

## Programming information for depth studies based on Field of Mars EEC Biology excursions

Information for teachers who have booked a [Field of Mars](#) Biology excursion for their Year 11 students in 2018

### 1. Depth Study organisation at a glance:

Timing	Working Scientifically Skills	Activity	Inquiry type
<b>2 hours</b> Pre-excursion work	Questioning and predicting  Planning investigations	<ul style="list-style-type: none"> <li>- Watch resource videos (see following pages)</li> <li>- Examine inquiry questions</li> <li>- Introduction to worksheet</li> <li>- Examine spatial information (Google map, Photos, Google earth tour)</li> <li>- Field study prep quiz</li> </ul>	Teacher guided (in class)
<b>5 hours</b> Excursion fieldwork	Conducting investigations	<ul style="list-style-type: none"> <li>- Field study excursion with Field of Mars EEC</li> <li>- Students conduct field work and collect first hand data and information</li> <li>- Data: 1. Invertebrate survey, 2. Scats, 3. % Ground cover, 4. Soil texture &amp; pH, 5. Abiotic factors</li> </ul>	EEC Teacher guided (in the field)
	Processing data and information	<ul style="list-style-type: none"> <li>- Process and analyse fieldwork data and information</li> <li>- Students make their own investigation process analysis</li> <li>- Assess human actions and associated environmental impacts for future management</li> </ul>	Student guided (in the field/ some in class)
<b>4 – 7 hrs</b> Post - excursion depth study work	Analysing data and information  Problem solving	<ul style="list-style-type: none"> <li>- Further investigate or commence a particular inquiry or area of interest inspired or prompted by the original modelled fieldwork investigation.</li> <li>- Depth Study Inquiry questions can be simple or complex depending on your class needs:</li> </ul> <p>Simple example inquiry questions:</p> <ul style="list-style-type: none"> <li>- How has human activity impacted the Sugarloaf point ecosystem?</li> <li>- How should the ecosystems at the Sugarloaf study sites be managed for maximum biodiversity?</li> </ul> <p>Complex example inquiry question:</p> <ul style="list-style-type: none"> <li>- What are the potential impacts on the red-crowned toadlet populations in northern Sydney of the increased brush turkey populations that have resulted from successful fox-baiting programs?</li> </ul>	Teacher/Student Guided (in class)
<b>1 – 4 hrs</b> Depth study assessment	Communicating	<ul style="list-style-type: none"> <li>- Prepare and deliver a communication piece for a specific audience: For example: field study report, mock media story, management plan or funding proposal.</li> <li>- Alternately set an open book exam with extended response questions that focus on communicating the qualitative and quantitative data as well as findings of the Depth study inquiry</li> </ul>	Student guided or Open Inquiry

## 2. Specific programming information and resources

Teachers can simply “cut and paste” from this document into their Stage 6 programming for **Modules 3, 4** and **Depth studies**.

Content:	Teaching and learning:	Timing
<p><b>Module 3 (K+U):</b></p> <ul style="list-style-type: none"> <li>- conduct practical investigations, individually or in teams, or use secondary sources to examine the adaptations of organisms that increase their ability to survive in their environment, including:               <ul style="list-style-type: none"> <li>structural adaptations</li> <li>physiological adaptations</li> <li>behavioural adaptations</li> </ul> </li> <li>- Explain modern-day examples that demonstrate evolutionary change</li> </ul>	<p><b>FIELD OF MARS EEC PRE-EXCURSION WORK:</b></p> <p><b>A series of videos (currently in production) that prepare students for the Excursion fieldwork</b></p> <p><b>VIDEO 1:</b> Introduction to Field of Mars EEC and the Bio excursion video resource series</p> <ul style="list-style-type: none"> <li>- How the video series fits with the syllabus</li> <li>- Field of Mars EEC</li> <li>- EEC staff</li> <li>- How the excursion and subsequent depth study process works</li> <li>- List of videos in the series</li> <li>- Link to, and explanation of, the excursion worksheet that will be used</li> </ul> <p><b>VIDEO 2:</b> Introduction to the Sugarloaf (the field study site):</p> <ul style="list-style-type: none"> <li>- Location</li> <li>- Spatial description</li> <li>- Biotic description</li> <li>- Abiotic description</li> <li>- Refer students to page of supporting resource links</li> </ul> <p><b>VIDEO 3:</b> Introduction to two organisms and their habitat niches at the study site:</p> <ul style="list-style-type: none"> <li>- Organism names and description</li> <li>- Habitat outline</li> <li>- Link some structural, behavioural and physiological adaptations to the preferred habitat</li> <li>- Refer students to page of supporting resource links</li> </ul> <p><b>PROPOSED VIDEO 3.5:</b> A more advanced version of video 3 video using the language of evolution (<i>adaptation, evolution, mutation, natural selection, rationale, trait</i>) that outlines the “selective pressures” on these two organisms at the study site</p>	<p>0.5 hr</p>

