BIOLOGY

Dr. O'Malley

ecology

Classification

- Carolus Linnaeus
- KPCOFGS
- Types: FoodType, structure/morphology, habitat
- Why classify? so all can use the same names

Populations

- population density
- growth rate, birth rate mortality/death rate
- age structure chart
- carrying capacity (K)
- equilibrium / disequilibrium
- world pop. Δes w/the way we use resources.

Succession

- Primary succession (1°)
- Secondary succession (2°)
- Pioneer species
  - → long roots
  - → N-fixing bacteria

Biomes

- Taiga
- Desert
- Tundra
- Savanna
- Deciduous Forest
- Tropical Forest
- Temperate Grassland

Systems

↳ LORAX
↳ parts of ecosystem work together

Food Webs

TROPHIC LEVEL
Producers
Consumers: Herbivores, Decomposers, Omnivores, Carnivores

Predation → Predator-Prey Relations

Competition
↳ For Resources
- food
- habitat
- mates

Defences
- mimicry
- chemical defence
- poison
- camoflage
- teeth/claws

Symbiosis

- commensalism
- mutualism
- parasitism

15 Aug 2013

Biology Unit 1 Vocabulary: Ecology

ECOLOGY VOCAB

Ecology

Ecosystem

Organism

Habitat

Resources

Niche

Abiotic

Acclimation

Interdependence

Greenhouse effect

Population

Conformers

Regulators

Dormancy

Migration

Generalist

Specialist

16

Name and period: _____

Aug 16, 2012

EMERALD ASH BORER (EAB)

An arborist came to your house to look at your trees, because some are losing foliage. He notices that you have two Ash trees on your property, and comments that there is a known incidence of Emerald Ash Borer in your neighborhood. The arborist recommends treating your trees with a product called TREE-äge. Should you treat your trees? Why or why not? **Use the provided materials to complete the following tasks. Be prepared to share your answers with the class. Write your answers in complete sentences when the answer is not a figure.**

Create a figure that shows the life cycle of the Emerald Ash Borer.

Create a food web that includes the Emerald Ash Borer.

You have noticed that other Ash trees in your neighborhood are already infected with EAB. Are your trees at risk?

By writing your ideas and reasoning below, be prepared to discuss with the class the ecological, environmental, and financial impact of the EAB infestation.

Systematics & Classification

20 Aug 2013 (run over to 21 Aug)
(Cut cards while doing NB grade)

15 Au
20

Classification (Carolus Linnaeus)

	Domains	
Animalia	Kingdoms	Kings
Cordata	Phylum	Play
Mammalia	Class	Chess
Rodentia	Order	On
Scuridae	Family	Fat
Tamiasciurus	Genus	Green
hudsonicus	species	Stools/Squares

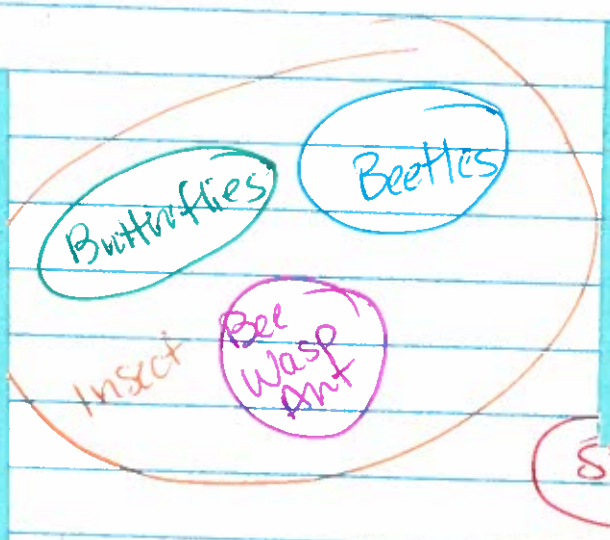
Common squirrel

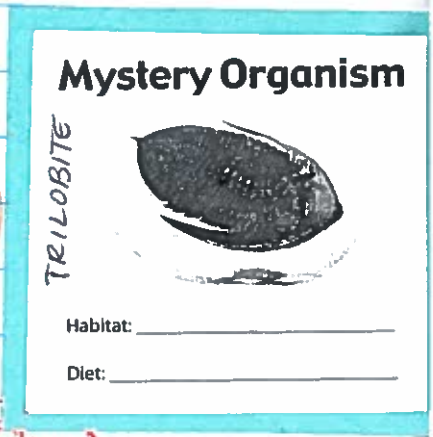
Types of Classific
1) Food type - Food
2) Habitat - Ecos
3) Structure - desc
(wings, legs, other parts)

Lumpers?
Splitters?
Neither?

Why classify: 8/21

- Scientists speaking different languages can identify species
- Clarifies organism when the same common name is used for different animals/plants
- Consistent





18
16

Genus species		Family	Order	Class	Phylum
	Earthworm		Megadrilacea	Oligochaeta	Annelida
	Daddy Longlegs	Pholcidae	Opiliones	Arachnida	Arthropoda
Lithobius sp	Garden Centipede	Lithobiidae	Lithobiomorpha	Chilopoda	Arthropoda
Buprestis aurulenta	Golden Jewel Beetle	Buprestidae	Coleoptera	Insecta	Arthropoda
Calosoma calidum	Fiery Hunter	Carabidae	Coleoptera	Insecta	Arthropoda
Cicidela oregona	Pacific Tiger Beetle	Carabidae	Coleoptera	Insecta	Arthropoda
Adalia bipunctata	Two-spot ladybug	Coccinellidae	Coleoptera	Insecta	Arthropoda
Holorusia hespera	Giant Crane Fly	Tipuloidea	Diptera	Insecta	Arthropoda
	Mayfly (larvae)		Ephemeroptera	Insecta	Arthropoda

Insect Classificatio

20 Aug 2013

mollusc

Banana Slug
Ariolimax columbianus
Habitat: moist forests
Diet: leaves, animal droppings, dead plant material

worm

Ear
Phylum Annelida, over 1,500 species
Habitat: soil
Diet: plant matter

arachnid

Daddy Longlegs
Family Pholcidae
Habitat: cool, damp places
Diet: flies, insects

Sow Bug
Oniscus asetus
Habitat: gardens, areas with people
Diet: decaying plants and animals

Oregon Swallowtail
Papilio machaon oregonius
Habitat: riparian areas
Diet: nectar

Field Crescent
Phyciodes campestris
Habitat: pen areas
Diet: nectar

Snowberry Clearwing
Hemaris diffins
Habitat: open areas
Diet: nectar

butterflies

Habitat: gardens and moist forests
Diet: insects

Clown Millipede
Harpaphe haydeniana
Habitat: Douglas-fir trees
Diet: plants, detritus

many pairs of legs

Beetles

Harvester Ant
Pogonomyrmex spp.
Habitat: open ground
Diet: dead insects and seeds

Golden paper wasp
Polistes fuscatus
Habitat: pen areas
Diet: goldenrod nectar, insects

Bumble Bee
Bombus spp.
Habitat: clearings and meadows
Diet: pollen

Social insects

American Emerald
Cordulia shurtleff
Habitat: ponds and open lakes
Diet: insects

Boreal Bluet
Enallagma boreale
Habitat: ponds and lakes
Diet: aphids and baby grasshopers

Damselflies

Habitat: streams and small rivers
Diet: dead or drowning insects

Rough Plant Bug
Brochymena spp.
Habitat: forests
Diet: caterpillars, plant nectar, plant seeds

Single-banded Backswimmer
Notonecta unifasciata
Habitat: ponds, lakes, slow streams
Diet: fish, insects

True Bugs

legs underneath

Two-spot Ladybug
Adalia bipunctata
Habitat: trees, shrubs, buildings
Diet: aphids

Golden Jewel Beetle
Buprestis aurulenta
Habitat: coniferous forests
Diet: dead wood (larvae)

Giant crane fly
Holorusia hespera
Habitat: forested areas
Diet: dead organic mater (larvae)

Food Webs

21 Aug 2013

Essential Questions:

1. How do organisms interact with each other and with the environment in which they live?
2. How does energy flow through a food web?

How does EAB interact w/ its environment? → • EATS ASH TREES • EATEN BY WOODPECKE

Why does it need to eat? • ENERGY

SUN → PLANTS → 2° 3° CONSUMER .... PREDA

★DISTRIBUTE HANDOUT★ It's a puzzle!

SPOTTED OWL IS ENDANGERED!

Food CHAIN (linear) fungi → flying squirrel → pileated woodpecker → owl

Food Webs show connections

Homework: make food web on page 22-23

arrow goes FROM food TO eate

22 Aug 2013

Producers - use sun for photosynthesis

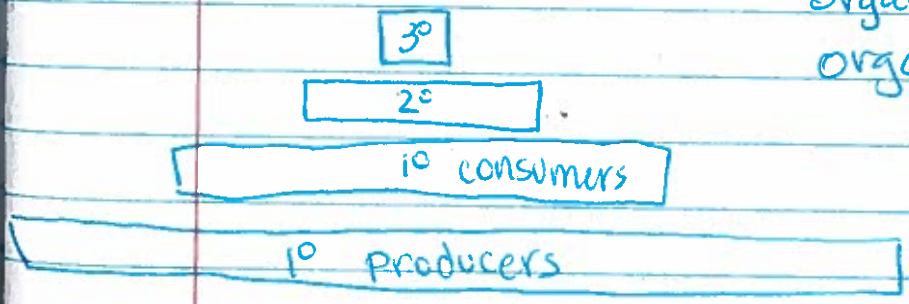
consumers:
- Herbivores - eat plants
- Decomposers - eat dead organisms (eg fungi)
- Omnivores - eat plants & animals
- Carnivores - eat only animals

Population - group of individuals living in the same area

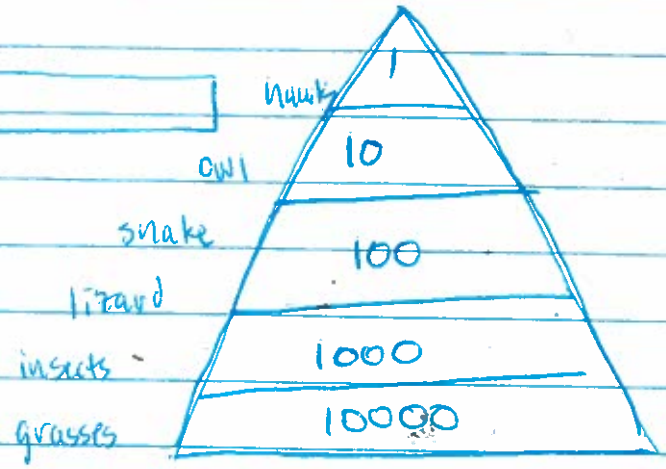
Ecosystem - community of organisms & physical factors w/which they interact

