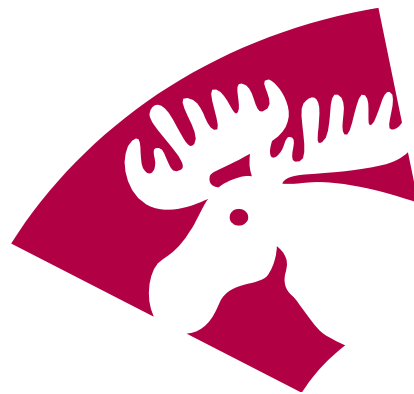


# Holland Patent Environmental Science



If found, please return this to the student, teacher, or office of Holland Patent High School.

Student \_\_\_\_\_

Teacher: Mr. Lucason, room 304

This is your equivalent to a text book for this class. Inside are most of the notes for the year, handouts, some of the exam and quiz days (there may be more) and assignments. The class is broken up into days of the school year to make it easier in case of snow days etc... I am hopeful that this will help you succeed in the class and look forward to this year with you.

#### Day 1

- Expectations – assignments on time 10% penalty/day, - respect the teacher, your peers and the type of learning environment that we will be in, - prepare well for all quizzes and exams, - and ask questions when you do not understand something
- Shoes – we go into the field a lot and you need to wear the proper foot attire. You may store an old pair of shoes under the front desk.
- Clothes – similar to the expectations of gym, you are expected to be dressed properly to go outside even in the winter or receive a zero for participation for that day
- We will be going to the Salmon River Fish Hatchery in Altmar NY in October. If there are limited seats it will be on a first come first serve basis.
- Grading is based on a point system. Each assignment has a point value and at the end of the term your grade is based on the number of points you earn out of the points that you could have earned.
- Other information – Mr. Lucason's background and interests, last year's notes to this year's students, Student interest and information cards

#### Day 2

- Nature walk – at each location write down what you see and hear and what frequents the area that you do not see now and how do you know this
- Site 1

- Site 2

- Site 3

### Day 3

- Go back to Site 1 and see how well you did.
- What are some of the things that you missed or did not think of?
- List them below

### Day 4

- Topographic maps
  - What do they tell you that a road map does not?
  
  - When would you want a topographic map rather than a road map?
  - Cartographer - profession using maps
  - Orienteering
  - Hiking into a remote location, building a house, pond, orchard
- Do the topographic exercise –
  - Did it help? How will you remember?

### Day 5

- History of the region and your backyard
- What is here now? –

- 500 years ago –

- 5000 years ago –

- 10,000 years ago –

- 450,000,000 years ago -

## Day 6

- SOIL
- What is soil? –
  
- Soil vs. Dirt –
  
- Soil Uses –
  - Plants, stability, chemistry, life (bacteria, fungus, worm, microbes, fox, woodchuck, chipmunks – you get the picture)
  - Decomposers
  - Art
  - Cleans / filters water and pollution
    - Traps toxins
    - Septic systems
  
- What does dirt do? – **NEVER call SOIL dirt**

## Day 7

- Soil Forming Factors – How do soils develop? (color, texture, structure)
  - Parent Material – What the soil comes / forms from
    - Glacial Till – mix of materials - the glacier threw up
    - Glacial Outwash – stratified material from glacial runoff
    - Rivers – deposits from flooding and receding – layered silt
    - Lakes – lacustrine – formed as lakes fill in and dry up
    - Residual – form in place from rock
    - Marine – ocean related deposits and material
  - Climate – moisture, heat, and wind influence how fast and well soil develops
    - Wetting and drying
    - How much life can exist – biotic influences
    - Freezing and thawing
  - Time – the longer a soil exists the greater the development
  - Biotic – worms, bacteria, plants, animals all influence the development and disturbance of soils
- Soil Particles – Sand Silt Clay
  - Organic material is also found in soil and is very influential in terms of soil properties
  -

## Day 8

- High water table – where is the water and why is that important?
- How do we find the high water table
  - Redoximorphic features – oxidized and reduced
    - Rust
    - Non-oxygenated – blue-grey
    - Worms, roots, wet, dry
- What does it show?

- Seasonal flux
- Why would you want your septic above the high water table?
  
- Foundation?
  
- Driveway
  
- Use it to bid a job as a contractor or engineer

#### Day 9

- Soil Profiles – what does a soil's profile look like?
- Profile of a student's head on the board with the overhead. Example in class.
- O – organic material only – no mineral content – leaf litter and roots
- A – organic material and mineral content – chew test – a deep flat horizon may indicate that it has been tilled in the past
- B – more developed than the horizons below it – usually has color and structure with some limited organic material
- C – parent material – very little development or color
- Use the space below to sketch a soil profile and label the horizons

#### Day 10

- Soil Dig
  - Look at horizons
    - Landforms -
    - High water table -
    - Color -
    - Structure –

#### Day 11

- Outside to profile a soil
  - Pay attention to the real profile to get a feel for the differences

#### Day 12

- Soil textures using a textural triangle
  - Based on the content of sand, silt, and clay
  - In groups use the flow charts in the back to become familiar with how to texture a soil
  
- Is too much soil a bad thing? – When?
  - Water
  - Air

- Soil use map for the town of Lee – agriculture, development, roads, conservation land, forest potential
  - What is the importance of a soil use map?
  - When might you ever use a soil use map?