<p><b>Module 3 (Skills):</b></p> <ul style="list-style-type: none"> <li>- develops and evaluates questions and hypotheses for scientific investigation BIO11/12-1</li> <li>- designs and evaluates investigations in order to obtain primary and secondary data and information BIO11/12-2</li> <li>- communicates scientific understanding using suitable language and terminology for a specific audience or purpose BIO11/12-7</li> </ul>	<p><b>VIDEO 4:</b> Introduction to the questioning, planning, conducting investigation processes that will be used on the excursion, as well as the likely audiences whom we may be communicating our findings to.</p> <p><b>NOTE:</b> Video 4 may be split into two shorter videos</p> <p>There will also be separate spatial information sources: (Google map, Photos, Google earth tour)</p>	
<p><b>Module 3 (K+U):</b></p> <ul style="list-style-type: none"> <li>- conducts practical investigations, individually or in teams, or use secondary sources to examine the adaptations of organisms that increase their ability to survive in their environment, including: <ul style="list-style-type: none"> <li>- structural adaptations</li> <li>- physiological adaptations</li> <li>- behavioural adaptations</li> </ul> </li> <li>- Explain modern-day examples that demonstrate evolutionary change</li> </ul>	<p><b>FIELD OF MARS EEC FIELDWORK EXCURSION (Module 3 content):</b></p> <ul style="list-style-type: none"> <li>- Adaptations of two species (Red-crowned Toadlet and Long-Nosed Bandicoot)</li> <li>- Biotic and abiotic investigation of two habitat sites</li> <li>- Comparing and contrasting these two sites to help explain the selective pressures influencing these organisms at the Sugarloaf site.</li> </ul> <p><b>NOTE:</b> The Fieldwork component is worth 5 hrs of depth study time. (Module 3 - 2 hrs + Module 4 – 3 hrs)</p>	2 hrs fieldwork
<p><b>Module 4 (K+U):</b></p> <p>Investigate and determine relationships between biotic and abiotic factors in an ecosystem, including:</p> <ul style="list-style-type: none"> <li>- the impact of abiotic factors</li> <li>- the impact of biotic factors, including predation, competition and symbiotic relationships</li> <li>- the ecological niches occupied by species</li> <li>- predicting consequences for populations in ecosystems due to predation, competition, symbiosis and disease (ACSBL019, ACSBL020)</li> </ul>	<p><b>FIELD OF MARS EEC PRE-EXCURSION WORK:</b></p> <p><b>VIDEO 5:</b> Introduction to Abiotic factors at the Sugarloaf excursion study site:</p> <ul style="list-style-type: none"> <li>- Introduction to the ecological niches and species that we will be focussing on at the field study sites.</li> <li>- Climate data, flow charts showing how abiotic factors are important to these ecological niches.</li> <li>- Refer students to page of supporting resource links</li> </ul> <p><b>VIDEO 6:</b> Introduction to Biotic factors at the excursion study site:</p>	0.5 hr

<p>explain a recent extinction event (ACSBLO24)  - measuring populations of organisms using sampling techniques (ACSBLO03, ACSBLO15)</p>	<ul style="list-style-type: none"> <li>- Food chains, predator-prey, competition, breeding seasons, symbiotic relationships, disease</li> <li>- Brief analysis of a local extinction event: Where have the Goannas gone?</li> <li>- Refer students to page of supporting resource links</li> </ul>	
<p><b>Module 4 (Skills):</b>  develops and evaluates questions and hypotheses for scientific investigation BIO11/12-1</p> <p>designs and evaluates investigations in order to obtain primary and secondary data and information BIO11/12-2</p> <ul style="list-style-type: none"> <li>- conducts investigations to collect valid and reliable primary and secondary data and information BIO11/12-3</li> <li>- selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media BIO11/12-4</li> <li>- analyses and evaluates primary and secondary data and information BIO11/12-5</li> </ul>	<p><b>FIELD OF MARS EEC PRE-EXCURSION WORK:</b></p> <p><b>VIDEO 7: Meet an ecologist Part 1.</b></p> <ul style="list-style-type: none"> <li>- What does a consulting Ecologist do?</li> <li>- Who do they work for?</li> <li>- What does their work look like (Fieldwork - data analysis - Report preparation &amp; writing)</li> <li>- How do they identify data sources that will allow them to address the inquiry questions.</li> <li>- Diff between qualitative and Quantitative data</li> <li>- Discussion of what constitutes valid and reliable data</li> <li>- What does it look like when they “process” data</li> </ul> <p><b>NOTE:</b> This may be split into two shorter videos and a page of supporting resource links</p> <p><b>VIDEO 8: Meet an ecologist Part 2.</b></p> <ul style="list-style-type: none"> <li>- Biotic sampling methods</li> <li>- How to Identify target spp and come up with a fieldwork plan</li> <li>- Considerations for validity and reliability of results</li> <li>- Methods: Quadrat, surveys, hair tubes, wildlife cameras, anabat detectors etc</li> </ul> <p><b>VIDEO 9: Meet an ecologist Part 3.</b></p> <ul style="list-style-type: none"> <li>- Introduction to Abiotic sampling methodologies and instruments</li> <li>- Basic introduction to each factor, instruments and their usage as well as possible error</li> </ul>	<p>1 hr</p>

