

# **Diving and Snorkelling Safety Manual**



**2022**

**Version 3**

# **Emergency Contacts**

<b>Police/ Fire/ Ambulance (Australia)</b>	<b>000 (or 112 via locked mobile)</b>
<b>Diving Emergency Service (Australia &amp; International)</b>	<b>1800 088 200</b>
<b>Royal Adelaide Hospital (Hyperbaric Unit)</b>	<b>(08) 7074 0000</b>
<b>Coast Guard Assist (South Australia)</b>	<b>(08) 8248 6100</b>
<b>Marine Radio (Distress, safety and calling)</b>	<b>VHF Channel 16 (Australia &amp; International)</b> <b>27 MHz Channel 88 (Australia)</b> <b>UHF Channel 5 (Australia)</b>
<b>Flinders University Security (24hrs)</b>	<b>(08) 8201 2880</b>
<b>Maritime Safety Dive Officer (MSDO)</b>	<b>Matt Lloyd – 0414 190 051 or (08) 8201 2534</b>
<b>College Diving Contacts</b>	<b>Charlie Huveneers (CS&amp;E) - 0405 635 257 or (08) 8201 2825</b> <b>Hiro Yoshida (CHASS) - 0427 427 179 or (08) 8201 9749</b>
<b>Associate Director, WHS</b>	<b>Helen Webb – 0414 190 024 or (08) 8201 3024</b>

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## Section 2 Overview, Scope, Roles & Responsibilities

### 2.1 Overview

Flinders University is committed to continuously improving the management of the risks associated with diving and snorkelling operations. This manual aims to provide information and resources drawing from organisation considered best practice, International Standards, Australian Standards and Work Health and Safety legislation/regulations.

This Manual must be read in conjunction with the [Diving and Snorkelling Safety Procedures](#) which sets out the minimum requirements for all diving and snorkelling operations undertaken by all workers (including academic staff), students, visitors and collaborators from external organisations who are involved in any aspect of underwater diving or snorkelling operations related to their research, work or study at Flinders University.

Flinders University diving operations must be compliant to Australian legislation, including the South Australian Work Health and Safety Act 2012 and Work Health and Safety Regulations 2012 (or equivalent in each State and Territory). Under this legislation the University must ensure that the risks associated with diving and snorkelling work are managed as far as reasonably practicable.

This manual is underpinned by the Australian Standards for scientific diving (AS/NZS 2299.2) series and internationally to the American Academy of Underwater Sciences (AAUS) standards for scientific diving.

The University undertakes diving and snorkelling that is only non-commercial, scientific, archaeological, cultural, for natural resource management, for research or educational purposes. It conducts only General, Incidental or Limited Scientific Diving but not High Risk Diving as defined by the WHS Regulations 2012

Scientific diving does not include performing any high-risk tasks usually associated with commercial diving such as placing or removing heavy objects underwater, inspection of pipelines and similar objects, construction, demolition, cutting, welding or the use of explosives.

All persons involved in diving are responsible for ensuring that they do so in accordance with this Manual and the [Diving and Snorkelling Safety Procedures](#)

All University Divers **must have read, understood** and follow the [Diving and Snorkelling Safety Procedures](#) and this manual to ensure safe and efficient diving operations.

Further information, forms and documents are available on the University [Diving and Snorkelling](#) web page.

### 2.2 Scope

This Manual;

- Applies to all workers, students, visitors and collaborators from external organisations involved in any aspect of diving or snorkelling operations related to their teaching, research, work or study at Flinders University.
- Does not apply to diving or snorkelling clubs associated with Flinders University.

### 2.3 Roles and Responsibilities

On a dive site there is a distinct chain of command and direction given by these responsible persons in the dive leadership group must be followed by all members of the dive team. Below is a summary

of key roles and responsibilities, however please refer the [Diving and Snorkelling Safety Procedures](#) for a more comprehensive description:

### **2.3.1 Maritime Safety Dive Officer (MSDO)**

In charge of managing diving and boating operations conducted through the University to ensure safety in accordance with Australian legislation, regulations, standards and University procedure. The MSDO has the authority to restrict, prohibit or suspend activities, or require additional safety practices, procedures or equipment to ensure safety.

### **2.3.2 Dive Coordinator**

Nominated person responsible for the supervision, safe conduct and overall running of the on-site diving operation. Must be experienced in the type of diving work to be supervised and approved by the relevant College Dean on the recommendation of the Maritime Safety Dive Officer.

The Dive Coordinator must maintain a high level of knowledge and competence regarding safe dive planning, [use of DCIEM dive tables](#), type/s of scientific diving and divers they wish to supervise as well as knowledge of diving equipment in use.

Note, when multiple Dive Coordinators are onsite, the MSDO may nominate a Lead Dive Coordinator so there is a clear level of responsibility and chain of command on a dive site.

### **2.3.3 Dive Leader**

The 'in water' leader of a dive team. The Dive Leader must be nominated by the Dive Coordinator for each dive and must be the person most qualified/ experienced for the conditions, tasks and equipment of the planned dive. The Dive Leader is responsible for the safe conduct and in-water supervision of their individual dive team. The Dive Leader must maintain an active watch on less experience divers and must be able to assist distressed divers in an emergency.

### **2.3.4 Divers**

Must follow all instructions of the dive leadership group above and dive in a responsible and safe manner. All divers must conduct frequent air and buddy checks to maintain adequate in-water safety and dive within close proximity to their buddy diver/s. The MSDO will classify a diver as either a Restricted, Limited or General Scientific Diver depending on training and experience. All divers must align with the limits in place for their diver category and must comply with the requirements of the [Diving and Snorkelling Safety Procedures](#) and the [safe diving limits](#) of this manual.

### **2.3.5 Surface Attendant**

Must have knowledge of the Diving/ Snorkelling Plan, emergency procedures, signals and equipment in use. Must maintain active watch on the dive team and assist the diving group get into and out of the water. May be required to assist in an emergency.

### **2.3.6 Skipper/ Coxswain**

Is in charge of the vessel and safety of the personnel on-board. Can cancel or postpone boating if they deem the operations or sea conditions unsafe. Note, when divers or snorkelers are in the water, the skipper/coxswain must always gain clearance from the Dive Coordinator prior to undertaking any "live boating".

## **2.4 Conduct and Professionalism**

All personnel in within a broader dive team must conduct themselves in a professional manner and lead by example to create a safe diving culture in alignment with University diving procedures. Diving can be a higher risk activity particularly in a University setting where there is a higher number of



student divers with limited training and experience, thus it is very important that those in leadership roles train and mentor the next generation of diving professionals to increase their overall competency which will lead to safer and more effective diving operations.

## 2.5 Unsatisfactory or Inappropriate Behaviour

Should the Dive Coordinator or Dive Leader have concerns as to whether an individual has adhered to University Diving Procedures, he/she should discuss the concerns with the individual in the first instance. The individual's Supervisor and the MSDO must be informed if the matter is of a serious or repeated nature where formal action may be required.

## 2.6 Disciplinary Action

The MSDO has the authority to restrict, prohibit or suspend diving and boating activities, or require additional safety practices, procedures or equipment to ensure safety.

Any unsafe behaviour or failure to comply to University boating or diving procedure or this manual may be cause for restriction or revocation of a diver's status by action of the MSDO.

The College Dean may also take further disciplinary action in accordance with the relevant University People and Culture Procedures.

# Section 3 Diver Competency, Classification & Fitness to Dive

## 3.1 Minimum Training and Experience

All Flinders University Scuba divers must have as a minimum:

- Open water diving certificate (or equivalent).
- At least 18 hours experience and minimum 15 logged dives.
- Current occupational AS/NZS 2299 dive medical (renewed annually).

Within the first 6 months of undertaking a dive with the University, divers must complete:

- Current Provide First Aid (HLTAID003) (renewed every 3 years).
- Oxygen Provider and CPR training (renewed annually).

## 3.2 Diving Medicals

Divers must have a good medical history and maintain a good level of fitness.

University divers **must** pass their annual occupational AS/NZS 2299 Dive Medical prior to undertaking any diving with the University This dive medical must be performed by a doctor with training in diving or hyperbaric medicine and must be renewed annually.

Click the link for a copy of the [AS/NZS 2299 Dive Medical Form](#).

Note, International dive medical equivalents should generally be professional, occupational or commercial diver medicals. International and visiting divers should contact the MSDO for more details on how to obtain the equivalent medical outside Australia.

In general, a dive medical suitable for University work and SA WHS Regulations must follow;

### **Regulation 169—Certificate of medical fitness**

A certificate of medical fitness must:-

(a) be issued by a registered medical practitioner with experience in dive medicine or underwater medicine;

(b) state the following:

- (i) the name of the person to whom it is issued;
- (ii) its date of issue and its expiry date;
- (iii) whether or not the person to whom it is issued is, in accordance with the fitness criteria, medically fit to carry out diving work;
- (iv) any conditions in relation to the type of diving work the person to whom it is issued is fit to carry out, or the circumstances in which the person is fit to carry out general diving work, including, in the case of a person who is under 18 years of age, any particular conditions applicable to the age of the person.

Local Dive Doctors can be found at [Dive medical doctors](#) or the South Pacific Underwater Medicine Society website <http://www.spums.org.au/diving-doctors-near-you> for qualified doctors located more broadly.

**Regardless if someone has a current medical, the Dive Coordinator on site MUST prohibit diving if that person's physiological or psychological state has been altered, or appears to have been altered, by illness, fatigue, injury, intoxication, or loss of coordination.**

### **3.3 Refusal to Dive**

The decision to dive is that of the diver. The ultimate responsibility for personal safety rests with the individual diver. It is the diver's responsibility and duty to refuse to dive, without fear of penalty, if in his/her judgment, conditions are unsafe or unfavourable, or if he/she would be violating the precepts of this manual.

No dive team member will be required to be exposed to hyperbaric conditions against his/her will.

No dive team member may dive for the duration of any known condition, which is likely to adversely affect the safety and health of the diver or other dive team members.

### **3.4 New Diver Evaluation 'Check Out' Dive**

The MSDO and Dive Coordinators have the right to assess any diver new to the Dive Register. Diver competencies will be validated using skills outlined in the [New diver/ snorkeller evaluation form](#). All new divers will be required to complete part or all of the evaluation depending on previous diver training and experience. General Scientific Divers may assist in the evaluation of new divers and so may support the MSDO or Dive Coordinator in undertaking 'Check out' dives.

### **3.5 Diver Classifications alignment with WHS Regulations and Scientific Diving Standards**

All University divers will be classified as either a Restricted, Limited or General Scientific Divers. **No High Risk diving (as defined by [WHS Regulations](#)) is permitted.**

Please refer to Part 8 – Diving work, in the current South Australian [Work Health & Safety Regulations 2012](#) and contact the MSDO for a University copy of the [AS/NZS 2299.2 Scientific Diving standards](#). Refer to the Table 3.1 below which summarises Flinders University diving classifications alignments to these diver and diving categories.

**Table 3.1**

Terms used under WHS 2012 Regulations adopted by SA	Terms used in AS/NZS 2299.2 scientific diving standards	Flinders University Diver Classifications
General Diving	Scientific Diver	General Scientific Diver
Limited Scientific Diving	Visiting Scientific Diver	Limited Scientific Diver
Incidental Diving	Restricted Scientific Diver	Restricted Scientific Diver

### 3.6 Diver Classifications

The MSDO will determine the classification based on the diver's qualifications, experience assessment of abilities and role, with advice from relevant Dive Coordinators.

The minimum training and experience required for each classification are listed below.

#### 3.6.1 Restricted Scientific Diver

- Minimum Open Water Diver certification (or equivalent).
- 18 hours and 15 dives logged experience.
- Depth limit of 12 metres.
- Must be supervised in water by a General Scientific Diver or Dive Coordinator.
- Will be restricted in the types of diving tasks and equipment.
- Also referred to as Scientific diver in training.

#### 3.6.2 Limited Scientific Diver

- Rescue Diver certification (or equivalent).
- 60 hours logged diving experience.
- 5 dives following Flinders scientific diving procedure (or equivalent).
- Able to undertake scientific diving to a depth of 18 metres.
- Does not involve the use of plant powered from the surface.
- Does not use any lifting equipment or buoyancy lifting devices.
- No more than 28 days diving every 6 months.

#### 3.6.3 General Scientific Diver

- Occupational Diver qualification (AS/NZS 2815 e.g. ADAS Scientific or Part 1), or Professional Dive Leader Qualification (e.g. Dive Master equivalent or higher).
- 80 logged hours diving experience.
- 10 dives following Flinders scientific diving procedure (or equivalent).
- Able to undertake scientific diving to a depth of 24 metres.

- Able to be an in-water Dive Leader.

#### **3.6.4 Dive Coordinator**

- Occupational Diver qualification (AS/NZS 2815 e.g. ADAS Scientific or Part 1), or Professional Dive Leader Qualification (e.g. Dive Master equivalent or higher).
- 100 logged hours diving experience.
- 20 dives following Flinders scientific diving procedure (or equivalent).
- Able to undertake scientific diving to a depth of 30 metres.
- Able to coordinate and supervise scientific diving operations.
- Dive Coordinators will be appointed at the discretion of the MSDO. Selection is based on individuals who poses leadership skills, sound judgement, have sufficient experience in the type of diving work to be conducted and a demonstrated ability to follow University diving procedure.

#### **3.6.5 Maritime Safety Dive Officer (MSDO)**

- Occupational Diver and Supervisors qualifications (AS/NZS 2815-1, 2 and 5; e.g.: ADAS Parts 1, 2 and 5 Dive Supervisor or equivalent) and preferably a Professional Dive Instructor Qualification (Minimum: ISO 24802-1; e.g. PADI Assistant Instructor or equivalent/higher).
- 200 logged hours occupational diving experience (100 hours of which is scientific).
- Extensive experience in the supervision of diving operations in support of scientific research programs.
- In charge of managing the safe conduct of all Flinders University diving and boating operations.

#### **3.6.6 Surface Attendant**

- Current Provide First Aid, Oxygen and CPR (unless second person has them on surface).
- Working knowledge of signals.
- Working knowledge of diving equipment and use.
- Working knowledge of Diving/ Snorkelling Plan and emergency procedure.

### **3.7 Visiting Research Personnel or Volunteers**

Visiting research personnel or volunteers must submit their certifications, current medical and logged dives a minimum of 10 days in advance of their arrival at the University to allow for assessment and registration.

They must fulfil requirements for the level of diver classification they wish to apply for. Note, for international personnel AS/NZS2299 medicals are preferred however international equivalency are acceptable.

All Visiting Research Personnel and Volunteers must be accompanied in-water by a General Scientific Diver or Dive Coordinator initially.

### 3.8 Proof of Diving Experience, Dive Log Books and Exceptions

It is a University and occupational diving requirement that all divers must have and maintain an up to date Dive Log Book that records their dives. This will be examined to determine experience and competencies and must be presented to the MSDO before any diver will be classified.

Divers without a logbook claiming to have the required experience for listing on the University Dive Register will only be permitted to dive on a case-by-case basis and at the discretion of the MSDO. To be permitted, the person must first submit a signed stat declaration statement outlining their diving experience and qualifications.

### 3.9 Minimum Diving Activity to Maintain Active Status

To maintain active status on the University Dive Register all divers should;

- maintain in date diving certifications, AS/NZS 2299 dive medical, Provide First Aid, CPR and Oxygen training.
- participate in at least 12 dives in a 12-month period, to maintain their skills, dive fitness and knowledge.

The MSDO has the authority to restrict, prohibit or suspend any diver from the University dive register who does not meet or maintain the minimum training and activity requirements defined in this manual.

Divers who have not been diving within a 6-month period shall not dive until the MSDO has given approval. A work up dive may be required.

### 3.10 'Work up' Dives

At the discretion of the MSDO or Dive Coordinator, divers who have not dived for an extended period of time (e.g. 6 months or more), or those who wish to dive to increased depths, may be required to perform a series of 'work up' dives.

This 'Work up' dive would generally cover some or all of the fitness and skill requirements as set out in the [New Diver/ Snorkelling evaluation form](#) and would typically be conducted in shallower depths or sheltered waters. The Dive Coordinator or MSDO, may conduct this supervised dive himself/herself or may delegate to an equivalent person if they are at the General Scientific Diver (i.e. Dive Leader) level or above. The 'Work up' dive must be recorded on the [New Diver/ Snorkelling evaluation form](#) or the Diving Safety Log.

### 3.11 Fitness to Dive

All diving personnel must maintain a level of physical fitness commensurate with the type of diving operation/s in which they are likely to be involved whilst at the University.

All personnel who have successfully passed an annual Occupational AS/NZ 2299 dive medical will generally be classed as "fit to dive". For divers recovering from a medical condition, operation or pregnancy, a new AS/NZS 2299 dive medical, dated after their recovery period and with a competency assessment may be required, at the discretion of the MSDO.

Each individual is responsible for notifying their Dive Coordinator or MSDO of any medical condition or injury that may have commenced/occurred to them since the date of their last medical, and which would increase their level of risk if they undertook a dive. If an individual decides they are fit to dive, then their fitness may be further assessed by the Dive Coordinator on site, or by the MSDO at any time, with any of those individuals able to veto any dive if they see fit.

As minimum all University divers must be competent swimmers and should be able to:

- Perform a 400 metre swim in under 12 minutes with no fins;
- Tread water for 10 minutes without fins;
- Swim 200 metres on the surface in full SCUBA gear using a snorkel in under 15 minutes;
- Perform an inert diver tow. That is, in less than 5 minutes tow or push another diver a distance of 50 metres, with both divers in full SCUBA or Snorkel equipment.

Scientific diving teams are often made up of a broad range of divers of mixed age, fitness, training and experience. All these factors including time since last dive can affect a divers ability to undertake a diving task safely and competently. It is very important for the Dive Coordinator to have awareness of his/her dive team strengths and weaknesses and modify tasks to suit and if there are any divers that require additional guidance underwater then they must be paired with an experienced Dive Leader.

## Section 4 University Dive Register & Registration

To register as a new University diver, all new divers must complete the following form:

- [Diver/snorkeller registration & statement of understanding form.](#)

All forms and scanned copies of dive certifications, current dive medical, copies of the last 18 hours of your diving logbook and within 6 months evidence of completion of Provide First Aid, CPR and Oxygen training must be provided to the [Maritime Safety Dive Officer](#) for inclusion to the University Dive Register. Furthermore;

- Application to dive with the University must be received no later than **ten (10) working days** prior to the intended date/s of any dive/s, and must provide all relevant details of the intended diving operation and include all information required by this Manual.
- All details provided are to be logged on the University Dive Register and verified by the MSDO with regard to currency of qualifications, dive medical status and equipment test status.
- Copy of all Dive Log book(s) or stat declaration must be provided for sighting, copied and recorded on the University Dive Register.
- Divers must notify the MSDO of any medical condition or injury that may have commenced/occurred to them since the date of their last medical, and which would increase their level of risk if they undertook a dive.

The MSDO should endeavour to remind all divers of upcoming expiry dates, giving at least 1-month notice of these, to allow time for renewal. Notwithstanding this, **individual Divers are responsible for keeping track of these dates**, to ensure they are current on the University Dive Register. The MSDO has discretion to offer 2 months extension for extenuating circumstances.

The following information should be maintained by the MSDO for each diver on the University Dive Register:

- Name, DOB, address and next of kin information.
- Details of diving qualifications, and due date for renewal of diving qualifications (if applicable).
- Details of employment status (i.e. staff, volunteer, external agency etc.) and base of operations.
- Flinders University diver classification – allocated by MSDO.

- Date of most recent diving medical and due date for renewal of diving medical.
- Provide first aid, CPR and Oxygen qualifications and due date for renewal.
- Details of any personal diving equipment used and due date for renewal of test certification for any such equipment.
- Details of any other certification held. e.g. Coxswains.
- Other relevant comments.

## Section 5 Field Trip Approvals & Dive Planning

All participants undertaking field work must have read the [Field trip guidelines](#). The Field Trip Guidelines are intended to assist in the preparation for a Field trip to ensure safety of all participants. Please refer to the [Field trips](#) website for further details.

As part of the field trip planning and approval process, the Field Trip Leader must submit all Field trip details, relevant documentation and [Risk assessments](#) via the [FlinSafe](#) online system.

Note- it is recommended that documentation be submitted **at least 1 week prior** to the activity to be undertaken so that there is sufficient lead in-time for the relevant Supervisor, WHS verifier, Maritime Safety Dive Officer and College Dean to review and approve the activity.

