teachers guide

Food and energy 5: Animal release

Components

	NAME	DESCRIPTION	AUDIENCE
	Animal release teachers guide	This guide explains how to use an interactive learning object and worksheet to examine an organisms's energy requirements.	teachers
	Species re-introduction fact sheet	This fact sheet provides information on the threats facing many of our native species and techniques scientists may use to combat their decline.	students
	Animal release learning object	Students assemble diverse information to make an informed decision on the selection of the best honey possum release site.	students
	Honey possum challenge worksheet	This structured worksheet guides students through the learning object, *Animal release*. Questions encourage students to make an informed decision on which site offers the best chance of a successful re-introduction program.	students

Purpose

- To introduce students to the complex nature of re-introduction programs.
- To elaborate on student understandings of energy requirements by examining how scientists use this knowledge to make informed decisions on an organism's habitat requirements.

Outcomes

Students:

- understand that many native species are under threat and that a re-introduction is just one technique scientists can use to ensure a species survival;
- realise that re-introductions require extensive research into a species' biology and ecology, including habitat requirements and threats;
- appreciate that preserving a habitat is preferable to attempting to rebuild that habitat and re-introduce a species at a later date; and
- make an informed decision on which honey possum release site provides the best chance of re-introduction success.

Activity summary

ACTIVITY	POSSIBLE STRATEGY
Students read the fact sheet, *Species re-introduction* then consider questions given in Using the fact sheet, below.	teacher-led whole class discussion
Students use the learning object, *Animal release*, to complete its associated worksheet, *Honey possum challenge*.	students complete individually or in pairs

Technical requirements

The learning object requires Adobe Flash Player version 9 or later, which is a free download from adobe.com.

The teachers guide, fact sheet and worksheets require Adobe Reader (version 5 or later), which is a free download from www.adobe.com. The worksheet is also available in Microsoft Word format.

Using the fact sheet, *Species re-introduction*

The fact sheet introduces concepts of re-introduction as a conservation technique. It discusses the depth of knowledge scientists require to make informed decisions and the need for laboratory and fieldwork to achieve this.

At the end of the fact sheet students are asked to discuss the potential benefits and drawbacks of re-introductions. The discussion might cover…

Benefits

- increased chance of species survival
- restoration of natural biodiversity
- increased awareness of conservation issues
- economic benefits to an area, through increased tourism

Drawbacks

- considerable long-term costs in research, release and monitoring programs
- failed re-introduction means loss of precious individuals from the source population
- inadvertent introduction of disease by donor animals
- unexpected negative effects on other species from re-introduced animals
- negative impact on the source population due to removal of individuals

Possible reasons for re-introductions to fail

- unsuccessful control of threats
- degradation or change to the species' preferred habitat
- natural disaster
- a release population that is too small, or genetically different from the original population
- a captive-bred release population that has lost behaviours needed to survive in the wild

Using the learning object, *Animal release,* and its worksheet

The learning object and associated worksheet guides students through the habitat requirements of a honey possum, and threats that can cause their population to decline. It is designed to mimic the information routinely considered by conservation scientists, although the process has been simplified.

Photographs, maps, dieback and vegetation data are generalised and may not exactly reflect the true conditions in the named parks. However, the data used in *Animal release* are based on authentic research data that have also been simplified.

The learning object is structured in a series of screens. Students interact with activities and information on each screen, and note useful data in an associated worksheet. They use second-hand data to calculate food resources available to honey possums at different sites. All information is then prioritised to select the best re-introduction site for a population of honey possums.

A large number of assumptions have been made in the learning object. It is important that these are brought out through discussion with the students to minimise any misconceptions and to allow the students to glimpse the complexity of any human intervention in the natural environment.

Students should be made aware of the limitations of the dieback maps. As explained by Annabelle Bushell at Project Dieback:

> This dataset has been derived from several sources. The background data were mapped early in the 1970s from broad scale (1:40 000) black and white aerial photographs with ground-truthing. These background data have been progressively superseded since 1976 by mapping derived from large scale aerial photography (1:4,500) and intensive ground survey. The current strategic mapping was created in 2005 from colour aerial photography (1993 to 1996) and black and white aerial photography (1986) at various scales (1:4500; 1:25 000 and 1:100 000) with limited ground-truthing. Geographic extent is remnant vegetation within the 400 mm+ rainfall isohyets.
>
> The accuracy of the background post-1976 and strategic mapping data is highly variable and cannot be used for operational decisions and planning. Additionally, given that the data is not current, disease categories for areas may have changed and it is likely disease boundaries have extended. Ground-truthing is required before operational decisions can be made."

Further assumptions that have been made in the learning object include:

- All sites are empty of honey possums. In reality honey possums are present in many of the areas used in the learning object.
- Nectar concentrations have been estimated, based on published data.
- Honey possum energy intake has been restricted to nectar. In reality they consume a mixture of nectar and pollen.
- Territorial requirements have been ignored.
- Minimum viable population to ensure long-term survival has been ignored.