	<b>VIDEOS 10-12:</b> How to use the different Field of Mars EEC instruments and data management methods that will be used on the Excursion. Including notes on error and reliability.	
<b>Module 4 (K+U):</b> investigate practices used to restore damaged ecosystems, Country or Place	<b>FIELD OF MARS EEC FIELDWORK EXCURSION (Module 4 content):</b>  <ul style="list-style-type: none"> <li>- Investigation of the human actions and their associated environmental impacts at the Sugarloaf study site</li> <li>- Investigation of current management challenges and actions at the Sugarloaf study site</li> </ul>	1 hr
<b>Module 4 (K+U):</b> Analyse evidence that present-day organisms have evolved from organisms in the past by examining and interpreting a range of secondary sources to evaluate processes, claims and conclusions relating to the evolution of organisms in Australia, for example: (ACSBL027, ACSBL005) <ul style="list-style-type: none"> <li>- small mammals</li> <li>- sclerophyll plants</li> </ul> investigate the reasons for changes in past ecosystems, by: <ul style="list-style-type: none"> <li>- interpreting a range of secondary sources to develop an understanding of the changes in biotic and abiotic factors over short and long periods of time (ACSBL025, ACSBL026)</li> <li>- evaluating hypotheses that account for identified trends (ACSBL001)</li> </ul>	<b>FIELD OF MARS EEC FIELDWORK EXCURSION (Module 4 content):</b>  <ul style="list-style-type: none"> <li>- Adaptations of the Long-nosed Bandicoot</li> <li>- Evolutionary phylogeny and the differences of opinion regarding evolutionary origin. <i>The Bandicoots are of the order Peramelemorphia. Current knowledge of the evolution of this order involves a controversy of whether it's members were evolved from <a href="#">Dasyuromorphia</a> (carnivores) or <a href="#">Diprotodontia</a> (herbivores)</i></li> <li>- Adaptations of Sclerophyll plants – linked to their evolution</li> <li>- Summary of how this study site has changed (Biotic and Abiotic) over short and long periods of time</li> </ul> <p><b>NOTE:</b> The Fieldwork component is worth 5 hrs of depth study time. (Module 3 - 2 hrs + Module 4 – 3 hrs)</p>	2 hr

<p><b>Depth study</b></p> <p><b>Content:</b></p> <p>Teacher chooses specific K + U content from Modules 3 &amp; 4 to be covered in depth. <i>(other content to be included where necessary for inquiry/task context)</i></p> <p><b>Skills:</b> <b>(Focus on skills 1, 7 &amp; two more)</b></p> <ol style="list-style-type: none"> <li>1. developing and evaluates questions and hypotheses for scientific investigation</li> <li>2. designing and evaluating investigations in order to obtain primary and secondary data and information</li> <li>3. conducting investigations to collect valid and reliable primary and secondary data and information</li> <li>4. selecting and processing appropriate qualitative and quantitative data and information using a range of appropriate media</li> <li>5. analysing and evaluating primary and secondary data and information</li> <li>6. solving scientific problems using primary and secondary data, critical thinking skills and scientific processes</li> <li>7. communicating scientific understanding using suitable language and terminology for a specific audience or purpose</li> </ol>	<p><b>Suggested Depth study inquiry questions:</b></p> <p>Simple example inquiry questions:</p> <ul style="list-style-type: none"> <li>- How has human activity impacted the Sugarloaf point ecosystem?</li> <li>- How should the ecosystems at the Sugarloaf study sites be managed for maximum biodiversity?</li> </ul> <p>Complex example inquiry question:</p> <ul style="list-style-type: none"> <li>- What are the potential impacts on the red-crowned toadlet populations in northern Sydney of the increased brush turkey populations that have resulted from successful fox-baiting programs?</li> </ul> <p><b>Assessable tasks:</b></p> <ul style="list-style-type: none"> <li>- Construct an information report addressing the above inquiry questions</li> <li>- Prepare an Environmental management plan addressing “key threatening processes at the field study site.</li> <li>- Prepare a public information product (eg pamphlet, video, podcast) addressing the above inquiry questions</li> <li>- Prepare a detailed timeline for the ecosystem studied: It’s past, present and future directions INCLUDING reference to the fieldwork processes</li> <li>- Media story: what does the future hold for Biodiversity management at the site?</li> <li>- Mock funding proposal for future management of the site</li> <li>- Open book exam based on Depth study. (Students can bring their own notes, excursion worksheet, etc. Field of Mars EEC can help you formulate task questions)</li> </ul>	<p>8 hrs total including assessment</p>
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