### 5.1 Diving Approvals

Before the start of any University Field Trip involving Diving, the Field Trip Leader and Dive Coordinator **must** obtain **approval** from the Maritime Safety Dive Officer and College Dean as part of the Field trip planning and approval process.

Using the [FlinSafe](#) field trip planning and approvals online system, please submit a [Diving/ Snorkelling plan](#) and ensure that you forward the field trip documentation and a [Risk assessment](#) to the Maritime Safety Dive Officer (MSDO) for review **at least 1 week prior** to the commencement of the trip. Note, the MSDO is often away on boating or diving field trips so expect some delays in response times, it is highly recommended to submit diving field trips with as much lead in time as possible to allow sufficient time for review and ensure there is no delays with approvals.

#### 5.1.1 Risk Assessment

Prior to undertaking any University field trip, risks and hazards must be identified and controls implemented to manage overall risk to an acceptable level. It is the **initial** responsibility of the Dive Coordinator for any particular diving operation, to ensure as far as is practicable that all risk, hazards and controls are identified through the Risk assessment process.

A formal [Risk assessment](#) must be submitted for internal review via the [FlinSafe](#) online system so that the MSDO and College Deans can review and approve prior to the work being undertaken. The [Risk assessment](#) must outline all fieldtrip, diving, snorkelling and/ or boating risks, hazards and control measures applicable. Where a Risk assessment already exists for any project or task, the Dive Coordinator is responsible for reviewing this on a regular basis and updating when any of the project/task conditions or procedures change in any substantial way e.g. where an increased risk may exist.

The Risk assessment should be sent to all members of the Dive team so that all participants have an understanding of the tasks, risks, hazards and controls in place prior to the diving operation taking place.



## 5.1.2 Diving/ Snorkelling Plan

A [Diving/ Snorkelling plan](#) must be submitted for all Diving or Snorkelling operations undertaken at the University. The Dive Coordinator is responsible for preparing the document and as a minimum the Diving/ Snorkelling plan must state;

- the method of carrying out the diving work;
- the tasks, duties and classification level of all members of the dive team;
- the diving equipment, breathing gases and procedures to be used in the dive;
- as applicable, dive times, bottom times and decompression profiles;
- emergency procedures.

The Dive Coordinator **must ensure** the Diving/ Snorkelling Plan and Risk Assessment has been reviewed and approved by the MSDO and the College Dean **before** starting a diving operation. Once approved it should be sent to all members of the diving team so that they have an understanding of the dive profiles, tasks, equipment and emergency protocol in place prior to the diving operation taking place.

## 5.2 Diving Operations - Daily On-site Forms

The Dive Coordinator must ensure that daily on-site diving forms are completed during the diving operations to ensure that risk has been adequately assessed at the dive site, a pre-dive briefing has been given to the entire dive team, dive equipment has been checked prior to divers entering the water and all dives have been logged.

Dive Coordinators must use the following daily on-site dive forms:

- (a) [Diving On-site Risk Assessment](#)
- (b) [Diving Safety Briefing](#)
- (c) [Diving Equipment Checklist](#)
- (d) [Diving Safety Log](#)

Note, for ease of use a combination form (cd) [Diving Equipment Checklist and Safety Log Combined](#) form is also available for use.

**Note, scanned copies of all forms must be sent to the MSDO within 1 month post trip.**

### 5.2.1 Diving On-site Risk Assessment

Due to the changeable nature of diving and operating in the marine environment. The conditions on site must be assessed on the day of the dive and recorded on the [Diving on-site risk assessment](#). An assessment must be made and recorded as to the suitability of the condition at the site which would allow for a safe dive to occur. All diving personnel must be briefed during the Diving Safety Briefing on any areas of moderate to higher risk as highlighted in the Diving on-site risk assessment.

### 5.2.2 Diving Safety Briefing

To help ensure a successful diving operation, it is important that each member of the dive team understands the objectives of the dive and in particular that they understand their roles and the roles of all other members of the dive team during the dive.

A [Diving safety briefing](#), normally conducted by the Dive Coordinator, allows for the exchange of the above information. It also allows minor modifications to be made to the dive plan in the event of



adverse environmental conditions or problems with any member/s of the dive team. A dive briefing should include, but not be limited to:

- Details of the dive plan.
- Nomination of the dive team.
- Safe diving limits.
- Details of expected 'in water' conditions.
- Any likely hazards and risks encountered.
- Lost buddy procedure.
- Diver recall and rescue diver protocol.
- Shark protocol.
- Location of safety gear and trained personnel.
- Emergency contacts, location of nearest hyperbaric chamber and medical facility.
- Final check that divers are fit and well, understand the dive plan and are comfortable to undertake the dive.

### **5.2.3 Diving Equipment Checklist**

A pre-dive check must be performed on the equipment of the diver/s for all dives, including snorkelling. This must be done by the Dive Coordinator who can be assisted by either the Surface Attendant or Diver's buddy. The checks must be recorded on the [Diving equipment checklist](#).

### **5.2.4 Diving Safety Log**

For every Flinders University dive, the Dive Coordinator must ensure that an entry on the [Diving safety log](#) is completed for each diver, listing all requested details of that dive. This should be completed at the surface by the Dive Coordinator, who can be assisted by the Surface Attendant and, the form must be completed **immediately after** the dive.

### **5.2.5 Personal Dive Log**

It is a University and legal requirement that all occupational divers maintain a personal dive log (book) which states at least the following:

- Name of diver and buddy.
- Date, time and location.
- Diving modes used.
- General nature of diving operations.
- Maximum depth and dive time.
- Diving tables or computers used.
- Detailed report of any near miss or actual incidents.

The MSDO will validate diving experience via a divers log (book) and divers will need to provide evidence of logged dive experience upon request.

### **5.2.6 Post Dive Reporting**

On completion of the whole diving operation, the Diving on-site risk assessment, Diving safety briefing, Diving equipment checklist and Diving safety log must be scanned and forwarded to the

MSDO, as soon as practicable (and in any case, no later than one month after the dive operation). These records may be audited by the MSDO to check for correct application of DCIEM dive tables and conformance with the Diving/ Snorkelling plan form submitted. Records of these forms must be maintained by the MSDO for a minimum of 7 years.

### 5.2.7 Summary of All Dive Forms

All up to date diving forms are available on the [Diving & Snorkelling website](#) and are listed in the [Appendix I](#).

## 5.3 Flow Chart to assist with Dive Planning and Conduct of Diving Operations

Refer to the [Diving and Snorkelling website](#) for guidance on the process for diving operations and approvals and refer to example [Dive Planning Flow Chart in Appendix H](#) for further guidance.

## Section 6 Dive Teams

### 6.1 Normal dive teams

A normal dive team comprises a group of people, who as a unit can perform the duties of a Dive Coordinator, Diver/s (Dive Leader and buddy/s), Surface Attendant/s and Skipper (where required). A normal dive team may be made up of:

- two qualified divers (diving as a buddy pairs within close visual contact of one another and able to offer immediate assistance if required) and at least one competent Surface Attendant; or
- three qualified divers (diving as a buddy trio within close visual contact of one another and able to offer immediate assistance if required) and at least one competent Surface Attendant; or
- more than three divers, (grouped into buddy pairs or trios within close visual contact of one another and able to offer immediate assistance if required) and one or more competent Surface Attendants, as required.

**Note:** Where more than one Dive Team is in the water and there is only one Surface Attendant, dive teams must work in close proximity to each other (within 20m), or tow a surface marker buoy to allow their location to be easily determined.

### 6.2 Exceptions to normal dive teams

#### 6.2.1 Two Person Dive Teams

The use of two-person dive teams is discouraged, but may be approved by the MSDO in some circumstances, such as in the case of one of the following:

- two experienced divers working at shallow depths in sheltered waters and in a well-known previously dived location and low risk conditions; or
- one diver working tethered or free, with fully kitted up (dressed in) Standby diver able to offer immediate assistance if required.

Before approval is given for any two-person diving operation, the MSDO will carefully consider the Diving/ Snorkelling plan and risk assessment prepared for the dive operation.

## 6.2.2 Diving without a Surface Attendant

Diving without a Surface Attendant will only be approved by the MSDO in exceptionally safe circumstances, such as in cases of experienced divers working at shallow depths in sheltered waters. Diving without a Surface Attendant will not be permitted where there will be more than one buddy group in the water at one time (i.e. more than three divers).

Before approval is given for diving to occur without a Surface Attendant, the MSDO will consider all relevant factors.

Conditions which must be met before diving without a Surface Attendant are as follows:

- the operation must have been approved for two-person diving if only two divers are involved;
- the divers involved must agree they are prepared to dive without a Surface Attendant;
- at the time of the dive, the Dive Coordinator must have determined that "low-risk conditions" are prevailing at the dive site (these conditions are defined in Section 10).
- where the above points have been met, all divers involved must agree to abort the dive at a signal from the Skipper or any diver if conditions cease to be safe;
- any boat used must be moored as close to the dive site as possible, and all divers must stay within 50m of the vessel;
- a check **must** be made that the anchor of the boat being used is secure, immediately upon starting the dive; and
- the Dive Coordinator must ensure a current line is deployed from the stern of the boat - before divers enter the water. This should comprise a floating rope with **minimum** length of 10m and diameter of 10 mm, with a large, highly visible buoy preferably with a dive flag mounted, attached to its free end.

## 6.2.3 Solo Diving

Solo diving (i.e. diving with no buddy diver nor Surface Attendant present) is **not permitted** under any circumstances, except in case of extreme emergency.

## 6.3 Lost Buddy and Dive Buddy Procedures

During the vast majority of Flinders University diving operations, the buddy system will be used so that individual divers have an adequate safety buffer in place in the event of an underwater emergency (e.g. out of air) Note, during scientific and archaeological diving, divers are often focused on an underwater task, thus there is a very real danger of divers becoming task loaded or task fixated and lose focus on conducting frequent buddy and air checks. Hence, **it is vital in that all divers remember to conduct frequent air and buddy checks to maintain adequate in-water safety.**

Where divers are paired together on a dive, and lose contact with each other during that dive, the 'lost buddy' procedure is to be followed. This involves trying to locate each other through the following set routine:

- Immediately on noticing contact has been lost with their buddy, each diver should circle 360°, looking for the buddy, or their exhaust bubble trail (often easier to see if looking up slightly).
- If visual contact is not made after the above procedure, each diver should ascend 3 - 5 metres, and repeat the procedure.
- Return to the last known contact point if it is close and safe to do so.

- If contact is still not re-established, each diver should surface at the specified ascent rate. On regaining contact at the surface, the dive may be recommenced or terminated, at the discretion of the Dive Coordinator or Dive Leader.
- If a diver is still missing more than 5 minutes after his/her buddy surfaces an immediate search should be instigated where it is safe to do so, and continued until either the diver is located or the searching diver deems that further assistance is required.

**NB: The [Lost buddy and dive buddy procedures](#) MUST be understood by all divers and must be discussed in every pre-dive briefing.**

## 6.4 Rescue of a Submerged Unresponsive Diver

The dive team must always be prepared for additional emergencies such as finding a buddy diver unresponsive at depth. **Thus, all divers must have read and understood the flow chart listed in [Appendix B - Recommendations for a rescue of a submerged unresponsive diver](#).** The steps outlined will give the unresponsive diver the greatest probability of survival.

## 6.5 Underwater Communications

Where University divers are required to use a communications system, or wish to do so, they must consult the MSDO prior to any dive with that system, and the guidelines below should be adopted. The Dive Coordinator must run a training and familiarisation session for all personnel involved in the dive.

### 6.5.1 Lifelines (Diver to Surface)

In situations where University divers are required to operate with lifelines tethering them to the boat, attended by a Surface Attendant, all divers must be familiar with the standard communication signals listed in [Appendix E](#) of this manual.

*Consider - strong current, soft and silty bottom substrate, and risk of entrapment when using lifelines.*

### 6.5.2 Voice Communications

Where divers are intending to use voice communication systems, they must be familiar with the particular equipment to be used, prior to attempting any dive. It should be noted that familiarisation with equipment is especially important where full face masks are being used.

In such a case, consideration should be given to performing a familiarisation dive or dives with the equipment to be used, in sheltered waters, prior to undertaking field operations.

### 6.5.3 Buddy Line

A buddy line is a line joining 2 divers with sufficient strength that gives the divers the ability to communicate and stay together. It should be approx. 2 - 3 m in length.

Poor visibility would be a factor where the Dive Coordinator would need to consider using a buddy line. Buddy lines should be fitted with quick release clips in-case of emergency.

**If a Buddy Line is to be used in a dive, the MSDO should be contacted for advice prior to use.**

### 6.5.4 Dive Flags & Dive Floats

It is important that all dive sites are clearly marked so that neighbouring boats or people are aware that diving is taking place and thus stay well clear of the area.

As standard University procedure a Dive Flag **must** be displayed on all dive sites (i.e. either on the boat or adjacent shore) when divers are in the water.

When divers are in a free swimming mode all Dive Leaders must also wear a Dive Float tethered via a float line to clearly display their location.

If divers are diving in a fixed location, then the Dive Float may be anchored at the dive site and used as a shot line for divers to safely descend/ ascend.

For either configuration the Dive Floats can also be used to aid communication with the Surface team in the event of an emergency (i.e. shark, diver recall etc).

### **6.5.5 Emergency Recall**

An Emergency Recall Plan should be developed for each dive and agreed on prior to commencement and reiterated during pre-dive briefing.

## **Section 7 Diving and Boating Equipment**

All equipment used for Flinders University diving/boating must meet the required occupational standards. Flinders University diving and boating equipment must not be used for any dives that are not approved by the MSDO.

The Dive Coordinator and all divers are responsible for ensuring that all required equipment is carried by each diver on every dive, unless special dispensation has been granted by the MSDO.

### **7.1 Compulsory Equipment for all Divers**

The following equipment must be used or carried by each diver on every dive:

- Exposure protection e.g. wetsuit or dry suit as appropriate to the prevailing environmental conditions.
- Mask, fins, snorkel and diver's knife. The knife and snorkel shall be worn in such a way that is suitable to the equipment used and will not foul equipment or released weights. If the risk assessment indicates that the snorkel is creating an additional risk, then it need not be worn.
- A weight belt or a buoyancy control device incorporating an integrated weight system with quick-release and weights (if required for buoyancy control).
- Where divers are operating in free-swimming SCUBA mode in circumstances in which there is surface support, there must be a means of emergency recall of all divers to the surface.
- A personal Ocean Guardian Scuba 7 (Shark Shield) electrical shark deterrent for all marine and estuary dives.
- One or more Ocean Guardian Freedom 7 (Shark Shields) electrical shark deterrent dedicated to the boat and set up next to the dive ladder when diving anywhere in Australia and where dangerous sharks are known to exist while diving internationally.

The Dive Coordinator must ensure that at/or close to their dive site there is adequate means of immediate communication and:

- Provision of medical grade oxygen should it be needed in the event of an accident or emergency.

## 7.2 Compulsory Equipment for Individual SCUBA Divers

As well as the equipment listed at Section 7.1, the following equipment must be used or carried by each diver on every SCUBA dive unless special dispensation has been granted:

- a SCUBA cylinder and valve designed in accordance with AS 2030 or nearest equivalent;
- a SCUBA regulator and alternative air source or air supply, such as an octopus regulator;
- a buoyancy control device (BCD) with oral and SCUBA-feed inflators, for use with both wetsuits and dry suits;
- an air cylinder pressure contents gauge;
- depth gauge
- timing device, e.g. watch or dive computer;
- a high visibility inflatable position signalling device (e.g. 'SMB' or 'safety sausage') with spool and line.

## 7.3 Other Plant & Equipment which may be required

There must be a risk assessment and should be a SWP for all tasks undertaken, and tools used. The risk assessment must identify any other equipment that may be needed i.e.

- emergency air supplies;
- further exposure protection, such as gloves, hood and booties;
- any other relevant PPE that may be identified in the risk assessment;
- a compressed air powered signalling device;
- submersible dive tables;
- a lifeline or float-line or mermaid catcher or shot line;
- night diving equipment as appropriate, including primary and backup torch, and cyalume stick/s.

## 7.4 Task Specific Equipment and Tools which may be used by Divers

Flinders University divers are only permitted to use tools underwater if they have first received training in appropriate techniques and skills, are familiar with the operation that item of equipment, and have received permission from the MSDO.

The following equipment may be used by:

### a. General Scientific Divers

- underwater photographic equipment;
- underwater slates, measuring tapes, lightweight grids, frames, collection bags and traps;
- pole driver or hammer, to pound in stakes and pickets;
- small hand tools such as screw drivers, pliers, etc., and small hand held pneumatic tools with underwater shut-off;

- lifting equipment and small lift bags (buoyancy lifting device) with less than 60kg lifting capacity;
- shark cage;
- small water dredge/ air lift pump or vacuum for scientific investigations and silt removal. Must be low power, low risk, non-commercial grade i.e. engine power not to exceed 5.5 hp per dredge line which must be diver controlled for easy shut-off under water and present no risk of suction powered injury to divers. Note, these items are also referred to as plant powered from the surface.

## b. Restricted and Limited Scientific Divers

- Shark cage which ascent/ descent is controlled by the Surface Attendant via a rope or cable.
- underwater photographic equipment;
- underwater slates, measuring tapes, lightweight grids, frames, collection bags and traps;
- pole driver or hammer, to pound in stakes and pickets;
- small hand tools such as screw drivers, pliers, etc.

Divers with classification of Limited and Restricted must not use the following:

- plant powered from the surface;
- any lifting equipment or buoyancy lifting devices.

## 7.5 Breathing Air Compressor Systems

Breathing air compressors used for filling scuba cylinders must be serviced every 12 months or 100 hours (whichever comes first) with details recorded in the compressor log book. Trained and inducted Dive Coordinators must always supervise the set up and safe use of portable air compressors. When in operation moisture must be bled off frequently and filters changed in accordance with manufacturers specifications. Note, for Flinders University diving operations refer to the Safe Work Procedure (SWP) - Bauer Oceanus-B Scuba Compressor.

## 7.6 Air Quality Testing

Breathing gases used in diving operations should not present any risk to the diver. Breathing gases used in diving operations shall not contain any contaminants that can cause toxic or harmful effects either acutely or in the long term. For gas sources not controlled by Flinders University, every effort should be made to verify breathing gas meets the requirements of table 7.5. When in remote areas the air quality should be verified by using a portable air quality testing kit (or Carbon monoxide analyser). Professional air quality testing needs to be done every 100 hours or every 6 months as minimum. Air quality testing certificates must be sent to the MSDO and kept on file for 7 years.

**Table 7.5 - Breathing air specification**

Component	Concentration at 15 °C and 101.3 kPa
Oxygen	(2.1 ± 1) %
Carbon dioxide	≤ 600 ppm
Carbon monoxide	≤ 5 ppm
Oil	≤ 0.5 mg/m <sup>3</sup>

Odour	No discernible odour
Water	≤ 30 mg/m <sup>3</sup>

## 7.7 Flinders University 'loan equipment'

Flinders University Dive equipment must not be used for dives that are not approved by the MSDO. Where Flinders University equipment is issued on loan to a diver, an **equipment loan form** detailing the condition of the equipment must be signed by both parties at handover, and on return of the equipment.

After issue, the diver is **fully responsible** for the care of any such equipment, and must ensure proper cleaning and maintenance is carried out regularly. Problems with any item must be reported to the Dive Coordinator and MSDO as soon as possible and the equipment tagged out appropriately and not used until rectified. It must not be further loaned out to others.

If any University equipment is abused, damaged, or stolen, due to inadequate care, the diver concerned will be required to replace/repair the item/s involved immediately, at their own expense.

## 7.8 SCUBA Cylinders

Flinders University SCUBA cylinders must not be used for dives that are not approved by the MSDO.

### 7.8.1 Testing of SCUBA Cylinders

All Flinders University SCUBA cylinders must be tested and serviced at least **annually** (and this must be recorded with MSDO), and any cylinder used on a University dive must be in test date at the time of the dive. If any cylinder is found to be totally drained of air at the time of filling, it must be inspected and tested prior to being used again.

### 7.8.2 Filling of SCUBA Cylinders

Flinders University SCUBA cylinders may only be filled at approved filling stations where servicing and air quality testing is done in accordance with this manual, or with a portable air compressor unit approved for such use by the MSDO. After filling, cylinders should have their valves taped or capped to prevent contamination and allow easy identification of full cylinders.

