

The **carrying capacity** is the maximum population size of a particular species that a given ecosystem can sustain. There are many factors both biotic and abiotic that can affect the carrying capacity. Whether a species survives is dependent on many things such as food, shelter, and other resources and if it can find and compete for these resources.

Introduced species are non-native species that were intentionally or unintentionally introduced to an area. A species is considered Invasive only if it is able to find the resources it needs to survive in the new area and poses a threat to the natural ecosystems. The invasive species competes with and/or consumes native species. This can devastate native populations at all trophic levels. More troubling is that often an invasive species has no natural predators. Either none prefer the new species or none are adapted to consume the new prey (unpalatable, poisonous, armored) in the new area allowing their populations to grow unchecked. Another advantage is the invading species' natural diseases may not have spread to the area.

### **The Game**

Consider the things a deer needs to survive:

- Food
- Water
- Shelter
- Space

What will happen to the deer population if the availability of these things changes? What will happen to the deer if they have to deal with the stress of a super competitor, an invader?

To understand the plight of the deer we must be the deer... Let's play Oh Deer! (Game created by Patty Dalton, modified by Mariel Tinney)

### **Procedure:**

1. The instructor will divide students into roles (1/3 deer and 1/3 resource and 1/3 recorders-elk).
2. Students will use designated hand signals to indicate what they are looking for (if a deer/elk) and what type of resource they are (if a resource).
  - Arms raised over head at a point is **shelter**
  - Hands placed over stomach is **food**
  - Cupped hands raised to the mouth is **water**
  - Arms outstretched at the side is **space**
3. Deer and resources roles will face away from each other and select a signal for the round.
4. At a signal from the instructor student will face each other and deer will look for a matching signal. If one is found they remain a deer. If one is not they die and become a resource.
5. Game is repeated for many rounds and observations recorded by the future elk.

An invasive species of elk are introduced that have a similar niche to the deer. However since these elk are larger, have no predators and no diseases in the area they have a competitive advantage.

The first advantage in the game will be letting the elk have first shot at the resources since they do not need to watch for predators they can spend more time eating.

The second advantage will be that elk can last two rounds without finding a resource before they die. This represents their greater tolerance range to biotic factors like no predation and no disease to kill off the animals more quickly than just starvation or dehydration and their tolerance to the affects of abiotic factors like limited shelter and space.

6. Game is played with new rules for many rounds and teacher records data.

**Round 0:**

Resources: \_\_\_\_\_

Deer: \_\_\_\_\_

Elk: N/A

	Resources	Deer	Elk
<b>1</b>			N/A
<b>2</b>			N/A
<b>3</b>			N/A
<b>4</b>			N/A
<b>5</b>			N/A
<b>6</b>			N/A
<b>7</b>			N/A
<b>8</b>			N/A
<b>9</b>			N/A
<b>10</b>			N/A

	Resources	Deer	Elk
<b>11</b>			N/A
<b>12</b>			N/A
<b>13</b>			N/A
<b>14</b>			N/A
<b>15</b>			N/A
<b>16</b>			N/A
<b>17</b>			N/A
<b>18</b>			N/A
<b>19</b>			N/A
<b>20</b>			N/A

	Resources	Deer	Elk
<b>21</b>			
<b>22</b>			
<b>23</b>			
<b>24</b>			
<b>25</b>			
<b>26</b>			
<b>27</b>			
<b>28</b>			
<b>29</b>			
<b>30</b>			