

## Specification for Assessment #8

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### Investigating Limiting Factors

#### Competency

Student can investigate multiple factors that impact native populations in the ecosystem.

Focus of this assessment:

- ☐ Declarative knowledge
- ☒ Procedural knowledge
- ☐ Problem solving

#### Evidence

Students are asked to analyze observations and identify ways by which factors might have caused the population of a particular animal in an ecosystem to decrease. Students then describe observable evidence that, if obtained, would support that explanation. Three different eyewitness observations are provided, each of which could be associated with one of these eight factors provided to students: food, shelter, water, space, disease, parasitism, predation, or nesting sites.

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## Example Task

There are geese living around a pond near your school. The size of the goose population living there has decreased over the past five years. Some factors that might be limiting the goose population are listed in the box below:

Food	Water	Disease	Predation
Shelter	Space	Parasitism	Nesting sites

Three neighbors living near the pond have made some observations that may be related to the decrease in the goose population.

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1st neighbor's observation: **A fox moved into the area around the pond.**

**Explain** how the goose population might be limited by what the neighbor saw.

**Describe an observation** you or another scientist might make that would support your explanation.

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2nd neighbor's observation: **There has been very little rainfall and the water level in the pond has been lower than usual.**

**Explain** how the goose population might be limited by what the neighbor saw.

**Describe an observation** you or another scientist might make that would support your explanation.

### Example Task (continued)

3rd neighbor's observation: **Several houses were built around the pond. To make room, most of the trees and bushes growing around the pond were cut down.**

**Explain** how the goose population might be limited by what the neighbor saw.

**Describe an observation** you or another scientist might make that would support your explanation.

## Scoring Plan for the Example Task

*Correct answers written in the wrong section of a particular assessment, but intended for the appropriate prompt, will be graded in full. For example, observable evidence can appear under the limiting factor hypothesis prompt.*

### 1st Observation: A fox moved into the area around the pond.

<p>Student's explanation of how the goose population might be limited by a fox moving into the area is ecologically reasonable.</p> <ul style="list-style-type: none"> <li>A student's explanation may contain factual errors concerning the characteristics or behaviors of particular species, but if the explanation is otherwise ecologically reasonable, it is still awarded credit.</li> </ul>	2 pts.
<p>Student describes evidence that would support his or her explanation of how the goose population might be limited by a fox moving into the area.</p> <p><i>Point is awarded if the student provides argumentation based on prior knowledge or reasoning, even if an <u>observation</u> is not proposed.</i></p> <p><i>For example, in the case of a fox preying on a goose population, the following response would be acceptable:</i></p> <p><i>"Foxes are known to eat other birds, so they might eat geese."</i></p>	1 pt.
<p>This evidence, as described, would be observable.</p> <p><i>Point is awarded based on <u>observability</u>, <u>not</u> how well the student's response supports the previous explanation.</i></p>	1 pt.

### 2nd Observation: There has been very little rainfall and the water level in the pond has been lower than usual.

Student's explanation of how the goose population might be limited by lack of rainfall and a lower water level in the pond is ecologically reasonable.	2 pts.
Student describes evidence that would support his or her explanation of how the goose population might be limited by lack of rainfall and a lower water level in the pond.	1 pt.
This evidence, as described, would be observable.	1 pt.

### 3rd Observation: Several houses were built around the pond. To make room, most of the trees and bushes growing around the pond were cut down.

Student's explanation of how the goose population might be limited by the loss of trees and bushes around the pond is ecologically reasonable.	2 pts.
Student describes evidence that would support his or her explanation of how the goose population might be limited by loss of trees and bushes around the pond.	1 pt.
This evidence, as described, would be observable.	1 pt.

## Procedure for Creating Parallel Tasks

Parallel tasks will pertain to a different ecosystem and animal population in decline. **The directions to the student, however, will remain the same across all tasks.**

- The introductory statement or paragraph briefly describes an ecosystem with reference to an animal population that has recently decreased.
- Describe three events occurring around the same time and observed by eyewitnesses. Each event potentially could cause the decrease in population (directly or indirectly), and each event implicates at least one of the following limiting factors: food, shelter, water, space, disease, parasitism, predation, or nesting sites. Though each event may limit the population in more than one way, a variety of types of events should be used. For instance, the introduction of three different predators should not be used for the three events.

## Scoring Plan for Parallel Tasks

*Correct answers written in the wrong section of a particular assessment, but intended for the appropriate prompt, will be graded in full. For example, observable evidence can appear under the limiting factor hypothesis prompt.*

Scoring plan used for the example task	Generic scoring criteria for all parallel tasks
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### 1st Observation

<p>Student's explanation of how the goose population might be limited by a fox moving into the area is ecologically reasonable.</p> <ul style="list-style-type: none"> <li>A student's explanation may contain factual errors concerning the characteristics or behaviors of particular species, but if the explanation is otherwise ecologically reasonable, it is still awarded credit.</li> </ul>	<p>Student's explanation of how the animal population might be limited by the event described in the 1st observation is ecologically reasonable.</p> <ul style="list-style-type: none"> <li>A student's explanation may contain factual errors concerning the characteristics or behaviors of particular species, but if the explanation is otherwise ecologically reasonable, it is still awarded credit.</li> </ul>	2 pts.
<p>Student describes evidence that would support his or her explanation of how the goose population might be limited by a fox moving into the area.</p> <p><i>Point is awarded if the student provides argumentation based on prior knowledge or reasoning, even if an <u>observation</u> is not proposed.</i></p> <p><i>For example, in the case of a fox preying on a goose population, the following response would be acceptable:</i>  <i>"Foxes are known to eat other birds, so they might eat geese."</i></p>	<p>Student describes evidence that would support his or her explanation of how the animal population might be limited by the event described in the 1st observation.</p> <p><i>Point is awarded if the student provides argumentation based on prior knowledge or reasoning, even if an <u>observation</u> is not proposed.</i></p> <p><i>For example, in the case of a fox preying on a goose population, the following response would be acceptable:</i>  <i>"Foxes are known to eat other birds, so they might eat geese."</i></p>	1 pt.
Same as generic.	<p>This evidence, as described, would be observable.</p> <p><i>Point is awarded based on <u>observability</u>, not how well the student's response supports the previous explanation.</i></p>	1 pt.

### Scoring Plan for Parallel Tasks (continued)

#### 2nd Observation

Student's explanation of how the goose population might be limited by lack of rainfall and a lower water level in the pond is ecologically reasonable.	Student's explanation of how the animal population might be limited by the event described in the 2nd observation is ecologically reasonable.	2 pts.
Student describes evidence that would support his or her explanation of how the goose population might be limited by lack of rainfall and a lower water level in the pond.	Student describes evidence that would support his or her explanation of how the animal population might be limited by the event described in the 2nd observation.	1 pt.
<b>Same as generic.</b>	This evidence, as described, would be observable.	1 pt.

#### 3rd Observation

Student's explanation of how the goose population might be limited by the loss of trees and bushes around the pond is ecologically reasonable.	Student's explanation of how the animal population might be limited by the event described in the 3rd observation is ecologically reasonable.	2 pts.
Student describes evidence that would support his or her explanation of how the goose population might be limited by loss of trees and bushes around the pond.	Student describes evidence that would support his or her explanation of how the animal population might be limited by the event described in the 3rd observation.	1 pt.
<b>Same as generic.</b>	This evidence, as described, would be observable.	1 pt.