#### *The Tahunanui sand dunes*

Investigate a pattern in an ecological community, with supervision

AS 91158 Credits: 4

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| Achievement | Achievement with Merit | Achievement with Excellence |
| Investigate a pattern in an ecological community, with supervision. | Investigate in-depth a pattern in an ecological community, with supervision | Comprehensively investigate a pattern in an ecological community, with supervision. |

Student instructions

This assessment activity requires you to produce a report about a pattern (or absence) in an ecological community. The investigation will involve gathering, analysing and interpreting information about the Tahuna sand dune community, an environmental factor relating to the pattern and how this might affect at least two species in the ecosystem (ie. the community and abiotic environment).

*FYI the dunes have not always been there.... shall we discuss?*

<http://homepages.ihug.co.nz/~sissons/Beachhistory.html> <http://www.museumnp.org.nz/pdfs/Tahuna.pdf>

You will have about 1-2 weeks to carry out research into the organisms and environmental factors relevant to your investigation. During this time you can discuss ideas with other students. You may choose to compare the field data you collected during your field work with the data from another group, or data provided by your teacher.

You will then **complete your written report individually**.

Your report will be assessed on how comprehensively you identify, describe and explain the pattern in the community, by relating it to environmental factors (biotic and abiotic) and the biology (adaptations) of interrelated organisms of different species.

**Collecting and processing information….**

Collect information relevant to your investigation, by carrying out research and gathering field data (the method is not assessed). You should investigate at least two named organisms (ideally more) that are related to each other, and to the pattern you are investigating.

Make sure you have collected enough information to allow you to discuss:

* the biology of your chosen organisms (ecological niche, adaptations – structural, behavioural or physiological)
* the environmental factors that could affect your organisms (biotic and abiotic)
* interrelationships between organisms in your chosen ecological community.

Record details of the information sources you use and include this in a bibliography at the end of your report.

You may organise and store your information (including field work data) in an online document such as a spread sheet or table, for easy access.

For authenticity purposes, you may not share these documents with other students during the assessment.

**Producing your report....**

Your report, using the data and information you gathered, should include:

* **Introduction** – a description of the Tahuna sand dunes and the scientific names of the organisms investigated.
* **Biology of the Ecological Community** – information about the organisms in the community you investigated. Describe the ecological niche and adaptations of at least two species, and relevant interrelationships between these organisms.
* **Abiotic Environment** – description of the abiotic factors found in the area you investigated. You should include observations and measurements collected in fieldwork.
* **Description of Pattern** – describe the findings (and/or observations) from the fieldwork/collected data and use these to identify the distribution pattern (or absence of a pattern) in the ecological community. You should include tables or graphs in this section, to clearly show the distribution pattern.
* **Discussion** – relate the pattern in the community to the biology of the organisms and the environmental factors in the ecosystem. Include:
* explanations for how or why the biology (adaptations, interrelationships) of at least two species relates to the pattern (or absence of a pattern)
* a discussion of how environmental factors (abiotic and/or biotic) might affect the organisms in the community, and how this relates to the observed distribution pattern, or absence of a pattern. This could involve elaborating, applying, justifying, relating, evaluating, comparing and contrasting, and/or analysing.
* **Bibliography** – a list of the information sources you used to help you write your report, written in a format that allows other people to find the information sources. This will not be assessed, but it is expected good practice to acknowledge information sources you used in your work.

**Something to get you started *(you will need more):***

Marram

<http://en.wikipedia.org/wiki/Ammophila_(Poaceae)>

<http://www.microscopy-uk.org.uk/mag/articles/anne1.html>

Pingao

<http://www.landcareresearch.co.nz/research/biosystematics/plants/weaving/pingao.asp>

