**3.1 How Changes Occur Naturally in Ecosystems**

**Change in organisms**

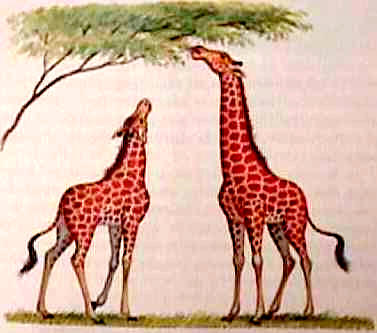
-the process that causes change in living things is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

-natural selection means that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Example:*

#1

**

#1

#2

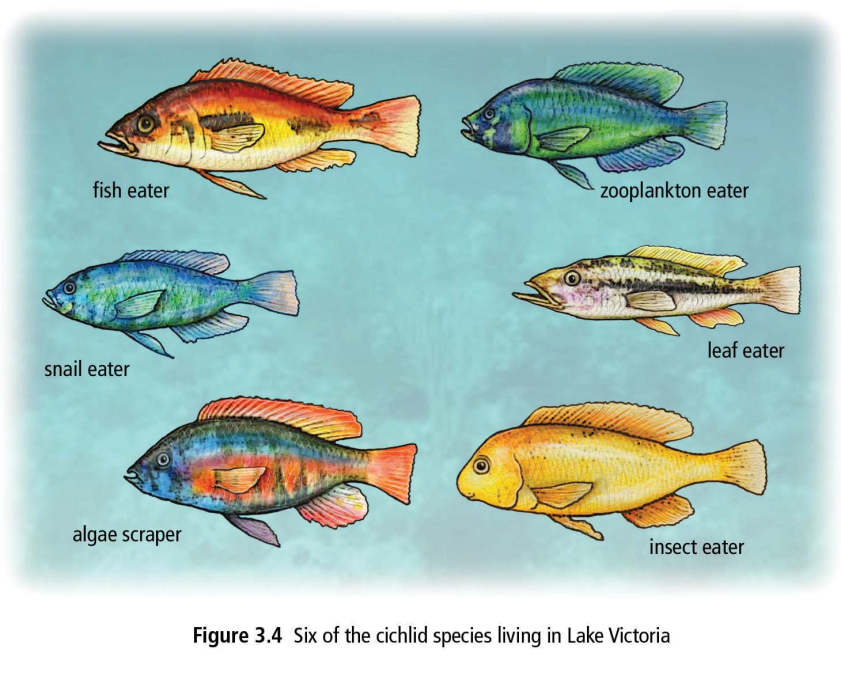
*Giraffe #1 – shorter neck*

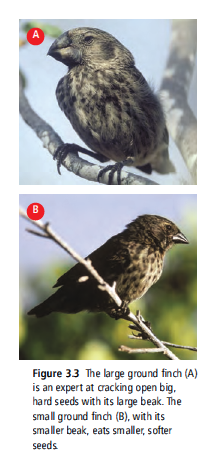
*Giraffe #2 – longer neck*

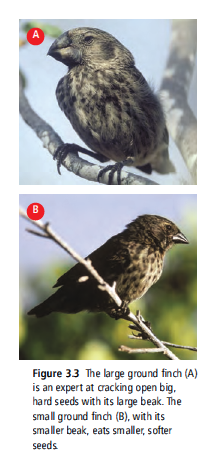
*Which giraffe will have the advantage if all the low-lying vegetation becomes grazed by a competing species?*

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs when a common ancestor “diverges” into a number of different species over time