#### Day 13

- Review for an exam – soil, history of the area

#### Day 14 – EXAM

#### Day 15

- Water Quality – Are there differences between different glasses of water?
- Biotic Indicators – living organisms that can show the overall quality of water quickly
  - How do they work?
    - Each species has its own tolerance of pollution
    - Those with a low tolerance of pollution can indicate very good health
    - By finding organisms with a high tolerance of pollution does not automatically indicate that the water is polluted – only that it is not polluted enough so that they cannot exist
    - Each species has been assigned a number based on how much pollution it can take – the lower the number the less pollution it can tolerate
- Abiotic – non-living
  - Dissolved Oxygen
  - Turbidity
  - Nitrates
  - Phosphates
  - Flow rate
  - Temperature

#### Day 16

- Outside to stream sample and determine the relative health of the stream
- Be sure to also look under rocks and in leaf litter

#### Day 17

- How do we measure flow rate?
  - Cubic feet per second is the proper unit
  - Diagram below what is on the board

Go through your data from yesterday - what do your findings suggest about the quality of the stream?

### Day 18

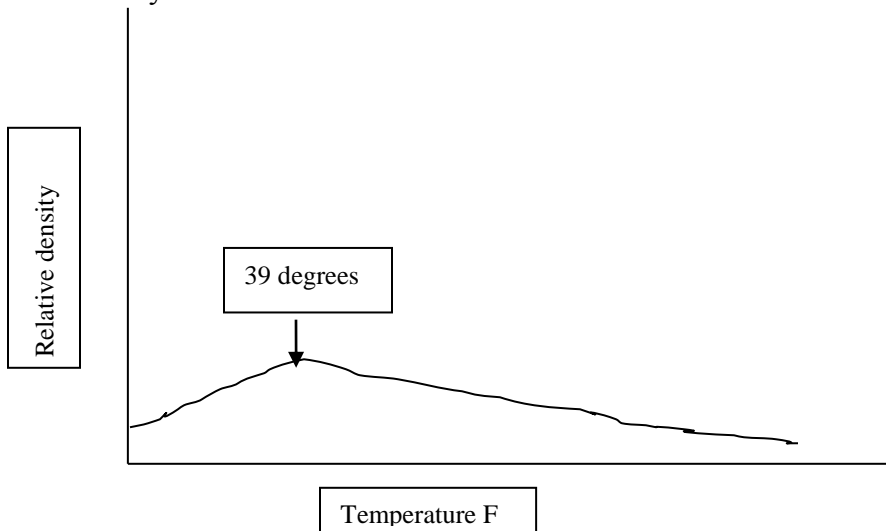
- Outside to stream sample and determine the relative health of the stream
- Be sure to also look under rocks and in leaf litter
- Calculate the flow rate of the stream
- What do your findings suggest about this stream compared to the other one

### Day 19

- Water Chemistry
- Draw a water molecule below
  
- What are the charges on oxygen and hydrogen ions?
  - Cation
  - Anion
- Makes water a polar molecule
  - Charge at either end
- Adhesion – sticks to other things (think of adhesive tape)
  - Capillarity – trees, soil, wicks
    - Ability to move against gravity
- Cohesion – sticks to itself
  - Water from faucet vs. oil being poured – drip vs. string of molecules

### Day 20

- Why is water so important?
- Solvent – dissolves something else
  - Water is a good solvent because of polar properties
- Solute – the substance that gets dissolved
  - Pulled apart by water and held in between the molecules
  - Salt and water = salt water where you can still taste the salt
- Why don't lakes freeze solid?



- **Make a diagram of a lake in the winter below noting the temperatures**
- **As you do this think about where most fish will be and why.**
  - **Think enzymes and metabolic activities (remember fish are cold blooded)**
  - **Also think about what would happen if the lake froze from the bottom up**

#### Days 21 and 22

- What makes a lake a lake and not a pond?
- Great Lakes
  - 20 % of Freshwater on Earth
    - Enough to submerge the lower 48 states under 9 feet of water
  - Formed by glaciers during the last ice age
  - Superior, Michigan, Huron, Erie, Ontario
    - Superior is the largest and the deepest
    - Michigan is the only Great Lake totally in the US
    - Huron has the largest wave ever recorded on any of the Great Lakes at 43 feet high
    - Lake Erie is the shallowest of the Great Lakes
    - Lake Ontario is the smallest of the lakes in surface area but the second deepest over all at over 800 feet deep
  - Many wars have been fought on the Great Lakes
  - There are over 10,000 ship wrecks at the bottom of the Lakes
    - These are preserved very well due to the deep cold fresh water
  - A major source of commerce since the area was settled
  - Ecology has changed a lot
    - Pollution
      - Industrialization
      - Dumping
    - Dams
      - mills
      - Spawning fish
    - Over fishing



- Commercial fishing in the 1800s into the 1900s with trawlers like on the ocean
- Lake trout, salmon, yellow (walleye) pike, blue (walleye) pike
  - Blue pike now extinct
- Introduced species
  - Alewife
    - Lead to Chinook and Coho salmon
    - Brown and steelhead trout
  - Zebra mussel
  - Round goby
  - Spiny water flea

#### Day 23

- Present use of the Great Lakes
  - Commerce – shipping
  - Sport fishing
  - Recreation
  - Nuclear Power Plants
- What lies ahead?
  - Fresh water sales to Japan and other countries?
  - Reintroduction of Native fish?
- Fish Hatchery
  - What we will see
  - History of the hatchery
  - Purposes of today's hatchery
    - Sport fish
    - Reintroduction
    - Research
  - Expectations of students

#### Day 24ish Discuss the field trip to the Salmon River Fish Hatchery

#### Day 25ish

- Field Trip

#### Day 26

- What did you think?
- What was the neatest thing about the hatchery?
- Review what we saw
- Suggestions for next year