<http://tvnz.co.nz/meet-the-locals/nz-geography-our-own-gold-coast-3342514>

Lupin

<http://en.wikipedia.org/wiki/Lupin>

Spinifex

<http://www.teara.govt.nz/en/coastal-shoreline/5/2/2>

Evidence required: Biology 91158

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The student is able to **investigate** a pattern in an ecological community, with supervision.  The report includes evidence of:   * **Analysing**, and **interpreting** information about a NZ forest community. * *Information may come from direct observations, collection of field data, tables, graphs, resource sheets, photographs, videos, websites, and/or reference texts.* * Describing observations or findings, and using those findings to **identify the pattern** (or absence) in a NZ forest community * *This could include zonation, stratification, succession or another distribution pattern.* * Relating this pattern to **one environmental factor** (abiotic or biotic) * Describing how the environmental factor might affect **two species** within the community. | The student is able **to investigate in-depth** a pattern in an ecological community, with supervision.  The report includes evidence of:  **As for A**  **AND**   * Providing a **reason** to explain *how* or *why* the biology of one of the chosen species relates to the pattern (or absence). * *The biology relates to at least* ***one*** *structural, behavioural or physiological* ***adaptation*** *of the organism.* * *Adaptations (structural, behavioural or physiological) relate to the environmental factor and an interrelationship with an organism of another species (e.g. competition, predation, or mutualism).* | The student is able to **comprehensively investigate** a pattern in an ecological community, with supervision.  The report includes evidence of:  **As for M**  **AND**   * Using an *environmental factor* (abiotic or biotic) and the *biology of interrelated organisms* of two different species to **explain the pattern** (or absence). * *The explanation may involve elaborating, applying, justifying, relating, evaluating, comparing and contrasting, and analysing.* |