The amount of air pressure left in returned cylinders must be checked prior to filling, and cylinders must have at least **50 BAR** of pressure remaining. If, at the time of filling, any cylinder is found to be totally drained of air, it must be inspected and tested prior to being used again.

Cylinders with any defects (e.g. air leaks from valves) must be tagged **OUT OF SERVICE** and put aside for defects maintenance and reported to the MSDO. Users who have not previously used cylinder filling compressors must not do so until they have been given detailed operational and safety instructions by a competent and trained person e.g. MSDO or experienced Dive Coordinator. New user must have also read and understood the relevant SWP. All divers assisting with air fills must be supervised by a trained and competent Dive Coordinator. All fill details, filter changes etc must be recorded on the compressor log book.

## 7.9 Use of University Equipment by Non-Flinders University Personnel

Flinders University equipment may only be used by personnel from outside the University on approved University activities & use must fulfil the requirements of this manual.



## 7.10 University Research Vessels

Organisations/groups who charter Flinders University Vessels (i.e. boats) may dive following their own diving procedures, provided those procedures meet all relevant government regulations and standards for the type of diving operation.

## 7.11 Use of Personal Diving Equipment

Personal diving equipment may be used by divers/personnel from the University where the following conditions are met:

- equipment must be in good working condition and suitable for scientific diving.
- equipment must be maintained in annual service at the owner's expense, and
- evidence of servicing of equipment/or a copy of current service certificates must be forwarded to the MSDO prior to use, and kept on file for a minimum of seven years.

## 7.12 Diving Equipment Check

For all Flinders University dives a full pre-dive check must be performed on the equipment of any diver/s. This should be done primarily by the Dive Coordinator assisted by either the Surface Attendant, or by the diver's buddy.

Divers must also check that gear fits correctly and that items such as hair or other items do not interfere with its function.

If using unfamiliar gear or tools the Dive Coordinator should train/ induct the divers on the safe use.

A suitable [Diving equipment checklist](#) can be found on the [Diving and Snorkelling website](#) with other daily dive forms. Completed checklists and training or induction records are to be forwarded to the MSDO post trip.

## 7.13 Medical Equipment

### 7.13.1 First Aid Kit

For every Flinders University diving operation, a first aid kit that meets minimum requirements of a remote kit (as set out in the *Approved Code of Practice for First Aid in the Workplace*) and/ or a "Scale F kit" as required under the National Standard for Commercial Vessels must be available on site.

### 7.13.2 Oxygen Resuscitation Equipment

(e.g. DAN O<sub>2</sub> kit or similar).

For every Flinders University diving operation (including snorkelling), oxygen resuscitation equipment suitable for the treatment of an unconscious, breathing patient, and a supply of medical oxygen sufficient to transport at least two patients to the nearest treatment facility must be available on site.

All such oxygen resuscitation equipment must be kept clean and dry in a waterproof case, and maintained in annual service (or to manufacturers specifications).

### 7.13.3 Automated External Defibrillator (AED)

A portable marine grade Automated External Defibrillators (AED) are strongly recommended for all University diving trips where available. The likelihood of reviving a drowning or heart attack victim on a dive site without the use of an AED are very slim so all efforts must be made by the Dive Coordinator to access one.

The AED must be kept clean and dry in a waterproof case. The charge must be checked prior to each trip and batteries replaced every 3 years (or to manufacturers specifications).

## 7.14 Equipment Maintenance

All diving and safety equipment used on Flinders University diving operations (including personal equipment) must be maintained and serviced by a qualified technician **annually or to the manufacturer's specifications**. As a minimum, the following service schedules must be observed for the equipment listed below.

**Table 7.1 Maintenance Schedule**

<b>SCUBA cylinder</b>	12 months service/ test required at approved test station.
<b>Air storage cylinder</b>	Service/ test required every 5 years at qualified test station.
<b>Regulator/Contents gauge</b>	12 month service required (or to manufacturers specifications).
<b>Depth gauge</b>	12 month service/ test required.
<b>Dive computer</b>	12 month service/ test required (or to manufacturers specifications).
<b>BCD inflator unit/valves</b>	12 month service required (or to manufacturers specifications).
<b>Air compressor systems</b>	Compressor – serviced every 12 months or 100 hours whichever comes first. Air purity associated with compressor – tested every 6 months, or 100 hours whichever comes first.
<b>Oxygen equipment</b>	12 months service required (or to manufacturers specifications).

All equipment in use must be cleaned and/or flushed with fresh water at the end of every working day, and any faults or defects noted. **Defective equipment must be tagged OUT OF SERVICE** to prevent accidental use and all defects must be reported to the Dive Coordinator and then the MSDO. Equipment that is known to be faulty in any way must **not** be used.

A supply of OUT OF SERVICE TAGS must be kept in a location accessible to all Flinders University divers, e.g. DAN O<sub>2</sub> kit.

Maintenance records for all University or personal diving equipment must be sent to the MSDO who will kept on file for a minimum of 7 years.

## 7.15 Equipment Purchases

University staff or students should consult with the MSDO on any diving related equipment purchases to ensure the correct brands, make or models are purchased which are fit for scientific diving purposes.

## 7.16 Equipment Hygiene

To help prevent possible transmission of infectious diseases between divers, sharing of face masks, snorkels and regulators between divers is discouraged, unless an appropriate disinfection schedule has been completed. Flinders University divers issued with equipment are responsible for the hygiene of the equipment whilst it is in their care.

## Section 8 Decompression Tables & Dive Computers

### 8.1 Decompression Tables

All University Diving operations are governed by The Defence and Civil Institute of Environmental Medicine (DCIEM) dive tables.

It is vital that all University divers and particularly Dive Coordinators know how to fill out the Diving safety log, correctly interpret the DCIEM dive tables and for repetitive diving, accurately calculate effective bottom time to safely account for the residual nitrogen in a diver's body to ensure that dives are conducted within safe limits. Refer to [Appendix C for a copy of the DCIEM dive tables](#) and please read and understand [Safe Dive Planning - How to use DCIEM dive tables](#) induction/ training Power Point or refer to [Appendix D](#).

### 8.2 Safe Dive Planning – How to use DCIEM Dive Tables

The DCIEM dive tables are one of the most thoroughly tested and conservative dive tables in the world, however, even DCIEM dive tables supplemented by Dive computers are simply guides that attempt to take into account the physiological processes involved with the breathing of compressed gases at depths. They are most definitely not infallible, and do not take into account many factors that can affect an individual's susceptibility to decompression sickness. These factors include (but not limited to) cold conditions, working hard underwater, variations in age, sex, weight, physical condition, recent illnesses (including hangovers) and injuries.

During the formulation of the dive plan the Dive Coordinator must give consideration to any existing or potential risk factors that may render the dive less safe and for any dive must ensure dive tables are used more conservatively than normal if a diver is subject to any factor/s likely to increase DCI risk before, during or immediately after a dive. For example, if potential risk factors have been identified that may render the dive less safe, the Dive Coordinator should calculate the Repetitive Group (RG) from the DCIEM dive table at the next subsequent depth rating giving a more conservative safety buffer and RG out for subsequent repetitive dives.

**Please contact the Maritime Safety Dive Officer or experienced Dive Coordinator if unclear on any aspects of the [Safe Dive Planning - How to use DCIEM dive tables](#).**

#### 8.2.1 Safe Diving Procedures

During the diving operation the Dive Coordinator must also ensure that;

- All dives governed by the DCIEM dive tables with a maximum Repetitive Group (RG) of **H** if hyperbaric chamber is < 2 hours away and (**G** if Hyperbaric chamber is >2 hours away).
- **No Decompression diving is permitted.**
- Undertake conservative dive planning i.e. dive deep to shallow and stagger the dive teams so that divers have the maximum Surface Interval (SI) between dives to ensure that they off gas excess Nitrogen in their body safely.
- Avoid bounce diving and ensure a minimum Surface interval of 15 minutes between dives.
- Maximum of 5 days repetitive diving permitted with the 6<sup>th</sup> day free of diving.
- Avoid physical exertion or exercise post dive.

## 8.2.2 Safety Stops

In line with the dive plan, all divers are to perform a safety stop, if safe to do so at 3 metres for 5 minutes. Where a dive is longer than 120 minutes duration divers **must** perform a safety stop at between 3 to 5 metres depth for at least 5 minutes.

## 8.2.3 Ascent Rates

All divers must adopt an ascent rate of 9 metres per minute when surfacing. Divers must not exceed the ascent rate specified in the DCIEM tables 18m ± 3 metres per minute.

## 8.2.4 Omitted Decompression Schedule

Where a diver has not completed any, or a full set of, mandatory decompression stops they are deemed to have Omitted Decompression.

In this instance where a chamber is not immediately available to a diver having omitted decompression, the preferred action is to get the diver to a compression chamber for treatment. The diver should receive 100% O<sub>2</sub> by double-seal oro-nasal mask enroute to the compression chamber.

It is crucial to seek immediate medical advice and initiate possible evacuation procedures.

After conducting the omitted decompression schedule the diver's condition must be monitored for **at least 24 hours** after the dive for symptoms of DCI, and the diver must not enter the water again until at least 24 hours after the dive. As well, the diver must not expose him/herself to anything likely to increase the risk of DCI (e.g. exercise, altitude, alcohol etc.), or which could mask the symptoms of DCI (e.g. alcohol, drugs). If symptoms of DCI occur, the diver should be transported to the nearest recompression facility as soon as possible.

## 8.3 Dive Computers

***Important Note:*** An approved dive table (i.e. DCIEM) must be used for planning and control of all Flinders University dives. A computer may only be used to keep track of, or assist with any dive.

Divers using computers must be familiar with their use, including any peculiarities specific to the type being used.

- Where a diver is using a dive computer as well as dive tables, **the advice of the more conservative of the two must always be followed**. Although this is usually the dive tables (especially with short form DCIEM air decompression tables), Appendix C, many brands of dive computer take into account factors such as multiple ascents, multiple diving days and errors in planned dive profiles, and because of this, on some occasions, a dive computer may indicate a diver's bottom time has expired earlier than the dive tables indicate that the dive should be ended.
- If a computer fails during a dive after indicating the need for decompression (decompression dives are not permitted), then ascend and follow the mandated decompression schedule. Report to the Dive Coordinator to complete the Omitted Decompression schedule.

### 8.3.1 Review of dive computer data at end of each diving day

Dive computer data should be examined at the end of each dive and adjusted data noted in the dive log and DCIEM dive planning adjusted.

At the end of each day this data should be checked and recalculated again.

## 8.4 Summary of Safe Diving Limits

All University divers are required to read and understand this safety manual and the [Diving and Snorkelling Safety Procedure](#).

All safe diving limits must be adhered to, in short:

- Conservative dive planning must be undertaken.
- All dives underpinned by DCIEM dive tables with a maximum repetitive group of **H** (**G** if hyperbaric chamber is >2 hours away).
- **No Decompression diving permitted.**
- Maximum of **7 ascents** in a day.
- Dive profile deep to shallow.
- Minimum surface interval of **15 minutes** between dives.
- Minimum of 3 people to a dive team; 2 divers with a Dive Coordinator/ Dive Attendant as top-side support.
- Maximum depth (i.e. Restricted Scientific Diver **12m**, Limited Scientific Diver **18m**, General Scientific Diver **24m** and Dive Coordinator up to **30m**).
- Diver to top-side communications established by use of Lifelines, Float lines or Coms units. In-water communications signals understood.
- Dive Leader and Buddy system established to conduct frequent diver/ air checks.
- Low minimum air **50 bar** (on surface).
- Ascent rate of **9 metres per minute**.
- Ocean Guardian (Shark shield) to be worn at all times.
- Maximum of 5 days repetitive diving permitted with the 6<sup>th</sup> day free of diving.
- Minimum 24 hours surface interval if flying after diving.

## Section 9 Additional Factors when Planning Diving

### 9.1 Recompression Chamber Support of Diving

The requirements of this section have been adapted from *Australian Standard AS/NZS 2299.2 – Occupational Diving Operations: Scientific Diving* and this document should be consulted for further information.

### 9.2 Availability of Recompression Chamber Support

Dive planning for Flinders University dives must always take into the difficulties and availability of emergency recompression chamber support.

### 9.3 Diving Without a Recompression Chamber On-site

Diving undertaken without on-site recompression chamber support should be performed with controlled ascents and routine safety stops as required by this Manual. Where multiple dives are undertaken, the short form DCIEM air decompression tables, must be followed, and residual nitrogen times taken into account in calculating any subsequent allowable dive times.

**When completing a Diving/ Snorkelling Plan, the Dive Coordinator (with advice from the MSDO if required) is responsible for setting out a procedure for transporting divers to the nearest acceptable and available recompression facility, and to communicate this to all other divers on the dive team.**

The Dive Coordinator must also realistically estimate the time necessary for the transportation of a diver to the recompression facility in the event of an accident (such time taken as the time from when the diver leaves the water to the commencement of his/her recompression in the chamber). This is to be recorded in the Diving Emergency Response section of the Diving/ Snorkelling Plan form.

In the event that one or more significant identifiable risk factor/s (pre-disposing factors) are present before, during or after a dive (e.g. cold water, fatigue, hard work, post dive exercise, etc.), the Dive Coordinator must ensure that allowance is made for these and that, if at all possible, details of such are communicated to all divers **BEFORE** the dive.

Such allowance shall be implemented by reducing the available time for the dive, with the amount of time reduction to be determined as follows:

- **where the dive is deeper than 12 m** - moving one or two time or depth levels, depending on the level of the risk factor/s, up the short form DCIEM air decompression tables, or
- **where the dive is to 12 m or less**, - moving one or two time or depth levels, depending on the level of the risk factor/s, across Table 9.1.

As well, for all dives of greater than 9 metres in depth, or between 7 m and 9 m in depth where a dive is for longer than 180 minutes duration, divers must perform a safety stop at between 3 to 5 metres depth for at least 5 minutes, where safe to do so.

#### **9.4 Alterations to Bottom Times for 'Remote' Diving Operations**

Where divers are working in remote locations (remote = any area of diving operation greater than 30 minutes from medical assistance).

Access to a hyperbaric unit recompression chamber may be delayed in the event of a diving accident. For this reason, where any Flinders University diving operation is conducted in an area that is greater than six (6) hours travelling time from the nearest recompression facility, great care must be taken during planning for the diving operation to allow for all risk factors that may increase a diver's susceptibility to DCI. During such diving operations a safety margin must be added to dives by reducing the maximum bottom time permitted by the dive tables.

The following rules must be adhered to at all times during remote diving operations:

- If the permitted Effective Bottom Time (EBT) is exceeded during any dive, the diver concerned must not re-enter the water for at least 18 hours, oxygen must be administered for up to 30 minutes and the diver's wellbeing must be monitored over this period.
- After any dive, divers must avoid any activity likely to increase their risk of contracting DCI (e.g. exercise).
- During dive planning, when determining the amount of time required to evacuate a patient from the dive site to a recompression chamber, the following points should be taken into account:
  - the time commences from when the diver is removed from the water or shows any signs of DCI, and ends when they are able to be placed inside the recompression chamber;

The only form of transport that can reliably be counted on to be available for patient evacuation is the means by which the dive site was initially accessed (i.e. car/boat). The assumption must not be made that air or road ambulance will be available, contactable, and able to reach the site within a reasonable time period. Notwithstanding the above, the following table must be used to derive maximum repetitive group limits for diving each day, depending on the level of recompression chamber support available.

The times given in *Table 9.1* must take precedence over the short form DCIEM air decompression tables, Appendix C.

**Table 9.1: Repetitive Group Limits for Diving Depending on Level of Recompression Chamber Support (based on DCIEM Air Decompression Tables) shown as letter designations.**

Maximum Dive Depth (m)	Maximum Rep. Group Chamber < 2 hours	Maximum Rep. Group Chamber > 2 hours
6	H	G
9	H	G
12	H	G
15-30	DCIEM No deco limits	DCIEM no deco limits

## 9.5 Travelling and Flying after Diving

Due to increased risk of decompression illness incurred through exposure to altitude after diving, restrictions on road and air travel apply where University divers are subject to pressures of greater than one atmosphere whilst breathing compressed air. These rules and limitations apply to all University divers and must be followed, except in the event of an extreme emergency where no other option is available. In any such case, these rules should only be breached on the advice of medical personnel trained in hyperbaric medicine, and with the consent of all diving personnel involved.

**After incurring any form of decompression illness, a diver should not be exposed to greater than 150m effective altitude for seven days.**

## 9.6 Flying after Diving

As it is impossible to guarantee that a diver will not be affected by decompression illness due to the effects of flying after diving, the rule below must be adhered to by all Flinders University divers, except in cases of extreme emergency, i.e. where a person may require helicopter evacuation from a site. (NB: In a pressurised aircraft, the altitude referred to is the 'effective cabin altitude'. Commercial aircraft are usually pressurised to an effective cabin pressure of 2400m or less.)

**After any dive covered by this manual, using compressed gases, the minimum surface interval before the diver/s involved can travel by air shall be 24 hours.**

## 9.7 Road Travel after Diving

The restrictions on road travel after diving take the form of a 'delay period' before divers are able to ascend to heights (over hills and mountains) of greater than a certain threshold (refer to Table 9.2 below).

**The Dive Coordinator for any field trip is responsible for determining whether or not travel after the dive will exceed an altitude threshold, and to ensure the correct delay before travelling after diving is observed.**

Table 9.2 is taken from Appendix H of Australian Standards AS2299.2. It lists the appropriate delay periods required after diving before travel above certain altitudes is permitted. These recommendations have been developed with advice from hyperbaric medicine specialists, and should be applied where air or road travel after a dive will exceed any of the altitude thresholds listed.

**When calculating applicable delays after diving, the Dive Coordinator must also take into account the following:**

- these recommendations are for divers who are in normal health following diving. If any signs or symptoms of illness or injury are present, advice should be sought regarding the need for emergency evacuation.
- exertion by their divers after any dive/s subject to this table; and
- effects on their divers of in-water exertion and water temperature during the dive/s.

**Table 9.2 (Table H from AS/NZS 2299.2): Recommended Delay before Exposure to Altitude after Diving**

Altitude (m)	Minimum delay before travel to altitude (hrs.) Category of Dive (see Legend below)		
	Category 1	Category 2	Category 3
0 - 150	Nil	Nil	2
150 - 600	Nil	2	12
Cabin P 600 - 2400	12	24	48
>2400	24	48	72

## LEGEND

- Category 1:** A single dive to  $\leq 50\%$  of the DCIEM no-decompression limit, or two short dives within 18h with a total, combined bottom time of  $\leq 50\%$  of the no-decompression limit for the depth of the deeper dive. No decompression dives or repetitive dives to have been performed in the preceding few days.
- Category 2:** Dives exceeding category 1 but not included in Category 3, e.g. one or more dives to  $> 50\%$  of the no-decompression limits, or a single decompression dive in a day.
- Category 3:** Repetitive deep diving over multiple days; multiple decompression dives on one day; extreme exposures; omitted decompression, or other adverse events.

**Note:** The altitude referred to in the table is the effective altitude. In pressurised aircraft, the relevant environment is the effective altitude of the aircraft cabin and not the flying altitude. Commercial aircraft are usually pressurised to achieve an effective cabin altitude of 2400m or less.

## 9.8 Diving with other groups

Due to the nature of University research, situations often arise where Flinders University divers need to work with divers from other groups/ organisations. The following sections outline the requirements to be met by Flinders University divers when operating under these circumstances.

### 9.8.1 Research Diving in Conjunction with other Organisations

Where Flinders University divers operate with divers from another organisation, the following scenarios may occur:



Where Flinders University personnel are working with another organisation (i.e. with their divers, and/or using their vessel), the Flinders University diver/s will normally be bound by that organisation's diving code, provided that Code and Dive Plan and other documentation i.e. Risk Assessments have been provided to, and approval given by the MSDO prior to the planned operation. In this situation Flinders University divers must meet all certification requirements of the organisation, and gain approval to dive as required by the organisation's diving procedures.

The Flinders MSDO must be notified of all such diving operations, but the diver/s involved need not complete Flinders University dive record forms for these dives, provided that the organisation's dive documentation and authentication are used and sent to MSDO. Where a section or details of the field trip, risk assessment or dive planning documentation are not supplied by the other organisation then the Dive Coordinator or diver must develop these using Flinders forms.

Note, that field trip and risk assessment documentation will need to be completed as per procedures.