#### Day 27

- Clean water consumption – how much /day
  - Brushing
  - Washing
  - Laundry

- Dishes
- Toilet
- Drink
- Others
- = your water consumption / day
- How much water does NYC use in a day ~ 9,000,000 people
- How much water does NYC use in a year?
  - Figure these out below
  
- Acid rain
  - Caused by
    - Ohio smoke stacks – sulfur
    - Sulfuric and nitric acids form in the upper atmosphere
    - pH is affected in the precipitate
- Dead Lakes
  - Aluminum in fish gills
  - Eggs and fry killed by acid flux from runoff – unable to maintain homeostasis
  - No recruitment of young fish in the population
  - Buffering capacity cannot handle the new lower pH
  - Liming lakes and hay bales

#### Day 28

- Review for Exam
  - Water quality
  - Water chemistry
  - Great Lakes
  - Fish Hatchery
  - Acid Rain

#### Day 29

- **Exam**

#### Day 30

- What are fish?
  - Characteristics/ what makes a fish a fish
- Different types of fish
  - Warm water

- Cold water
- Native
- Introduced
- Sport
- nuisance
- States' roles
  - Stocking
  - Reclaiming lakes
  - Recommendations on fish consumption – mercury and toxins
  - Access to waterways
  - Habitat improvement
  - Sport-fishing regulations
    - Creel limits
    - Size limits
    - seasons
- regulation of imported fish

#### Day 31

- Learn the fish on the cupboards
- Students should use this time to learn the fish by appearance

#### Day 32

- Students continue to learn the fish
- Review the fish and learn facts about most of them

#### Day 33 - 34

- Last days of learning the fish
- Yellow bullhead, brown bullhead, channel catfish, green sided darter, Johnny darter, rainbow darter, yellow perch, blue pike, walleye, sauger, chain pickerel, northern pike, muskellunge, tiger musky, Atlantic salmon (landlocked), Chinook salmon, Coho salmon, sockeye salmon, rock bass, black crappie, smallmouth bass, largemouth bass, red breasted sunfish, bluegill, pumpkinseed, brook trout, lake trout, brown trout, rainbow trout / steelhead, sheepshead / drum, American eel, white sucker, longnose gar, bowfin, burbot, grass carp, white perch, carp, quillback, slimy sculpin, golden shiner, blacknose dace, emerald shiner, fathead minnow, alewife, rainbow smelt, lake sturgeon, shortnose sturgeon, brook stickleback, lamprey
- Use the space below to write down facts to remember about some of these fish

Days 35 – 36

- Fish Anatomy / Dissection
- 35 – external anatomy
- 36 – internal, fillet the fish to look at bones and finish the internal anatomy, skull, brain, clean-up

Day 37 – Fish Exam

Day 38 - 40

- review for 10 week
- **Bring wool and cotton socks into class by day 42**

Day 41

- 10 week exam

Day 42

- Wilderness Survival
- Proper clothing
  - Put one wool sock on one foot and a cotton sock on the other
  - Take the temperature of each of your feet
  - Cotton – before –
  - Wool – before –
  - Outside dip your sock covered feet into a bucket of water and stand there for 5 – 10 minutes depending on the weather
  - Cotton – after –
  - Wool – after –
  - What does this tell you about proper clothes?
- Why did the wool stay warmer than the cotton?
- Where do we lose heat?
- Why do we lose so much from this part of our body?
- Is it better to start a hike a little cool and add clothes as is needed or bundle up get hot and then take them off as is needed?
- Wind as a factor:
  - 30 – 30 – 30 rule = temp below zero, wind speed, time it takes for exposed body parts to freeze
- Wind Chill Table is located below

Wind (mph)	Actual Air Temperature in F							
	40	30	20	10	0	-10	-20	-30
5	35	25	15	5	-5	-15	-25	-35
10	30	15	5	-10	-20	-35	-45	-60
15	25	10	-5	-20	-30	-45	-60	-70
20	20	5	-10	-25	-35	-50	-65	-80
25	15	0	-15	-30	-45	-60	-75	-90
30	10	0	-20	-30	-50	-65	-80	-95
35	10	-5	-20	-35	-50	-65	-80	-100
40	10	-5	-20	-35	-55	-70	-85	-100

#### Day 43

- Planning a route
- Pick a point A and a point B
- Plan a safe and easy way to get from A to B
  - Think about terrain, wind, swamps, snow drifts
- What will you use to orient yourself as you make your trek
- Explain to the class what made you pick that route

#### Day 44

- Outside to find food
- We will be looking for
  - Inner bark of trees (esp. white pine)
  - Buds
  - Berries
  - Seeds
  - Fallen fruit
  - Spider eggs
  - Insect larvae
  - Insect pupae
    - Under bark and rotten logs
  - Lichens
  - Hemlock needles
  - Animals if we are so lucky

#### Day 45

- Priorities of Life
- How long do we have?
  - 3's
  - Breathing 3 minutes
  - Bleeding 3 – 6 minutes from an artery
  - Extreme temperatures high or low – 3 – 4 hours
  - Water 3 days
  - Food 3 weeks
- What can lead to life threatening conditions
  - Mind – attitude, fear, panic
  - Injury
  - Temperature
    - < 95 F
    - >101 F
  - Disease / Illness
- Common Wilderness Problems – take notes on each
  - Dehydration
  - Hypothermia
  - Sunstroke / heat exhaustion
  - Snowblindness / sun blindness
  - Frostbite

