive Time**	**Surface interval**
10m/33ft	0:50 mins	2:30 mins
20m/66ft	1:10 mins	3:30 mins
30m /99ft	1:35 mins	4:45 mins
40m /131ft	N/A	8:00 mins (max of 3 dives per day)
50m /164ft	N/A	10:00 mins (max of 2 dives per day)
60m /197ft	N/A	14:00 mins (max of 1 deep dive per day)
70m /229ft	N/A	17:00 mins (max of 1 deep dive per day)
80m /262ft	N/A	20:00 mins (max of 1 deep dive per day)

For depths of less than 40m/131ft, the recommended surface interval is calculated as 3 times the dive time (e.g.: the surface interval time for a dive of 0:50 minutes is 0:50 x 3, which gives a surface interval time of 2:30mins)

For depths of 40m/131ft and greater, suggested surface intervals are in the table above. It is important to understand that there has been little study on this subject so you should try to be conservative and extend surface intervals where ever possible.

NOTE: ATTEMPTING TO FREEDIVE TOO DEEP TOO MANY TIMES IN ONE SESSION WILL LEAVE YOU EXHAUSTED AND FATIGUED, WHICH WILL MAKE YOU MORE SUSCEPTIBLE TO DCS.

It is recommended to avoid flying up to 24 hours after freediving.

RIGGING FLOATS AND ROPES FOR FREEDIVING SFE

Objectives:

1. State the 3 roles of the freediving buoy.
2. Describe a suitable freediving rope.

Value: Rigging ropes and buoys is an important part of freediving. These skills and knowledge will make sure your freediving sessions are trouble free and maximise your safety.

The buoy and rope is a fundamental part of your freediving equipment. They are both multi-purpose: the rope provides safety and is used as a guide for direction and body positioning; the buoy is where the rope attaches to the surface and is also used as a surface marker to attach the diver down flag. The buoy also provides support for breathe-up and sometimes storage for gear.

The freediving rope attaches to the buoy on the surface which provides enough buoyant force to overcome the negative weight of the bottom plate, weights and any size of freediver who may be using the rope to pull upward on. The bottom weight/plate also helps to keep tension on the rope, keeping it in a straight line for descent and ascent purposes. This helps with streamlining and body positioning.

The bottom plate will provide a separation point from the bottom weight which is paramount to avoid possible tangles with freediving lanyards and the bottom weights. The bottom plate also serves as a great place to attach tags for collection by the freediver during WSF competitions.

The freediving rope should have a diameter of around 10 - 14 mm/ ½ inch – enough to grip in the hand and be used to pull on. The material should be low stretch to eliminate any bounce or stretch. Braided cord rope is the best choice as it is hard wearing but has supple characteristics which make it great to handle and resist knots and twisting. The rope should be a bright colour, such as white or yellow. This high visibility will enable freedivers to clearly see it amongst the blue or green hues of the water column.

Be sure to maintain your equipment. Wash the ropes/buoys with fresh water to prolong its life. Hang and dry in between usage to keep a perfect, working, trouble-free rope/buoy.

The freediving float has 3 primary roles:

- An attachment point for the rope
- A surface marker to attach a diver down flag
- A breathe up and recovery platform area

Some freediving buoys have a space where drinking water or other tools can be stored.

The freediving float should be bright in colour to make it stand out to other water users. The traditional freediving buoy is round in shape and uses a car tyre inner-tube for inflation. These types of buoys create a large amount of buoyancy and stability with the ease of manoeuvrability.

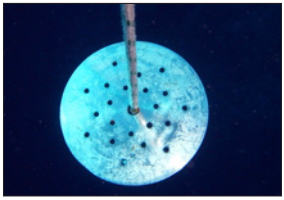
The freediving rope will need to be marked at certain depth intervals so it can be deployed easily and at the desired depth. Start by marking your rope every 5m/16ft, and every 10m/33ft until its end. Your WSF Professional Instructor will guide you through a rope rigging session.

