

EMS Program Steps	Australian Curriculum – Science Years 4-10	Elaborations
<ol style="list-style-type: none"> 1. Introduction to Biodiversity 2. Investigation of Local Marine Area 3. Marine Reserve Experience or Research 	<p>Year 4 Content Descriptions:</p> <p>Biological sciences</p> <p>Science Understanding:</p> <ul style="list-style-type: none"> • Living things have life cycles (ACSSU072) • Living things, including plants and animals, depend on each other and the environment to survive (ACSSU073) 	<ul style="list-style-type: none"> • Investigating how plants provide shelter for animals • Investigating the roles of living things in a habitat, for instance producers, consumers or decomposers • Observing and describing predator-prey relationships • Predicting the effects when living things in feeding relationships are removed or die out in an area • Recognising that interactions between living things may be competitive or mutually beneficial
<ol style="list-style-type: none"> 4. Comparisons between unprotected and fully protected areas 5. Education for Sustainability, Strong Conservation Focus 	<p>Science as Human Endeavour:</p> <ul style="list-style-type: none"> • Science involves making predictions and describing patterns and relationships (ACSHE061) • Science knowledge helps people to understand the effect of their actions (ACSHE062) 	<ul style="list-style-type: none"> • Exploring ways in which scientists gather evidence for their ideas and develop explanations • Considering how scientific practices such as sorting, classification and estimation are used by Aboriginal and Torres Strait Islander people in everyday life • Considering methods of waste management and how they can affect the environment • Exploring how science has contributed to a discussion about an issue such as loss of habitat for living things or how human

<p>6. Investigation of Local Marine Area</p>	<p>Science Inquiry Skills</p> <p>Questioning and predicting:</p> <ul style="list-style-type: none"> • With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge (AC SIS064) <p>Processing and analysing data and information:</p> <ul style="list-style-type: none"> • Compare results with predictions, suggesting possible reasons for findings (AC SIS216) <p>Communicating:</p> <ul style="list-style-type: none"> • Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports (AC SIS071) 	<p>activity has changed the local environment</p> <ul style="list-style-type: none"> • Working collaboratively to identify a problem to investigate • Communicating with other students carrying out similar investigations to share experiences and improve investigation skills • Using simple explanations and arguments, reports or graphical representations to communicate ideas to other students • Discussing how well predictions matched results from an investigation and proposing reasons for findings • Comparing, in small groups, proposed reasons for findings and explaining their reasoning
<p>1. Introduction to Biodiversity</p> <p>2. Investigation of Local Marine Area</p> <p>3. Marine Reserve Experience or Research</p>	<p>Year 5 Content Descriptions:</p> <p>Biological sciences</p> <p>Science Understanding</p> <ul style="list-style-type: none"> • Living things have structural features and adaptations that help them to survive in their environment (AC SSU043) 	<ul style="list-style-type: none"> • Explaining how particular adaptations help survival such as nocturnal behaviour, silvery coloured leaves of dune plants • Describing and listing adaptations of living things suited for particular Australian environments • Exploring general adaptations for particular environments

<p>4. Action for the Marine Environment</p> <p>5. Education for Sustainability, Strong Conservation Focus</p>	<p>Science as a Human Endeavour <i>Use and Influence of Science:</i></p> <ul style="list-style-type: none"> Scientific knowledge is used to inform personal and community decisions (ACSHE217) 	
<p>6. Comparisons Between Unprotected and Fully Protected Area</p>	<p>Science Inquiry Skills <i>Questioning and predicting:</i></p> <ul style="list-style-type: none"> With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (ACSIS232) <p><i>Processing and analysing data and information:</i></p> <ul style="list-style-type: none"> Compare data with predictions and use as evidence in developing explanations (ACSIS218) <p><i>Communicating:</i></p> <ul style="list-style-type: none"> Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports (ACSIS071) 	<ul style="list-style-type: none"> Working collaboratively to identify a problem to investigate Sharing ideas as to whether observations match predictions, and discussing possible reasons for predictions being incorrect Communicating with other students carrying out similar investigations to share experiences and improve investigation skills Using simple explanations and arguments, reports or graphical representations to communicate ideas to other students
<p>1. Introduction to Biodiversity</p> <p>2. Investigation of Local Marine Area</p> <p>3. Marine Reserve Experience or Research</p>	<p>Year 6 Content Descriptions Biological sciences Science Understanding</p> <ul style="list-style-type: none"> The growth and survival of living things are affected by the physical conditions of their environment (ACSSU094) 	<ul style="list-style-type: none"> Investigating how changing the physical conditions for plants impacts on their growth and survival Considering the effects of physical conditions causing migration and hibernation