- Burns from a fire
- Cuts, breaks, bruises

#### Day 46

- Causes of heat loss
- **Homework is to look up the following terms and give an example of each**
  - **Radiation**
  - **Conduction**
  - **Convection**
  - **Respiration**
  - **evaporation**
- Hypothermia – kills the unprepared – Mr. Lucason’s experience on Wild Cat Mtn.
  - Lowering of the body core temperature
  - Caused by:
    - Lack of proper clothing
    - Getting wet – rain, falling into water, perspiration
    - Lack of adequate shelter
    - Getting physically over tired
  - Symptoms
    - Poor coordination (can’t tie shoes)
    - Shivering violently or stopping (body is trying to keep warm and then starts to shut down)
    - Careless attitude “I don’t care”
    - Sleepy – weak
    - Collapse
    - Fight help – “leave me alone” – they may not realize that something is wrong
    - Muscles are rigid

#### Day 47

- Why are shelters important?
- Wind, rain, elements, hold some heat
- How to construct shelters
  - Barriers between you and the elements
  - Think your way through the construction of how to best separate yourself from the cold or elements that can harm your well-being
- Snow shelter
- Lean to shelter
- Design an appropriate shelter that you can construct in a one hour period
  - Think about size
  - Materials
  - Effort to make
  - How well it will work

Plan your shelter with your group – size, shape, materials, location – sketch it out

#### Day 48 and 49

- Construct your shelters
- Take the temperature inside and outside your shelter with you in the shelter for at least 5 minutes
- How do you build a fire?
  - Oxygen
  - Wind
  - Surface area to volume ratio – amount of energy to bring it up to temperature
    - Small to large
  - Dry vs. wet – energy to bring it to temperature vs. energy to get rid of the water
    - Dry is better
    - Look for birch bark, beech leaves, small dead twigs
- Practice setting up a fire

#### Day 50

How well did your shelter work? Go out and test the shelters.

#### Day 51

- Predicting the weather in winter
- Good signs
  - Light winds – stable weather
  - Clear skies – dry weather – and cold nights
  - Wind direction
    - NW – W – SW – S = colder to warmer
  - Frost in the morning – a sun shiny day
  - Campfire smoke is rising – high pressure = dry conditions water vapor is lighter
  - Rising barometer – dry air
  - Stars are bright – little moisture
  - Puffy cumulus clouds – tend to mean dry to good weather but can produce some snow flurries
- Bad signs
  - Freshening winds mean a pressure change usually accompanied by precipitation and a temperature change
  - High cirrus clouds – usually indicates a storm in 12 – 36 hours – if the clouds are windswept it indicates that a windy period is coming with moisture
  - No frost in the morning means a cloudy moist day
  - Winds from SE – E – NE – N (indicates a storm especially if the wind speed increases)
  - Campfire smoke stays low to the ground indicates low pressure and a storm may be coming
  - Falling barometer – moist air is on the way
  - Rings are visible around the sun or moon indicate a storm in 8 – 36 hours

- Stars are dim – only the brightest are visible – moisture in the air
- Flat stratus clouds – cold storm is coming
- Fog – indicates warming temperatures and the possibility of rain or wet snow
- Sudden wind shift may indicate a fast moving storm and a drastic change in temperature
- Generalities
  - Clouds bring milder temperatures at night and the possibility of precipitation
  - Clear skies in winter mean cold nights
  - In a storm a wind shift from east to west means that the storm will end soon

### Day 52

- Reading about Hypothermia
- Ice thickness = how much weight

### Ice Thickness

### Maximum Safe Load

2	One person on foot
3	group of people in single file
7	car of 2 tons or snowmobiles
8	light truck of 2.5 tons
10	medium trucks of 3.5 tons
12	heavy trucks of 8 tons
15	10 tons
20	a fire truck
30	a 747 can land

- **These safe loads only apply to clear lake ice that has not been heavily traveled. For early winter slush ice the ice thickness should be doubled**
- **Black / clear ice is safer than white ice**

### Day 53

- Wildlife Ecology – What is it?
- What do you and your classmates think?
- It is –
  
- Estimating populations – make notes to remember how each works
  - Actual count
  - Kill ratio – hunting
  - Scat
  - Tracks
  - Aerial photography - grid
  - Heat signatures – moose
  - Mark and recapture
- Example of a method
  - Deer poop 12.7 times / day
  - How can we use this to estimate a population?



- Plan it out with a neighbor – do not look at the next page until you think that you have figured out how to do it

#### Day 54

- Deer Poop Count
- As a group we will be clearing 3 – 6 200'x200' areas or if fresh snow is coming we will just mark the areas to be studied off
- How many deer /square mile do you think there are in this area
- We will come back on day 56 to recount the poop as a group

#### Day 55

- Mark and recapture – using pieces of paper
- How many are there?
- How it works:
  - Capture as many as possible
  - Mark all that were captured and release them back into the wild
  - Recapture as many as is possible
  - Use the “Lincoln-Peterson Method” to estimate the population size
- Capture – mark – release – recapture

$$N = \frac{(M)(n)}{R}$$

N = population  
 M = total marked  
 n = total recaptured  
 R = # marked in the recapture

- Exercise – rip up a piece of paper
  - One partner will close their eyes and pick up 15 pieces
  - Mark each piece with an x
  - Mix these back in with the rest
  - Repeat the exercise with the other partner recapturing 15 pieces
  - Put the variables into the equation and see how close you come to the real number
  - Use everyone’s numbers to see how close the class came to the total number of pieces

#### Day 56

- Go back out and record the number of deer droppings on the data page
- Add them up in class
- There are 640 acres / square mile
- It has been 48 hours
- How many deer per square mile?
- Answer the questions on the data page.

