After today you should be able to answer the following:

1. Describe what is meant by deterministic processes versus stochastic processes.
   - Be able to classify processes as deterministic or stochastic.

2. Describe 3 types of stochasticity that are important in conservation. Include examples.

3. How are deterministic processes and the 3 types of stochasticity related to population size?

4. Discuss 3 key factors that determine the effects of environmental stochasticity on the probability of population extinction.

5. Describe key steps that must be taken to deal with: a) deterministic processes and b) stochastic processes.
   - Give an example of this process using penguins (or something else)

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**Figure 10.** Example of Demographic Variation: Probability of extinction sometime during a 100 generation period due solely to producing only one sex of offspring.

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**TABLE 2**

**Expected Times to Extinction (in years) from MWM ($T_K$) and the Simulation Model (ATE) for Various-Sized Grizzly Bear Populations Given in Table 1**

<table>
<thead>
<tr>
<th>Population Size ($n = K$)</th>
<th>$T_K$ (Years)</th>
<th>ATE (Years)</th>
<th>Length of Simulation Run (Years)</th>
<th>Cumulative Extinct Populations*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>210</td>
<td>19</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>451</td>
<td>44</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>30</td>
<td>1049</td>
<td>69†</td>
<td>200</td>
<td>98</td>
</tr>
<tr>
<td>50</td>
<td>2796</td>
<td>79</td>
<td>200</td>
<td>94</td>
</tr>
</tbody>
</table>

* Cumulative percentage of extinct populations is the percentage of the 50 replicates which became extinct within the length of the simulation run.
† Where <100% of populations became extinct, ATE figures are an underestimate of the true ATE. Nevertheless, this error is likely much less than the difference between true ATE and $T_K$.

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**Only Demographic Stochasticity**

**With Environmental Stochasticity Added**