<p>4. Action for the Marine Environment</p> <p>5. Education for Sustainability, Strong Conservation Focus</p>	<p>Science as a Human Endeavour <i>Use and Influence of Science:</i></p> <ul style="list-style-type: none"> Scientific knowledge is used to inform personal and community decisions (ACSHE217) 	
<p>6. Comparisons Between Unprotected and Fully Protected Area</p>	<p>Science Inquiry Skills <i>Questioning and predicting:</i></p> <ul style="list-style-type: none"> With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (ACSIS232) <p><i>Processing and analysing data and information:</i></p> <ul style="list-style-type: none"> Compare data with predictions and use as evidence in developing explanations (ACSIS218) Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts (ACSIS110) <p><i>Communicating:</i></p> <ul style="list-style-type: none"> Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts (ACSIS110) 	<ul style="list-style-type: none"> Working collaboratively to identify a problem to investigate Sharing ideas as to whether observations match predictions, and discussing possible reasons for predictions being incorrect Communicating with other students carrying out similar investigations to share experiences and improve investigation skills Using simple explanations and arguments, reports or graphical representations to communicate ideas to other students

<ol style="list-style-type: none"> 1. Introduction to Biodiversity 2. Investigation of Local Marine Area 3. Marine Reserve Experience or Research 	<p>Year 7 Content Descriptions Biological sciences</p> <p>Science Understanding</p> <ul style="list-style-type: none"> • There are differences within and between groups of organisms; classification helps organise this diversity (ACSSU111) • Interactions between organisms can be described in terms of food chains and food webs; human activity can affect these interactions (ACSSU112) 	<ul style="list-style-type: none"> • Considering the reasons for classifying such as identification and communication • Grouping a variety of organisms on the basis of similarities and differences in particular features • Classifying using hierarchical systems such as kingdom, phylum, class, order, family, genus, species • Using scientific conventions for naming species • Using provided keys to identify organisms surveyed in a local habitat
<ol style="list-style-type: none"> 4. Action for the Marine Environment 5. Education for Sustainability, Strong Conservation Focus 	<p>Science as a Human Endeavour Use and Influence of Science:</p> <ul style="list-style-type: none"> • Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management (ACSHE121) 	<ul style="list-style-type: none"> • Investigating how Aboriginal and Torres Strait Islander knowledge is being used to inform scientific decisions, for example care of waterways
<ol style="list-style-type: none"> 6. Comparisons Between Unprotected and Fully Protected Area 	<p>Science Inquiry Skills Questioning and predicting:</p> <ul style="list-style-type: none"> • Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (AC SIS124) 	<ul style="list-style-type: none"> • Working collaboratively to identify a problem to investigate • Recognising that the solution of some questions and problems requires consideration of social, cultural, economic or moral aspects rather than or as well as scientific investigation.

	<p>Planning and conducting:</p> <ul style="list-style-type: none"> Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS125) <p>Processing and analysing data and information:</p> <ul style="list-style-type: none"> Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate (AC SIS129) Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions (AC SIS130) <p>Communicating:</p> <ul style="list-style-type: none"> Communicate ideas, findings and solutions to problems Using scientific language and representations using digital technologies as appropriate (AC SIS133) 	<ul style="list-style-type: none"> Using information and knowledge from previous investigations to predict the expected results from an investigation Working collaboratively to decide how to approach an investigation Learning and applying specific skills and rules relating to the safe use of scientific equipment Identifying whether the use of their own observations and experiments or the use of other research materials is appropriate for their investigation Presenting the outcomes of research using effective forms of representation of data or ideas and scientific language that is appropriate for the target audience Using digital technologies to access information and to communicate and collaborate with others on and off site
<ol style="list-style-type: none"> Introduction to Biodiversity Investigation of Local Marine Area Marine Reserve Experience or Research 	<p>Year 8 Content Descriptions</p> <p>Biological sciences</p> <p>Science Understanding:</p> <ul style="list-style-type: none"> Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce (AC SSU150) 	<ul style="list-style-type: none"> Identifying the organs and overall function of a system of a multicellular organism in supporting the life processes Describing the structure of each organ in a system and relating its function to the overall function of the system Examining the specialised cells and tissues involved in structure and function of particular organs