Where there is going to be a significant change to Flinders University Diving Procedures or requirements (e.g. using surface supply or mixed gases or diving without Ocean Guardian Shark Shield) there must be documented discussion between the MSDO and the organisation's Diving Officer to formalise approval for Flinders University divers to participate. The organisation with the more stringent or higher standard should be followed.

Where Flinders University project organisers are working with divers from another organisation using a Flinders University vessel, or are on any Flinders University diving operations, the divers from the other organisation must meet all certification and documentation requirements of Flinders University. This includes gaining approval to dive from the MSDO, and College Dean prior to commencement of the operation. The Diving/ Snorkelling plan and operations (field trip and Risk Assessment forms) must meet the Flinders University approval processes.

**All new divers, including visiting scholars must register and a lead-time of at least 10 work days is required for new diver registration.**

### **9.8.2 Diving Overseas**

All University divers diving overseas must discuss the risk management procedures with the MSDO well in advance of the proposed diving dates. Clear lines of authority and shared responsibilities must be documented. All paper work required needs to be submitted to the MSDO as early as possible to ensure that all approvals through the normal College processes are obtained before the trip commences.

If it is a Flinders University managed operation, the requirements of the Flinders University Diving and Snorkelling Safety Procedure, this Manual and the Flinders University Field Trip Procedures apply. Where a section or details of the field trip, risk assessment or dive planning documentation are not supplied by the other organisation then the Dive Coordinator (or most senior diver) must develop these using Flinders forms.

Refer to the - [Diving Overseas Guidelines](#) on the Diving and Snorkelling website for factors that need to be considered when planning and undertaking any diving operations overseas. Refer to the Flinders University [International travel](#) website for further guidance.

## Section 10 Additional Risk Considerations

### 10.1 Exercise

Divers should not participate in activities involving vigorous physical exertion before, during (if avoidable) or after diving, as exercise of this nature will predispose a diver to DCI.

Where exercise is unavoidable before, during or after a dive (e.g. diving in strong currents, or walking in to a dive site) the MSDO should be advised, and extra allowance made to take account of this factor when calculating permissible dive times.

### 10.2 Alcohol

All divers and support team must have a blood alcohol level of 0 when conducting University diving operations. Alcohol consumption should be limited prior to and directly after diving.

Alcohol consumption will increase a diver's susceptibility to DCI, enhance the effects of inert gas narcosis, and increase a diver's rate of heat loss in cold water.

### 10.3 Drugs/ Medication

If at all possible, it is advisable for divers to avoid taking any drugs or medications whilst diving.

Drugs can influence diving safety in other ways, such as by impairing judgement and concentration, or by affecting a diver's susceptibility to narcosis and/or DCI.

If any Flinders University Diver is required to take medication for either short or long term prescription, they should contact their diving doctor for advice on any potential problems this may cause. They must inform the Dive Coordinator if they are scheduled to dive.

**In particular, divers should take care to check on potential complications with some seasickness medications, and some drugs used to assist people to stop smoking.**

### 10.4 Fatigue

During diving operations, fatigue can be extremely dangerous, and is also a potent predisposing factor for DCI. A tired diver should not be permitted to dive, and Dive Coordinators should monitor this.

All divers participating in a diving operation should ensure they get adequate sleep, as defined by the requirements of the diving programme.

### 10.5 Cold

All Flinders University personnel undertaking diving operations should take care to stay as warm as possible.

**A diver should cease diving operations if they become uncomfortably cold.**

To minimise the effects of cold, all divers should take care to keep warm before the dive, and must wear appropriate exposure protection during the dive. In particularly cold water, dives should be planned to minimise the amount of time in the water and the number of entries and exits made during the day. Sufficient time between dives must be allowed for a diver to rewarm adequately, prior to the next dive.

It should be noted that divers will continue to lose heat from their bodies for some time after exiting the water, and this 'after-drop' in body core temperature can reach dangerous limits even if the diver was in a reasonable state on exiting the water. For this reason, Dive Coordinators and Surface Attendants should monitor all divers for signs of hypothermia after any dive in cold water.

In environments away from temperate waters careful consideration & pre planning for the correct thermal protection for divers must occur.

## 10.6 Definitions of 'Low Risk' Conditions

Low risk conditions are suitable for those divers of lower levels of competency and for check out dives and conditions include:

- Depth of the site and its immediate surroundings does not exceed 12 m;
- Swell and/or wave height does not exceed 0.5 m;
- Current is nil to slight (a diver is able to easily swim into the current, with minimal exertion);
- Underwater visibility is greater than 4 m;
- Weather forecast is favourable;
- The dive starts and ends in full daylight.

For further information on risk assessment forms see Field Trip [Risk assessment](#) and [Diving on-site risk assessment](#) available on the [Diving and Snorkelling webpage](#).

## 10.7 Dive Profiles

Some dive profiles are associated with higher risks of decompression sickness than others. A dive profile which attains maximum depth early in the dive and gradually ascends to shallower depths is recommended. Dives that incorporate profiles that are known to expose divers to a higher risk of decompression sickness should be avoided or additional safety margins must be included in the dive plan.

## 10.8 Multiple Ascents

Research has shown that the more ascents performed during a day's diving, the greater the risk of DCS. Multiple ascents during a dive increase the risk of DCS by increasing the opportunity for bubble formation during the extra ascents.

Once bubbles have formed, rates of gas up-take and elimination are altered for all subsequent dives until there has been a long enough surface interval (SI) to allow complete off-gassing. This SI cannot be accurately determined through the use of dive tables, so dives must be planned carefully to ensure the number of ascents during a dive is kept to a minimum or additional safety margins are included in the dive plan.

Divers must not perform more than seven (7) ascents or go beyond the permitted Repetitive Group allowed by Table 7.1 for their location and depths, in any 24-hour period, whichever is the lesser. All multiple ascents should be at a rate slower than 9 metres/minute.

## 10.9 Multi-day Repetitive Dives

Divers performing successive multi-day repetitive dives must use the short form DCIEM air decompression tables (Appendix C) for calculating their no decompression limits on each dive. The effects of nitrogen build-up during this type of diving operation may lead to increased incidence of

DCS, and the risk of this must be considered even when all dives are shallow (current information indicates that shallow dives may have an elevated incidence of DCI).

- Restricted Scientific Divers or other divers who cannot fully mitigate DCI pre-disposing factors, and who have been performing repetitive dives over multiple days:
  - with three or more dives per day, must have a 24-hr break from diving after the 3<sup>rd</sup> day;
  - with fewer than three dives per day, must have a 24-hr break after the 5<sup>th</sup> day.
- All divers must show on the risk assessment how their planned dive profiles and dive days will mitigate against DCI.
- For divers under other classifications: after diving for five (5) consecutive days, the sixth (6<sup>th</sup>) will be a clear, continuous 24-hour dive-free break.

Divers shall not perform more than seven (7) ascents or go beyond the permitted Repetitive Group allowed by Table 9.1 for their location and depths, in any 24-hour period, whichever is the lesser.

Without prior approval from the MSDO, no diver is to spend more than six (6) hours total time in the water in any 24-hour period, whether the tables allow this or not.

The requirements in this manual for travel after diving must be followed.

## 10.10 Long Dive Times

Excessive dive duration is a potent predisposing factor to decompression illness, particularly when coupled with multiple ascents and multi-day diving operations. For this reason, all Flinders University dive plans should keep the amount of time divers spend in the water on any given day to a minimum and in any case to no more than six hours total time in the water in any 24-hour period (unless the MSDO gives prior approval for a longer period). Dive Coordinators should plan all diving operations with this aim in mind.

## 10.11 Diving During Strong Wind Warnings

If strong winds are likely to be present at a site, diving should only be conducted where the site is situated in a sheltered location (e.g. on the lee side of an island or headland). At the time of departure for the site, the Dive Coordinator must re-assess conditions at the site, as well as the sea conditions that will need to be negotiated to reach the site at return. Note there may be limits / consideration that may apply to the boat.

## 10.12 Currents

Diving in currents stronger than a diver can easily swim against is strongly discouraged. If permitted, all divers involved must be experienced in this type of diving and be tethered to the boat or use a dive float, so that their location is always visible. An experienced Skipper with knowledge of local conditions must be in charge of the vessel. Where an anchored vessel is being used for untethered SCUBA operations in such conditions, a current line of at least 30m length and 10mm diameter must be streamed behind the vessel, and the divers must work 'up-current' of the vessel.

## 10.13 Depth and Deep Diving

To manage risk associated with deeper diving, depths is tightly regulated at Flinders University by a Divers classification and experience. Restricted Scientific Divers are limited to 12m, Limited Scientific Divers to 18m, General Scientific Divers 24m and Dive Coordinators 30m. Special permission must be obtained from the MSDO before any dives are undertaken to depths of greater than those specified above.

It is mandatory to have a working depth gauge or dive computer to log depths on all University dives.

**Note, depths estimated from a boats echo sounder can be used as a guide only and must not be used in substitution for a depth gauge or dive computer.**

## **10.14 Remote Dive Site Locations**

A remote dive site location is any area of diving operation further than 30 minutes from medical assistance.

At least one member of any dive team working in a remote location must be experienced with the type of conditions expected at all sites to be dived in the area.

Any boat operating in remote areas must be equipped with extra fuel, and all required radio, safety and first aid equipment, as well as any other items deemed necessary by the MSDO or the Dive Coordinator for the trip.

For long field trips to remote areas, the Dive Coordinator for the operation must consider availability of the nearest recompression chamber in the event of a diving accident (**see Section 9**).

Consideration must also be given to stock extra Oxygen, carry portable defibrillators, a sat phone and have a trained Remote First Aider or Dive Medical Technician on-site.

## **10.15 Lack of Local Knowledge**

Divers with little local knowledge of a proposed dive site, or of Australian diving conditions, are not to be permitted to dive unless accompanied by a Dive Coordinator familiar with the proposed dive environment.

## **10.16 Diving without a Surface Attendant**

Diving without a Surface Attendant present is not recommended, but may be performed if approval is granted from the MSDO. Such diving will not be permitted in cases where there will be more than two buddy groups in the water at one time.

When making an assessment of whether or not to allow diving to take place without a Surface Attendant, the MSDO must take into account all relevant factors, including but not limited to:

- experience of the divers involved;
- depth of the proposed dive/s;
- nature of the dive site;
- weather conditions likely to be prevailing at the time; and
- task/s to be performed.

## **10.17 High Risk Shallow Dives and Boat Traffic**

Shallow dives in areas of heavy boat traffic expose divers to greater risk of injury from such traffic. Such dives must only be undertaken under compelling circumstances and with special permission from the MSDO. If diving in such an area, divers must fly a dive flag and have a dive float immediately above their work site to indicate their position.

Working close to cliffs / wave cut platforms / rock platforms (& high energy coasts) are other examples of where the risk assessment will require special considerations.

## 10.18 Diving while the Dive Boat is under way (*working live*)

*Working live* is where a dive boat is kept under way and/or its propellers are rotating whilst divers are in the water. The main danger is the potential for injury to divers from the hull and propeller/s of the boat which need to be mitigated and controlled. Working live may be required due to anchoring bans or divers surfacing in high energy zones or a large distance from the dive boat.

Except in cases of emergency, this practice is not permitted during a diving operation unless the Dive Coordinator expressly receives approval from the MSDO, and the following conditions are met:

- The Skipper must be suitably qualified to drive the boat being used, and must also have considerable experience in small vessel handling (as determined by the MSDO);
- A separate Surface Attendant must always be present to overcome situations where the Boat Operator may not be able to clearly see the location of the divers at all times from the boat's control position;
- A dive flag must be displayed at all times;
- All divers involved in the operation must agree to the use of this practice.

## 10.19 Diver Task Loading, Tools & Equipment

During scientific dives, divers will often be focused on an underwater task which includes the use of tools and equipment. In these situations there is a very real danger of divers becoming task loaded or task fixated and lose focus on conducting frequent buddy and air checks. Hence, **it is vital in that all divers remember to conduct frequent air and buddy checks to maintain adequate in-water safety.**

Low powered, low risk, Water dredges, Air lifts, Pneumatic tools, Small Lift bags (<60kg) and Shark cages are permitted, however, these plant and equipment may pose additional risks and thus must only be operated by suitably trained General Scientific Divers who have been trained and inducted in the use.

***Note- Restricted and Limited Scientific Divers will be restricted in tool use and are not permitted to use plant powered from the surface and any lifting equipment or buoyancy lifting devices for work purposes.***

Water dredges operated by General Scientific divers must be 5.5 horse power or lower and must have a valve on the device that can be controlled by the diver. Generally, air lifts are not to be used unless for small scientific research. Both dredges and air lifts must be low powered, low risk, non-commercial grade and pose no risk of suction injury to the divers.

# Section 11 Specialised Dive Activities

## 11.1 Restricted Overhead Environments (Obstructed Ascents)

***Note- Restricted and Limited Scientific Divers are not allowed to undertake this work.***

Restricted overhead environments include any diving environments in which direct ascent to the surface is impeded by a physical barrier, including cave, cavern, ice, shipwreck penetration or aquaculture net.

Special permission needs to be sought from the MSDO for General Scientific Divers to do a Restricted Overhead dive (include details in the [Diving/ Snorkelling plan](#) under *special conditions section*).

It does not include underwater areas, in which:

- Two divers can easily swim abreast;
- There is no significant danger of entrapment or entanglement;
- Loss of visibility due to siltation is unlikely;
- Direct sunlight is always available for illumination.

## 11.2 Night Diving

For a night dive to be approved by the MSDO, the following conditions must be met:

- Special permission needs to be sought from the MSDO for a night dive (include the details in the Diving/ Snorkelling plan under special conditions section).
- The provision of a Skipper/ Surface Attendant, or shore watch person (for shore dives) is mandatory.
- The Skipper/ Surface Attendant must have a white light suitable for signalling passing boats.
- Any boat used for night diving must comply with all proper navigation lights as required, especially a working anchor light.
- After anchoring, a flashing strobe light must be attached to the anchor line at the optimum distance below the surface that will allow divers to find the vessel without surfacing (where visibility permits this).
- Exit lights must be set when diving from shore.
- Each diver must have at least two (2) torches and a Cyalume stick or light, which is visible in a 360° arc.
- Night dives to depths of greater than 18 m must have compelling justification. For these dives, special control measures may need to be implemented, at the discretion of the MSDO.

## 11.3 Blue-Water Diving

Bluewater diving is diving conducted in any body of water in which there is no physical bottom within diving depth ranges. The following procedures are derived from the publication, *Scientific Bluewater Diving* (listed in references). Exceptions to these procedures may be made on a case-by-case basis. If a risk of entanglement with other structures exists, there must be other means of physical control.

Special permission needs to be sought from the MSDO for a Blue Water dive (include details in the [Diving/ Snorkelling plan](#) under special conditions section).

Procedures for diver control and communication must be developed to the satisfaction of the MSDO.

### Minimum Certification and Experience

The diver must have completed practical training in blue-water diving techniques, and demonstrate proficiency to the satisfaction of the MSDO. This training should include:

- Bluewater diving equipment deployment;
- Entry procedures;

- Buoyancy control and awareness;
- Diver communication;
- Scientific procedure familiarisation;
- Out-of-air procedures;
- Dangerous marine life defensive techniques;
- Exit procedures;
- Emergency communication and protocols.

## Equipment Requirements

- Divers must employ a down-line and counter weighted trapeze line system to maintain diver contact and depth control;
- The total weight in water of the downline and tether array must be no greater than 5 kg;
- All diver tether attachments must use connectors that can be quickly released by the diver while the line is under a tension at least equivalent to the weight of the entire array. Attachments must be to either the diver's BCD, or to a separate harness, but not to the diver's weight belt.

## Operational Requirements

A Surface Attendant or Skipper/ Coxswain must be stationed aboard any small craft from which blue-water diving is conducted as long as divers are in the water.

### 11.4 Nitrox Diving

The following guidelines address the use of nitrox (see glossary for definition) by Flinders University divers. In the first instance written permission from the MSDO must be obtained before nitrox can be used on any Flinders University dive.

Any diver wishing to use nitrox for a Flinders University dive must hold a nitrox diver qualification from a recognised diver training organisation. Proof of qualifications and experience must be given to the MSDO before a diver will be permitted to use nitrox on a Flinders University dive. (Refer to [Nitrox Diving Guidelines](#) on the [Diving and Snorkelling web site](#)).

### 11.5 Closed and Semi Closed Circuit Rebreathers

Closed and semi-closed circuit rebreathers are **NOT** approved for use for University dive operations.

### 11.6 Decompression Diving

Decompression diving is **NOT** permitted during any Flinders University diving operations. All University divers must be within the no-deco diving limits of the DCIEM dive tables.

### 11.7 Commercial Diving (High Risk Diving)

Scientific diving does not include performing any high risk tasks usually associated with commercial diving. Placing or removing heavy objects underwater, inspection of pipelines and similar objects, construction, demolition, cutting, welding or the use of explosives are not permitted.

### 11.8 Other Specialised Diving Activities



For other specialised diving activities or procedures not currently scoped in this manual the Australian and International Scientific diving standards must be referenced for best practice by the MSDO when scoping or developing new procedures. In the first instance, the MSDO must refer to [AS/NZS 2299.2:2002: Occupational Diving Operations - Part 2: Scientific Diving](#). If the specialised dive activity is not covered in this document, then the International [AAUS Scientific Diving Standards](#) may be referenced for best practice. Note, any new specialised dive activity will still need to be in alignment with the [Work Health & Safety Regulations 2012](#) and not be considered High Risk diving under these laws.

## Section 12 Snorkelling

### 12.1 Minimum Entry Requirements

All Flinders University **Snorkellers** should have as a minimum:

- Recreational Dive Medical declaration (valid within the last 3 years).
  - [Snorkelling AS4005.1 Recreational Dive Medical Form](#)
- At least 5 hours snorkelling experience.
- Should be competent swimmers i.e. able to swim 400m in under 12mins and tread water for 10mins (without fins).

All Flinders University **Snorkel Leaders** must have the above but also have:

- Rescue diver minimum and appropriate snorkelling experience.
  - Current Provide First Aid (HLTAID003) (renewed every 3 years).
  - Oxygen Provider and CPR training (renewed annually).

Snorkelling operations must be conducted under the supervision of a **Dive Coordinator**. Refer to [Section 2](#) of this manual for selection criteria.

### 12.2 Snorkel Diver Registration

To register as a Flinders University Dive Coordinator or Snorkel Leader please fill out the:

- [Diver/snorkeller registration and statement of understanding form](#)

Once complete please forward your Registration form, Dive medical declaration, Dive certifications, Provide First Aid, Oxygen and CPR to the Maritime Safety Dive Officer for inclusion on the University dive register.

### 12.3 Field Trip Approvals

Before the start of any University Field Trip involving snorkelling, the Field Trip Leader or Dive Coordinator **must** obtain **approval** from the Maritime Safety Dive Officer and College Dean as part of the Field Trip approval process.

Using [FlinSafe](#), please submit the [Diving/ Snorkelling plan form](#) and [Risk assessment](#) to the Maritime Safety Dive Officer for review **at least 7 days (1 week)** prior to the commencement of the trip. Refer to the [Field trips](#) for further information.

## 12.4 Snorkelling On-site Forms

During a snorkelling field trip, the Dive Coordinator is in-charge of supervising the snorkel diving operations and should complete the following:

- [Snorkelling on-site risk assessment](#)
- [Snorkelling safety briefing](#)
- [Snorkelling checklist and safety log](#)

Note: scanned copies of all snorkelling forms must be submitted to the Maritime Safety Dive Officer post trip.

## 12.5 Safe Snorkelling Limits

As a general guide, snorkelling by Flinders University personnel should only be used as an observation, photography, search or collection technique. No difficult or strenuous work of any kind should be attempted using snorkel diving, without implementation of appropriate safety precautions and approved by the Maritime Safety Dive Officer.

In short:

- **Minimum team of 3 people** i.e. 2 Snorkellers with Surface Lookout able to assist in an emergency.
- **Snorkellers and site must be clearly marked by a dive float with dive flag**, so they are clearly visible to any boat traffic.
- Snorkellers must work as **buddy pairs** at all times and stay within close proximity of one another.
- Snorkellers must always **stay within their personal limits** and take no more than 3 deep controlled breaths prior to undertaking a duck dive.
- When duck diving buddy pairs must work with a **1 up 1 down protocol** at all times maintaining an active watch on one another.
- Snorkellers must **actively equalise on descent to prevent ear squeeze**.
- Duck diving is only permitted to a **maximum depth of 5 metres**.
- Larger groups must consist of at least **1 in-water Snorkel Leader for a maximum of 8 Snorkellers**.
- Snorkellers must **stay within 20 metres of the Snorkel Leader** who will be clearly marked by an attached dive float.
- PFD vests and/or wetsuits should be used by Snorkellers to aid buoyancy and provide exposure protection.
- **Ocean Guardian (Shark shields) are to be worn at all times**.