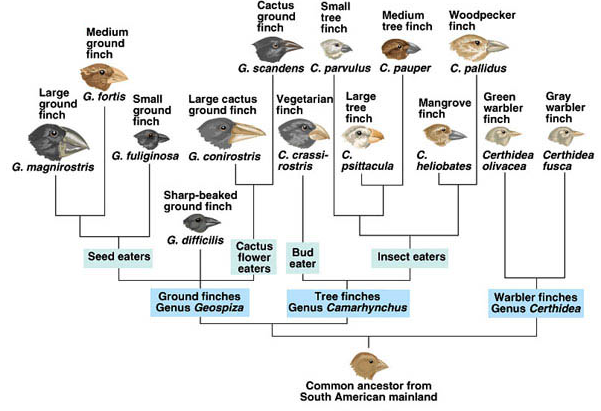
(e.g.Darwin’s Finches)







-The thirteen different finch species on the Galapagos Islands are descendants of a single ancestral finch from the mainland of South America



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Species  Name | Common  name | Habitat  and  Niche  (food type) | Beak type:  -probing  -grasping  -crushing |
| 1. | *G. conirostis* | Large cactus ground finch | Cactus flower eater | probing |
| 2. | *G. difficilis* |  |  |  |
| 3. | *G. fortis* |  |  |  |
| 4. | *G. fuliginosa* |  |  |  |
| 5. | *G. magnirostris* | Large ground finch | Seed eaters | crushing |
| 6. | *G. scandens* |  |  |  |
| 7. | *C. crassirostris* |  |  |  |
| 8. | *C. psittacula* |  |  |  |
| 9. | *C. pauper* |  |  |  |
| 10. | *C. parvulus* | Medium tree finch | Insect eater | grasping |
| 11. | *C. pallidus* |  |  |  |
| 12. | *C. heliobates* |  |  |  |
| 13. | *C. olivacea*  *C. fusca* |  |  |  |

**Ecological Succession**

Ecological succession is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

There are two types of ecological succession:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – occurs where no soil exists, such as bare rock (e.g. retreating glaciers, cooled lava).



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

are the first organisms

to appear

(e.g. lichen).

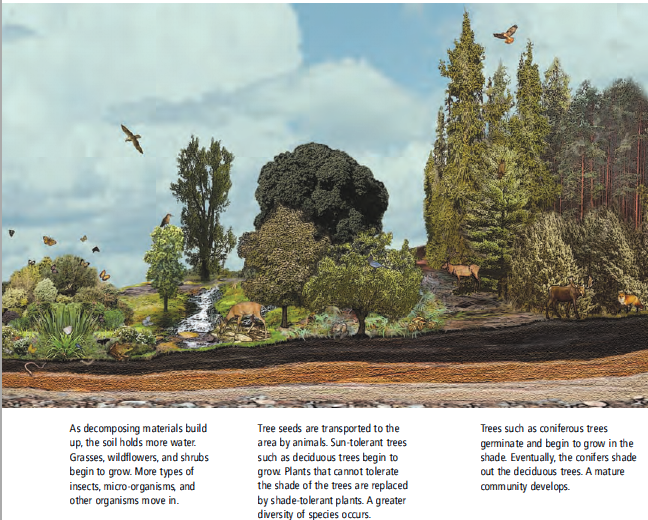


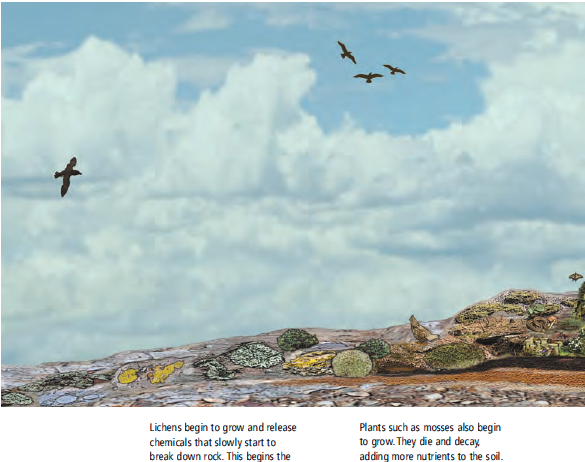
Succession ends with a stable

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(e.g. old growth forest)