		<ul style="list-style-type: none"> • Comparing similar systems in different organisms such as digestive systems in herbivores and carnivores, respiratory systems in fish and mammals • Distinguishing between asexual and sexual reproduction • Comparing reproductive systems of organisms
<p>4. Action for the Marine Environment</p> <p>5. Education for Sustainability, Strong Conservation Focus</p>	<p>Science as a Human Endeavour <i>Use and Influence of Science:</i></p> <ul style="list-style-type: none"> • Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management (ACSHE136) 	
<p>6. Comparisons Between Unprotected and Fully Protected Area</p>	<p>Science Inquiry Skills <i>Questioning and predicting:</i></p> <ul style="list-style-type: none"> • Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (AC SIS139) <p><i>Planning and conducting:</i> Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (AC SIS140)</p>	<ul style="list-style-type: none"> • Recognising that the solution of some questions and problems requires consideration of social, cultural, economic or moral aspects rather than or as well as scientific investigation • Using information and knowledge from their own investigations and secondary sources to predict the expected results from an investigation • Working collaboratively to decide how to best approach an investigation

	<p>Processing and analysing data and information:</p> <ul style="list-style-type: none"> Construct and use a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies (AC SIS144) Summarise data, from students' own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions (AC SIS145) <p>Evaluating:</p> <ul style="list-style-type: none"> Use scientific knowledge and findings from investigations to evaluate claims (AC SIS234) <p>Communicating</p> <ul style="list-style-type: none"> Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate (AC SIS148) 	<ul style="list-style-type: none"> Identifying any ethical considerations that may apply to the investigation Constructing tables, graphs, keys and models to represent relationships and trends in collected data Drawing conclusions based on a range of evidence including primary and secondary sources Identifying the scientific evidence available to evaluate claims Deciding whether or not to accept claims based on scientific evidence Using digital technologies to construct a range of text types to present science ideas Selecting and using appropriate language and representations to communicate science ideas within a specified text type and for a specified audience
<ol style="list-style-type: none"> 1. Introduction to Biodiversity 2. Investigation of Local Marine Area 3. Marine Reserve Experience or Research 	<p>Year 9 Content Descriptions</p> <p>Biological sciences</p> <p>Science Understanding</p> <ul style="list-style-type: none"> Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment (ACSSU175) Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176) 	<ul style="list-style-type: none"> Exploring interactions between organisms such as predator/prey, parasites, competitors, pollinators and disease Examining factors that affect population sizes such as seasonal changes, destruction of habitats, introduced species Considering how energy flows into and out of an ecosystem via the pathways of food webs, and how it must be replaced to maintain the sustainability of the system

		<ul style="list-style-type: none"> Investigating how ecosystems change as a result of events such as bushfires, drought and flooding
<p>4. Action for the Marine Environment</p> <p>5. Education for Sustainability, Strong Conservation Focus</p>	<p>Science as Human Endeavour Use and Influence of Science:</p> <ul style="list-style-type: none"> The values and needs of contemporary society can influence the focus of scientific research (ACSHE228) 	
	<p>Science Inquiry Skills Questioning and predicting:</p> <ul style="list-style-type: none"> Formulate questions or hypotheses that can be investigated scientifically (ACSIS164) <p>Planning and conducting:</p> <ul style="list-style-type: none"> Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS165) Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (ACSIS166) <p>Processing and analysing data and information:</p> <ul style="list-style-type: none"> Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170) 	<ul style="list-style-type: none"> Revising and refining research questions to target specific information and data collection or finding a solution to the specific problem identified Developing ideas from students own or others' investigations and experiences to investigate further Ensuring that any investigation involving or impacting on animals is justified, humane and considerate of each animal's needs Combining research using primary and secondary sources with students' own experimental investigation Considering how investigation methods and equipment may influence the reliability of collected data