- The Dive Coordinator, Snorkel Leader/s and Surface Lookout/s **must maintain a close watch on all Snorkellers**, conduct frequent headcounts, maintain watch for any hazards such as boat traffic and be able to assist in an emergency.
- Snorkeller recall signals and emergency protocol must be understood by all.

**An individual wishing to participate in snorkelling operations through the University must meet all snorkelling requirements of this manual and [Diving and Snorkelling Safety Procedure](#) and must satisfy the MSDO and Dive Coordinator of their fitness to take part in the planned activities.**

## 12.6 Snorkeller Fitness and Skill Evaluation

All persons participating in snorkel diving must be competent swimmers and observe the rules regarding boating, snorkelling and swimming safety.

**The MSDO or Dive Coordinator has the authority to assess any Snorkeller new to the University Dive Register** to make allowance for, the fact that the level of fitness required for safe breath hold diving is higher than that for SCUBA or SSBA diving. A Swim fitness evaluation and Snorkel diving skill evaluation session should be undertaken. Refer to the [New Diver/ Snorkeller evaluation form](#) for the relevant minimum competencies. The session should be held in a pool or sheltered water environment prior to the main Snorkelling field trip. The New Diver/ Snorkeller evaluation forms must be sent to the MSDO after completion. If inexperienced Snorkellers fail the swimming evaluation they **must wear a PFD lifejacket** to aid buoyancy if they are to participate in a University Snorkelling field trip.

## 12.7 Supervision of Large Groups

Where snorkelling is conducted by larger groups (i.e. >6 Snorkellers) there **must be at least one in-water Snorkel Leader for a maximum of eight Snorkellers**.

The Dive Coordinator, Snorkel Leaders and Surface Attendants must conduct regular head count, and must be capable of going to the assistance of any person in difficulties. Dive Coordinator/s, Snorkel Leaders and Surface Attendants must be equipped with a whistle (or other suitable equipment), and the group must be informed that if the whistle is sounded, all Snorkellers must return to the beach/boat. All Snorkellers must be paired up (experienced with novice where possible) and told to remain in contact with one another during the snorkelling activity.

## 12.8 Depth Limit

Given the very real dangers of shallow water blackout (hyperventilation) divers participating in snorkel diving should take great care to not exceed their personal limits. No diver will exceed **5 m** depth at any time.

No snorkel diving other than surface observation (where the diver remains at the surface at all times) is to be undertaken by any diver who has a repetitive factor (RF) of greater than 1.1 from previous compressed air diving operations.

During snorkel diving operations, appropriate first aid kit and oxygen resuscitation equipment, with sufficient medical oxygen supplies for the area of work, must be on site. At least one person involved must have qualifications in their use.

Snorkelling is prohibited in areas of high boating traffic, e.g. around boat ramps or in shipping channels.

## 12.9 Snorkelling Dive Flag and Float

A dive flag must be displayed adjacent to any snorkelling site at all times. Snorkel Leaders must wear a dive float (with dive flag) attached via a float line, to clearly display their location to the Dive Coordinator or any boats in the area, and to aid in the Snorkellers recovery from the water in the event of an accident.

# Section 13 Dangerous Marine Animals

## 13.1 Poisonous Marine Animals

Divers intending to work with dangerous marine animals must indicate what these are likely to be on the Diving/ Snorkelling plan and ensure that risks are adequately identified, and appropriate controls identified in the risk assessment. The Diving/ Snorkelling plan must contain adequate information to inform the MSDO and any persons in their dive team of the most appropriate first aid procedures for injuries associated with such animals. This is especially important for marine injuries requiring specialised treatment from bites or stings from dangerous marine animals such as Box Jellyfish, Blue Ringed Octopus, Sea Snakes, Cone Shells, Stingrays, Stonefish and Lionfish etc.

## 13.2 Sharks

The presence of sharks in Australian and other countries' waters is a recognised high-risk problem for diving operations. Therefore, only recognised and scientifically proven personal shark deterrents must be used.

Currently approved deterrents are Ocean Guardian (Shark Shield) electrical shark deterrents.

Ocean Guardian **Scuba 7** (Shark Shield) electrical shark deterrents are **compulsory** part of all divers' equipment while carrying out marine or estuary diving operations.

Ocean Guardian **Freedom 7** (Shark Shield) electrical shark deterrents are **compulsory** for all Snorkellers.

Exemptions may be applied to dive without electronic shark deterrents in other areas of the world provided the [Global Shark Attack File](#) data base supports this. The reasons must be fully documented in the Risk Assessment & Diving/ Snorkelling plan and endorsed by the MSDO and College Dean.

Ocean Guardian Freedom 7 electronic shark deterrents are compulsory for all University diving vessels used for marine or estuary diving operations and should be set up within close proximity of the dive ladder. See [Ocean Guardian \(Shark Shield\) user manual](#) (on the [Diving and Snorkelling website](#)).

Seal colonies & aquaculture facilities are a particular problem as they often attract sharks. Any dive conducted within 1 km of these at any time of year must have special permission from the MSDO and College Dean.

No free-swimming dives are permitted within 3 km radius of a seal breeding colony at any time during pupping season (usually in November to March inclusive). Divers wishing to work regularly near seal colonies should consider the use of specially fabricated shark cages, or some other mechanism to facilitate this type of work.

No snorkelling or free-swimming dives are permitted within a 1 km radius around an aquaculture facility during harvest time.

During any dives in areas where sharks have been sighted in the past (and particularly within 3 km of any seal colony), divers MUST avoid snorkel diving and extended surface/mid-water exposures.

Where a higher than normal risk of diver / shark interaction has been identified by any project risk assessment, all divers involved in the project must be made aware of and agree to follow the procedures outlined below:

- The decision to dive or not to dive lies with each individual diver and under no circumstances will any diver be pressured into diving under circumstances that they consider to be unsafe. A decision to dive is to be made only after a thorough risk assessment has been made of the site and the conditions.
- Individual divers and Dive Coordinators are responsible for assessing the risks of shark interaction before undertaking any dive operation.
- Except when using a specifically designed shark cage, no diving operations will be undertaken for at least two (2) nights within 3 km of a location where a Bull/ Tiger or White shark has been reported. (Note that this is the mandatory minimum restriction to diving operations and that other restrictions may be adopted in individual cases).
- Dive Coordinators must attempt to obtain up to date information on recent shark sightings from all reliable sources immediately prior to each dive trip (e.g. the afternoon before a morning departure).
- The use of personal electronic shark deterrents is compulsory for all marine and estuary dive operations undertaken by Flinders University divers.
- Emergency recall systems should be established where possible for all marine or estuary diving operations.
- In areas where a higher than normal risk of shark interaction has been identified, divers must operate in pairs to provide a better opportunity of detecting sharks at a distance before they become a threat.
- An injured or bleeding diver must leave the water immediately; other divers should also exit the water.
- No one will spear, catch, stab or mutilate fish or throw burly or offal into the water near diving operations.

### 13.2.1 Procedures for when a Shark is Encountered

#### Action to be taken by diver(s)

If a diver encounters a shark during a diving operation the following procedure should be followed:

- Remain calm; **do not** rush to the surface as the shark is likely to follow;
- Attract the attention of your buddy if they are not aware of the shark;
- Both divers should face each other to keep the shark in view;
- Ensure your Ocean Guardian (Shark shield) is on and operating;
- If using towed buoys, the emergency signal should be given. This should consist of 8 rapid up and down deployment of the buoy to attract the attention of the surface vessel. On seeing the signal, the vessel should immediately be positioned above the divers, and the coxswain must ensure the vessel's Ocean Guardian (Shark shield) is operating correctly (should one be fitted) and prepare for the retrieval of the divers;

- During ascent, divers should stay together, and prepare for quick entry into the vessel by undoing all harness/BCD attachments to facilitate this;
- The ascent should be made in a calm manner maintaining awareness of your breathing and ascent rate;
- Approaching the surface your BC should be removed and weight belt dropped so as a quick assisted entry into the vessel can be achieved.

### **Action to be taken by support vessel personnel**

Where a higher than normal risk of diver/shark interaction has been identified for a diving operation it is imperative that a vigilant watch is kept by the Dive Coordinator at all times while divers are deployed.

If the dive vessel personnel sight a shark while divers are deployed the following actions should be taken:

- The vessel should be located directly above the divers' bubbles with vessel Ocean Guardian (Shark shield) activated;
- The divers' attention should be gained by one of the following methods:

*Pulling on the divers' towed buoy*

Coordinator to Diver - One strong pull to gain the divers attention followed by a series of 4 bells (4 short quick pulls).

Diver to Coordinator - 4 bells to advise that the recall signal has been received and acknowledged.

### **13.2.2 Diving in High Risk Shark Sites**

The following are examples of high-risk sites:

- Breeding seal colonies.
- High density fishing sites, both commercial and recreational, including sea-based fish processing - to be avoided at times of fishing effort.
- Sea aquaculture sites such as tuna cages - all shark precautions must be adhered to.
- Aquaculture site assessment transit along the seabed.
- Environmental situations of poor visibility or highly turbid water close to estuarine river mouths.

## Section 14 Emergency Response

### 14.1 Emergency Plan

A detailed [Emergency Protocol & Flow Chart](#) Appendix A (*If a Diving Emergency Develops*) is available at the end of this manual and on the [Diving and Snorkelling webpage](#).

Any diver may deviate from the requirements of this manual to the extent necessary to prevent or minimize a situation likely to cause death, serious physical harm, or major environmental damage.

In the event of an emergency **immediately assist the injured person** and seek the appropriate medical assistance where required.

All members of the Dive team should be familiar with details of the *Diving Emergency Protocol*

The Dive Coordinator for the operation **must prepare an emergency response plan** for each diving/snorkelling operation and record this on the ***Diving/ Snorkelling plan*** (*in the Diving Emergency Response Plan section*).

### 14.2 Medical Assistance

The Dive Coordinator for any dive or set of dives is responsible for determining the most efficient means of obtaining medical assistance in the event of an accident during the dive. This information must be recorded in the Field Trip documentation.

Refer to the [Diving medical doctors and emergency contacts](#) link for a list of local medical facilities and emergency contacts available on the [Diving and Snorkelling website](#).

Adequate supplies of medical oxygen must be carried in the boat and/or vehicle to keep at least two (2) individuals on oxygen until such time as the patient can be 'handed over' to qualified assistance, or until further supplies of oxygen can be accessed.

For all Flinders University dives, approved resuscitation equipment must be carried in the boat and a person trained in the use of such equipment should be present as the Dive Coordinator or Surface Attendant.

**Note - An appropriate first aid kit and Oxygen kit must always be carried during diving operations.**

### 14.3 Emergency Reporting Procedures

The procedures given below are the minimum that should be carried out in the various circumstances.

#### 14.3.1 Reporting Minor Accidents / Incidents or Near Miss

Workers and students must:

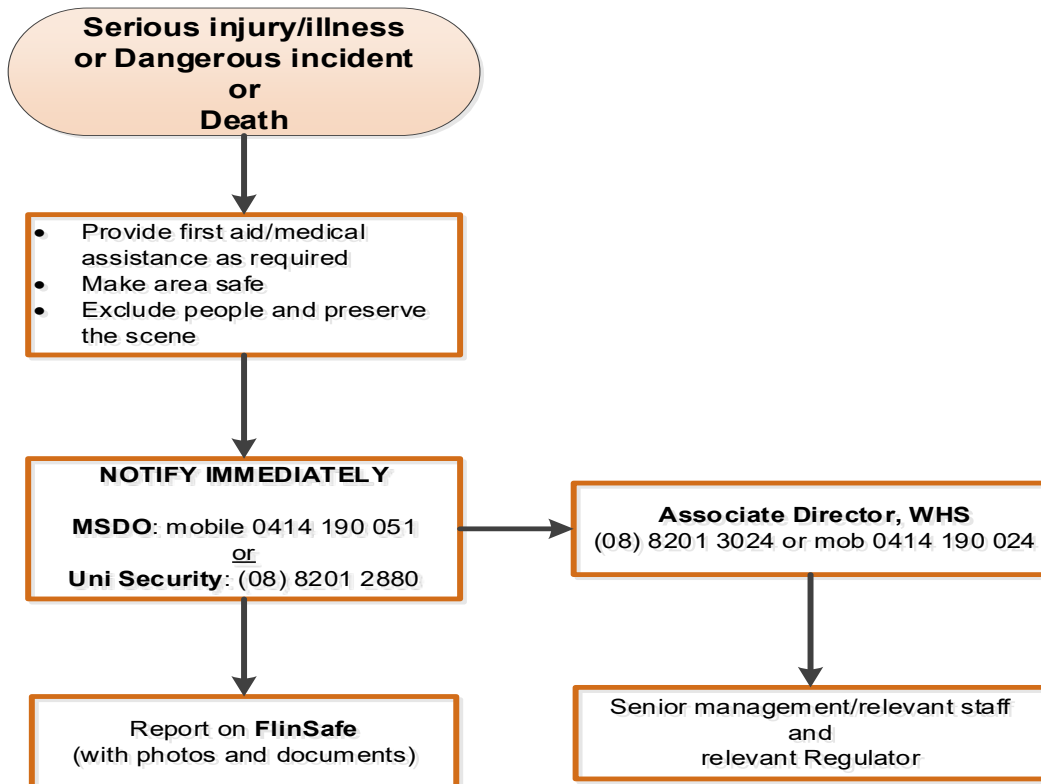
- Immediately report any diving or snorkelling incidents, accidents or near misses to the Dive Coordinator.
- Dive Coordinator is to report details to the Maritime Safety Dive Officer.
- The details of all accidents, incidents or near misses must also be reported to the WHS Unit via the University's FlinSafe [online reporting system](#) as soon as reasonably practicable or at least within 24 hours of the accident/incident occurring.

### 14.3.2 Reporting of [Notifiable Incident](#)

(i.e. death of a person, serious injury or illness, or a dangerous incident)

- Provide First Aid and obtain medical assistance (see *Emergency Protocol & flow chart*, Appendix A at the end of this manual & on [Diving & Snorkelling website](#)).
- Secure the scene and make sure no one else is placed at risk.
- The site can be disturbed to move a deceased person, assist an injured person, make the site safe or assist with a police investigation. Otherwise do not disturb the scene.
- Notify the MSDO, or if MSDO not available, University Security **immediately** by phone (see page 2 of this Manual for contact numbers). These members of staff will notify the Associate Director, WHS. *Note - some accident/incidents must be immediately notified to the relevant Regulator (see orange section below for details)*. This will be done by the Associate Director, WHS who will also advise other relevant senior management/staff.
- **As soon as possible** after the event, the accident/incident **must** be reported in the [FlinSafe](#) system. If the diver is not able to complete this themselves then it is the responsibility of the Dive Coordinator.
- The Dive Coordinator and/or Dive Leader must provide additional information in a detailed report to the University's WHS Unit and the MSDO. The Dive Coordinator should attach all comments and recommendations to the [FlinSafe](#) system or direct to the WHS Unit (if no internet access) (see below 14.4 for investigation of accident / incidents)

#### Notifiable Incident Flowchart





### **14.3.3 Post-Accident / Incident**

Before recommencing diving after any serious accident, any injured diver should have a full medical examination.

## **14.4 Investigation of Accidents and Incidents**

### **14.4.1 Secure the Scene**

The scene should remain undisturbed. If there has been a death, serious injury or any dangerous incident, the site and ALL EQUIPMENT including cylinders, breathing apparatus etc. **MUST NOT BE REMOVED OR ALTERED IN ANY WAY.**

In any case where component malfunction was likely, or was suspected to have been a likely cause of a serious accident, this equipment should be sealed immediately.

Where a fatality has occurred, all equipment should be left in the condition that it was in at the time of the accident until it has been investigated by the relevant authorities.

NOTE: Notwithstanding the above, the breathing gas supply should be isolated to retain the remaining gas. During such isolation, the number of turns, any undue force or other actions required to isolate the gas supply, should be noted and recorded.

### **14.4.2 Investigation Report**

In addition to existing legal requirements to record and report incidents, accidents and injuries, the University will investigate and document all diving-related incidents, accidents and injuries. Appropriate action to prevent further occurrences will then be taken. This will be done in consultation with staff and their representatives. The investigation report will contain the following:

- A summary of all aspects of the event occasioning the injury or death, specifying:
  - the name and address of the injured diver;
  - the date, location and time of the incident;
  - details of the diving experience of the injured diver, if injured whilst diving;
  - full details of the incident and cause (if known) or possible contributing factors;
  - the nature of the injury sustained by the diver; and
  - the Dive Coordinators and MSDO's recommendations to prevent a recurrence.
- Full narrative statements from all persons (including the supervisor, diver and surface attendant) engaged in the relevant diving operation and who can detail any information pertinent to the occurrence of the incident.
- Such medical reports, in relation to the diver, as are available, are compiled both before and after the occurrence of the incident.
- Full details of the type of diving apparatus used by the diver, in particular noting the condition of such equipment immediately after the incident including, in the appropriate case:
  - whether cylinder valves were opened or closed and to what extent;
  - remaining pressures in cylinder;
  - the position of the emergency supply valve;

- the type of breathing gas used; and
- turn off breathing supply and record the number of turns required.

Please refer to the WHS website provides for further details about [accident/incident investigation and reporting](#).

## Section 15 Record Keeping, Insurance & Governance

### 15.1 Record Keeping Responsibilities

Refer to [Appendix G](#) for a summary of records to be kept by Divers, Dive Coordinators and the MSDO.

### 15.2 Insurance

Insurance matters are managed by Risk & Insurance and all question regarding cover should be directed to [riskandinsurance@flinders.edu.au](mailto:riskandinsurance@flinders.edu.au).

#### Staff

Staff who undertake diving as part of their employment at the University when in Australia maybe covered by workers compensation if they sustain an injury at the time of working. The claim, if accepted may cover them for medical expenses and any loss of income as appropriate under Return to Work Act and Regulations.

Note - for work occurring outside of Australia then [riskandinsurance@flinders.edu.au](mailto:riskandinsurance@flinders.edu.au) should be consulted.

#### Students

The University's insurance arrangements provide a "safety net" cover for enrolled students who incur accidental injury while engaged in University activities including work experience placements. This includes diving operations which are part of a student's study.

#### 15.2.1 Travel Insurance

The University also offers travel insurance which provides additional coverage for staff and students. The travel insurance coverage applies when conducting approved field trips greater than 50km from a Flinders University campus, including interstate and overseas field trips. Please email the Universities Insurance Officer via [riskandinsurance@flinders.edu.au](mailto:riskandinsurance@flinders.edu.au) for up to date details as insurance providers and the level of cover for divers can vary from year to year.

Staff and students travelling outside of Australia for diving related to their employment (in the case of staff) or studies (in the case of students) must register for this travel insurance. Please refer to the [Staff travel insurance](#) or [Student travel insurance](#) webpage for up to date details.

Note, if the current Universities travel insurance is not providing adequate coverage for staff or students divers, [Divers Alert Network \(DAN\) diving insurance](#) is recommended.

Note, Short Course students, Volunteers and Visiting Divers (i.e. not employees of the University) are not generally covered under the Universities current insurance arrangement. For these situations [Divers Alert Network \(DAN\) diving insurance](#) is recommended.

### 15.3 University Boating and Diving Committee

The University Boating and Diving Committee reports to the University Health and Safety Committee on boating and diving safety matters.

- Specific functions of the Committee are to:
  - provide advice to the University Health and Safety Committee on boating and diving/snorkelling safety procedures
  - monitor boating and diving/snorkelling operations and safety performance, including ensuring that regular audits are undertaken by the MSDO.
  - provide a forum for discussing management of broader boating and diving operational areas; and
- Facilitate some of the function as a Dive Control Board to;
  - provide advice to the Maritime Safety Dive Officer, Scientific divers, College WHS Committees and University Health and Safety Committee;
  - in consultation review and recommend amendments to the University's diving and snorkelling safety manual and procedure;
  - establish and/or co-approve training programs through which the applicants for certification can satisfy the requirements of the University's diving and snorkelling safety manual;
  - establish criteria for equipment selection and use;
  - recommend new equipment or techniques;
  - establish and/or recommend facilities for the inspection and maintenance of diving and associated equipment;
  - periodically review the University's diving programs' performance; and
  - Provide technical advice to the WHS Unit when investigating into the nature and cause of diving accidents or violations of the University diving and snorkelling safety processes.