Day 57

- How far off are our results?
- Standard error becomes standard deviation – use the pieces of paper study

$$\text{Standard error} = \sqrt{\frac{(M)(n)(M-R)(n-R)}{R^3}}$$

- Confidence Interval – what is the range that the actual number should fall into with 95% confidence

$$N = \pm (t)(SE) \quad t = \text{confidence interval } 95\% = 1.96$$

SE = Standard Error

- Sample Problem
  - A wildlife biologist studying geese, caught 200 in cannon nets on Monday and tagged them. On Friday they captured 250 geese and 125 of the 250 were tagged. What is the estimated population? Show your work.

The answer is 400

- Now calculate the error and confidence interval at 95%

$$SE = 15.5$$

$$\text{Confidence Interval} = 369 - 431$$

- Examples on your own – calculate the estimated population, standard error, and confidence interval.
- A wildlife biologist initially captured 100 ruffed grouse near his camp. After banding them they were released. One week later he captured 150 grouse and noticed that 50 of them were already banded. How many grouse inhabit his research area?

- A team of biologists were trying to determine if the elk population in the Rocky Mountain National Park had indeed exceeded to “carrying capacity”. Using large cages elk were herded in and marked with ear tags – 260 total. Later that summer the biologists split up and monitored different parts of the park with binoculars. They were able to identify those with and without tags. In the end 473 elk were scoped and of those 183 had ear tags.

#### Day 58

- What can a skull tell you?
- Look at skulls from the back room
- What are some differences that you notice in the teeth – what do these differences tell you about the animals?
  
- Snout length? Why are they different? How does this relate to smell?
  
- Eye location – what animals have eyes in the front vs. the sides of their heads? Why?
  
- How strong are these animals’ jaws – what evidence is there on the different skulls?
  
- Plate fusion can tell you the relative age of the animals.
- **Your assignment is to read the introduction to Mammology, dentition of mammals, and how to age deer.**

### Day 59

- What can tracks tell you?
- Track walk – look at tracks and the activities of the animals
- Sometimes this is the best way to observe animals and their activities.
- While we are out look for different tracks
  - Try to figure out what made them
  - What were they doing
  - Why were they there
  - Anything else about the tracks or the animals that made them

### Day 60 – 62

- You need to know these animals and something about each – pay attention to what is discussed about each and write down the things that you will have the greatest difficulty remembering.
  - Moose
  - White-tailed deer
  - Cottontail rabbit
  - Snowshoe hare
  - Turkey
  - Ruffed Grouse
  - Spruce Grouse
  - Fisher
  - Mink
  - Grey fox
  - Eastern coyote
  - Bobcat
  - Red fox
  - Porcupine
  - Raccoon
  - Skunk
  - Beaver
  - Woodcock
  - Black bear
  - Flying squirrel
  - Little brown bat
  - Gray squirrel

- Red squirrel
- Muskrat

#### Day 63

Research a local animal or bird species that you find in the area. Your project is to pick a local bird or animal. Conduct literary research on it in terms of its winter habits, needs, locations, etc... Record all pertinent information. Now try to photograph the animal or bird on your own and record your observations, successes, failures, and learning experiences.

Determine the animal / bird that you are interested in.

Write it here –

Day 64 – walk in the woods to see what we can, look for signs, habitat use, etc...

#### Day 65

- Predation – What is it?
  - Predators are consumers that kill other organisms and eat them – prey is killed before or during the eating process
- What makes predators successful?
  - Sensitive eyes – hawks
  - Affective hearing – coyote
  - Highly developed sense of smell – sharks
  - Claws – cats
  - Speed – cheetah
  - Venom – snakes and insects
  - Teeth – cats and dogs and alligators and crocodiles and sharks ...

#### Day 66

- What about prey animals – how do they survive?
- Are they defenseless – NO
- Keen sense organs
  - Sight, hearing, smell
  - Think of an example for each
  - Sight –
  - Hearing –
  - Smell –
- Mimicry
  - Bright coloration to warn predators – red eft
  - Look like something that they are not – walking stick looks like a stick

- Look like something that they are not – a fly colored like a bee
- Blending into the background - fawn
- Other defenses
  - Glands, clouds of ink, spines, quills, flash (moth with eye pattern)
- Methods of predation
  - Concealment – eels
  - Traps – ant lions and spiders
  - Groups – wolves
  - Speed – cheetah
  - Stalk – lions

Day 67

- Begin to review for the exam

Day 68 and 69

Create wildlife habitat, learn how to prune trees, learn how to properly cut a tree safely

Day 70

- Review

Day 71

- Exam

Day 72 – 80

Contemporary issues in the environment.

We will be watching documentaries on different issues that are occurring now that will affect the environment for your children and grandchildren and then discuss each. oceans –( reefs, overfishing, temperatures, etc...) rain forests – ( losses, uses, long term repercussions) overpopulation of humans – (where, why, what can be done) ozone depletion, global warming, Asian black market trade on endangered animals, desertification, the oil spill in the Gulf, Emerald Ash borer, wood wasps, etc....