<p>6. Action for the Marine Environment</p>	<p>Evaluating:</p> <ul style="list-style-type: none"> • Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (AC SIS171) <p>Communicating:</p> <ul style="list-style-type: none"> • Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (AC SIS174) 	<ul style="list-style-type: none"> • Applying specific skills for the use of scientific instruments • Identifying gaps or weaknesses in conclusions (their own or those of others) • Identifying alternative explanations that are also consistent with the evidence • Presenting results and ideas using formal experimental reports, oral presentations, slide shows, poster presentations and contributing to group discussions • Using secondary sources as well as students' own findings to help explain a scientific concept • Using the internet to facilitate collaboration in joint projects and discussions
<p>1. Introduction to Biodiversity</p> <p>2. Investigation of Local Marine Area</p> <p>3. Marine Reserve Experience or Research</p>	<p>Year 10 Content Descriptions</p> <p>Biological sciences</p> <p>Science Understanding</p> <ul style="list-style-type: none"> • The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence (ACSSU185) 	<ul style="list-style-type: none"> • Outlining processes involved in natural selection including variation, isolation and selection • Describing biodiversity as a function of evolution • Investigating changes caused by natural selection in a particular population as a result of a specified selection pressure such as artificial selection in breeding for desired characteristics • Relating genetic characteristics to survival and reproductive rates

		<ul style="list-style-type: none"> Evaluating and interpreting evidence for evolution, including the fossil record, chemical and anatomical similarities, and geographical distribution of species
<p>4. Action for the Marine Environment</p> <p>5. Education for Sustainability, Strong Conservation Focus</p>	<p>Science as Human Endeavour</p> <p><i>Use and Influence of Science:</i></p> <ul style="list-style-type: none"> People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions (ACSHE194) The values and needs of contemporary society can influence the focus of scientific research (ACSHE230) 	<ul style="list-style-type: none"> Evaluating claims relating to environmental footprints Recognising that financial backing from governments or commercial organisations is required for scientific developments and that this can determine what research is carried out
<p>6. Action for the Marine Environment</p>	<p>Science Inquiry Skills</p> <p><i>Questioning and predicting:</i></p> <ul style="list-style-type: none"> Formulate questions or hypotheses that can be investigated scientifically (ACSIS198) <p><i>Planning and conducting:</i></p> <ul style="list-style-type: none"> Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS199) Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data (ACSIS200) 	<ul style="list-style-type: none"> Developing hypotheses based on well-developed models and theories Using internet research to identify problems that can be investigated Formulating questions that can be investigated within the scope of the classroom or field with available resource Developing ideas from students own or others' investigations and experiences to investigate further Evaluating information from secondary sources as part of the research process Applying specific skills for the use of scientific instruments Identifying where human error can influence the reliability of data

Processing and analysing data and information:

- [Analyse](#) patterns in [data](#), including describing relationships between variables and identifying inconsistencies ([AC SIS203](#))
- Use knowledge of scientific concepts to draw conclusions that are consistent with [evidence](#) ([AC SIS204](#))

Evaluating:

- [Evaluate](#) conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the [data](#) ([AC SIS205](#))

Communicating:

- Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate [scientific language](#), [conventions](#) and representations ([AC SIS208](#))

- Combining research using primary and secondary sources with a student's own experimental investigation
- Deciding how much data are needed to produce reliable measurements
- Identifying safety risks and impacts on animal welfare and ensuring these are effectively managed within the investigation
- Describing sample properties (such as mean, median, range, large gaps visible on a graph) to predict characteristics of the larger population, acknowledging uncertainties and the effects of outliers
- Using primary or secondary scientific evidence to support or refute a conclusion
- Constructing a scientific argument showing how their evidence supports their claim
- Evaluating the strength of a conclusion that can be inferred from a particular data set
- Distinguishing between random and systematic errors and how these can affect investigation results
- Identifying alternative explanations that are also consistent with the evidence
- Using the internet to facilitate collaboration in joint projects and discussions

		<ul style="list-style-type: none">• Constructing evidence based arguments and engaging in debate about scientific ideas• Presenting results and ideas using formal experimental reports, oral presentations, slide shows, poster presentations and contributing to group discussions• Using a range of representations, including mathematical and symbolic forms, to communicate science ideas
--	--	---