The Committee comprises:

- Maritime Safety Dive Officer (Chair);
- University WHS Consultant;
- one College Dean (i.e. Responsible Officer) or management representative from each College;
- two staff members from each College who are active scientific divers;
- one student representative from each College who are active scientific divers;
- nominated non-voting members involved in boating and diving operations.

The Committee meets on a quarterly basis and may co-opt additional members as appropriate. The Committee must have a balance of greater than 50% active scientific divers to so it can facilitate the above functions. Refer to the University Boating and Diving Committee terms of reference.

## 15.4 American Academy of Underwater Sciences (AAUS) Organisation Member

The American Academy of Underwater Sciences (AAUS) Standards for Scientific diving manual was developed and written by AAUS by compiling the policies set forth in the diving manuals of several university, private, and governmental scientific diving programs. These programs share a common heritage with the scientific diving program at the Scripps Institution of Oceanography (SIO). Adherence to the SIO standards has proven both feasible and effective in protecting the health and safety of scientific divers since 1954.

As an Organisation Member (OM) Flinders University aligns to the AAUS international scientific diving standard. As part of this membership Flinders University will produce an annual report which provides data for annual diving operations and diving incidents to the AAUS refer to [Appendix H](#) for Flinders/ AAUS statistics collection criteria. This report should also include recommendations for modifications to the AAUS Standards for scientific diving where applicable.

Flinders University upholds the principles of reciprocity of visiting scientific divers and aligns its reciprocity procedures to section 1.2 of the [AAUS Standards for Scientific Diving Manual](#). The Flinders University/ AAUS request for diving reciprocity form/ Verification of divers training and experience form can be found in [Appendix J](#) of this manual.

## Section 16 Appendices & Glossary

### APPENDIX A Diving Emergency Procedures

As all divers should be aware, many diving medical problems require immediate hyperbaric treatment if they are to be successfully resolved. In the field, or during transport to a recompression facility, the best first aid that can be administered for injuries/illnesses such as DCI or air embolism (and others) is oxygen delivered at as close to 100% as possible.

The flow chart on the next page may be used by Dive Coordinators as a basic template to design a site specific Emergency Response Protocol. The flow chart would slot into place along with the other steps required during an emergency, for example:

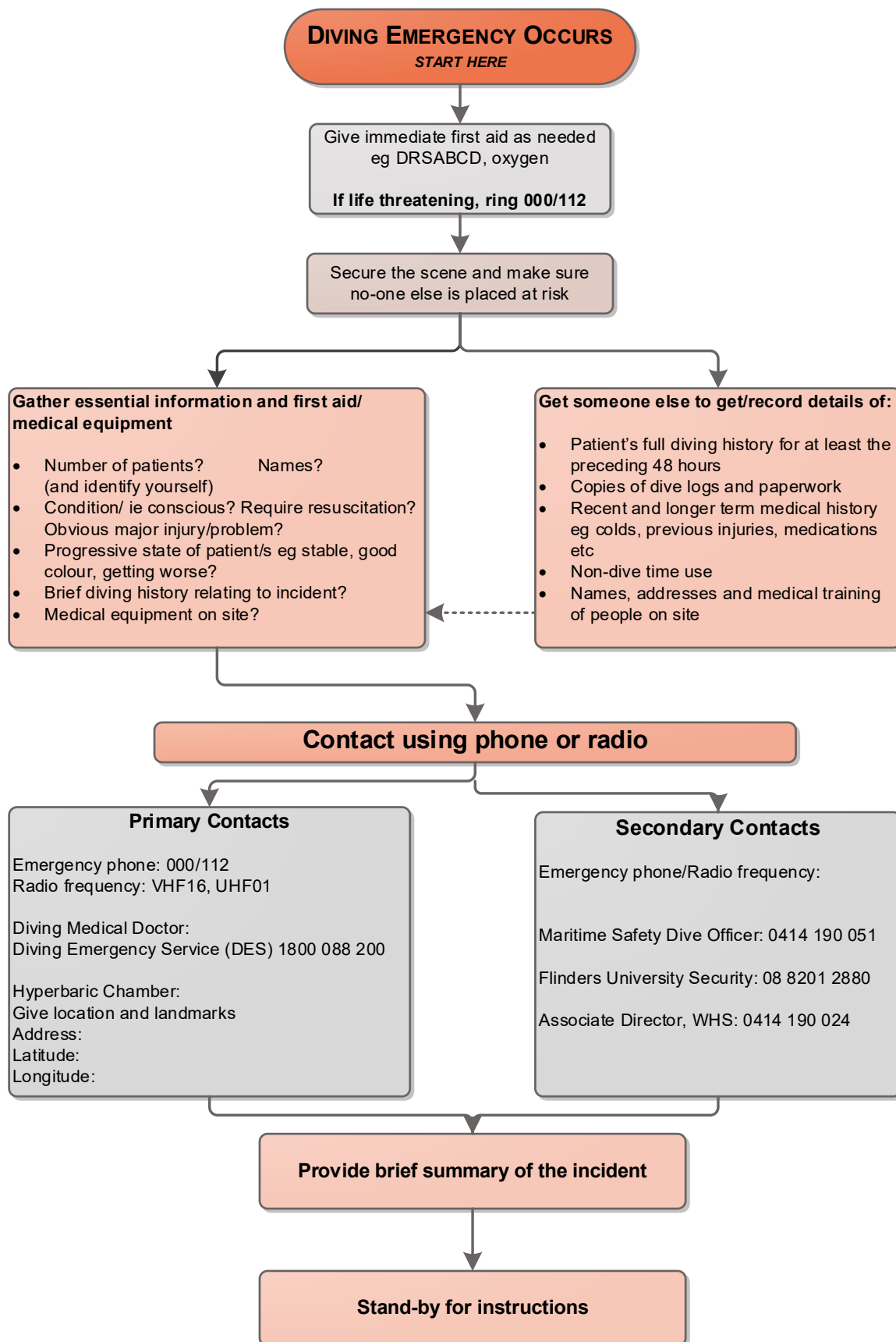
- 1) DRABCD. Recall all divers/swimmers to the boat or shore. If possible, recover all equipment after any accident, and separate it from other equipment for subsequent examination. The Dive Leader may decide not to recover equipment if doing so would be unsafe or cause undue delay.
- 2) Seek appropriate medical assistance<sup>1</sup> and follow any directions you are given. Refer to the [Diving & Snorkelling website](#) for a list of South Australian medical facilities and doctors trained in diving medicine;

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<sup>1</sup> **Important: Any call for medical assistance will be improved if you give important information such as your location, the type of emergency (diving, boating, etc.), number of people affected, their approximate age and sex, signs and symptoms and vital signs (descriptions of pulse, breathing, consciousness level), first aid given and any changes in patient's condition.**

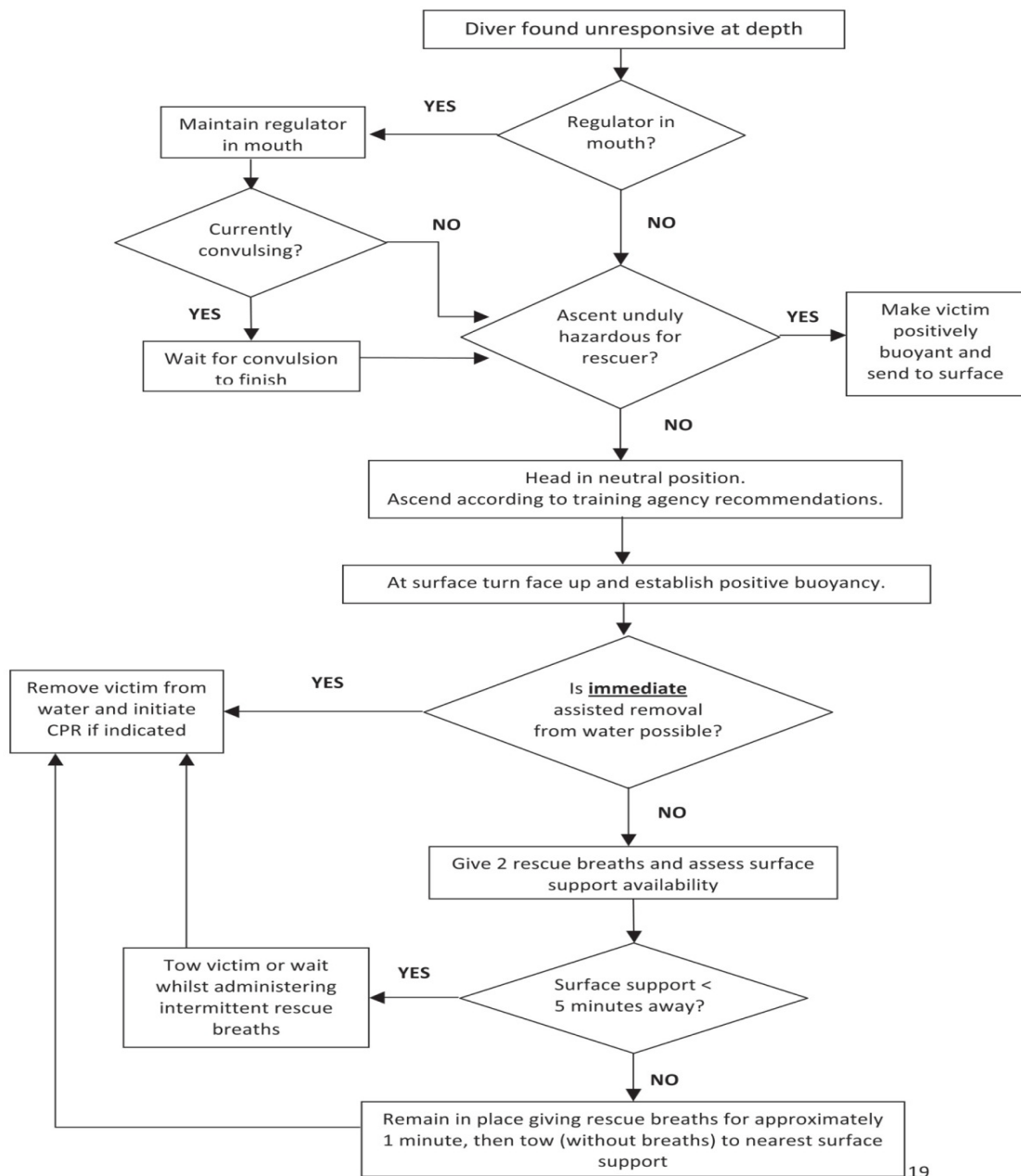
- 3) Ensure other members of the dive team are not at risk and that all divers are present;
- 4) Ensure that in the emergency, no equipment has been left in a dangerous condition; secure the equipment and the site.
- 5) Organise evacuation to the nearest hospital or vacant recompression chamber as dictated by the circumstances, the casualty's condition, or medical advice (i.e., DES);
- 6) Record the details of the casualty's dive immediately, including where the accident occurred, and the sequencing of treatment. Conditions of the emergency can often lead to neglect in completing the diving log/record, which may make it impossible afterwards to determine the time for which the diver was in the water;
- 7) Ensure the diver's dive record sheets and (if possible) their log book is available for the doctor, particularly if recompression is required. Details of the diver's last medical examination may be useful if these can be obtained quickly;
- 8) When the immediate emergency has passed and all necessary steps have been taken to assist the casualty, a full record of the incident must be compiled by the Dive Coordinator. To help with this, all personnel involved in the incident should endeavour to make notes on what happened as soon as possible after the incident, obtaining details from other divers, noting exact times etc.;
- 9) NOTE: Divers who develop symptoms of decompression sickness, even on a dive apparently carried out according to the tables, all may also develop symptoms at a later time and require recompression. In such a situation, the dive buddy should be kept under observation for at least 24 hours after the incident.

## A.2 Diving Emergency Flow Chart



# APPENDIX B Recommendations for Rescue of a Submerged Unresponsive Diver

From: S.J. Mitchell et al., Undersea and Hyperbaric Medicine 2012, Vol. 39, No. 6, pages 1099-1108




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# APPENDIX C DCIEM Air Diving Tables

**Note:** The DCIEM Air tables are designed around an ascent rate of 18m/min(+/-3m), however, it is highly recommended that, wherever possible, all divers adopt an ascent rate of slower than 9 m/min when surfacing after any dive to a depth of 20 m or less.



### A: AIR DECOMPRESSION

Depth	No-Decompression Bottom Times (minutes)		Decompression Required Bottom Times			
	Bottom Times (minutes)	∞	5	10	15	20
20' 6m	30 A 60 B 90 C 120 D	150 E 180 F 240 G 300 H 600 L				
30' 9m	30 A 45 B 60 C 90 D	100 E 120 F 150 G 180 H 270 L	360	400		
40' 12m	22 A 36 B 40 C 80 F	60 D 70 E 120 H 130 I	160 K 170 L	180 M 190	200	215
50' 15m	18 A 25 B 14 A 20 B	30 C 40 D 25 C 30 D	85 H 95 I	105 J 115 K	124 L	132 M
60' 18m	14 A 20 B	25 C 30 D	60 G 80 I	70 H 85 J	85 J	92 K
<b>Decompression Stops</b>			<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>
<b>In minutes</b>			<b>at 10' 3m</b>			
70' 21m	12 A 15 B	20 C 25 D	40 F 50 G	60 H 63 I	60 H 66 J	66 J
80' 24m	10 A 13 B	15 C 20 D	29 F 35 G	35 G 48 H	48 H 52 I	52 I
90' 27m	9 A	12 B 15 C 20 D	23 E 27 F 35 G	27 F 35 G 40 H 43 I	40 H 43 I	43 I
100' 30m	7 A	10 B 12 C 15 D	18 D 21 E 25 F 29 G	21 E 25 F 29 G 36 H	25 F 29 G 36 H	36 H
110' 33m		6 A 10 B 12 C	15 D 18 E 22 F 26 G	18 E 22 F 26 G 30 H	22 F 26 G 30 H	30 H
120' 36m		6 A 8 B 10 C	12 D 15 E 19 F 23 G	15 E 19 F 23 G 27 H	19 F 23 G 27 H	27 H
130' 39m		5 A 8 B	10 C 13 D 16 F 21 G	13 D 16 F 21 G	16 F 21 G	21 G
140' 42m		5 A 7 B	9 C 11 D 14 F 18 G	11 D 14 F 18 G	14 F 18 G	18 G
150' 45m		4 A 6 B	8 C 10 D 12 E 15 F	10 D 12 E 15 F	12 E 15 F	15 F
<b>Decompression Stops</b>			<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>
<b>In minutes</b>			<b>at 10' 3m</b>			

• NO-DECOMPRESSION LIMITS are given for first dives  
 • DECOMPRESSION STOPS are taken at mid-chest level for the times indicated at the specified stop depths  
 → Table B for Minimum Surface Intervals and Repetitive Factors  
 → Table C for Repetitive Dive No-Decompression Limits  
 → Table D for Depth Corrections required at Altitudes above 1000' (300m)

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### B: SURFACE INTERVALS

Rep. Group	0-15	0:30	1:00	1:30	2:00	3:00	4:00	6:00	9:00	12:00	15:00
A	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0
B	1.5	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0	1.0
C	1.6	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0
D	1.8	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0	1.0
E	1.9	1.6	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.0
F	2.0	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.1	1.0
G	-	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0
H	-	-	1.9	1.7	1.6	1.5	1.4	1.3	1.1	1.1	1.1
I	-	-	2.0	1.8	1.7	1.5	1.4	1.3	1.1	1.1	1.1
J	-	-	-	1.9	1.8	1.6	1.5	1.3	1.2	1.1	1.1
K	-	-	-	2.0	1.9	1.7	1.5	1.3	1.2	1.1	1.1
L	-	-	-	-	2.0	1.7	1.6	1.4	1.2	1.1	1.1
M	-	-	-	-	-	1.8	1.6	1.4	1.2	1.1	1.1

Repetitive Factors (RF) given for Surface Intervals (hr:min)

### C: REPETITIVE DIVING

Depth	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
30' 9m	272	250	230	214	200	187	176	166	157	150
40' 12m	136	125	115	107	100	93	88	83	78	75
50' 15m	60	55	50	45	41	38	36	34	32	31
60' 18m	40	35	31	29	27	26	24	23	22	21
70' 21m	30	25	21	19	18	17	16	15	14	13
80' 24m	20	18	16	15	14	13	12	12	11	11
90' 27m	16	14	12	11	11	10	9	9	8	8
100' 30m	13	11	10	9	9	8	8	7	7	7
110' 33m	10	9	8	8	7	7	6	6	6	6
120' 36m	8	7	7	6	6	5	5	4	4	4
130' 39m	7	6	6	5	5	4	4	4	4	4
140' 42m	6	5	5	4	4	4	4	3	3	3
150' 45m	5	5	4	4	4	4	3	3	3	3

Repetitive Dive No-D Limits given in minutes according to Depth and RF

### D: DEPTH CORRECTIONS

Actual Depth	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'
30' 9m	10	3	3	3	3	3	3	3
40' 12m	10	3	3	3	3	3	3	3
50' 15m	10	3	3	3	3	3	3	3
60' 18m	10	3	3	3	3	3	3	3
70' 21m	10	3	3	3	3	3	3	3
80' 24m	10	3	3	3	3	3	3	3
90' 27m	10	3	3	3	3	3	3	3
100' 30m	10	3	3	3	3	3	3	3
110' 33m	10	3	3	3	3	3	3	3
120' 36m	10	3	3	3	3	3	3	3
130' 39m	10	3	3	3	3	3	3	3
140' 42m	10	3	3	3	3	3	3	3

Add Depth Correction to Actual Depth of Altitude Dive

Actual Depth	10' 3m	20' 6m	30' 9m	40' 12m	50' 15m	60' 18m	70' 21m	80' 24m	90' 27m	100' 30m	110' 33m	120' 36m	130' 39m	140' 42m
10' 3m	10	3.0	10	3.0	9	3.0	9	3.0	9	3.0	8	2.5	8	2.5
20' 6m	20	6.0	19	6.0	18	5.5	18	5.5	17	5.0	16	5.0	15	4.5

Actual Decompression Stop Depths (feet/meters) at Altitude

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# APPENDIX D How to use DCIEM Dive Tables

## SAFE DIVE PLANNING

How to use DCIEM dive tables



## SAFE DIVE PLANNING - DCIEM DIVE TABLES

- ▶ Dive 1, Dive to depth to 18m with a Bottom Time (BT) of 30 mins.
- ▶ Refer to DCIEM Table A: Dive 1 Depth 18m with Bottom Time (BT) of 30 mins therefore Repetitive Group (RG) equals D.