Bottom plate and safety lanyard

When you start to freedive deeper, in low visibility or where the bottom depths are great, we use a safety system. The use of the bottom plate and lanyard enable the freediver to maintain contact with the rope rigging at all times, preventing anyone from disappearing into the deep, blue water.

The lanyard has 2 attachment points: one to the freediver and one onto the rope. This enables the freediver to free fall with confidence. It also enables the safety freediver to know that the freediver will descend and ascend utilising the rope, giving them greater peace of mind for deeper dives where they must rely on the diving time of their buddy to know where they are in the water column. The lanyard comes equipped with a quick release, just in case of the rare event of a tangled or stuck lanyard.

In the very rare event that the freediver does not return to the surface in the correct time frame, the attached lanyard enables the safety diver to pull the Freediver to the surface via the freediving rope, where they can be tended to.



The bottom plate separates the bottom weights from the lanyard which makes for a tangle-free dive. The distance between the bottom plate and bottom weight should be at least the length of the lanyard end to end (around 1.2m/3.9 ft to 1.5m/4.9ft).

VISUALISATION - MANAGING FEAR & DOUBT O_2

Objectives:

1. Describe 2 ways of managing fear and doubt.
2. State the best way to avoid fear and doubt.

Value: By having the knowledge to overcome doubts and fears and turning them into facts and fun, you can maximise relaxation and overcome any problems you may have from these scenarios, extending your freediving ability.

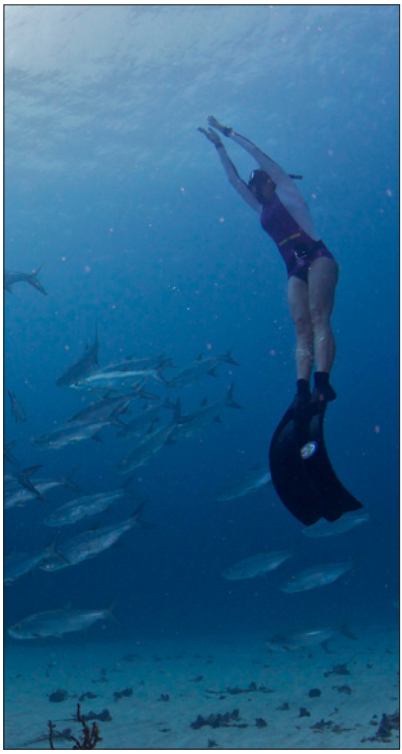
Visualisation has long been used in various forms and in many different sports and activities. All over the world there are many examples of this. We find visualisation and relaxation in meditation and yoga, which are most commonly recognised for relaxation. Taking time away from the sometimes harsh realities of life and using our minds to visualise positive thoughts, fun activities, nice memories or even other, imaginary, better worlds, is a very powerful tool. This tool has the power to overcome fear and doubt when used in some key simple ways. This is a great skill to develop for freediving.

Try this quick exercise:

Think of an empty, white, sandy beach, with a hammock tied between two coconut trees at sunset – and there it is! Within your mind, no matter where you currently are, you can visualise this scene at any moment. This is the simple power of visualisation.

We can use visualisation to overcome fears or doubts which have a tendency to enter our mind when we try things that may present a challenge. Historically, humans are good at imagining what could go wrong or focus on the more negative or challenged side of something. It is up to you personally to turn this around and start to use visualisation as a positive way to channel your thoughts to focus on the brighter side of life. During freediving we can use positive motivation to maximise relaxation and enjoyment and, ultimately, to find success.

When we find we may be doubting ourselves or facing unnecessary fear, we can turn it into a positive visualisation – this can ultimately turn failure into triumph.



WSF Pro Tip: The best method is to avoid fear and doubt in the first place by being comfortable with your freediving depths, times and distance. You will naturally have a higher level of confidence by progressing slowly and allowing your self a longer amount of time to adapt to challenges (this also applies to DYNAMIC/STATIC). Try not to progress until the depth, time or distance you are currently achieving feels very comfortable and easy, and even then, only progress a few metres at a time. This way you can avoid fear and doubt as you have great confidence in your current abilities.