Example Assessment Schedule: Biodiversity in a NZ forest community

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The student is able to **investigate** a pattern in an ecological community, with supervision.  The report includes evidence of:   * **Analysing**, and **interpreting** information about a NZ forest community. * *Information may come from direct observations, collection of field data, tables, graphs, resource sheets, photographs, videos, websites, and/or reference texts.* * Describing observations or findings, and using those findings to **identify the pattern** (or absence) in a NZ forest community * *This could include zonation, stratification, succession or another distribution pattern.* * Relating this pattern to **one environmental factor** (abiotic or biotic) * Describing how the environmental factor might affect **two species** within the community.   For example:  … The data collected shows stratification of the plant species investigated, where the mature plants of the \_\_\_\_\_\_\_\_\_\_ species exist mainly in the canopy layer and the \_\_\_\_\_\_\_\_\_ species exist mainly in the sub-canopy layer…  The main environmental factor causing the stratification of plant species in this section of the bush is the light intensity. Plants that require more light are found in the canopy layer, and plants that can live with lower light intensities (in the shade) are found in the lower layers…  An abiotic factor that affects the plant species in this forest community is sunlight. Plants need light energy to carry out photosynthesis, to convert this energy into glucose for the plant to use. The different amounts of light available in a forest community has led to plant species in the lower layers (e.g. \_\_\_\_\_\_\_\_) developing adaptations that allow them to photosynthesise with less light available…  (Note: The above ‘expected student responses’ are indicative only and relate to part of what is required. Annotated, complete reports in context that come from previous/current students or developed by teachers can be included as examples of evidence.) | The student is able **to investigate in-depth** a pattern in an ecological community, with supervision.  The report includes evidence of:   * **Analysing** and **interpreting** information about a NZ forest community. * *Information may come from direct observations, collection of field data, tables, graphs, resource sheets, photographs, videos, websites, and/or reference texts.* * Describing observations or findings, and using those findings to **identify the pattern** (or absence) in a NZ forest community * *This could include zonation, stratification, succession or another distribution pattern.* * Relating this pattern to **one environmental factor (**abiotic or biotic) * Describing how the environmental factor might affect **two species** within the community. * Providing a **reason** to explain *how* or *why* the biology of one of the chosen species relates to the pattern (or absence). * *The biology relates to at least* ***one*** *structural, behavioural or physiological* ***adaptation*** *of the organism.* * *Adaptations (structural, behavioural or physiological) relate to the environmental factor and an interrelationship with an organism of another species (e.g. competition, predation, or mutualism).*   For example:  … The data collected shows stratification of the plant species investigated, where the mature plants of the \_\_\_\_\_\_\_\_\_\_ species exist mainly in the canopy layer and the \_\_\_\_\_\_\_\_\_ species exist mainly in the sub-canopy layer…  The main environmental factor causing the stratification of plant species in this section of the bush is the light intensity. Plants that require more light are found in the canopy layer, and plants that can live with lower light intensities (in the shade) are found in the lower layers…  An abiotic factor that affects the plant species in this forest community is sunlight. Plants need light energy to carry out photosynthesis, to convert this energy into glucose for the plant to use. The different amounts of light available in a forest community has led to plant species in the lower layers (e.g. \_\_\_\_\_\_\_\_) developing adaptations that allow them to photosynthesise with less light available…  The plant species in the lower layers of the bush (tree ferns, shrubs) have adapted to survive with less light. They have developed broad, thin leaves, which allow them to capture as much light as possible for photosynthesis. This means they are able to produce glucose and survive in these environmental conditions (in the lower layers of the forest, where other plants may not be able to survive. By occupying a different layer in the forest from other species (e.g. canopy species) they reduce competition with other plants, for things such as space…  (Note: The above ‘expected student responses’ are indicative only and relate to part of what is required. Annotated, complete reports in context that come from previous/current students or developed by teachers can be included as examples of evidence.) | The student is able to **comprehensively investigate** a pattern in an ecological community, with supervision.  The report includes evidence of:   * **Analysing** and **interpreting** information about a NZ forest community. * *Information may come from direct observations, collection of field data, tables, graphs, resource sheets, photographs, videos, websites, and/or reference texts.* * Describing observations or findings, and using those findings to **identify the pattern** (or absence) in a NZ forest community * *This could include zonation, stratification, succession or another distribution pattern.* * Relating this pattern to **one environmental factor** (abiotic or biotic) * Describing how the environmental factor might affect **two species** within the community. * Providing a **reason** to explain *how* or *why* the biology of one of the chosen species relates to the pattern (or absence). * *The biology relates to at least* ***one*** *structural, behavioural or physiological* ***adaptation*** *of the organism*. * *Adaptations (structural, behavioural or physiological) relate to the environmental factor and an interrelationship with an organism of another species (e.g. competition, predation, or mutualism).* * Using an *environmental factor* (abiotic or biotic) and the *biology of interrelated organisms* of two different species to **explain the pattern** (or absence). * *The explanation may involve elaborating, applying, justifying, relating, evaluating, comparing and contrasting, and analysing.*   For example:  … The data collected shows stratification of the plant species investigated, where the mature plants of the \_\_\_\_\_\_\_\_\_\_ species exist mainly in the canopy layer and the \_\_\_\_\_\_\_\_\_ species exist mainly in the sub-canopy layer…  The main environmental factor causing the stratification of plant species in this section of the bush is the light intensity. Plants that require more light are found in the canopy layer, and plants that can live with lower light intensities (in the shade) are found in the lower layers…  An abiotic factor that affects the plant species in this forest community is sunlight. Plants need light energy to carry out photosynthesis, to convert this energy into glucose for the plant to use. The different amounts of light available in a forest community has led to plant species in the lower layers (e.g. \_\_\_\_\_\_\_\_) developing adaptations that allow them to photosynthesise with less light available…  The plant species in the lower layers of the bush (tree ferns, shrubs) have adapted to survive with less light. They have developed broad, thin leaves, which allow them to capture as much light as possible for photosynthesis. This means they are able to produce glucose and survive in these environmental conditions (in the lower layers of the forest, where other plants may not be able to survive. By occupying a different layer in the forest from other species (e.g. canopy species) they reduce competition with other plants, for things such as space…  *The main abiotic factors causing stratification in this part of the forest are light intensity and relative humidity. The plants in each layer of the forest have specific adaptations which allow them to survive in the conditions present (e.g. ).*  *Each plant has adapted to live in a different layer, because this allows them to avoid competition with some of the other plants in the forest. Gause’s principle states that no species can occupy the same ecological niche for long, because they will be in competition with each other for resources such as light, water, space and minerals.*  *A stratified forest is the perfect example of this principle, where plants have moved into slightly different niches in each layer of the forest. When we compare the community pattern in the untouched parts of the forest with the regenerating forest, we can see that they are quite different. While the untouched forest has reached a stratified climax community, where the layers (or strata) are well-defined, the regenerating forest does not have such obvious layers yet. This is because succession is taking place, where species gradually replace others over time. This area of the forest has fewer species and fewer layers, as there has not been enough time for a range of species to move into a range of niches in this community.*  *Eventually we would expect the regenerating forest to reach a climax community, similar to the area of untouched forest…*  (Note: The above ‘expected student responses’ are indicative only and relate to part of what is required. Annotated, complete reports in context that come from previous/current students or developed by teachers can be included as examples of evidence.) |

Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.