**DCIEM SPORT DIVING TABLES**

**A: AIR DECOMPRESSION**

Depth	No-Decompression Bottom Times (minutes)			Decompression Required Bottom Times	
	30 A	150 E	300 I	300	400
20' 6m	30 A	150 E	300 I		
30' 9m	45 B	120 F	210 J	300	400
40' 12m	30 A	60 D	90 G		
50' 15m	15 A	30 C	60 E		
60' 18m	15 A	30 C	60 E		

Decompression Stops in minutes at 10' 3m: 5 10 15 20

▶ **ASCENT RATE** is 50' (15m) plus or minus 10' (3m) per minute

▶ **NO-DECOMPRESSION LIMITS** are given for first dives

▶ **DECOMPRESSION STOPS** are taken at mid-chest level

▶ Table B for Minimum Surface Intervals

▶ Table C for Repetitive Dive No-Decompression Limits

▶ Table D for Depth Corrections required at Altitudes above 1000' (300m)

**B: SURFACE INTERVALS**

Depth	1.5		1.0		0.5		0.2		0.1	
	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0
A	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0
B	1.4	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0
C	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0
D	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0
E	1.9	1.8	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
F	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
G	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
H	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
I	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
J	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
K	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
L	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
M	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0

Repetitive Factors (RF) given for Surface Intervals (SI in min)

**C: REPETITIVE DIVING**

Depth	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
30' 9m	272	250	230	214	200	187	176	168	157	150
40' 12m	130	125	115	107	100	93	86	81	76	75
50' 15m	60	55	50	45	41	38	36	34	32	31
60' 18m	40	35	31	29	27	26	24	23	22	21
70' 21m	30	25	21	19	18	17	16	15	14	13
80' 24m	20	18	16	15	14	13	12	11	11	10
90' 27m	16	14	12	11	11	10	9	9	8	8
100' 30m	13	11	10	9	8	8	7	7	6	6
110' 33m	10	9	8	8	7	7	6	6	5	5
120' 36m	8	7	7	6	6	6	5	5	5	5
130' 39m	7	6	6	5	5	5	4	4	4	4
140' 42m	6	5	5	4	4	4	4	3	3	3
150' 45m	5	5	4	4	4	3	3	3	3	3

Repetitive Dives No-D Limits given in minutes according to Depth and SI

**D: DEPTH CORRECTIONS**

Actual Depth	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'	9000'	10000'
10' 3m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
20' 6m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
30' 9m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
40' 12m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
50' 15m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
60' 18m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
70' 21m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
80' 24m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90' 27m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
100' 30m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
110' 33m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
120' 36m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
130' 39m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
140' 42m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
150' 45m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Actual Depth Correction to Actual Depth of Altitude Dive

▶ **ASCENT RATE** is 50' (15m) plus or minus 10' (3m) per minute

▶ **NO-DECOMPRESSION LIMITS** are given for first dives

▶ **DECOMPRESSION STOPS** are taken at mid-chest level

▶ Table B for Minimum Surface Intervals

▶ Table C for Repetitive Dive No-Decompression Limits

▶ Table D for Depth Corrections required at Altitudes above 1000' (300m)

## SAFE DIVE PLANNING - DCIEM DIVE TABLES

- ▶ Dive 2. We are planning a second repetitive dive we then refer to DCIEM Table B: Surface Intervals.
- ▶ Since we finished up Dive 1 with a Repetitive Group (RG) of D and we have planned a 30 to 45 min Surface Interval (SI), Repetitive Factor (RF) equals 1.5.
- ▶ Note, determining the RF is vital to safe repetitive dive planning as it takes into consideration the Residual Nitrogen built up in the diver's body.

**DCIEM SPORT DIVING TABLES**

**A: AIR DECOMPRESSION**

Depth	No-Decompression Bottom Times (minutes)			Decompression Required Bottom Times	
	30 A	150 E	300 I	300	400
20' 6m	30 A	150 E	300 I		
30' 9m	45 B	120 F	210 J	300	400
40' 12m	30 A	60 D	90 G		
50' 15m	15 A	30 C	60 E		
60' 18m	15 A	30 C	60 E		

Decompression Stops in minutes at 10' 3m: 5 10 15 20

▶ **ASCENT RATE** is 50' (15m) plus or minus 10' (3m) per minute

▶ **NO-DECOMPRESSION LIMITS** are given for first dives

▶ **DECOMPRESSION STOPS** are taken at mid-chest level

▶ Table B for Minimum Surface Intervals

▶ Table C for Repetitive Dive No-Decompression Limits

▶ Table D for Depth Corrections required at Altitudes above 1000' (300m)

**B: SURFACE INTERVALS**

Depth	1.5		1.0		0.5		0.2		0.1	
	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5	1.0
A	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0
B	1.4	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.0
C	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0
D	1.5	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0
E	1.9	1.8	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
F	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
G	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
H	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
I	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
J	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
K	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
L	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0
M	1.9	1.7	1.5	1.4	1.3	1.2	1.2	1.1	1.1	1.0

Repetitive Factors (RF) given for Surface Intervals (SI in min)

**C: REPETITIVE DIVING**

Depth	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
30' 9m	272	250	230	214	200	187	176	168	157	150
40' 12m	130	125	115	107	100	93	86	81	76	75
50' 15m	60	55	50	45	41	38	36	34	32	31
60' 18m	40	35	31	29	27	26	24	23	22	21
70' 21m	30	25	21	19	18	17	16	15	14	13
80' 24m	20	18	16	15	14	13	12	11	11	10
90' 27m	16	14	12	11	11	10	9	9	8	8
100' 30m	13	11	10	9	8	8	7	7	6	6
110' 33m	10	9	8	8	7	7	6	6	5	5
120' 36m	8	7	7	6	6	6	5	5	5	5
130' 39m	7	6	6	5	5	5	4	4	4	4
140' 42m	6	5	5	4	4	4	4	3	3	3
150' 45m	5	5	4	4	4	3	3	3	3	3

Repetitive Dives No-D Limits given in minutes according to Depth and SI

**D: DEPTH CORRECTIONS**

Actual Depth	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'	9000'	10000'
10' 3m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
20' 6m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
30' 9m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
40' 12m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
50' 15m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
60' 18m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
70' 21m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
80' 24m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90' 27m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
100' 30m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
110' 33m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
120' 36m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
130' 39m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
140' 42m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
150' 45m	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Actual Depth Correction to Actual Depth of Altitude Dive

▶ **ASCENT RATE** is 50' (15m) plus or minus 10' (3m) per minute

▶ **NO-DECOMPRESSION LIMITS** are given for first dives

▶ **DECOMPRESSION STOPS** are taken at mid-chest level

▶ Table B for Minimum Surface Intervals

▶ Table C for Repetitive Dive No-Decompression Limits

▶ Table D for Depth Corrections required at Altitudes above 1000' (300m)

# SAFE DIVE PLANNING - DCIEM DIVE TABLES

- ▶ Dive 2 is proposed to maximum depth of 15m. We then must refer to DCIEM Table C: Repetitive Diving.
- ▶ Since we have a RF of 1.5 and depth of 15m, we therefore have a No Decompression (No-D) diving limit of 41 mins.
- ▶ Important to outline the No Decompression safe diving limits before undertaking the dive, if the dive team go over this time during the dive, they will need to implement an Emergency Decompression Safety Stop to off-gas before returning to the surface, i.e. generally 3m depth for 5mins.

**DCIEM SPORT DIVING TABLES**

**A: AIR DECOMPRESSION**

Depth	No-Decompression Bottom Times (minutes)		Decompression Required Bottom Times
	30 A	150 E	
20' 6m	30 A	150 E	720 M
30' 9m	30 A	100 E	360
40' 12m	22 A	60 D	180 K
50' 15m	18 A	30 C	90 J
60' 18m	14 A	25 C	40 E

**B: SURFACE INTERVALS**

Prev. Dive	1.5	1.2	1.0	0.8	0.6	0.4	0.2	0.1	0.0
A	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0
B	1.5	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.0
C	1.6	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0

**C: REPETITIVE DIVING**

Depth	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
30' 9m	272	250	230	214	200	187	176	166	157	150
40' 12m	156	125	115	107	100	93	88	83	78	75
50' 15m	40	35	31	27	27	26	24	23	22	21

**D: DEPTH CORRECTIONS**

Actual Depth	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'	9000'	10000'
10' 3m	299	299	299	299	299	299	299	299	299	299
20' 6m	110	110	110	110	110	110	110	110	110	110
30' 9m	40	40	40	40	40	40	40	40	40	40

# SAFE DIVE PLANNING - DCIEM DIVE TABLES

- ▶ Dive 2, we undertake second dive to a depth of 15m with a Bottom Time (BT) of 40 mins, Therefore RG = D.

**DCIEM SPORT DIVING TABLES**

**A: AIR DECOMPRESSION**

Depth	No-Decompression Bottom Times (minutes)		Decompression Required Bottom Times
	30 A	150 E	
20' 6m	30 A	150 E	720 M
30' 9m	30 A	100 E	360
40' 12m	22 A	60 D	180 K
50' 15m	18 A	30 C	90 J
60' 18m	14 A	25 C	40 E

**B: SURFACE INTERVALS**

Prev. Dive	1.5	1.2	1.0	0.8	0.6	0.4	0.2	0.1	0.0
A	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0
B	1.5	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.0
C	1.6	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0

**C: REPETITIVE DIVING**

Depth	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
30' 9m	272	250	230	214	200	187	176	166	157	150
40' 12m	156	125	115	107	100	93	88	83	78	75
50' 15m	40	35	31	27	27	26	24	23	22	21

**D: DEPTH CORRECTIONS**

Actual Depth	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'	9000'	10000'
10' 3m	299	299	299	299	299	299	299	299	299	299
20' 6m	110	110	110	110	110	110	110	110	110	110
30' 9m	40	40	40	40	40	40	40	40	40	40

# SAFE DIVE PLANNING - DCIEM DIVE TABLES

- ▶ Dive 2, we undertake second dive to a depth of 15m with a Bottom Time (BT) of 40 mins, Therefore RG = D. **NO INCORRECT**

**DCIEM SPORT DIVING TABLES**

**A: AIR DECOMPRESSION**

Depth	No-Decompression Bottom Times (minutes)		Decompression Required Bottom Times
	30 A	150 E	
20' 6m	30 A	150 E	720 M
30' 9m	30 A	100 E	360
40' 12m	22 A	60 D	180 K
50' 15m	18 A	30 C	90 J
60' 18m	14 A	25 C	40 E

**B: SURFACE INTERVALS**

Prev. Dive	1.5	1.2	1.0	0.8	0.6	0.4	0.2	0.1	0.0
A	1.4	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0
B	1.5	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.0
C	1.6	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.0

**C: REPETITIVE DIVING**

Depth	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
30' 9m	272	250	230	214	200	187	176	166	157	150
40' 12m	156	125	115	107	100	93	88	83	78	75
50' 15m	40	35	31	27	27	26	24	23	22	21

**D: DEPTH CORRECTIONS**

Actual Depth	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'	9000'	10000'
10' 3m	299	299	299	299	299	299	299	299	299	299
20' 6m	110	110	110	110	110	110	110	110	110	110
30' 9m	40	40	40	40	40	40	40	40	40	40









## APPENDIX E Communications

As per Section 8.5 of this Manual, where divers are required to use a communications system, or wish to do so, the MSDO should be consulted prior to diving and the guidelines below should be adopted.

### E.1 Lifeline Signals

In situations where Flinders University Divers are required to operate with lifelines tethering them to the boat, attended by a surface Diver's Attendant, those Divers and the Surface Attendant must be familiar with the standard communication signals used in this situation - as listed below.

Line signals comprise either pulls or bells or a combination of both. A pull is a steady movement of the line, of at least 0.5 metre - always given singly. A bell is a sharp quick tug, always given in pairs where possible, e.g. five bells is given as:

*1 pull to get the attention of the Surface Attendant/buddy; then 2 quick tugs (pause), 2 quick tugs (pause), 1 quick tug.*

It should be noted that one bell does not exist as a signal on its own.

#### Signals - Attendant to Diver

- |                                |   |
|--------------------------------|---|
| a) 1 pull                      | To call attention. Are you OK?                            |
| b) 2 pulls                     | Am sending down a rope's end (or as previously arranged)  |
| c) 3 pulls                     | You have come up too far. Go down slowly till we stop you |
| d) 4 pulls                     | Come up   |
| e) 4 pulls followed by 2 bells | Come up / hurry up. Come up, surface decompression        |

#### Direction Signals

- |            |   |
|------------|---|
| a) 1 pull  | Search where you are                                  |
| b) 2 bells | Go to the end of distance line / jack-stay / lifeline |
| c) 3 bells | Face shot lifeline then go right                      |
| d) 4 bells | Face shot lifeline then go left                       |
| e) 5 bells | Come in to your shot, or turn back if on a jackstay   |

## Signals - Diver to Attendant

### General Signals

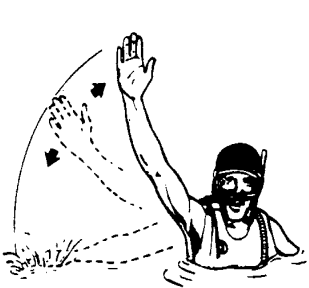
- |                                |  |
|--------------------------------|--|
| a) 1 pull                      | To call attention / Made bottom / Reached end of jackstay  |
| b) 2 pulls                     | Send me down a rope's end (or as previously arranged)  |
| c) 3 pulls                     | I am going down again  |
| d) 4 pulls                     | May I come up?   |
| e) 4 pulls followed by 2 bells | Assist me up / I want to come up   |
| f) Succession of pulls (>4)    | EMERGENCY SIGNAL (ONLY to be used in extreme emergency). Need not be answered, but must be obeyed IMMEDIATELY. |
| g) Succession of 2 bells       | Am fouled and need the assistance of another diver   |
| h) Succession of 3 bells       | Am fouled but can clear myself if left alone   |

### Working Signals

- |            |   |
|------------|---|
| a) 1 pull  | Hold on / stop  |
| b) 2 bells | Pull up   |
| c) 3 bells | Lower   |
| d) 4 bells | Take up slack lifeline / you are holding me too tight |
| e) 5 bells | Have found, started, or completed work                |

## E.2 Hand Signals

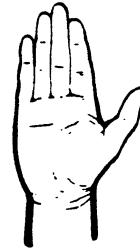
All Flinders University divers should familiarise themselves with the hand signals most commonly required for SCUBA diving. The signals can be found in any 'Open Water Diver' manual - as released by diver training organizations.



Distress/help



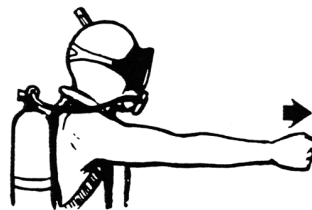
Buddy breathe/share air



Stop/hold it/stay there



OK/OK?



Danger



OK?/OK (on surface at distance)



Go up/going up



Out of air/danger



Something is wrong



OK?/OK  
(one hand occupied)



Go down/going down

## E.3 Voice Communications

There is a range of different voice communication systems available, but it should be noted that all voice communications equipment used for scientific diving must meet standards described in the Australian Standards for Occupational Diving AS2299.2.

**On any dive where use of a voice communication system has been made conditional on the dive taking place, the dive must not take place without a backup communications system being employed (e.g. a lifeline system), and all personnel involved in the operation being familiar with its use.**

## APPENDIX F Current First Aid and Oxygen Qualifications

### Introduction

Where short-hand descriptions or abbreviations like ‘oxygen and first aid certification’ are used in this Manual, they can mean many different things depending on background and the current nationally approved courses.

For some diver classifications, particular certifications *are required within 6 months* (section 2.3). This means that the diver is required to receive the required training within 6 months of their first dive with the University. This allows people time to fit into normal training schedules or some leeway to find the appropriate trainer or provider.

### F.1 First Aid courses

- “Provide First Aid” [HLTAID003] has previously been known among others as senior first aid. This is usually a 2-day course renewed every 3 years by a one-day refresher.
- Or if the risk assessment suggests one of these additional and advanced courses may be needed;
  - “Occupational First Aid”; [HLTSS00027]
  - “Remote Area First Aid”; [HLTAID005]

### F.2 Oxygen courses

CPR and Oxygen renewed annually

- “Oxygen First Aid in Dive Accidents” [DAN AP, 21965VIC]
- “Provide Advanced Resuscitation” [HLTAID007]
- “Provide Advanced First Aid”; [HLTAID006]



## **APPENDIX G Summary of Records to be kept by Divers, Dive Coordinators and MSDO**

### **G.1 Diver**

- Personal diving log
- Medical Certificates (by Doctor trained in underwater medicine).
- 'Provide First Aid' HLTAID003 and Oxygen training certificates.

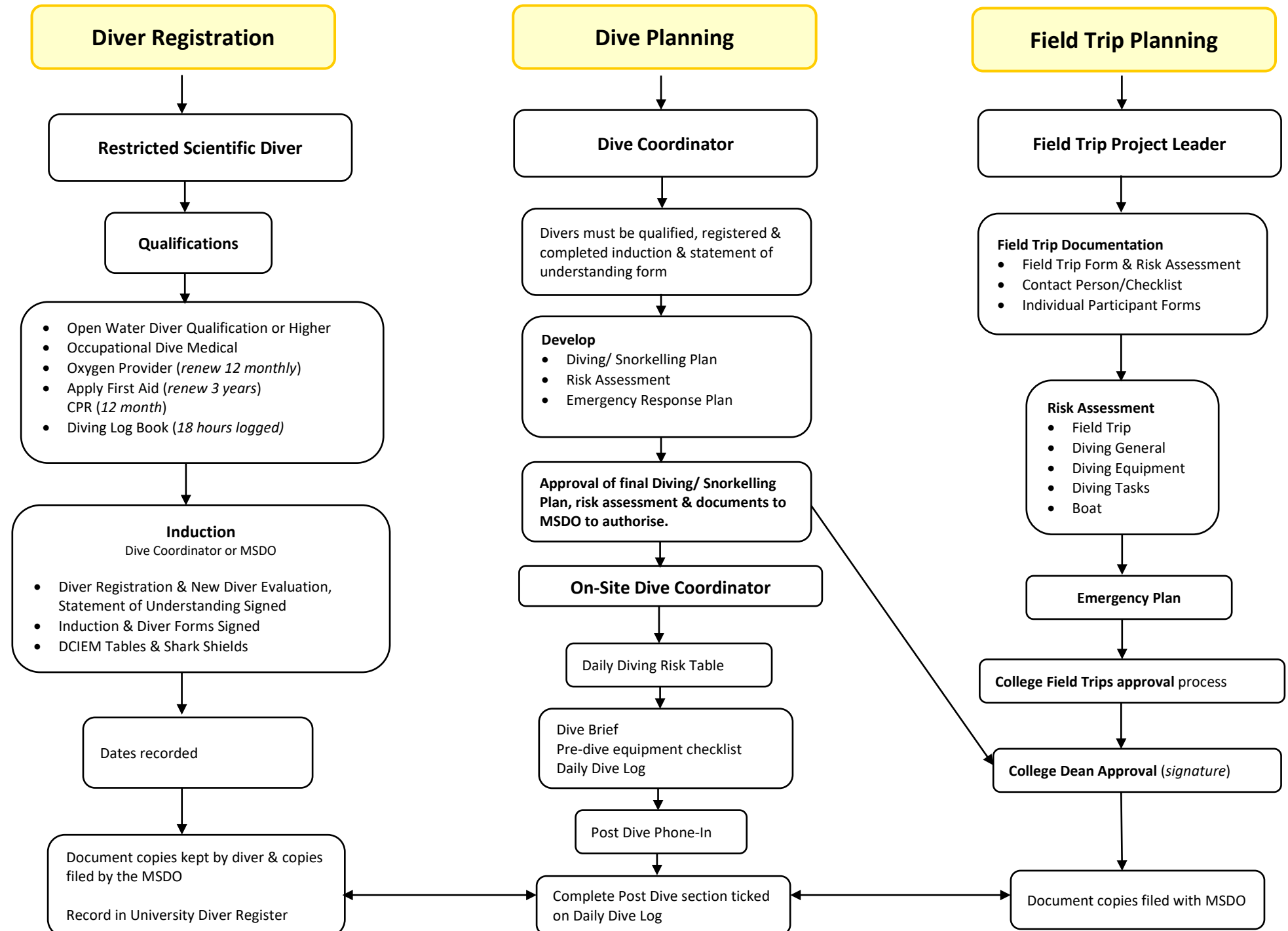
### **G.2 Dive Coordinator**

- Daily dive logs
- Daily onsite Risk Assessment
- Field trip forms.
- Diving/ Snorkelling Plan.
- Risk Assessments for the dive & any associated equipment.
- Daily equipment checklist.
- Participation forms (if relevant).

### **G.3 Maritime Safety Dive Officer (MSDO)**

- University Dive Register.
- New Diver Registration and statement of understanding forms.
- Copies of all divers certificates e.g. Dive medicals, First aid, Oxygen, log books.
- List of Dive Coordinators.
- Diving/ Snorkelling Plans & associated Risk Assessment & Field trip forms.
- Dive Logs, On-site Risk Assessments & Diving Safety Briefing forms.
- Equipment service records or defects lists.
- Annual audit and results.
- Copy of current policy & manual.
- Any documentation relation to changes to manual.
- Relevant legislation.
- Provide six monthly reports to the University WHS Committees.
- Diving field trip data base for AAUS annual dive log statistics summary.

# APPENDIX H Dive Planning Flowchart



## APPENDIX I Diving Forms

The Flinders University Diving Safety Manual provides information and advice to all divers involved in underwater research and teaching activities in the University as well as providing a concise statement of approved procedures governing all Snorkel (breath hold) and SCUBA diving operations conducted through the University.

The aim of these procedures is to ensure users conduct their diving operations in a safe manner. The University has a series of mandatory forms which need to be completed by Divers, Dive Coordinators and endorsed by the Maritime Safety Dive Officer for various processes and projects.