Ecological Pyramid

Biomass - amt of living organic matter in an organism (g/m^2 or cal/m^2)



Pyramid of Productivity - describes energy



FOOD WEB


Raccoon Omnivore - Eats crayfish, fish, turtles, frogs, small mammals, birds, eggs, insects, seeds, fruits


Black Bear: Omnivore - Eats berries, plants, fish, roots, insects, mice


Snakes Carnivore - Eats mice, salamanders, snails
Eaten by owls, hawks

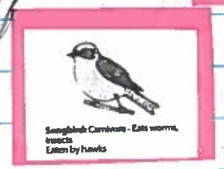

Frogs Carnivore - Eats bugs
Eaten by hawks, owls, snakes


Fishs Carnivore - Eats aquatic insects, other fish
Eaten by eagles, bear, whales, seals


Salamanders Carnivore - Eats insects, worms
Eaten by snakes, hawks


Snails Herbivore - Eats leaves
Eaten by birds, skunks


Skunks Carnivore - Eats insects, snails, mice
Eaten by owls


Songbirds Carnivore - Eats worms, insects
Eaten by hawks


Lizards Carnivore - Eats insects
Eaten by birds, snakes


Insects: Herbivore - Eats leaves, grass
Eaten by birds, salamanders, frogs, snakes, lizards


Grasshoppers Herbivore - Eats grass, leaves
Eaten by birds, frogs, salamanders


Pileated Woodpeckers Omnivore - Eats insects, fruits, seeds
Eaten by hawks, owls


Pumpk (mushrooms)
Eaten by Flying squirrels


Mouse: herbivore - Eats seeds, fruit
Eaten by owls, hawks, snakes, coyotes


Flying Squirrels Herbivore - Eats seeds, fungi
Eaten by coyote, bobcat, hawk, owl


Deer: Herbivore - Eats leaves, grass
Eaten by Mountain lions

LEAVES

GRASS

SEEDS

FRUIT
BERRIES

SHRUBS

BARK

22

FOOD WEB

21-22 Aug


Otters Carnivore - Eats fish, frogs, turtles, crayfish, insects, young birds; Top Carnivore


Spotted Owls Carnivore - Eats mice, rabbits
Eaten by hawks


Turkey Vultures Carnivore - Eats flesh from already dead animals; Top Carnivore


Bats: Insectivore - Eats insects
Eaten by owls, snakes


Mountain Lions Carnivore - Eats deer, young or sick bear, skunks, porcupines, young elk; Top Carnivore


Eagles Carnivore - Eats small mammals, salmon, ducks, gulls; Top Carnivore


Porcupines Herbivore - Eats leaves, grass, shrubs, bark
Eaten by Mountain lions, bobcats, foxes, wolverines

What is the impact of carnivores on the food web?

Would more species be affected if you ~~imp~~ eliminated the top carnivores, or the primary producers? why?

PRODUCTIVITY

FISH SKUNK SONGBIRD LIZARD
PORCUPINE WOODPECKER RACCON BE
MOUSE SQUIRREL DEER FUNGI
SNAIL INSECT GRASSHOPPER

LEAVES GRASS SEEDS BARK
FRUIT BERRIES SHRUBS

CARNIVORE

OMNIVORE

HERBIVORE

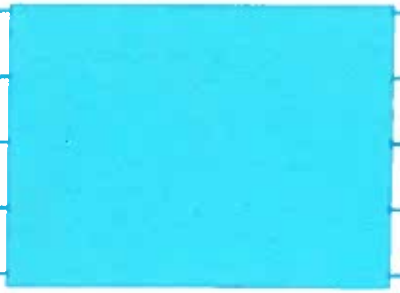
PRIMARY

23

FOOD WEB IMPACTS

23 Aug 2013

Explain what might happen to the organisms in your food web if unusually high amts of rain fell? creeks? rivers flooded.



★EQUILIBRIUM/ DISEQUILIBRIUM★

List other natural disturbances that might affect the food web.

1. Fire
2. Drought
3. Volcanic Eruptions
4. Too much of a nutrient
5. Too much sediment/landslide
6.
7.
8.
9.
10.

Disturbances can:

- restart succession
- increase diversity
- decrease diversity
- promote co-existence of competitors
- promote co-existence of predator & prey

Scientific Method

26 Aug 2013

Purpose:
- Question
- Why are we doing an experiment.

- How do organisms interact and impact their environment?
- How do physical & chemical constraints affect the homeostasis of an organism?

Procedure:
How we collect data to answer the question.

Ecocolumn
- what are biotic & abiotic factors
- carrying capacity

What data will we collect? How?

Results:

Data

Use our collected data to answer questions.

Conclusion:
use data to answer question.

Tomorrow
- Set up diagram
- Dirt
- seeds (grass)
- algae

obs
- water depth
- sod
- spreader?
- snail

Ecocolumn Setup

27 Aug 2013

Purpose

biotic
- How do organisms interact and impact their environment?

abiotic
- How do physical & chemical constraints affect the homeostasis of an organism?

PROCEDURE

← cup over dome lid
← grass seed
← damp soil
← 2 dome lids · coffee filter between
← water
· elodea
· filamentous algae
· duckweed

date	soil wet/dry	water color, clarity	algae #, length, color	grass color, length	notes

Symbiosis

28 Aug 208

Animals	Relationship	Comments
Barnacle/Whale		Barnacles create home sites by attaching themselves to whales. This relationship neither harms nor benefits the whales.
Remora/Shark		Remoras attach themselves to a shark's body. They then travel with the shark and feed on the leftover food scraps from the shark's meals. This relationship neither harms nor benefits the shark.
Bee/Maribou stork		The stork uses its saw-like bill to cut up the dead animals it eats. As a result, the dead animal carcass is accessible to some bees for food and egg laying. This relationship neither harms nor benefits the stork.
Silverfish/Army ants		Silverfish live and hunt with army ants, and share the prey. They neither help nor harm the ants.
Hermit crab/Snail shell		Hermit crabs live in shells made and then abandoned by snails. This relationship neither harms nor benefits the snails.
Cowbird/Bison		As bison walk through grass, insects become active and are seen and eaten by cowbirds. This relationship neither harms nor benefits the bison.
Yucca plant/Yucca moth		Yucca flowers are pollinated by yucca moths. The moths lay their eggs in the flowers where the larvae hatch and eat some of the developing seeds. Both species benefit.
Honey guide bird/Badger		Honey guide birds alert and direct badgers to bee hives. The badgers then expose the hives and feed on the honey first. Next the honey guide birds eat. Both species benefit.
Ostrich/Gazelle		Ostriches and gazelles feed next to each other. They both watch for predators and alert each other to danger. Because the visual abilities of the two species are different, they each can identify threats that the other animal would not see as readily. Both species benefit.
Oxpecker/Rhinoceros		Oxpeckers feed on the ticks found on a rhinoceros. Both species benefit.
Wrasse fish/Black sea bass		Wrasse fish feed on the parasites found on the black sea bass's body. Both species benefit.
Mistletoe/Spruce tree		Mistletoe extracts water and nutrients from the spruce tree to the tree's detriment.
Cuckoo/Warbler		A cuckoo may lay its eggs in a warbler's nest. The cuckoo's young will displace the warbler's young, and the warbler will raise the cuckoo's young.
Mouse/Flea		A flea feeds on a mouse's blood to the mouse's detriment.
Deer/Tick		Ticks feed on deer blood to the deer's detriment.

Symbiosis - organisms living together
a) Commensalism - live together - no harm, no benefit
Mutualism - both benefit
Parasitism - one is harmed

Ecology 1 Test Review
29 Aug 2013

Review for Biology Test 1, August 30, 2013

Ecology

Ecosystem

Organism

Habitat

Resources

Niche

Abiotic

Biotic

Interdependence

Population

Biomass

Who was the important scientist who first began using our modern methods of classification? How did he classify organisms?

Why do scientists classify organisms and give them Latin names?

How do we know when we are reading a Genus and species name?

In what ways to organisms interact with each other?

How does energy move through a food web?

What do producers do?

What kinds of consumers are there? What does each kind eat?

Draw an ecological pyramid. Label each trophic level. Give an example of an organism that might be in that trophic level. Draw the accompanying food chain.

What is a pyramid of productivity? Can you draw one, with an example food chain?

What happens to a food web if you eliminate primary producers?

What natural disturbances might impact a food web? Give 3 examples.

Vocabulary

3 Sept 2013

Population	Population Density
Dispersion	Carrying Capacity
Stability	Equilibrium
Birth Rate	Mortality Rate
Growth Rate	Age structure
Developed Countries	Developing Countries

tie to food web disturbances

Populations Homework

4 Sept 2013

- Read "Populations" (section 20-1)
- Answer questions on page 382 "Section 20-1 Review"

Populations Notes

date grass soil water
color + height damp/dry) color clarity

Populations

Symbiosis – living together

Clownfish and anemone

Kinds of symbiosis

Commensalism (neutral)

Mutualism (positive)

Parasitism (negative)

36

Survivorship curve: story of life and death.

Humans, frogs, songbirds

Carrying capacity – maximum amount of individuals an ecosystem can support

r-selected – take over a niche as fast as possible (put life in growth rate)

In an unstable environment, high fecundity (lots of babies), small body size, early maturity, short generation time, dispersed offspring.

K-selected – live a long time (put life in carrying capacity)

In a stable environment, large body size, long life expectancy, high parental care, fewer offspring

*continuum between K and r selected species. Some species vary throughout their lifespan, or there is a difference between sexes in one species.

Population & Carrying Capacity

10 Sept. 2013

How is carrying capacity (K) indicative of a population?

Factors Influencing a Population

(1) Competition for available food

(2) Size of food supply

(3) dispersal or migration to new territories

Carrying capacity — max # of organisms that can be supported by an ecosystem.