Day 81

- Identification Review – fish, mammals, aquatic indicators, soil profile, soil forming factors, 5 Great lakes

Day 81 -83

- Review for 20 week exam
- If we need to we will cut out a review day to fit the 20 week in before the regents exams

#### Day 84

- Field portion of 20 week exam
  - Wilderness survival
  - Tracks
  - Habitat

#### Day 85

- In class 20 week exam – everything from day 1 – present

#### Days 86 – 89

- Regents Exams – no class

#### Day 90

- Review the 20 week exam
- **BRING A SKETCH PAD OR CAMERA TO SCHOOL TOMORROW**

#### Day 91 and 92

- Winter Safari
- You have today and tomorrow to capture some unique feature or features outside in the woods
- Once you have the image that you think is unique or has meaning you will write about it
  - Write or find a poem that fits your image
  - Write some factual information about what you have captured or the environment in which it was captured
  - You will also use your sketch or picture
- This is due on day 95
- The final layout is to be on an 8 x 10 piece of paper in case you want to frame it or give it away as a gift to someone

#### Day 93

- Knots - no not how fast you are sailing
- Why are knots important and when are some appropriate and others not?
- In class we will learn and practice the following knots and learn their appropriate application
  - Square knot
  - Sheet Bend
  - Bowline
  - Double sheet bend

#### Day 94 - 98

- Hitches and knot
- When to hitch, when to tie?

- Clove hitch
  - 2 half hitches
  - Tautline
  - Figure 8 knot
  - Double fisherman's knot
- Bowline Around the Waist
  - Truckers Hitch
  - Constrictor
  - Albright

Knots continued

- Practice all of the knots and hitches that you have learned
- Try to do it with your eyes closed
- **Home work - practice your knots and remember when a certain knot is not appropriate**

Day 99

- Lashing – this is how some third world people still build their houses
- The secret is slow, steady, and tight
- Make a ladder or support for a shelter in groups of three

Day 100

- Review knots
- Practice your knots and hitches for a quiz tomorrow

Day 101

- In class knot and hitch exam

Day 102

- Environmental Relationships
- Write down an example next to each of these with a partner and then we will go through them as a class to make sure that people understand
- Predator / prey =
- Producer / Consumer =
- Autotroph / Heterotroph =
- Parasite / host =
- Scavenger / carrion =
  
- Roles of different organisms –
  - Herbivore –
  - Carnivore –
  - Omnivore –
  - Decomposer –
  - Keystone species –

Day 103

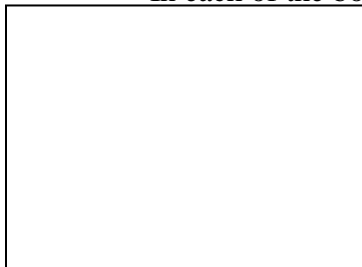
- Terms continued
- Community –
- Population
- Ecosystem –



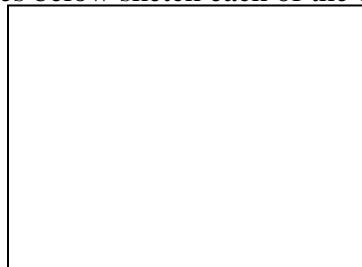
- Niche –
- Dynamic Equilibrium –
- Carrying capacity
  - Environmental
  - Social
- Range
  - Limits
  - Climate
  - Food
  - Barriers

Day 104

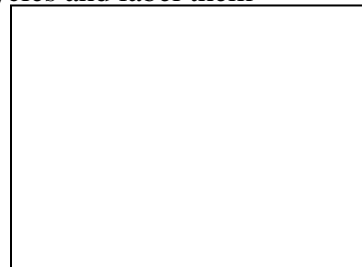
- Cycles in Nature
- Water
  - Evaporation
  - Evapotranspiration
  - Condensation
  - Precipitation
  - Runoff
- Carbon
  - Photosynthesis
  - Respiration
  - Decomposers
  - Fossil fuels
- Nitrogen
  - Denitrification
  - Nitrogen fixation
  - Bacteria
  - Legumes
- There are three concept maps that show each of the cycles.
- In each of the boxes below sketch each of the cycles and label them



Water



Carbon



Nitrogen



- Acid Rain
  - S and N acid
  - Smoke stacks and cars
  - Lowering of the pH
  - Increasing the solubility of heavy metals and toxins
    - Mercury
    - benzene
  - Aluminum
    - Fish gills
  - Flux from runoff kills eggs and small fish

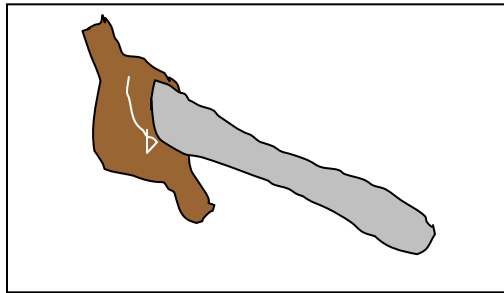
#### Day 106 – 109

- Wildlife related diseases and parasites
- Humans are affected by the following :
  - Take notes on each
- Rabies virus
- Lyme disease
- Type E Botulism
- West Nile virus
- Triple E
- Malaria
- Bot fly
- Tape worm
- Chigger
- Ticks
- Lice
- Fleas
- Mosquitoes
- Leeches
- Giardia (Beaver Fever)
- Avian Flu

#### Day 110 - 113

- Goldenrod Gall Study – what made that lump?
- **Purpose:** To discover what is inside the gall swellings on goldenrod plants.
- **Materials:** 5 goldenrod galls, paper towel, scalpel, hand lens, tweezers, and pencil.
- **Introduction:** You know it is autumn when the fields are covered with the yellow flowers of the goldenrod plant. In winter the stark dry stems of the goldenrod plants poke through the snow in these same places. If you look closely at goldenrod in the fall and winter, you will notice that some plants have swollen areas on the stem called **galls**. What causes the stem of the goldenrod to swell up into a gall? Why do only some and not all plants have galls?
- **Collection** of the galls: you and a partner are to collect 5 goldenrod galls in the time remaining for class. Look along the edge of the mowed areas and where you think you remember seeing goldenrod in the fall.