Just the simple act of holding your breath can sometimes bring out doubt and fear within the human psyche. When abstaining from air, it is a very normal, human, habitual response to trigger certain thought alarm bells within the mind. It is called survival instinct. The body is protecting itself. As you stop breathing, certain thought processes start that will encourage you to start breathing again. During freediving we become confident in our breath-holding ability and this fight or flight response diminishes greatly. This is why the average non-freediver is so amazed when they see a freediver underwater for what seems a very long time to the uninitiated.

Your thoughts are very powerful.

We can have greater control over our thoughts if we are relaxed and confident. Your mind must be relaxed when freediving. Thinking too much (over-thinking) actually uses a lot of oxygen as the brain is a highly oxidative organ when in high use.

Workshop:

Create a positive focus point that gives you feelings of happiness and enjoyment. Use this in your freediving. This helps by essentially creating a positive attitude from positive mental motivation which is the end goal.

If you have meaningless (not relevant to an actual physical problem) negative thoughts during a freedive, you can use your positive focus point to overcome this negative intrusion. Speaking to yourself within your mind is a great example of this, through giving yourself simple, positive instructions – for example, “Let go”, “Relax”, “Enjoy”.

Find your own positive focus point and start to use this if you happen to experience unnecessary negative thoughts while freediving.

REVIEW FROM WSF FREEDIVER

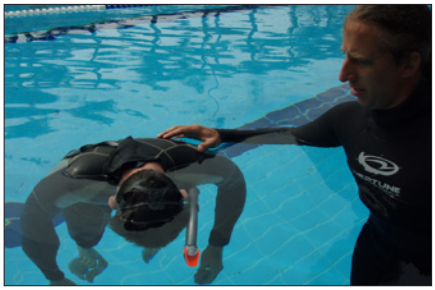
Blackout (BO), loss of motor control (LMC), shallow water blackout (SWB) SFE

Objectives:

1. List 3 causes.
2. List 3 ways to avoid.
3. List the 3 step management procedure.

Value: Developing the proper knowledge and having the practical skills to recognise and deal with these situations in a safe manner is paramount to successful freediving.

The human body has a limited supply of oxygen. Most of this supply is carried in our oxygenated arterial blood. When we freedive, the blood is shifted to the important core areas – the heart, lungs and brain. The extremities are left largely void of blood supply for the duration of the freedive. This is the effect of the DR.



If we push our freediving too close to, or past the limit of our oxygen supplies (hypoxia), it is possible to experience one of the three low oxygen related situations. Signs of hypoxia become obvious when the arterial oxygen tension drops below the critical threshold.

1. Loss of motor control (LMC): Losing control of motor skill function but still remaining conscious. Indicates very close to limit of oxygen supply.
2. Blackout (BO): Unconsciousness. Indicates the limit of oxygen supply needed to remain conscious has been exhausted in relation to static breath holds, dynamic swimming, or black out that occurs unrelated to depth.
3. Shallow water blackout (SWB) – Unconsciousness on ascent from depth. As the freediver ascends, the partial pressure of oxygen within the body decreases proportionally (Dalton's Law). If the freediver has exceeded the limit, the PpO2 can become too low to sustain brain activity and a SWB can occur.

According to US Navy data, the human brain is at perfect operation within the 0.21 PpO2 range. The air we breathe at sea level is 21% oxygen and 79% nitrogen, so with 1 atmosphere of ambient pressure, this equates to a PpO2 of 0.21.

Hypoxia Threshold (Low PpO_2)		
PpO_2	0.21	Normal PpO_2
PpO_2	0.16	Loss of motor control
PpO_2	0.12	Blackout likely
PpO_2	0.10	Minimum to sustain consciousness

Keep in mind that the above is in relation to breath-hold/freediving, which in turn means circulation is still active. In the past, people have made the mistake of comparing a breath-hold O2 level drop to a drowning victim who has no heart beat or DR. When freediving, there is still oxygen within the system if a possible O2 level drop occurs.

Why does it happen?