Home range - a populations already well-established territory

- "Year" = 1 minute
- to survive, collect @ least 5, not more than 10

- reproduce = # that survived 4th year - don't return all food to plot

YEAR	# of Deer @ start	# of deer @ end (prediction?)
1		
2		
3		
4		
5		

4 33 26

P. 387 # 1-3

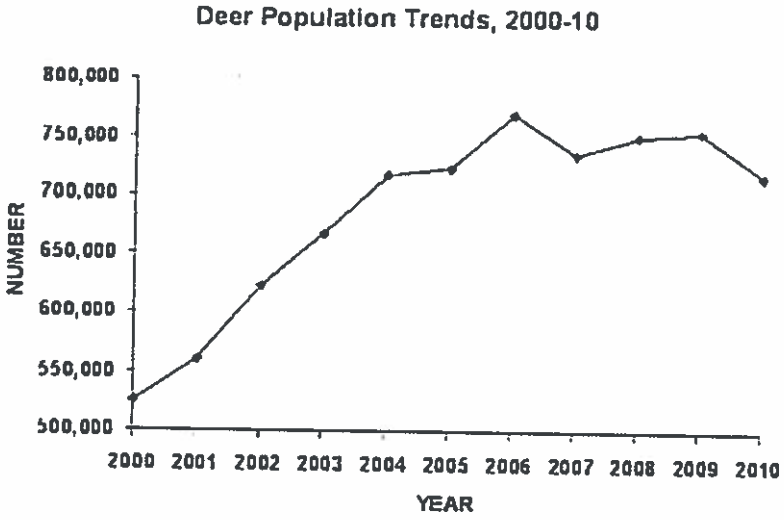
per 6

Population & Carrying Capacity

11 Sept 2013

How does carrying capacity (K) influence population growth?

- using the text & our activity yesterday:
- considering the population trend for deer in Dayton, what can you say about birth & death rates?
- Have those rates changed?



Name: _____
Period ____.

Notes 27c(Biomes Video)

1) Long term patterns of temperature and moisture is called _____.

2) The Tundra covers what fraction of the earth's land area? _____.

3) How cold can the tundra get _____ degrees C.

4) Because of _____, trees can not grow their roots in the soil.

5) What is the largest continuous biome on earth? _____

6) What is the main type of precipitation in a Taiga? _____

7) Deciduous forests have mild winters and _____ summers.

8) Grasslands are now covered with _____ fields and _____ raising grounds.

9) Tropic grasslands are called _____.

10) How many feet of rain can the rainforest get a year? _____

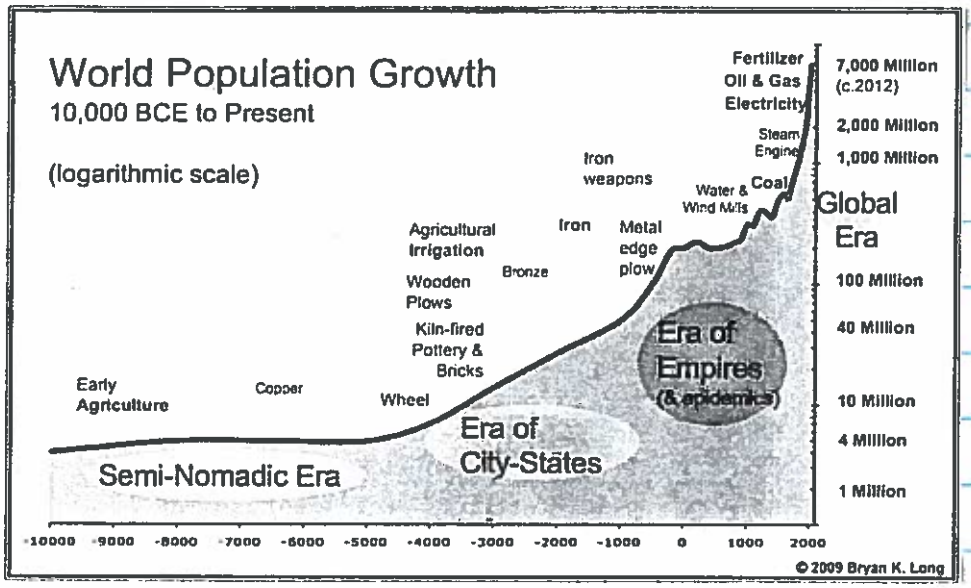
11) What is form at a region of dry air? _____

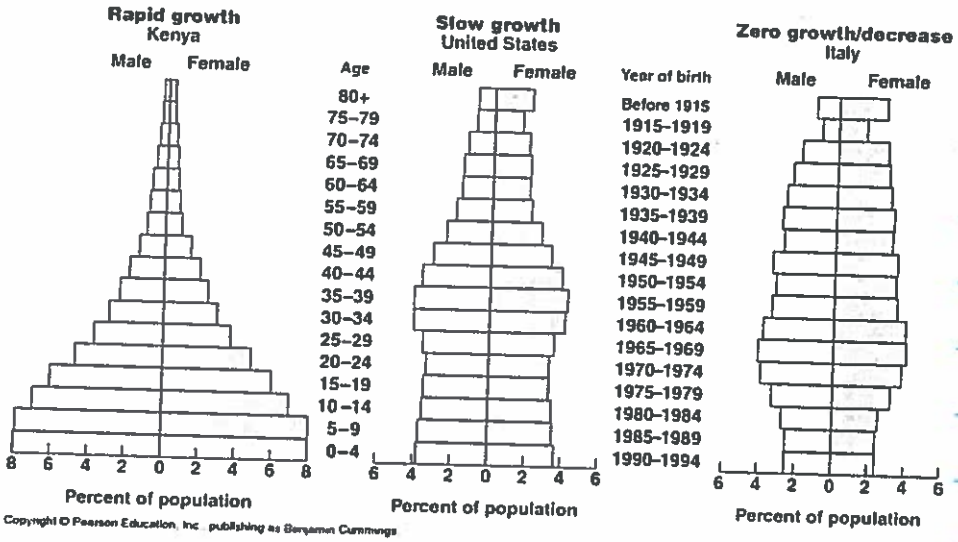
12) Deserts cover what percent of the earth's land area. _____

13) Some deserts may go _____ without rainfall.

Human Populations

12 Sept 2013





↑ agriculture ↑ ↗
land war

For different Eras in the history of man, ~~human population~~ K was stable @ different ~~amounts~~ populations

What are the axes? What are the 4 Eras? What factors contributed to an increase in K (carrying capacity)

Why did K change in these different periods of history?

How are populations in different parts of the world different? Character, etc. them w/ ...

Characterize the growth of the human population
- discuss growth of the pop. (exponential? logistic?)

- Discuss K.

What tools/knowledge made an increase in K possible?

Will we reach a max K? What technologies need to be developed?

- What kind of growth?
- What is allowing pop growth
- How does the graph show rapid/slow/no growth.

Predation

16 Sept 2013

* book pg 396 ch 21
* Define Terms
* Show how they relate
  - predation
  - predator
  - prey
  - natural selection
  - defenses (text + pics)
  - competition
  - what animals compete for

What I expect to see in notebooks:
- what these words mean
- what predators have to do with natural selection
- what do organisms compete for (examples)
- how does prey defend itself (examples)

Natural Selection

fittest wins

Competition

Compete for:

- food
- habitat / shelter
- mates

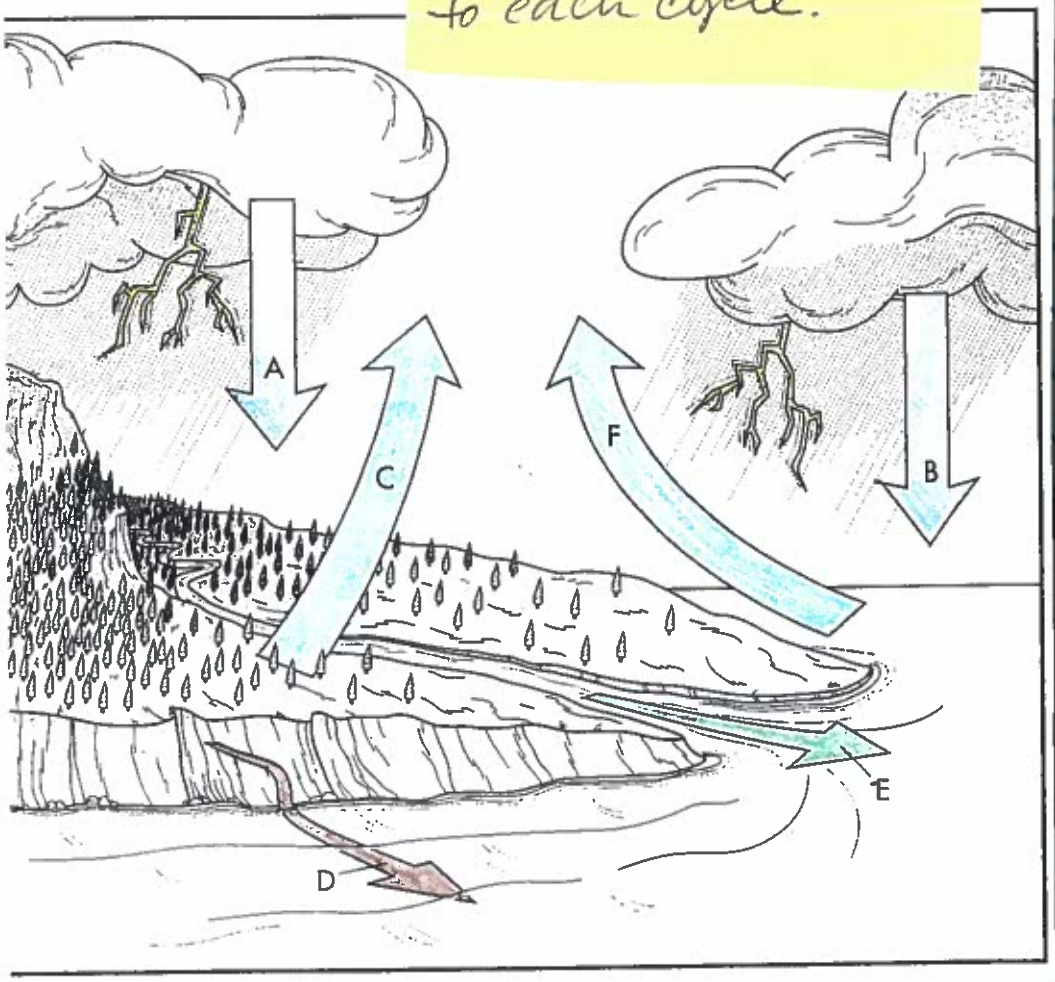
Defenses

- mimicry
- chemical defense
- poison
- camoflage
- teeth : claws

The WATER CYCLE

17 Sept 2013

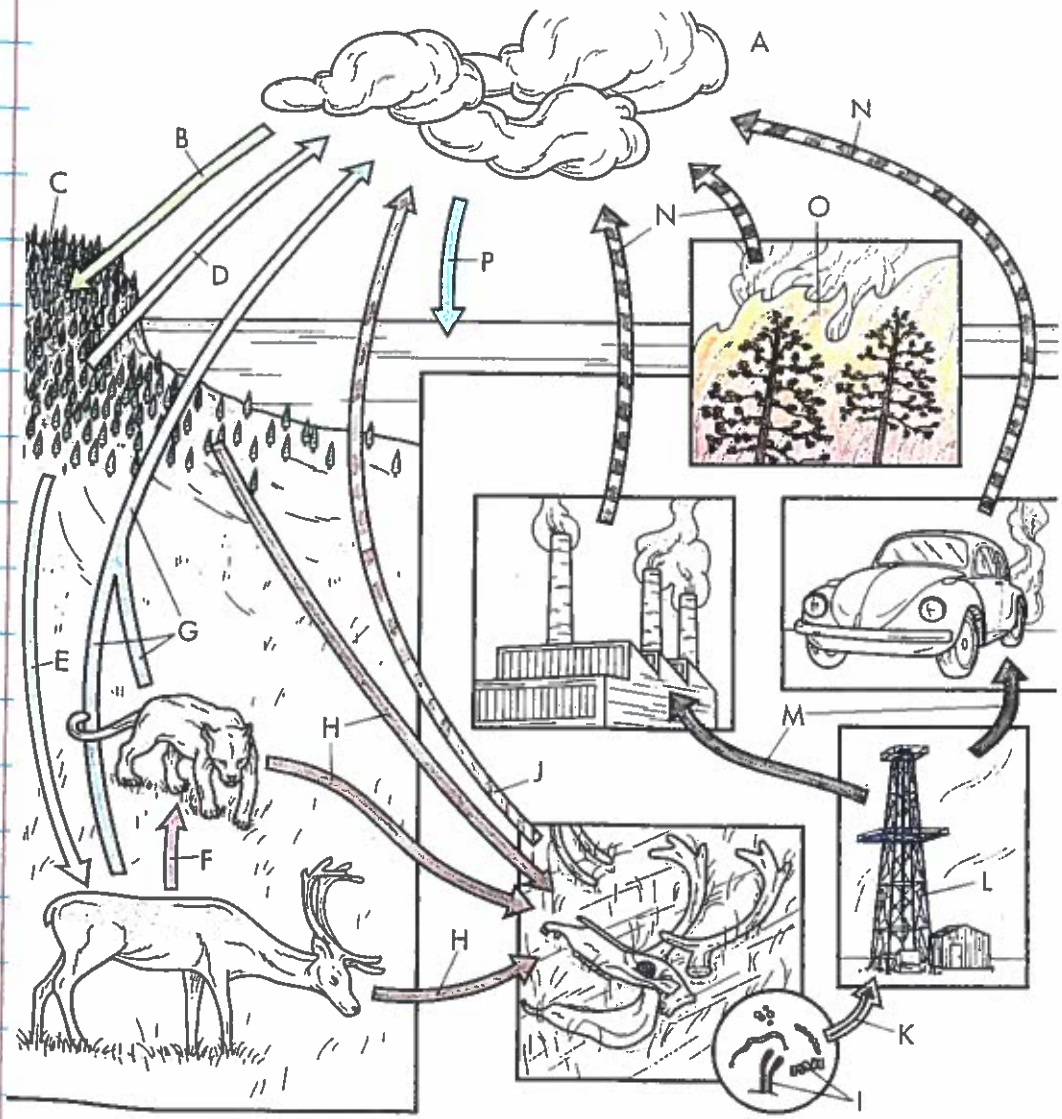
Use the picture? info given to create a list of biotic components and abiotic components to each cycle.



The Water Cycle

- Precipitation Over Land.....A
- Precipitation Over Ocean.....B
- Transpiration C
- Seepage From Ground ....D
- Runoff From Surface ....E
- Evaporation from Ocean .....F

The CARBON CYCLE
17 Sept 2013

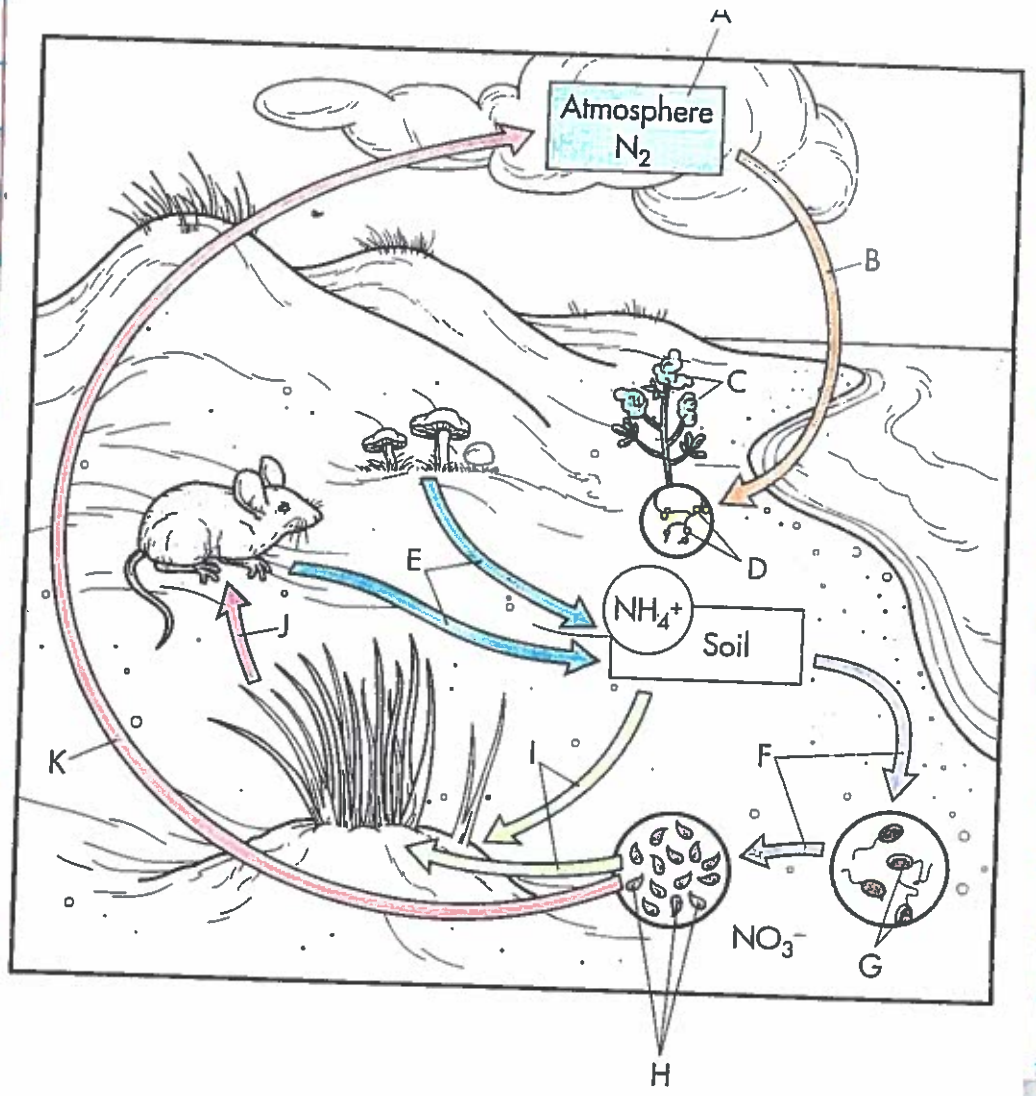


The Carbon Cycle

- Atmosphere .....A
- Photosynthesis .....B
- Forest C
- Respiration in Plants..D
- Plant Consumption.....E
- Animal Consumption ....F
- Respiration in Animals.....G
- Decay.....H
- Detritus Feeders I
- Respiration in Detritus Feeders.....J
- Conversion to Fossil Fuel .....K
- Fossil Fuel Processing L
- Uses for Fossil Fuel ..M
- Products of Combustion .....N
- Forest Fire.....O
- Exchange with Oceans ..P

The NITROGEN CYCLE

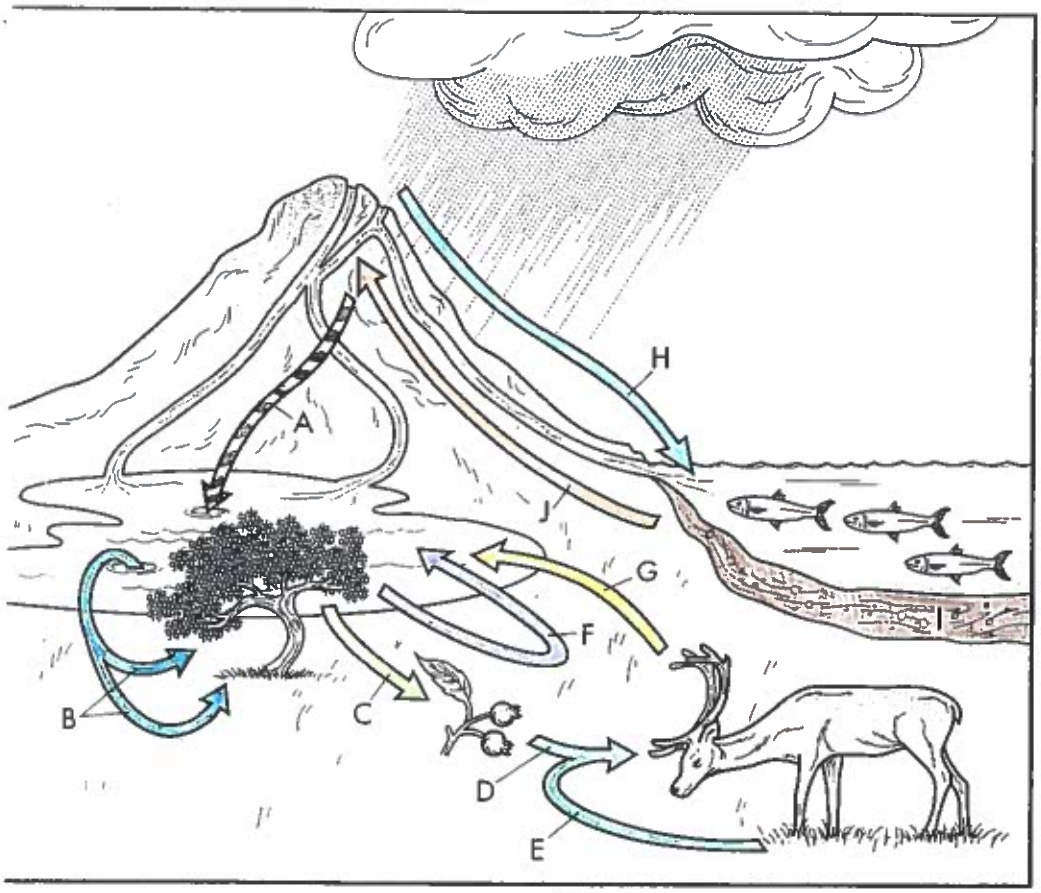
18 Sept 2013



The Nitrogen Cycle

- Atmosphere ..... A
- Nitrogen Fixation ..... B
- Legume Plant C
- Nitrogen-Fixing Bacteria ..... D
- Ammonification ..... E
- Nitrification ..... F
- *Nitrosomonas* ..... G
- *Nitrobacter* ..... H
- Consumption by Plants I
- Consumption by Animals ..... J
- Denitrification ..... K