- **Predictions:** Before you open the goldenrod galls to see what is inside, make a hypothesis based on your observations of the **unopened** galls.
  - Hypothesis –
- The goldenrod galls are probably caused by? Something non-living? A microorganism? A small animal? A large animal? The plant itself? Other?
  - -
- Briefly give reasons for your prediction.
- **Procedure:**
  - A – Unfold and stack a few paper towels upon which you will cut.
  - B – Carefully insert the blade of the scalpel lengthwise into the gall. Twist the knife until the gall pops open.

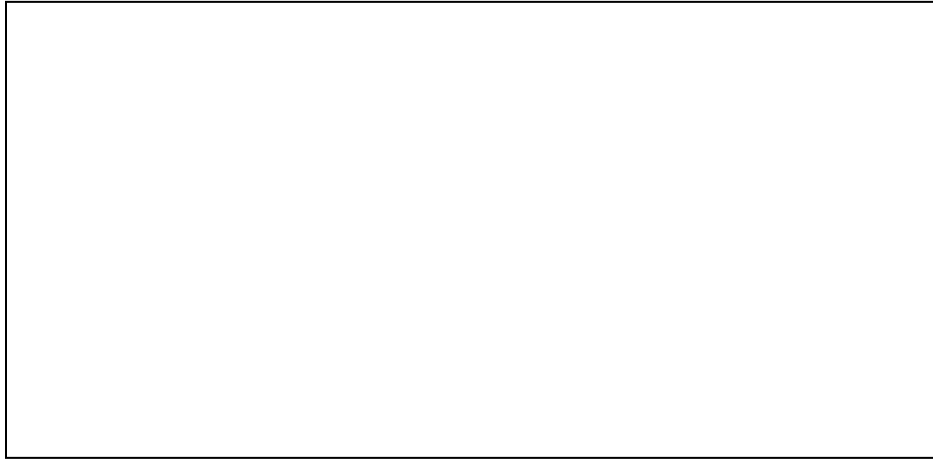


- **Analysis and Discussion:**
- What is inside your goldenrod galls: Something non-living? A microorganism? A small animal? Plant tissue? Other?
  - -
- Identify what is inside your goldenrod galls. Use the identification key. List the common names of what is or was inside the galls.
  - Gall 1 –
  - Gall 2 –
  - Gall 3 –
  - Gall 4 –
  - Gall 5 –
- Why do you think that only some and not all of the goldenrod plants have galls?

Day 114 – 115

- How do things fly?
- Physics of lift.

- Copy the diagram on the board into the box below. Be sure to label it appropriately.



- Vacuum = empty space
- Class activity – make a “wing” outside on the driveway
  - Students will move on either side of the wing starting and ending at the same time
  - Note the space created on the upper portion of the wing and how much faster the particles must travel to end at the same time
- Jets? Planes? – How are their wings shaped?
- Why must birds and aircraft travel in a forward motion?
  
- What needs a greater forward velocity to gain lift – a sparrow or a 747? Why?
  
- Try to picture the following: Geese on the water taking off, a bird taking off from a tree limb, a dove taking off from the side of the road.
  
- **HOMEWORK**
- **Hummingbirds and helicopters – For homework find out how they fly and hover.**
  - **Explain –**
  
- **What has lower pressure – water rich air or dry air?**
  - **Do you think that this can affect lift?**

Day 116 – 117

- Review for EXAM
  - Human caused problems
  - Wildlife diseases and parasites
  - Environmental relationships and roles
  - Cycles
  - Galls
  - Lift

Day 118

- **EXAM**

Day 119

- Birdhouse Project – due on day 134

In this project you are to research extensively a specific bird species, local to the area. You are to develop a detailed write-up about the bird with pictures, descriptions of the physical appearance, calls, territory, nesting habitat (a lot of detail), feeding habits, competing bird species for food, or nesting sites, predators, ... This write-up should be at least a full page size 12 font 1 ½ spaced.

In addition to the write-up you are to build a bird house that reflects the type of nesting habitat of the bird. (It may be easier to do a cavity or shelf nester.) The size of the house, any lining, size of the entrance, and directions for placement should all be included and reflect the actual nesting habitat of the bird. In addition, you should include directions of how to build the nesting box / shelf etc... (Dimensions of each cut, where the clean out is, diagram, what to line it with if anything, ...)

You may seek help in the actual construction of the house, but it is you who must design it based on the bird's requirements / preferences. Local lumber dealers will normally have very poor grade timber that they will sell to you cheap when you tell them what you need it for.

Have fun with this.

You will be graded based upon details in your report (more than a field guide) and how well your house and explanation of placement reflect the actual habitat used by the bird.

Day 119

- Check on the wildlife improvements that you made – see if there is any use

Day 120 - 122

What is a migration? Why do they occur? What are the benefits and detriments to the environment and the species?

- Bird Migration
  - What is migration? –
  - Why must birds migrate? –
  - How is this beneficial to the animals and the environment? –
  
  - Are there any disadvantages to the migration of birds? –
  
- 5 methods
  - Magnetism – using the magnetism of the Earth
  - Landmarks – some birds follow landmarks such as rivers
  - Smells – some birds use smells such as the ocean to migrate
  - Stars – some birds migrate at night by the stars
  - Sun – some birds use the sun to migrate
  
- Other migrations some examples – there are many others
  - Monarch Butterfly migration – why is it so unique?
  