Honey possums aren't currently listed as threatened and there are no plans to carry out re-introductions, however their future does not look entirely rosy. Their habitat is unique. Nowhere else in the world is there the same year-round diversity of flowering plants.

Unfortunately the conservative nature of their diet, sensitivity to dieback, feral predators, fires and decreasing rainfall, all combine to make honey possums vulnerable to change. Land clearance, weed invasion, illegal grazing, increased soil salinity and over picking for the cut flower industry all add to the pressure, reducing or degrading the remaining habitat.

Today's challenge is to find a balance between the conservation of this unique habitat and its occupants and the desire for ongoing economic development.

The learning object makes a random selection of four sites from a bank of 12. In each case, selected sites will include one from group A, two from group B and one from group C. Group A sites are all suitable for honey possum re-introduction; group B sites less suitable; and group C sites the least appropriate.

GROUP A	GROUP B	GROUP C
Scott National Park	Fitzgerald River National Park 1	Kings Park
Two Peoples Bay Nature Reserve	Fitzgerald River National Park 2	Whiteman Park
West Cape Howe National Park	Lesueur National Park	Yanchep National Park
	Nambung National Park	
	Stirling Range National Park	
	Torndirrup National Park	

Image credits

Species re-introduction

'Dodo' by Pearson Scott Foresman, PD, commons.wikimedia.org/wiki/File:Dodo_2_(PSF).png

'Rabbit-proof fence in 2005' by Roguengineer, GFDL, commons.wikimedia.org/wiki/File:Rabbit_proof_fence_in_2005.jpg

'Thylacine in 1928' photographed at Hobart Zoo in 1928 by B Sheppard, PD, commons.wikimedia.org/wiki/File:Tasmanian_wolf.jpg

additional photography by Paul Ricketts, Michael Wheatley and Helen Billiald.

Animal release

'Visible Earth – Western Australia' by Jeff Schmaltz / NASA, PD-USGOV-NASA, visibleearth.nasa.gov/view_rec.php?id=8167

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'Yanchep National Park wildflowers' by BoundaryRider, CC-BY-SA-3.0, commons.wikimedia.org/wiki/File:Yanchep_National_Park_wildflowers.JPG

'Yanchep National Park' by Ausxan, PD, commons.wikimedia.org/wiki/File:Yanchep_National_Park_3.jpg

'*Grevillea preissii gnangarra*' by Gnangarra, CC-BY-2.5 Australia, commons.wikimedia.org/wiki/File:Grevillea_preissii_gnangarra_02.JPG

'Whiteman Park village' by Gnangarra, CC-BY-2.5 Australia, commons.wikimedia.org/wiki/File:Whiteman-park_village_st_gnangarra.jpg

'*Banksia attenuata*' by Hesperian, GFDL, commons.wikimedia.org/wiki/File:Banksia_attenuata_tree.JPG

'*Scholtzia involucrate*' by Hach3, GFDL, commons.wikimedia.org/wiki/File:Scholtzia_involucrate.jpg

'*Dryandra cirsioides*' by MainlandQuokka, GFDL, commons.wikimedia.org/wiki/File:Dryandra_cirsioides-4.JPG

'Fitzgerald River National Park' by Brian Voon Yee Yap. GFDL, commons.wikimedia.org/wiki/File:Fitzgerald_River_National_Park_DSC04436.JPG

additional photography by Don Bradshaw, Jane Ganfield, Helen Billiald and Michael Wheatley.

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Web: spice.wa.edu.au
Email: spice@uwa.edu.au
Phone: (08) 6488 3917

Centre for Learning Technology (M016)
The University of Western Australia
35 Stirling Highway
Crawley WA 6009

Associated SPICE resources

Food and energy 5: Animal release may be used in conjunction with related SPICE resources to address the broader topic of how scientists determine energy requirements of a species.

DESCRIPTION	LEARNING PURPOSE
Food and energy (overview) This learning pathway shows how a number of SPICE resources may be combined to teach the topic of food and energy.	
Food and energy 1: The honey possum In a video interview, zoologist Professor Don Bradshaw tells how he became interested in the honey possum, a rare and unusual Australian marsupial, and describes some of their unique adaptations.	**Engage**
Food and energy 2: Pollen Students use a virtual microscope to examine pollen from a range of plants, measure the size of pollen grains, and learn about features such as pore width and cell wall width.	**Explore**
Food and energy 3: Fauna surveys Students explore factors controlling abundance and distribution of organisms, and occupation of particular habitats.	**Explore**
Food and energy 4: Honey possum respiration Students use a worksheet to explore the process of respiration in heterotrophic organisms.	**Explain**
Food and energy 5: Animal release Students answer questions to identify an environment that will effectively sustain a released population of honey possums.	**Elaborate**