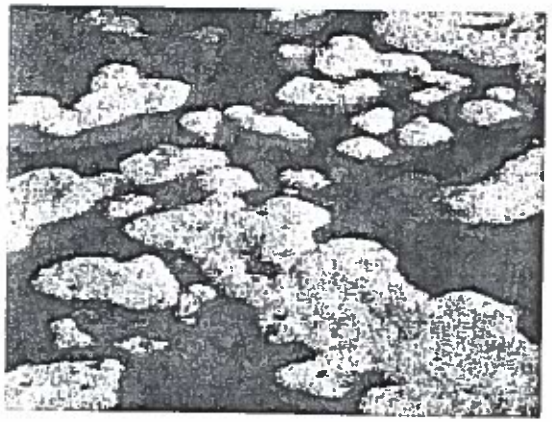
The PHOSPHORUS CYCLE



The Phosphorus Cycle

- Erosion from Rock .....A
- Absorbtion by Plants ..B
- Concentration in Plant Tissues C
- Plant Consumption .....D
- Grazing .....E
- Plant Waste .....F
- Animal Waste.....G
- Runoff to Ocean .....H
- Marine Sediment I
- Geologic Upthrust .....J

Studying an Algal Bloom



Objectives: *Investigate* how algae are affected by common pollutants, *determine* how common pollutants contribute to environmental problems, *analyze* the effect of different concentrations of common pollutants on the growth of algae.

Purpose: You are a naturalist specializing in aquatic ecosystems for the state park service. During your annual visit, you realize that the state's largest lake is covered by a thick, green scum. Plants and fish in the lake are dying. You suspect that runoff containing pollutants such as fertilizers from a nearby housing development may be contributing to increased algae growth in the lake. To test your hypothesis, you decide to test the effects of two common pollutants, nitrate and phosphate, on the rate of algal growth.

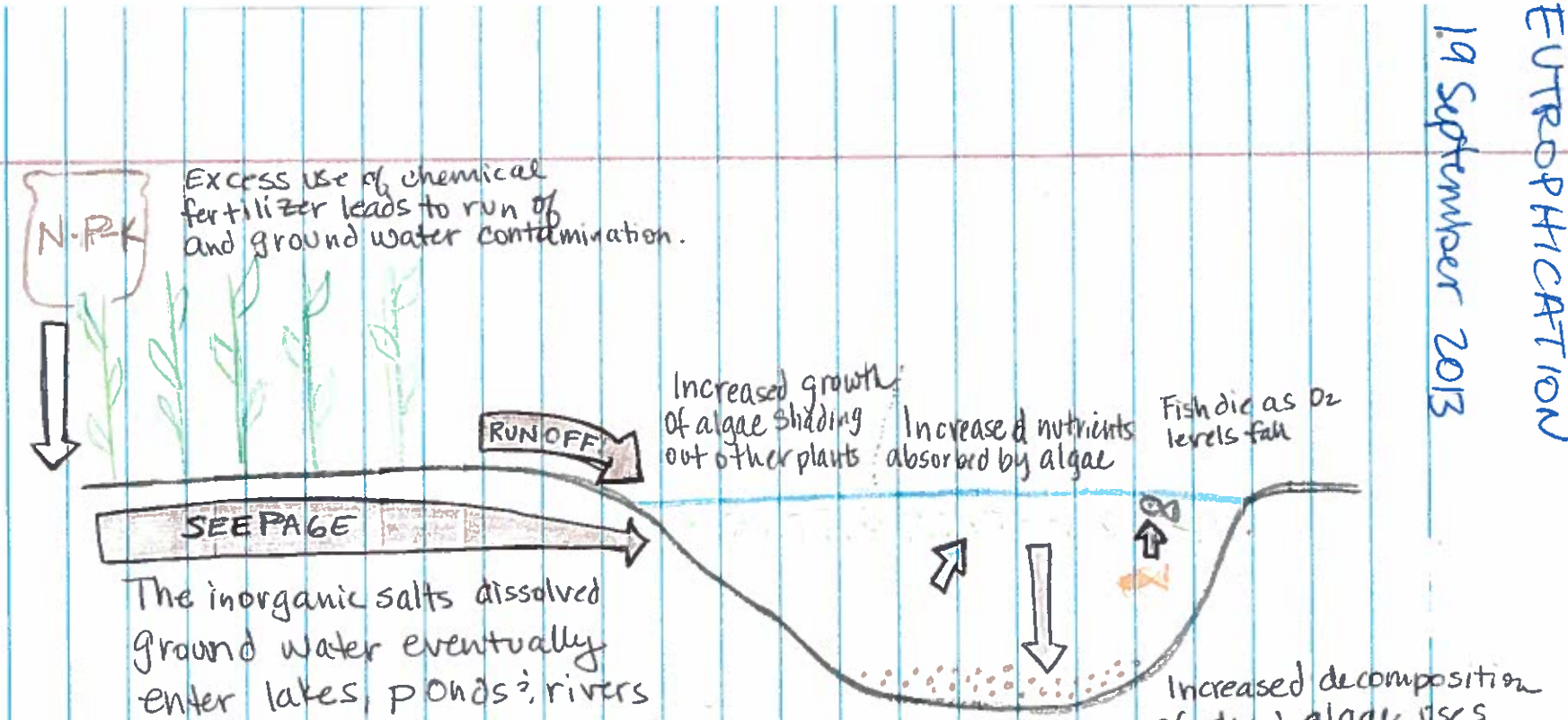
Background: Lakes and ponds undergo a natural succession. When a lake is young and deep, there are fewer aquatic organisms because the nutrients they require are scarce. Over time, runoff into the lakes brings nutrients needed to sustain phytoplankton and other primary producers. This allows an increase in population at all levels of the food web and in the overall biomass of the lake.

An **algal bloom** is a sudden massive growth of algae. At first, you may think this rapid growth of algae is

impact, runoff into lakes and ponds can have devastating effects. Drainage from agricultural fields transports nitrogen and phosphorous used for fertilization into the surrounding bodies of water. Under some conditions, fecal material from animals raised on farms also adds to the nitrate and phosphate totals.

EUTROPHICATION

19 September 2013



Ecosystems: Biogeochemical Cycles

Duckweed, Elodea, and Algae: Why Are They Important?

Why should you add duckweed, elodea, and algae to your aquarium? Each is special in its own way. Water plants, like elodea and duckweed, are beautiful to look at. Algae and water plants help keep a healthy exchange of gas in the water. They also provide food and shelter for many animals. What other reasons can you think of for adding these organisms to your aquarium?

Not Just Beautiful to Look At

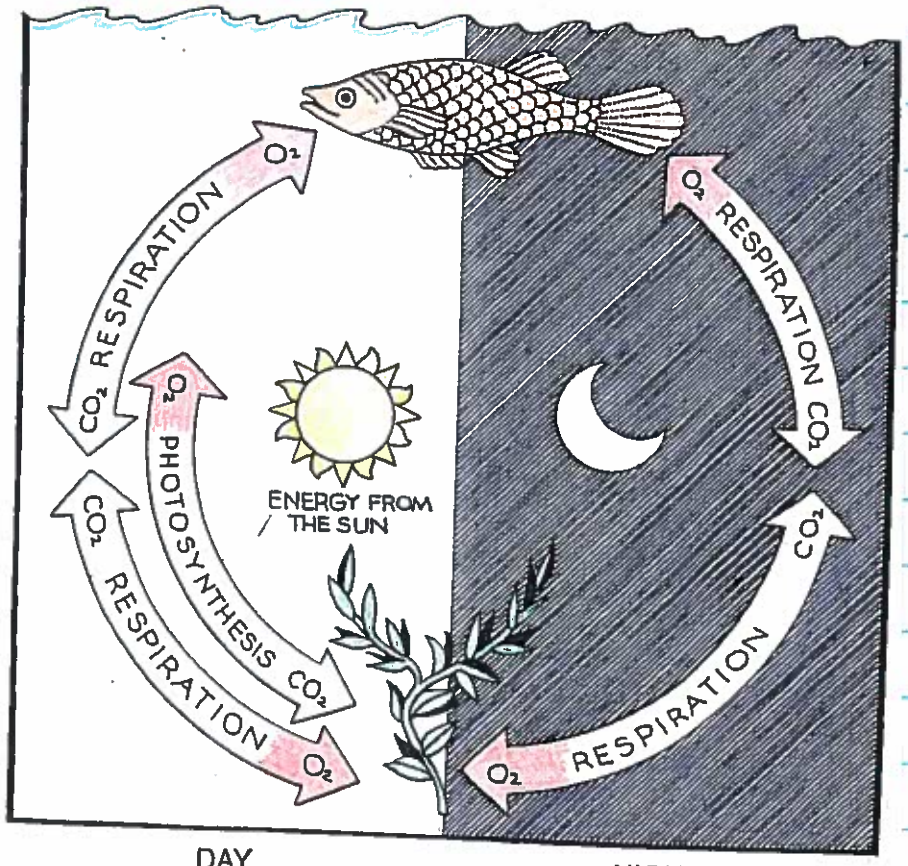
Aquatic organisms such as duckweed, elodea, and algae add a special kind of beauty to our world. Some have bright colors and unusual shapes. Others sway with the gentle motion of the water's current.

These producers are especially important in a pond or slow-moving stream. This is because they help provide oxygen for animals in the water. How? By taking in one gas (carbon dioxide, or CO_2) and giving off another (oxygen or O_2).

Some aquatic organisms provide homes and protection for tinier organisms and baby animals. These creatures nestle in the leaves and stems of underwater plants where they can live safely.