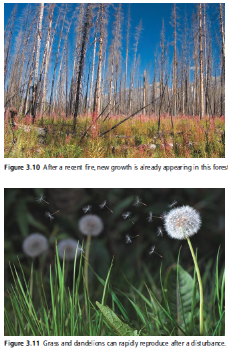
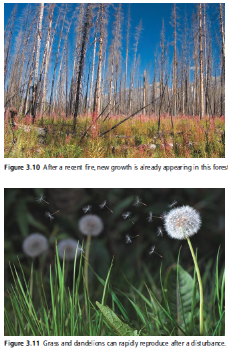
*Stages of Primary Succession*





1. *Bare rock*
2. *Pioneer species (e.g. Lichens)*
3. *Mosses*
4. *Insects, microorganisms, and other organisms move in.*
5. *Grasses, wildflowers, shrubs*
6. *Tree seeds brought in by animals. Sun-tolerant (deciduous) trees begin to grow.*
7. *Coniferous trees begin to grow.*
8. *Mature community develops*

2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – occurs after a disturbance takes place, but the soil remains intact (e.g. forest fire, clear-cut)



Natural events that harm ecosystems:

1)

2)

3)

4)

5)

**3.2 How Humans Influence Ecosystems**

**Sustainability and Resource Exploitation**

-the ability of an ecosystem to sustain ecological processes is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

-sustainability can be adversely affected through:

1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(e.g. cities, roads, industry, agriculture, recreation)

2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(e.g. obtaining and use of soil, wood, water, gas, oil, minerals)

Effects on ecosystem’s biodiversity and health:

Effect Example

1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -destruction of bamboo forests in China, Panda’s food source

2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -Three Gorges Dam on China's Yangtze River, dividing river

3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -clear-cutting of Amazon rainforest

4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -overworked land and drought created the “dust bowl” (1930s)

5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -damage due to heavy modern tractors and farm equipment

6) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -BP oil disaster (Gulf of Mexico, 2010)

7) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -over-fishing of Atlantic cod lead to a ban in the 1990s



The 3 Gorges Dam in China is a major hydroelectric project that divides the Yangtze River.

An example of clear-cutting of the Amazon rainforest in Brazil.

Birds and aquatic life were greatly affected negatively by the BP oil disaster of 2010.

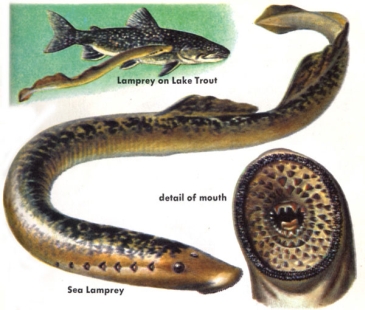
**3.3 How Introduced Species Affect Ecosystems**

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ are called ***native species****.*

**-ecosystems can be disturbed when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Introduced species fall into three categories:**



1. ***Harmless 2. Beneficial 3. Invasive!***

1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – e.g. roses introduced into a garden

2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – e.g. European leaf-feeding beetle eats the

invasive plant “purple loosestrife”

3) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – major cause of biodiversity loss, harm native

species in various ways.

**5 Ways invasive species cause harm:**

i) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– e.g. scotch broom competes with Garry Oak on Van. Island.

ii) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– e.g. American bullfrog eats native frogs

iii) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ –e.g. West Nile virus has spread to North America

iv) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -e.g. sea lampreys parasitize fish in the Great Lakes

v) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_– e.g. Eurasian milfoil forms dense mats on lake surfaces

*Scotch broom plants (yellow bushes) are an invasive species that threatens the native Garry Oak on Vancouver Island.*



*Eurasian milfoil threatens the lake ecosystems of Ontario rapidly changing its abiotic factors.*

*West Nile virus, originally from East Africa, spread to North America via birds and mosquitos.*

*American bullfrogs not only compete with other native frog species…they eat them!*