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Refer to the [Diving and Snorkelling website](http://www.flinders.edu.au/whs/working-safely/diving.cfm) for the most up to date versions of the forms i.e. <<http://www.flinders.edu.au/whs/working-safely/diving.cfm>>

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### Diving Forms Listing only;

#### New Diver/ Snorkeller Registration

- Diver/ Snorkeller Registration & Statement of Understanding Form
- Safe Dive Planning – How to use DCIEM dive tables
- New Diver/ Snorkeller Evaluation Form

#### Diving Medicals

- Dive Medical Doctors & Emergency Contacts
- Scuba Diver ASNZS 2299 Occupational Dive Medical Form
- Snorkelling AS 4005.1 Recreational Dive Medical Form

#### New Field Trip or Dive Project

- Field Trip Documentation
- FlinSafe
- Risk Assessment
- Diving/ Snorkelling Plan Form

#### Daily Diving Operations

- Diving On-site Risk Assessment
- Diving Safety Briefing
- Diving Equipment Checklist
- Diving Safety Log
- Diving Equipment Checklist & Safety Log Combined

#### Daily Snorkelling Operations

- Snorkelling On-site Risk Assessment
- Snorkelling Safety Briefing
- Snorkelling Checklist & Safety Log

#### Other Dive Information

- Diving Overseas Guidelines
- Nitrox Diving Guidelines
- Lost Buddy & Dive Buddy Procedures
- Safe Work Procedure – Bauer Oceanus-B Scuba Compressor
- Ocean Guardian (Shark Shield) User Manual
- Flinders University/ AAUS Request for Diving Reciprocity Form/ Verification of Diver Training and Experience

## APPENDIX J Flinders/ AAUS request for Diving Reciprocity

### Verification of diver training and experience

Diver: \_\_\_\_\_

Date: \_\_\_\_\_

This letter serves to verify that the above listed person has met the training and pre-requisites as indicated below, and has completed all requirements necessary to be certified as a (*Scientific Diver / Diver in Training*) as established by the (*Organizational Member*) Diving Safety Manual, and has demonstrated competency in the indicated areas. (*Organizational Member*) is an AAUS OM and meets or exceeds all AAUS training requirements.

#### The following is a brief summary of this diver's personnel file regarding dive status at

\_\_\_\_\_  
(Date)

_____ Original diving authorization	
_____ Written scientific diving examination	
_____ Last diving medical examination	Medical examination expiration date _____
_____ Most recent checkout dive	
_____ Scuba regulator/equipment service/test	
_____ CPR training (Agency) _____	CPR Exp. _____
_____ Oxygen administration (Agency) _____	O2 Exp. _____
_____ First aid for diving _____	F.A. Exp. _____
_____ Date of last dive _____ Depth _____	
Number of dives completed within previous 12 months? _____	Depth Authorization _____ feet
Total number of career dives? _____	

Any restrictions or Waivers of Requirements? (Y/N) \_\_\_\_\_ if yes, explain:

Please indicate any pertinent authorizations or training:

#### Emergency Information:

Name: \_\_\_\_\_ Relationship: \_\_\_\_\_  
Telephone: \_\_\_\_\_ (work) \_\_\_\_\_ (home)  
Address: \_\_\_\_\_

This is to verify that the above information is complete and correct

Dive Officer:

\_\_\_\_\_  
(Signature) \_\_\_\_\_ (Date)

\_\_\_\_\_  
(Print)

## APPENDIX K Flinders/ AAUS Statistics Collection Criteria

### COLLECTION CRITERIA:

The "Dive Time in Minutes", The Number of Dives Logged", and the "Number of Divers Logging Dives" will be collected for the following categories.

- Dive Classification
- Breathing Gas
- Diving Mode
- Decompression Planning and Calculation Method
- Depth Ranges
- Specialized Environments
- Incident Types

Dive Time in Minutes is defined as the surface-to-surface time including any safety or required decompression stops.

A Dive is defined as a descent underwater utilizing compressed gas and subsequent ascent/return to the surface with a minimum surface interval of 10 minutes.

Dives will not be differentiated as open water or confined water dives. But open water and confined water dives will be logged and submitted for AAUS statistics classified as either scientific or training/proficiency.

A "Diver Logging a Dive" is defined as a person who is diving under the auspices of your scientific diving organization. Dives logged by divers from another AAUS Organization will be reported with the diver's home organization. Only a diver who has actually logged a dive during the reporting period is counted under this category.

Incident(s) that occur during the collection cycle: Only incidents that occurred during, or resulting from, a dive where the diver is breathing a compressed gas will be submitted to AAUS.

### DEFINITIONS:

#### Dive Classification:

- Scientific Dives: Dives that meet the scientific diving exemption as defined in 29 CFR 1910.402. Diving tasks traditionally associated with a specific scientific discipline are considered a scientific dive. Construction and trouble-shooting tasks traditionally associated with commercial diving are not considered a scientific dive.
- Training and Proficiency Dives: Dives performed as part of a scientific diver-training program, or dives performed in maintenance of a scientific diving certification/authorization.

#### Breathing Gas:

- Air: Dives where the bottom gas used for the dive is air.
- Nitrox: Dives where the bottom gas used for the dive is a combination of nitrogen and oxygen percentages different from those of air.
- Mixed Gas: Dives where the bottom gas used for the dive is a combination of oxygen, nitrogen, and helium (or other inert gas), or any other breathing gas combination not classified as air or nitrox.

#### Diving Mode:

- Open Circuit SCUBA: Dives where the breathing gas is inhaled from a self-contained underwater breathing apparatus and all of the exhaled gas leaves the breathing loop.
- Surface Supplied: Dives where the breathing gas is supplied from the surface by means of a pressurized umbilical hose. The umbilical generally consists of a gas supply hose, strength member, pneumofathometer hose, and communication line. The umbilical supplies a helmet or full-face mask. The diver may rely on the tender at the surface to monitor the divers' depth, time and diving profile.
- Hookah: While similar to Surface Supplied in that the breathing gas is supplied from the surface by means of a pressurized hose, the supply hose does not require a strength member, pneumofathometer hose, or communication line. Hookah equipment may be as simple as a long hose attached to a standard scuba cylinder supplying a standard scuba second stage. The diver is responsible for monitoring his/her own depth, time, and diving profile.
- Rebreathers: Dives where the breathing gas is repeatedly recycled in a breathing loop. The breathing loop may be fully closed or semi-closed. Note: A rebreather dive ending in an open circuit bailout is still logged as a rebreather dive.

#### Decompression Planning and Calculation Method:

- Dive Tables
- Dive Computer
- PC Based Decompression Software

#### Depth Ranges:

Depth ranges for sorting logged dives are: 0-30, 31-60, 61-100, 101-130, 131-150, 151-190, 191-250, 251-300, and 301->. Depths are in feet seawater (when measured in meters: 0-10, >10-30, >30-40, >40-45, >45-58, >58-76, >76-92, and >92->). A dive is logged to the maximum depth reached during the dive. Note: Only "The Number of Dives Logged" and "The Number of Divers Logging Dives" will be collected for this category.

#### Specialized Environments:

- Required Decompression: Any dive where the diver exceeds the no-decompression limit of the decompression planning method being employed.
- Overhead Environments: Any dive where the diver does not have direct access to the surface due to a physical obstruction.
- Blue Water Diving: Open water diving where the bottom is generally greater than 200 feet deep and requires the use of multiple tethers diving techniques.
- Ice and Polar Diving: Any dive conducted under ice or in polar conditions. Note: An Ice Dive would also be classified as an Overhead Environment dive.
- Saturation Diving: Excursion dives conducted as part of a saturation mission are to be logged by "classification", "mode", "gas", etc. The "surface" for these excursions is defined as leaving and surfacing within the Habitat. Time spent within the Habitat or chamber must not be logged by AAUS.
- Aquarium: An aquarium is a shallow, confined body of water, which is operated by or under the control of an institution and is used for the purposes of specimen exhibit, education, husbandry, or research (Not a swimming pool).

#### Incident Types:

- Hyperbaric: Decompression Sickness, AGE, or other barotrauma requiring recompression therapy.
- Barotrauma: Barotrauma requiring medical attention from a physician or medical facility, but not requiring recompression therapy.
- Injury: Any non-barotrauma injury occurring during a dive that requires medical attention from a physician or medical facility.
- Illness: Any illness requiring medical attention that can be attributed to diving.
- Near Drowning/ Hypoxia: An incident where a person asphyxiates to the minimum point of unconsciousness during a dive involving a compressed gas. But the person recovers.
- Hyperoxic/Oxygen Toxicity: An incident that can be attributed to the diver being exposed to too high a partial pressure of oxygen.
- Hypercapnea: An incident that can be attributed to the diver being exposed to an excess of carbon dioxide.
- Fatality: Any death accruing during a dive or resulting from the diving exposure.
- Other: An incident that does not fit one of the listed incident types

Incident Classification Rating Scale:

- Minor: Injuries that the OM considers being minor in nature. Examples of this classification of incident would include, but not be limited to:
  - Mask squeeze that produced discoloration of the eyes.
  - Lacerations requiring medical attention but not involving moderate or severe bleeding.
  - Other injuries that would not be expected to produce long term adverse effects on the diver's health or diving status.
- Moderate: Injuries that the OM considers being moderate in nature. Examples of this classification would include, but not be limited to:
  - DCS symptoms that resolved with the administration of oxygen, hyperbaric treatment given as a precaution.
  - DCS symptoms resolved with the first hyperbaric treatment.
  - Broken bones.
  - Torn ligaments or cartilage.
  - Concussion.
  - Ear barotrauma requiring surgical repair.
- Serious: Injuries that the OM considers being serious in nature. Examples of this classification would include, but not be limited to:
  - Arterial Gas Embolism.
  - DCS symptoms requiring multiple hyperbaric treatment.
  - Near drowning.
  - Oxygen Toxicity.
  - Hypercapnea.
  - Spinal injuries.
  - Heart attack.
  - Fatality.

## APPENDIX L Glossary and Abbreviations

ATA	Atmosphere. A measurement of pressure.
Bail-out system	An independent air supply worn and activated by a diver to counter an out of air, low on air or contaminated air situation. Also referred to as an 'emergency air supply'.
BCD	Buoyancy control device.
Bottle bank	A group of two or more high pressure breathing air cylinders, yoked together and used in conjunction with a regulator to deliver air to a diver.
Bottom time (BT)	The total elapsed time from when a diver leaves the surface to the time (next whole minute) at which ascent is commenced, measured in minutes.
Breathing hoses	Hoses attached to a regulator that is designed to supply air to the diver and operate at near ambient pressure.
Buddy diver	A member of a group of two or three divers.
Buddy line	A line used to connect two or more divers, allowing them to maintain contact.
Combined dive	The bottom times of more than one dive, added together and treated as bottom time for a single dive for the purposes of determining decompression requirements. DCIEM tables say surface interval of less than 15 minutes are combined.
Competency equivalent	A level of competency in a specific task attained through training and experience that is equal to that a qualification required to perform that task.
Competent person	A person who has acquired, through training, qualifications or experience (or combination of these) the knowledge and skills to enable that person to safely perform a specified task.
Compression (recompression) chamber	A surface chamber in which persons may be subject to pressures equivalent to or greater than those experienced underwater, or which simulate those experienced on an actual dive. Hyperbaric chamber also.
CPR	Cardio pulmonary resuscitation.
Current line	A line deployed behind a boat in conditions of strong current to facilitate the recovery of divers from the water. Also called a 'Mermaid Catcher'.



DAN	Diver's Alert Network.
Decompression illness (DCI/DCS)	The term covers the conditions known as decompression sickness (bends) and arterial gas embolism, but does not include barotrauma of ascent. Results from the formation of gas bubbles in the body.
Decompression schedule	A specific decompression procedure enumerated as 'stops' (see below) for a given combination of depth and bottom time as listed in a decompression table.
Decompression stop	The specified length of time which a diver must spend at a specified depth to allow for the elimination of sufficient inert gas from the body to allow safe ascent to the next decompression stop or the surface.
DCIEM	Canadian Defence and Civil Institute of Environmental Medicine.
DCIEM Tables	Decompression tables developed by DCIEM. To be used for Flinders University diving operations.
Dive Coordinator (DC)	The nominated supervisor responsible for the safe conduct and overall running of the on-site diving/ snorkelling operation. Must be experienced in the type of diving work to be supervised and approved by the relevant College Dean on the recommendation of the Maritime Safety Dive Officer.
Diving Day	A 24-hour period during which dives are undertaken.
Dive Float	A highly visible dive float with attached dive flag generally tethered to the diver or seabed through rope or cord to mark the divers location. Note, also referred to as a Float line.
Dive Leader (DL)	The Dive Leader is the 'in water' leader of a dive team. The Dive Leader must be nominated by the Dive Coordinator and must be the person most qualified/ experienced for the conditions, tasks and equipment of the planned dive.
Diving/ Snorkelling Plan (or Dive Plan)	An operational plan prepared by the Dive Coordinator for a dive or snorkelling operation. A Diving/ Snorkelling plan must be prepared and submitted for every Flinders University dive which requires the MSDO and relevant College Dean approval prior to commencement of diving.
Daily Dive Log	Form, used to record details of each dive for every diver.
Diver Register	A listing of all divers experienced and qualified to dive for Flinders University according to these procedures – maintained by the Maritime Safety Dive Officer.

Dive Team	The total number of personnel directly involved in any diving operation.
Dive Master (DM)	A Dive Master is an individual who has received training to a high level from one of the recreational diver training organisations Competencies generally expressed in AS 4005.2 (named Recreational Dive Supervisor)
Dive Medical	<ol style="list-style-type: none"> <li>1. Occupational / Commercial AS 2299.1; (for SCUBA Diving) renewed 12 monthly. Must be by a Doctor qualified in underwater medicine.</li> <li>2. Recreational Diving Medical as per AS 4005.1; (snorkelling &amp; volunteer only) must be by a Doctor qualified in underwater medicine.</li> </ol>
Diving Officer (DO)	Aka, Maritime Safety Dive Officer, See 'MSDO'.
Diving Operation	Where personnel from Flinders University undertake a trip for the purpose of scientific or related underwater diving. The operation includes all time devoted to the trip, including preparation before departure, and the subsequent reporting phase on return.
Effective bottom time (EBT)	The product of a diver's actual bottom time for a dive, multiplied by their Repetitive Factor at the start of the dive (from any previous exposure to > than ambient pressure).
Effective depth	For a dive at altitude, the depth of an equivalent dive at sea level.
Emergency air supply	See 'bail-out system'.
Exceptional exposure dive	A dive where the maximum recommended dive time for a particular depth (shown by the limiting line in the decompression tables being used) is exceeded by a diver at that depth.
Field Trip Leader	Person with overall responsibility for the conduct of a field trip. Note, has no authority over any decision made by a Dive Coordinator during the conduct of any diving operation.
Flinders University Diver	Any Flinders University staff member or student, listed on the Flinders University Diver Register, who is undertaking a dive on behalf of the University.
Free flow primary air supply	A surface supplied breathing method in which air enters the helmet/mask in a continuous flow, and is not controlled by a demand regulator.

Incident	Any unplanned event that has the potential for damage, loss or injury to personnel and/or equipment and machinery. Also includes near miss.
Lifeline	A line of not less than 8 mm diameter attached to the diver at one end and tended from the surface at the other, which is capable of being used to haul the diver to the surface.
Limiting line	A line shown in some decompression tables, which indicates time limits (bottom times) beyond which the decompression tables shown are less safe.
Main air supply	The main supply of any diver's breathing air, including air delivery from SCUBA cylinders, low pressure compressors or 'bottle banks.
Mermaid Catcher	See Current Line, above.
Mother Ship	A vessel (generally large) used as a base in remote areas, from which smaller vessels are used to conduct field or diving operations.
MSDO	Maritime Safety Dive Officer. Provide oversight for managing boating and diving operations undertaken at Flinders University.
NAUI	National Association of Underwater Instructors - a diver training organization.
Night diving	Any diving operation conducted in the hours of darkness, including 1 hour prior to sunset and 1 hour after sunrise.
NQS	National Qualification Scheme. A National system set up to ensure a minimum level of training in various fields (e.g. recreational SCUBA training).
PADI	Professional Association of Diving Instructors world-wide diving instruction and training business.
Post Dive	Confirm the dive has been completed as per Diving/ Snorkelling plan. Information recorded on Diving Safety log. If there were issues this should also be recorded.
Quick release	Able to be immediately released from closed position by the single operation of one hand.
Remote dive site	Any area of diving operation greater than 30 minutes from medical assistance.
Repetitive dive	Any dive conducted after a surface interval from a previous dive of more than 15 min. and less than 18 hours, or that has a repetitive factor at the start of the dive of greater than 1.0.

Repetitive factor (RF)	Using the short form DCIEM air decompression dive tables, a figure determined by the repetitive dive group (RG), and the length of the surface interval after a dive, and used for repetitive diving.
Repetitive group (RG)	After a dive conducted using the short form DCIEM air decompression dive tables, every diver will fall into a Repetitive Group category - determined by the dives they have completed in the previous 18 hrs.
Reserve air supply	The quantity of air that will enable a diver to return safely to the surface from the planned depth of the dive, completing all planned decompression stops.
Residual nitrogen	The nitrogen that remains dissolved in a diver's body tissues after the diver has surfaced.
Risk Assessment	A process of identifying and setting up mechanisms for dealing with all risks involved in a particular field operation. It must be carried out for every College diving operation.
Safety Line	Lifeline, Buddy Line, Float Line or Current Line.
Saturation	That condition where a person's body tissues are totally saturated with the particular inert gas element of the breathing medium in use.
Scientific diving	Diving performed for the purpose of professional scientific research, natural & cultural heritage resource management, or scientific research as an educational activity.
SCUBA	Self-Contained Underwater Breathing Apparatus. Equipment designed to deliver air to a diver, using an open circuit system independent of the surface.
Shot rope	A rope running vertically from the surface (dive control position) and fixed to the worksite or bottom with a weight or attachment. The rope is marked with depth graduations to facilitate decompression stops at the correct depth. See also 'lazy shot'.
SI	Surface interval. Time between surfacing from one dive and commencing the next. If the SI is less than 15 minutes, then the second 'dive' is deemed a continuation of the first dive.
Snorkelling	'Free swimming' diving, or duck-diving - where fins and a mask and snorkel are used. Breath-hold diving.
Snorkel Leader	The Snorkel Leader is the 'in water' leader of a Snorkelling group. The Snorkel Leader must be nominated by the Dive Coordinator and must be the person most qualified/ experienced for the conditions, tasks and equipment of the planned snorkel.

Surface Marker Buoy (SMB)	A high visibility inflatable position signalling device with spool and line which can be diver deployed. Also referred to as a Safety Sausage.
SPUMS	South Pacific Underwater Medicine Society. Organization of medical professionals regulating diving medicine activities in Australasia.
Stand-by Diver	A diver sitting topside at the dive location capable of rendering assistance to a diver in the water in an emergency situation. This is usually the Surface Attendant
SSBA	Surface Supplied Breathing Apparatus. Equipment delivering air to diver from the surface.
SSI	SCUBA Colleges International – a diver training organization.
Surface Attendant (SA)	A diver’s attendant, who does not enter the water. Must maintain active watch on the dive team and assist the diving group get into and out of the water. May be required to assist in an emergency.
Tethered mode (in relation to SCUBA diving)	SCUBA diving in which a diver is secured by a lifeline and tended by a diver’s attendant, or is secured to a tended float line.
University Diving Procedures	Term used in this manual to encapsulate all Flinders University diving procedures. University diving Procedures are made up of the Flinders University Diving and Snorkelling Safety Procedure, all diving and snorkelling forms, SWP, diving webpage and this manual.
Visiting Diver	A trained, certified visiting diver (not a Flinders University student or staff member) who performs tasks relevant to scientific diving, who has a current diving medical certification and who is permitted to dive with the University by the MSDO during his/her visit.
Volunteer Diver	A person not otherwise associated with Flinders University, who has volunteered to assist with diving, and meets the requirements necessary to be listed on the Diver Register.
Within 6 months	Some diver classifications have noted that particular certifications “are required within 6 months” (section 4); this means that the diver is required to receive that training within 6 months of their first dive with the University. This allows people time to fit into normal training schedules or some leeway to find the appropriate trainer or provider.
Working ‘live’	Where a vessel being used in the conduct of a diving operation is under power whilst Divers are in the water.

## APPENDIX M      References

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