Why Swap Gases?

Animals, plants, and other living things, such as algae and bacteria, are always using oxygen. This is called **respiration.** Respiration helps organisms get energy. In the daylight, organisms that have chlorophyll, such as plants, algae, and some bacteria, can use the sun's energy, water, and carbon dioxide to make their own food. We call this **photosynthesis.** Through photosynthesis, these organisms release much more oxygen than they take in. In the water, animals such as fish, snails, and tadpoles use the oxygen to breathe.



Oxygen-carbon dioxide cycle

er organisms
ıals, such as t
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f these produ

yellow-green. It
.t has no leaves
of one to three
: center. From
s. Use your hand
l plant up close.

l View

. it almost never
›es duckweed
orm new fronds.
t and then
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frond of
stay in groups
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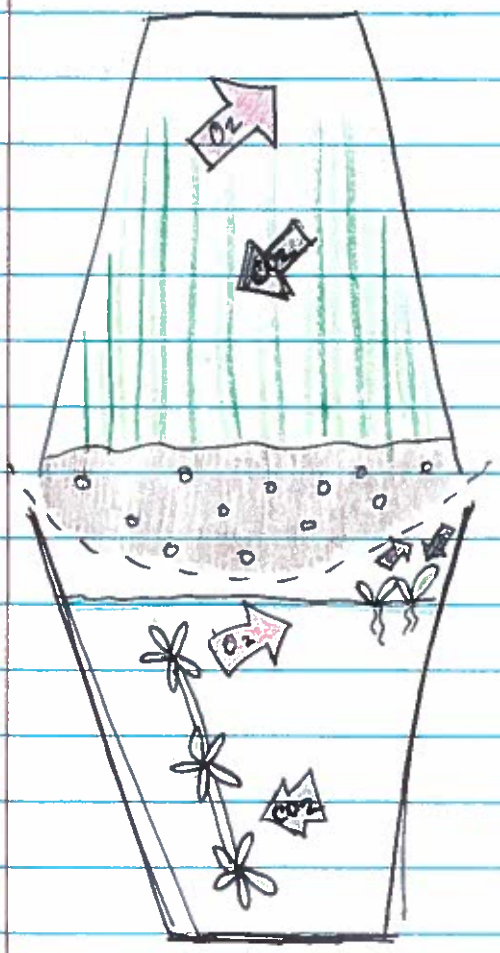
plants when

Ecocolumns: Biogeochemical Cycles

20 Sept 2013



Process by which organisms use oxygen:
Respiration

Process by which plants make their own food:
PhotoSynthesis

Organisms that make their own food are:
Producers

Organisms that eat other food:
Consumers

How can duckweed change water chemistry?

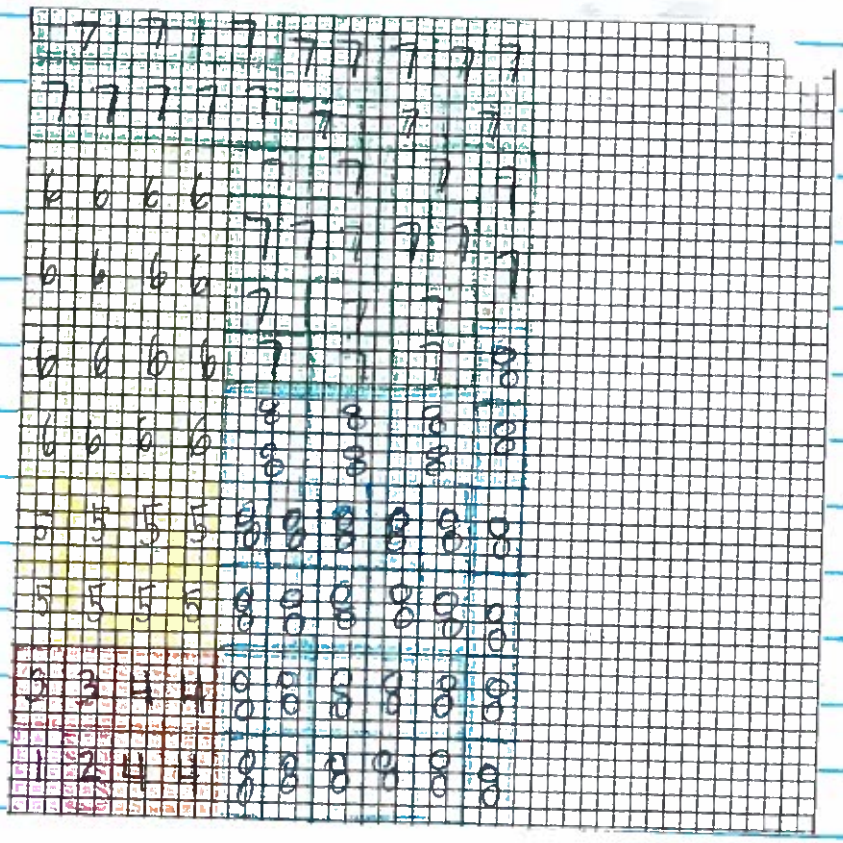
Lily Pad Puzzle

24 Sept 2013

Essential Q: How is carrying capacity indicative of a population?

Pond: 48 x 48 grid
Lilypad: 3x5

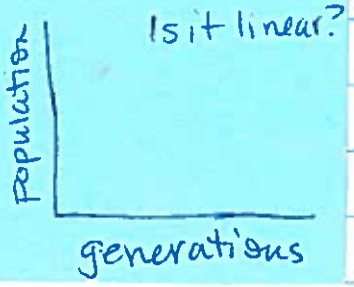
- Each day double the # of lilypads.
- Double until half the pond is full.



Repeat, but count # of lily pads each generation.

Generation	# New Lilypads	# of L.P. in Pop

Make a graph



Generation (days)	new	total
1	1	1
2	1	2
3	2	4
4	4	8
5	8	16
6	16	32
7	32	64
8	64	96

1. How many lily pads to fill half the pond?
2. How many days before half the pond is filled?
3. How many more until the pond is full?

What is reproductive rate?

What is the carrying capacity for lilypads in the pond?

What resources are limited?

Systems

26 Sept 2013

Science System

System - set of individual objects that interact to influence each other to perform a task or function

---

Lorax: Emphasize ecological consequences

Examples of Systems

1. Cell
2. Oxygen/CO_2/ water/N/P cycles
3. Classification of organisms
4. Rock cycle
5. Weather ? Climate
6. Solar System
7. Simple Machines
8. Electrical systems? Circu
9. Ener Reso
10. Tec
11. So

1. Read story
2. Create concept map summarizing the story ? its message
3. Discuss story from different points of view (Once-ler, Lorax, Barbaloots)

THE LORAX CONCEPT MAP

26 Sept 2013

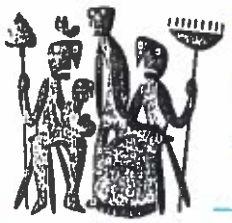

Gluppity-Glup


Total Population


Chopping Rate

Gluppity Glup kills Lorax's friends

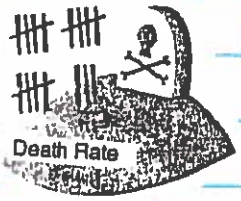
Once-ler Family Workers



↑ Chopping rate = ↑ sales

Tool helps Chop more


Sales of Thneeds


Death Rate

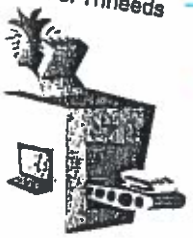

Super-Axe Hacker

Creates gluppity-glup

Invites family to work

Once-ler sells thneeds

Production of Thneeds



Once-ler uses super-axe hacker to chop trees faster

Once-ler profits from thneeds


Once-ler


Profits

Once-ler makes thneeds

Tries to change Once-ler's ways


Thneed

Truffula trees used to make thneeds

"I speak for the trees"


Lorax

Truffula Trees


Humming Fish

Bar-ba-loots live under trees

Speaks to Bar-ba-loots

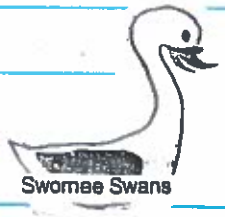
Truffula produces fruit


Truffula Fruits


Bar-Ba-Loots

live in harmony

live in harmony


Swomee Swans

Bar-ba-loot eats Truffula fruit

live in harmony

SUCCESSION
30 Sept 2013

Succession - regrowth of an area

2 Types

Primary succession - developing of a community that has not supported life previously
i.e. rock, sand dunes, volcanic eruption

Secondary succession - sequential replacement of species that follow disruption of a community.
↳ fires, landslides, hurricanes, floods

"Pioneer Species" - first species early in the community.

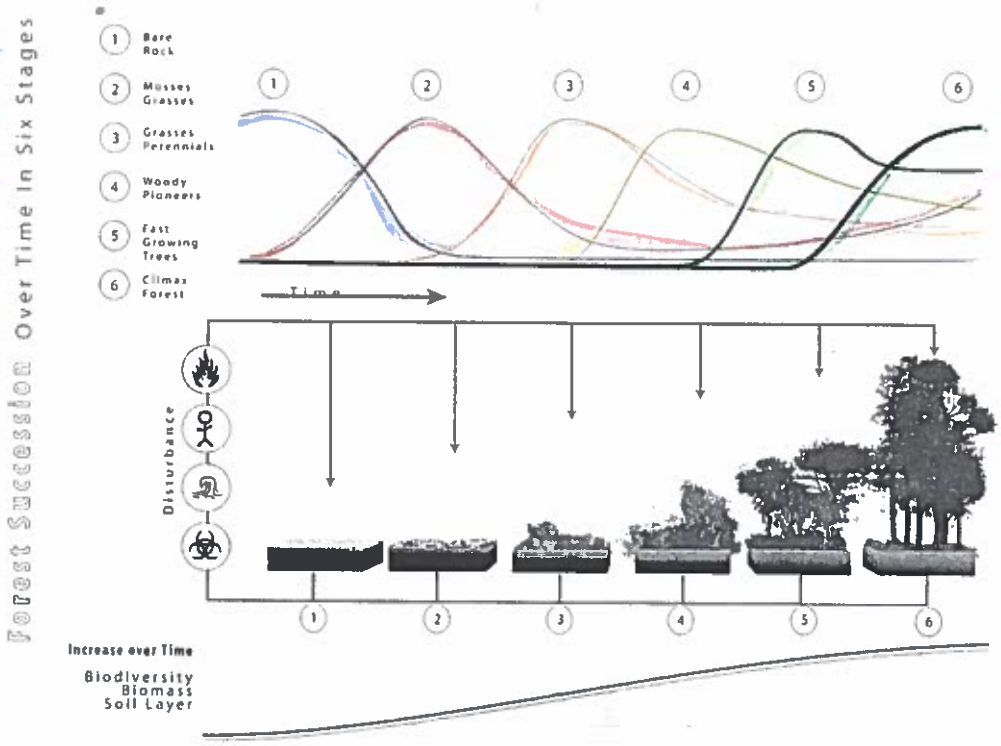
Characteristics of pioneer species?
↳ usually plants w/ long roots, root nodes w/ N_2 fixing bacteria

ENVIRONMENT
- thin, low quality soil

Sand → grasses
saltwater → algae
↳ sea grasses
fresh water → algae, mosses, grass
deforested land → birch trees, raspberry, heath

- make new soil
- provide nutrients for small fish & aquatic plants

Succession (cont)
30 Sept 2013



text pg 406

Stage		
1	Bare Rock	Place to grow
2	Mosses/Grasses	Colonize rock: make soil
3	Grasses/Perenials	more organic matter
4	Woody Pioneers	↓ Larger plants grow
5	Fast growing trees	as soil thickens and
6	Climax Forest	becomes nutrient rich.