The simple answer is that we all have a limit. Staying within this limit is one of the skills of freediving successfully. If we push too far, too deep or we go for too long, we can exceed our limit and have possible LMC/BO/SWB. The human body has an amazing protective feature when we are freediving if our O2 limit is reached. As the O2 level drops into the 0.10 zone, the brain switches off to preserve the remaining oxygen well before it is completely exhausted.

Other physiological manifestations happen at this point too: the throat/larynx will spasm and create a seal so as to not let water enter the lungs. In the past, this has been explained as dry drowning. The laryngo spasm will only last a short while and affords a window of opportunity to rescue a freediver from the water – hence why it is so important to freedive with a buddy.

Most cases of O2 level drop in freediving are caused by freedivers going too deep, too far, too long, too quickly in their career. Take a more relaxed progression to freediving and you will find far more success and safety.

Signs of BO/LMC/SWB at depth or at surface

- Exhaling air – As the Freediver loses motor control, they lose the ability to hold the air in their lungs and air can escape the mouth in the rhythm of the contractions from the urge to breathe.
- Tremors - The hands, arms, legs, fingers, head and eyes can display shakes and tremors as a sign of O2 level drop.
- Loss of consciousness – a freediver may just stop fining or moving and slump. This can be suddenly or gradual as the O2 level drop progresses.
- Motionlessness – A freediver may seem to freeze and be unable to speak or move for a short period of time, then suddenly re-animate and display jerking movements of the head or limbs.

KEEPING AN EYE ON YOUR BUDDY FOR ANY OF THESE SIGNS IS IMPORTANT.

How to avoid

The good news is that BO/LMC/SWB are rare and easy to avoid. By simply taking a relaxed progression to time, depth or distance in your freediving, you can successfully freedive without ever experiencing an O2 level drop. That is, do not progress your freediving until your past efforts feel easy. So if you are very comfortable with a freedive to 15m then it is a good time to progress, but only a few metres at a time, to say 17m. If a time, distance or depth feels difficult then it is unwise to progress further as you are at greater risk of BO/SWB/LMC. Have fun with your freediving and keep it drama free. Freediving becomes easier the more we do it and, in fact, your progression will be far more successful by avoiding BO/LMC/SWB.

Practical steps to avoiding BO/LMC/SWB

1. Do not push your limits. Only progress when you feel very comfortable at a certain time, distance and depth, and then only progress conservatively.
2. Wear proper freediving equipment that fits correctly, including: form fitting suit, low volume mask, long bladed fins. These will conserve oxygen and, alongside being relaxed and comfortable, you will use less O2.
3. Progress conservatively. Make sure your previous time, distance or depth was an easy success before you go further. If your previous dive was difficult, then it is a fast way to failure by trying to push further.
4. Avoid over breathing and hyperventilating. Taking to many large breaths will turn your blood Ph alkaline (the bhor effect) in this state the bond between Haemaglobin and oxygen becomes to strong and the oxygen will not reach the tissues where it is needed, this can cause O2 level drop.

WSF Pro Tip: If you find before a freediving session that you do not feel great or perfect or in good condition for a freediving performance, don't hesitate to abort your session or choose to only swim safety for your other buddies. There could be many reasons for feeling unwell such as, being cold, tired or sick. You will find you may use more oxygen than you normally would so wait until next time to challenge your time, distance or depth. You can still have fun and enjoy the ocean and freediving session when providing safety and support for your team.

How to manage a BO/SWB/LMC

For all BO/SWB/LMC scenarios, we use the following protocol:

RESCUE - Bring the freediver to the surface/keep them on the surface (to keep the airways out of the water).

RESPONSE - Remove mask/or facial equipment, blow air across the facial area, tap the cheeks, instruct them to breathe.

REVIVE - If the response phase does not achieve alertness then use rescue breaths to engage a response, deliver O2, open the laryngo spasm to promote breathing response.

WSF Pro Tip: If a freediver experiences an LMC, you can support the freediver until they find their composure, but be ready to initiate Rescue Response Revive as LMC is commonly followed by BO/SWB.

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