

#### Components

NAME	DESCRIPTION	AUDIENCE
	<i>Diving adaptations</i> teachers guide	This guide suggests how to use the learning object and worksheets to explain adaptations through the context of air-breathing animals that dive to depth.
	<i>Challenges of diving to depth</i> background sheet	This background sheet for teachers provides information on major challenges facing air-breathing diving animals. It describes adaptations for oxygen storage and efficient oxygen use.
	<i>Sink or swim</i> learning object	Students investigate structural, physiological and behavioural adaptations of air-breathing diving animals. Three mammals, a bird and a reptile are compared to show how adaptations meet challenges of diving.
	<i>Diving to depth</i> worksheet	Students record data from the learning object, <i>Sink or swim</i> , on this worksheet. It includes questions about adaptations of air-breathing diving animals.

#### Purpose

To Explain structural, physiological and behavioural adaptations that enable air-breathing, diving animals to meet challenges of diving in a marine environment.

#### Outcomes

Students:

- explain that adaptations enhance an animal's ability to survive in a particular environment;
- understand that air-breathing diving animals have different adaptations that enable them to meet challenges of the marine environment; and
- identify and interpret the type of adaptation of each animal (structural, physiological and behavioural) and how they function in the marine environment.

#### Activity summary

ACTIVITY	POSSIBLE STRATEGY
Students access the learning object, <i>Sink or swim</i> . Teacher hands out part 1 of the worksheet, <i>Diving to depth</i> .	individually, or in pairs as resources permit Students record data, presented in the learning object, on the worksheet.
Teacher distributes part 2 of the worksheet, <i>Diving to depth</i> .	individually or in small groups This may be completed in class, or as homework.

#### Technical requirements

The learning object requires Adobe Flash (version 9 or later), which is a free download from [adobe.com](http://adobe.com). The teachers guide, background sheet and worksheet require Adobe Reader (version 5 or later), which is a free download from [www.adobe.com](http://www.adobe.com). The worksheet is also available in Microsoft Word format.

## Teachers notes

The learning object allows students to explore diving adaptations of five different species and make predictions regarding diving feats each animal might achieve.

Students are asked to reassess their diving predictions, on completion of the learning object, in light of information delivered regarding oxygen storage and use. Students record data from the learning object onto part 1 of the worksheet. Part II provides the opportunity to further analyse and interpret this data.

The learning object presents, for comparative purposes, the diving ability of a human freediver. To explore freediving further we recommend the websites [www.verticalblue.net](http://www.verticalblue.net) and [www.aidainternational.org](http://www.aidainternational.org).

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Web: [spice.wa.edu.au](http://spice.wa.edu.au)

Email: [spice@uwa.edu.au](mailto:spice@uwa.edu.au)

Phone: (08) 6488 3917

Centre for Learning Technology (M016)

The University of Western Australia

35 Stirling Highway

Crawley WA 6009

banner image: 'banded sea snake' by Julie Bedford, NOAA

## Associated SPICE resources

*Adaptations 5: Diving adaptations* may be used in conjunction with related SPICE resources to study structural, physiological and behavioural adaptations.

DESCRIPTION	LEARNING PURPOSE
<i>Adaptations (overview)</i>  This learning pathway shows how a number of SPICE resources can be combined to teach the concept of adaptations in plants and animals.	
<i>Adaptations 1: Defining adaptations</i>  An interactive quiz encourages students to differentiate between different types of adaptation: structural, behavioural or physiological.	Engage
<i>Adaptations 2: Emperor penguins</i>  Students conduct experiments to model structural, physiological and behavioural adaptations of emperor penguins.	Explore
<i>Adaptations 3: Barrow Island marsupials</i>  Students use a learning object to investigate adaptations of four marsupials that live on Barrow Island.	Explain
<i>Adaptations 4: Samphires</i>  A profile diagram of a lake provides students with an opportunity to determine which species of samphire would be mostly likely to survive in particular locations.	Explain
<i>Adaptations 5: Diving adaptations</i>  Students use a learning object to compare and contrast physiological, structural and behavioural adaptations of air-breathing diving animals.	Explain
<i>Adaptations 6: Freediving</i>  Students watch a video of a human freediver and consider differences between acclimatisation and adaptation. Students review risks of diving associated with pressure.	Elaborate