Wolves in Yellowstone
7 Oct 2013

What factors are needed to insure resilience in an ecosystem?
Can you model an ecosystem in equilibrium and argue the challenges of disequilibrium w/in an ecosystem?

Aspen → Elk → Wolves

	Wolves	Elk	Aspen
Wolves	mate	wolves eat elk	Wolves keep elk from eating all trees
Elk	wolves eat elk	mate	elk eat young aspen
Aspen	wolves keep elk from eating young aspen	elk eat young aspen	pollinate

3468 mi^2
2,221,766 acres

United States Map > Small B&W Outline Map > Black and White Outline Map

59

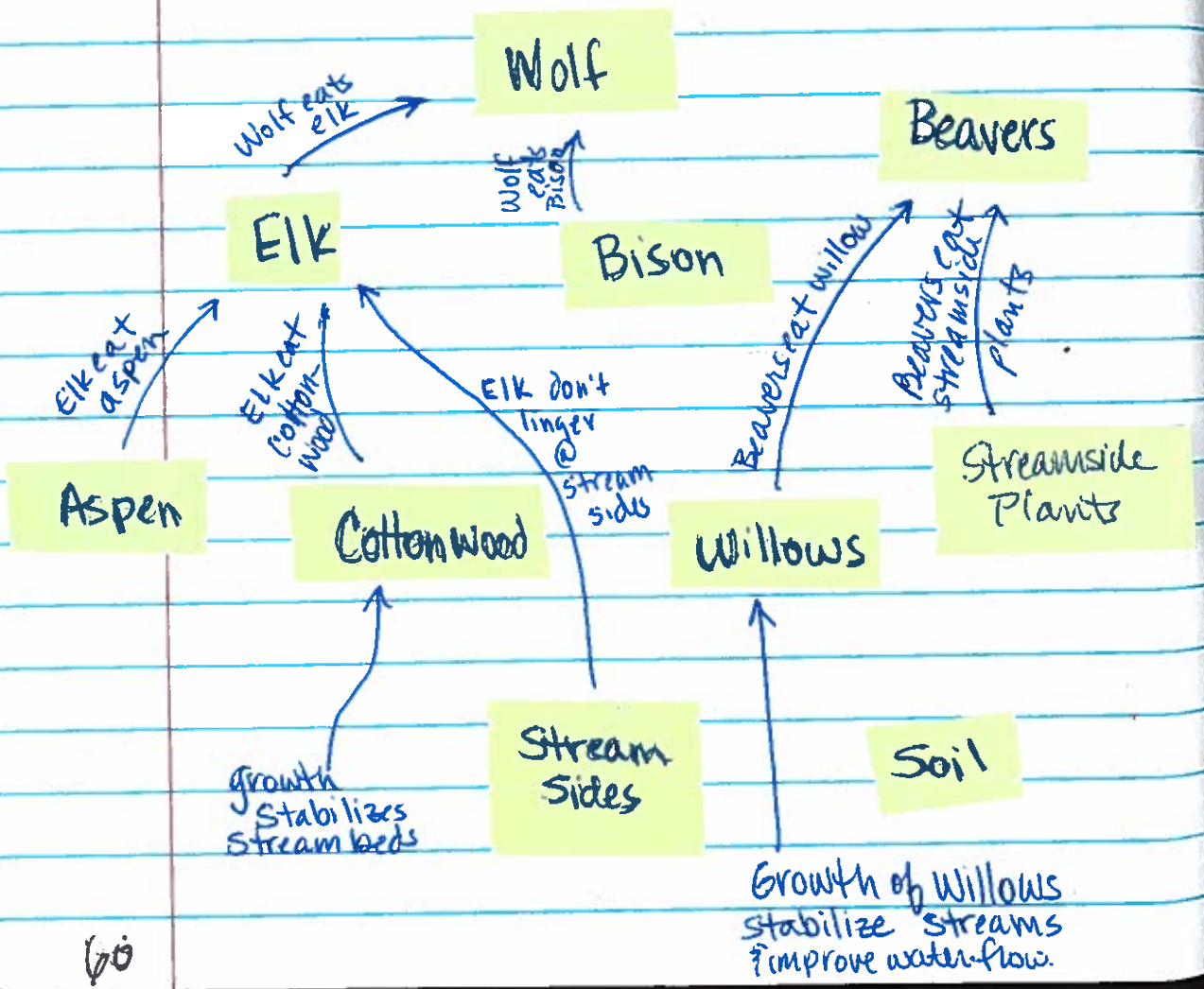
Yellowstone's Place in the US

Keystone Species
8 Oct.

A Keystone Species has a disproportionately large effect on its environment.

Animals	Plants
Wolf	Aspen
Elk	Cottonwood
Bison	Willows
Beavers	'Streamside Plants'

*w/ no wolv
there are toom
herbivores (elk;
and too few plant
w/o plants, strea
eroded.



Before & After Wolves

Restoring wolves to Yellowstone after a 70-year absence as a top predator—especially of elk—set off a cascade of changes that is restoring the park's habitat as well.

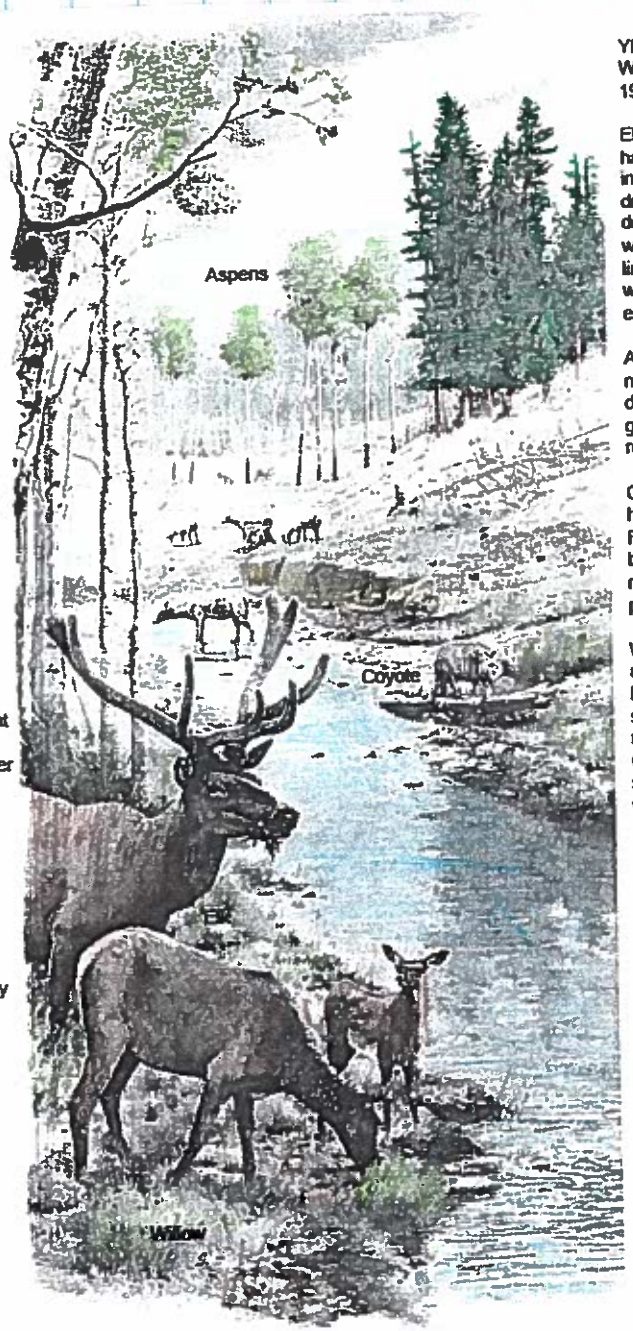
YELLOWSTONE WITHOUT WOLVES 1926-1995

ELK overbrowsed the stream side willows, cotton-woods, and shrubs that prevent erosion. Birds lost nesting space. Habitat for fish and other aquatic species declined as waters becam broader and shallower and, without shade from streamside vegetation, warmer.

ASPEN trees in Yellowstone's northern valleys, where elk winter, were seldom able to reach full height. Elk ate nearly all the new sprouts.

COYOTE numbers climbed. Though they often kill elk calves, they prey mainly on small mammals like ground squirrels and voles, reducing the food available for foxes, badgers, and raptors.

ART BY FERNANDO G. BAPTISTA, NG STAFF. AMANDA HOBBS, NG STAFF
SOURCES: ROBERT L. BESCHTA AND WILLIAM J. RIPPLE, OREGON STATE UNIVERSITY; DOUGLAS W. SMITH, YELLOWSTONE NATIONAL PARK



YELLOWSTONE WITH WOLVES 1995-PRESENT

ELK population has been halved. Severe winters early in the reintroduction and drought contributed to the decline. A healthy fear of wolves also keeps elk from lingering at streamsides, where it can be harder to escape attack.

