Name_____ Per _____
Partner _____

Ecosystem Project

You will be given a fictional ecosystem that will consist of the following species:

- Producer(s)
- Primary Consumer(s)
- Secondary (or higher) Consumer(s)
- Decomposer(s)

Each species description will include:

i. Geographic distribution
ii. population size
iii. reproductive behavior
iv. ecological niche
    i. nutritional requirements
    ii. position in food web
v. sensitivity to environmental insults
vi. any known usefulness/attractiveness to humans
vii. climate: temperature, seasons, humidity, and precipitation
viii. surface conditions: soil minerals, soil texture, water, grade (slope)

1. First, draw a diagram below to represent the food web of the ecosystem. Draw arrows from an energy source pointing to the organism that obtains the energy.

2. You will be presented with an environmental insult, or change. Your task is to:
    A. Describe the **effect** of the change on each of the species in the ecosystem. Classify the effect as
        - threatened: if the effect of the change will negatively affect the species
        - endangered: if the effect of the change would be drastic enough to lead to the extinction of the species
        - increased: if the change actually improves the status of the species
        - no change: if the change would have no effect on the species
    B. Propose **mitigation**, methods of protecting the species and/or removing the change.

Attach your effects and mitigation proposals on separate pages

Name_____ Per _____
Partner _____

ECOSYSTEM: THE VIKING VALLEY

PRODUCER: Norse Sea Lily
- i. range: many lakes and ponds.
- ii. pop size: large
- iii. reproduction: flowering plant pollinated by mead bees; flowers in early summer
- iv. nutrition:
  - a. autotroph
  - b. eaten by Go Fish (roots), Horned Viking Beast (leaves), Mead Bees (nectar), Lily Weevil (immature fruit)
- v. sensitivity: the more minerals in the water the better, needs full sunlight
- vi. humans use: artificial poi & glue (roots), fibers for fabric (stems), snack food (seeds), decoration (flowers), roofing material (leaves)
- vii. climate: cool winters with foggy mornings, warm and sunny summers
- viii. surface: lives in water

1° CONSUMER: Mead Bee
- i. range: many lakes and ponds
- ii. pop size: small
- iii. reproduction: a single queen lays many eggs which are tended by her daughters
- iv. nutrition:
  - a. eats nectar and pollen of the Norse Sea Lily
  - b. eaten by some birds
- v. sensitivity: low sensitivity, but only one food source
- vi. humans use: often considered a pest
- vii. climate: active during warm months, hibernates in winter
- viii. surface: flying insect: hives on land, food flower floats on surface of water

1° CONSUMER: Go Fish
- i. range: many lakes and ponds
- ii. pop size: moderate
- iii. reproduction: following a mating ritual in clear water the females lay eggs & the males fertilize the eggs externally,
  males guard nest until eggs hatch, babies receive no care nor assistance
- iv. nutrition:
  - a. Norse Sea Lily & other plant roots
  - b. are eaten by Horned Viking Beast who like them better than Lilies but not as much as mead.
- v. sensitivity: eggs are sensitive to chemical pollutants, adults are pretty tough
- vi. humans use: sport and food fish
- vii. climate: any temp above freezing & below 50 C
- viii. surface: lives in water

Name_____ Per _____
Partner _____

1° CONSUMER/2° CONSUMER: Horned Viking Beast
i. range: these organisms inhabit only the Viking Valley, but are capable of living in other niches
ii. pop size: many 1000s
iii. reproduction: life-long pair bonds, internal fertilization, low birth rate, extensive care of young
iv. nutrition:
a. Go Fish, mead, lilies, eagles, cougars & broccoli
b. top level predator
v. sensitivity: low chemical sensitivity, sudden temperature change can harm them
vi. humans use: extremely attractive exotic pets
vii. climate: warm and sunny weather with plenty of water
viii. surface: amphibious

1° CONSUMER/DECOMPOSER: Yeast Beast
i. range: very limited, only in Mead Bee hives
ii. pop size: moderate in hives, zero elsewhere
iii. reproduction: high fecundity: usually asexual budding
iv. nutrition:
a. eats nectar and pollen brought to hive by bee excretes mead
b. Horned Viking Beast drink mead. Horned Viking Beast really like that mead
v. sensitivity: low sensitivity to chemicals
vi. humans use: no known use
vii. climate: warm & moist
viii. surface: live in hive which protects them from climate extremes

DECOMPOSER: Ship Worm
i. range: many reservoirs such as Lake Perris
ii. pop size: large
iii. reproduction: hermaphroditic, lay many eggs, external fertilization, no care of young
iv. nutrition:
a. eats dead organic matter
b. eats anything & everything, once it's died
v. sensitivity: low sensitivity to chemicals, light, temp or salinity change
vi. humans use: no known use, humans think they are ugly
vii. climate: any temperature above freezing
viii. surface: lives in water

Name_____ Per _____
Partner _____

********** for the teacher **********

Environmental Insults: The teacher will assign one of these changes to each group:

A. Overfishing of Go Fish causes a dramatic reduction in their population.
B. A gravid (pregnant) Lily Weevil is inadvertently introduced into the valley. The Lily Weevil eats immature Norse Sea Lily fruit. Worse yet are its reproductive habits. It parasitizes hymenopterans (bees) by stinging them into paralysis and laying a single egg in the abdomen of each insect. The Weevil larva then feeds upon its host from the inside out! Needless to say, this is an experience which a Mead Bee does not survive.
C. Humans have hunted the Horned Viking Beast to a dangerously low population level
D. Nitrates from agriculture have caused an algae bloom in several ponds, lowering Oxygen levels in the water and reducing sunlight to the species in the ponds
E. A disease spreads among the Shipworm populations, greatly reducing their numbers.
F. Exotic pet harvest by humans. Viking Beasts are collected and sold into captivity, greatly reducing their population size.
G. Pesticide use has greatly reduced the population of the Mead Bee.

Ecosystem Project Scoring Rubric
Biology B

Name(s) _____Per____

_____

I. Food Web

The food web diagram accurately shows the energy relationships between all 6 assigned species.

_____/ **10**

II. Species Status after Environmental Insult

Status of each species after the environmental insult (e.g., threatened, endangered, increasing, no change) is logical for the given insult, and ecology terms are used to justify the status.

Norse Sea Lily _____/ 5

Mead Bee _____/ 5

Go Fish _____/ 5

Horned Viking Beast _____/ 5

Yeast Beast _____/ 5

Ship Worm _____/ 5

SUB-TOTAL = _____/30

III. Mitigation

Suggested action is logical for the given insult, and its effectiveness is justified using ecology terms.

_____/10

GRAND TOTAL = _____ / 50