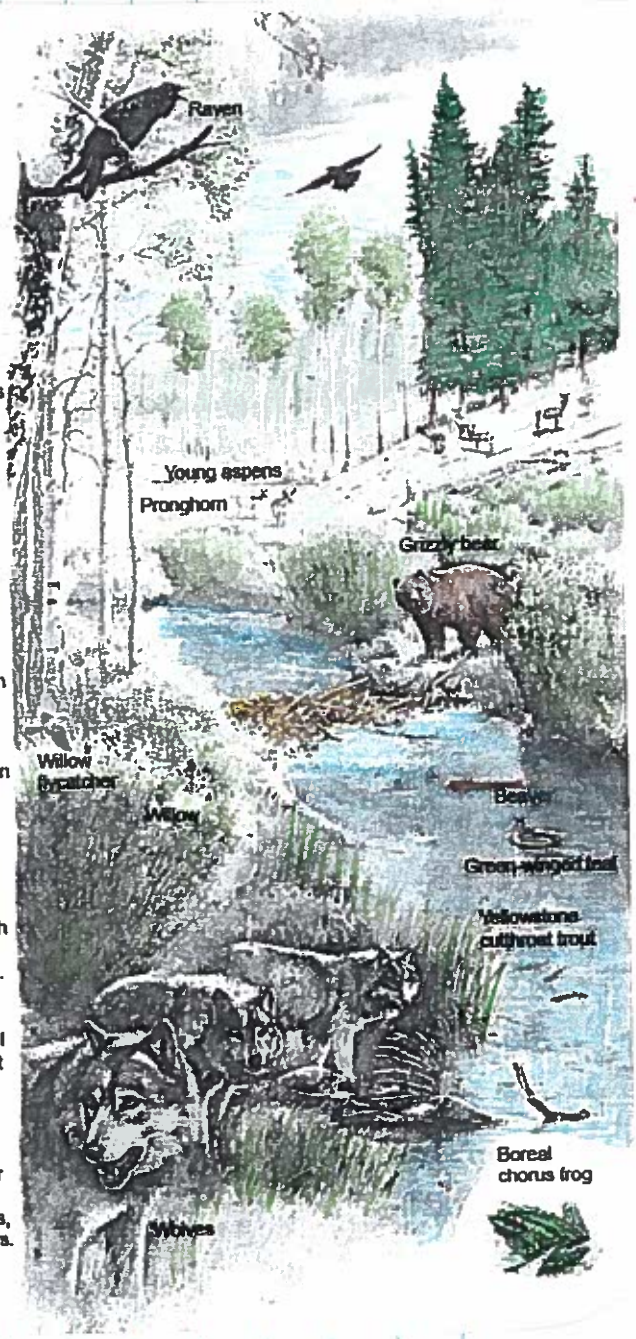
ASPENS The number of new sprouts eaten by elk has dropped dramatcally. New groves in some areas now reach 10 to 15 feet tall.

COYOTES Wolf predation has reduced their num bers. Fewer coyote attacks may be a factor in the resurgence of the park's pronghorn.

WILLOWS, cottonwoods, and other nparian vegetation have begun to sta bilize stream banks, helping restore natural water flow. Overhanging branches again shade the water and welcome birds.

BEAVER colonies in north Yellowstone have risen from one to 12, now that some stream banks are lush with vegetation, especially willows (a key beaver food). Beaver dams create ponds and marshes, supporting fish, amphians, birds, small mammals, and a rich insect population to feed them.

CARRION Wolves don't cover their kill, so they've boosted the food supply for scavengers, notably bald and golden eagles, coyotes, ravens, magpies, and bears.



Can you model an ecosystem in equili- ...nd argue ...llenges ...quilibrium ...system?

The two Oregon State Researchers had no special interest in wolves when they first visited Yellowstone. Rather, they were puzzled by the relative absence of two tree species they figured should be there in abundance. For William Ripple and his student Eric Larson, it was aspen. For Robert Beschta, it was cottonwood.

Beschta was also stumped by the Lamar River. It cuts a wide valley across Yellowstone's northern range, and had spread its smooth plains across the valley floor over many centuries. Willows, cottonwoods, and other streamside plants should have been flourishing, holding the ground in place. But, the plants were sparse, and the river had started carving the soil away.

When he examined cottonwoods along the Lamar in 2001, he found a strange pattern. Hundreds of older trees measured more than a foot around. But there were almost no midsize, middle-age trees. Whatever new cottonwoods had sprouted since the 1920s, few had survived. From the 1960s on, almost none had made it.

The timing was striking. The 1920s, the same time new cottonwoods and aspens stopped surviving, was when the last of Yellowstone's native wolves were killed off. "That was kindof our "Aha" moment", Ripple said.

Most scientists and managers before 1970 agreed that herds of thousands of elk and hundreds of bison were overgrazing the range, wiping out aspen and streamside willows.

Beavers, left with nothing to eat, declined, and barren stream sides eroded.

Make note of these definitions and questions & your responses in your science notebook (pg 60-61)

A KEYSTONE SPECIES has a disproportionately large effect on its environment.

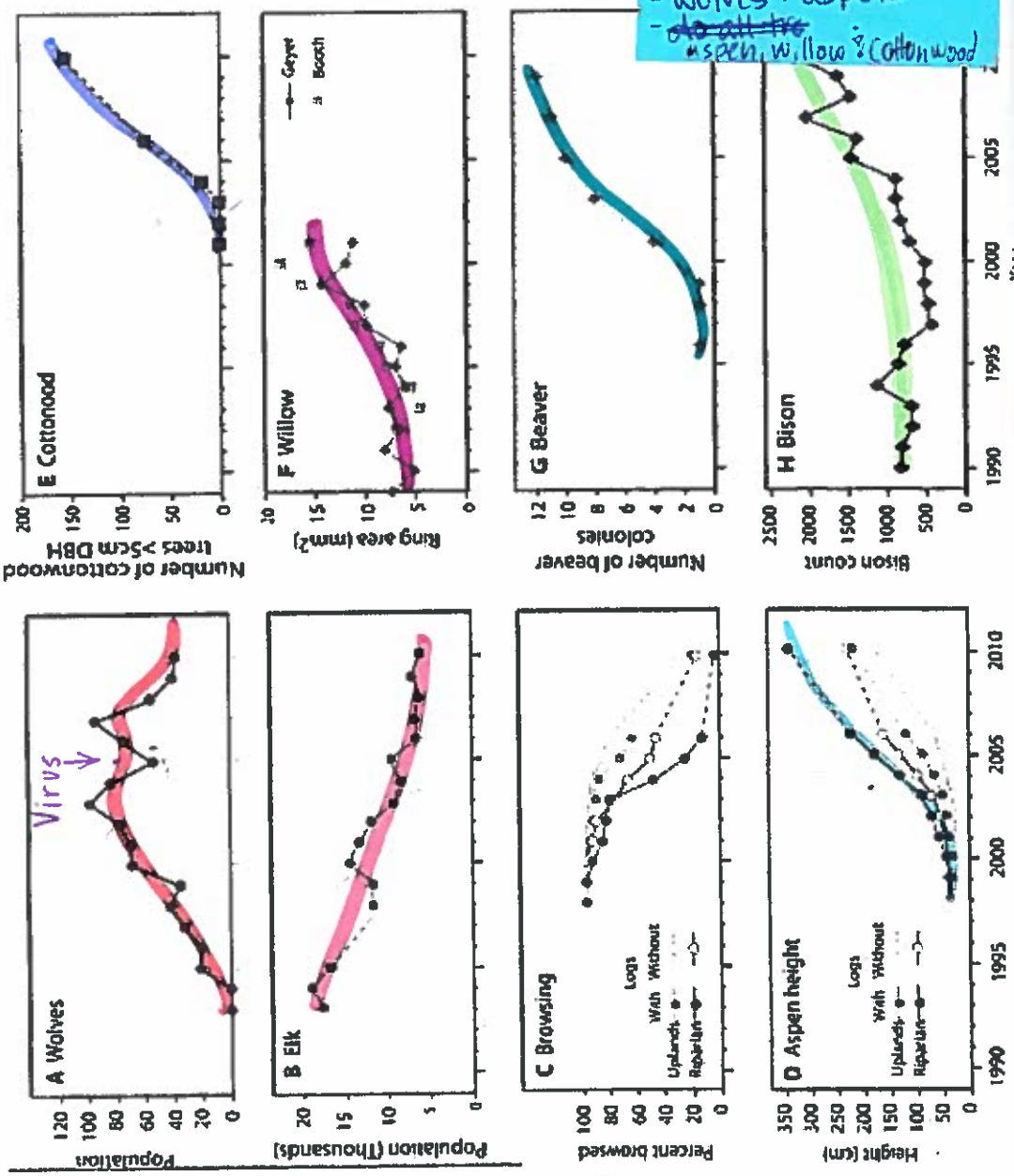
1. What animals are mentioned in this article?
2. What plants are mentioned?
3. Create a graphic organizer that shows the interactions between the animals and wolves. Include the plants' interactions with animals and briefly describe how the presence or absence of wolves can impact the plant life.
4. The community of Yellowstone National Park also includes its special geology and landscape. How was the landscape impacted when wolves were removed from the park?

Dr. O'Malley will look for this work in your notebook during the next notebook check! Trim the article and "before and after" page and include them in your notebook.

Yellowstone Population Data
9 Oct 2013

- What happened to wolf pop in 2005? increase or decrease?
- Did this short-term population change impact elk, bison or trees?
- Wolves : bison
- Wolves : aspen
- ~~do all trees~~ aspen, willow & cottonwood

Yellowstone Populations



Yellowstone Population Analysis
9 Oct. 2013

Describe:

How elk populations change as wolf populations change.

As wolf populations increase from 1995 to 2010, elk populations decrease.

How beaver populations change as wolf populations change.

As wolf population increase from 1995-2010, beaver populations increase.

How all 3 tree populations change as wolf: elk populations change. Explain

Aspen, cottonwood & willow trees all increase as wolves increase and elk increase. This is probably because as wolves decrease (by eating) the elk, there are fewer elk eating young trees.

Did the decline in wolf populations starting in 2005 affect the other trends? Explain.

The Wolf population declined in 2005 because of a virus. There was not a (significant) change in the other animal or plant populations trends after 2005.

Rewilding
10 Oct.

NPR Podcast

Wolves arrived → Elk avoided valleys? → also ate coyotes
gorges
Elk left gorges → those areas grew in trees
trees grew → birds returned
beavers moved in
Beavers built dams → diversity in aquatic environment increased
Berries on shrubs → Bears moved in
fewer coyotes → more rabbits ∴ more ha
~~Stretched~~ plants → changed the course of waterways
secured banks

Gaia Hypothesis

Rewilding - bringing back plants, animal s
- bring back keystone species?
Watch what happens

Megafauna

Do you agree w/ the idea of REWILDING?

- Use facts & evidence

SELF - REFLECTION