  - Caribou migration –
  
  - Whale migrations –

Day 123 - 124

- Bird calls and identification introduction on the smart board and outside
- Cadence
- Location

Day 125 - 126

- Review for the thirty week exam

**Day 127**

- **30 week EXAM – Field portion**

**Day 128**

- **30 week EXAM – Class portion**

**Day 129**

- **Review the exams**

### Day 130

Birdhouse project is due

- First day of bird identification outside
  - Sight
  - Song
  - Silhouette
  - Movements – tail of Phoebe
  - Flight pattern

### Days 131 – 140

- Bird Identification
- A list of likely birds is presented below:

Chickadee	Brown creeper	Ring billed gull
Junco	House Sparrow	Herring gull
Tufted titmouse	Grackle	Red tailed hawk
Hairy woodpecker	European Starling	Blue Jay
Downy woodpecker	Bluebird	Purple martin
Robin	Song sparrow	Canada geese
Cardinal	Chipping sparrow	Mallard ducks
Kinglets (red and gold)	Northern Yellow Flicker	Red winged blackbird
Common crow	Field sparrow	Killdeer
Great blue heron	House finch	Mourning dove
Goldfinch	Purple finch	Rock dove
Nuthatch	Swallow (species)	Pileated woodpecker

### Day 141

- Bird Quiz

### Day 142 – 143

- Begin the Forestry Unit
- Types of trees
  - Conifers -
  - Deciduous -
- Seed dispersal –
  - Animals
  - Birds
  - Wind
  - Insects
  - Gravity



- Fire
- Soil requirements
- Springwood / summerwood –
  
- Types of forest
- Mast –
- Timber Value \$ -
- Browse –
- Cover
- Succession
- Types of timber harvest
  - Selective
  - Seed tree
  - Clear cut
- Resources
  - Renewable -
  - Nonrenewable –

Day 144 – 150

- Tree and shrub identification
- A list of trees and shrubs are listed below:

Sugar maple	Willow	Norway maple
Hemlock	Beech	Black cherry
Ironwood / hop hornbeam	Blue Beech	Yellow birch
Basswood	White ash	Elm
Butternut	Quaking aspen / poplar	Raspberry
Wild rose	Staghorn sumac	Wild apple
Wild grape	Burdock	Spruce (species)
White pine	Eastern Cottonwood	Dandelion
Poison ivy	Witch hazel	White birch
Black berry	Ragged robin	Purple loostrife
Wintergreen	Canada mayflower	Cattail
Speckled alder	Red and White Cedar	Russian olive

Day 151

- Quiz – tree and shrub identification

Day 152

- Local edible and medicinal plants research project
- Research three local plants that are either edible or have medicinal properties
- You can format the information however you want, but you must include:
  - A picture of each
  - The Latin and common names of each
  - What value does it have?
    - Information about its nutrition or medicinal value.
    - Any history of the plant and its uses
  - Identifying characteristics of the plant and other species that look similar and how to tell the difference

Day 153

- Go outside and begin to hunt for these and collect them and show them to the class on day 154
- Be sure to place the plants flat on a piece of paper towel so that they can dry or if they are identified by a flower in water

Day 154

Present the plants that were found to the class and explain what the value of each is and how to identify them

Day 155

**40 week project assignment**

- **Break into groups for the 5<sup>th</sup> grade experience**
- **Each group will be assigned a unit that they will teach to the fifth graders in a 15 minute period at a station (the 5<sup>th</sup> graders will rotate through the stations).**
- **Plan what you want to cover, what materials you will need, create an outline**

Day 156

- **Practice for time and get the materials you need**
- **Run through your presentation a few times**

Day 157

- **Go to each others sites and critique**

Day 158 & 159

- **HPE and GWF**

Day 160

- Entomology – study of insects
- What makes something an insect?

- Exoskeleton – outer covering – protection from impact and water loss
- Wings – functional and no longer functional
- Legs – 6 jointed legs
  - Vary with purpose / function
    - Preying mantis
    - grasshopper
- Mouth parts – very different from each other
  - Some main ones are:
    - Sponging – fly
    - Piercing / sucking – mosquito
    - Piercing /lapping - horse fly
    - Sucking – butterfly
    - Chewing – dragonfly
    - Vestigial – mayflies – do not feed as adults
- Orders – refer to the poster at the back of the room for examples

Day 161

- Collect insects in the fields and identify them in the field or make notes on their descriptive features and we will try to identify them in class later

Day 162

- Continue to collect insects while keeping track of the different types and reoccurring species

Day 163 – 166

- Begin to review for the final exam

Day 167

- Field portion of the final exam

Day 168

- In class portion of the final exam

Days 169 and 170 – review the finals

**If we are pressed for time at the end of the year the entomology unit will be eliminated. If we have extra time we will extend the entomology unit and review time.**

**I am hopeful that you had an enjoyable year and learned each and every day that you were in this class. I wish you the best of luck in all of your future endeavors and as you prepare for the rest of your life remember these two quotes:**

**“Ignorant people with good intentions are very dangerous” Dr. Whittier**

**AND “the secret to happiness for the rest of your life is to find something you like to do and then find someone to pay you to do it” Mr. Tarleton**

**Emergency Shelter Insert**

Emergency Shelter – getting out of the elements

Seek shelter before dark

Get into an existing shelter if possible – leanto, cave, rock overhang, crevice, etc...

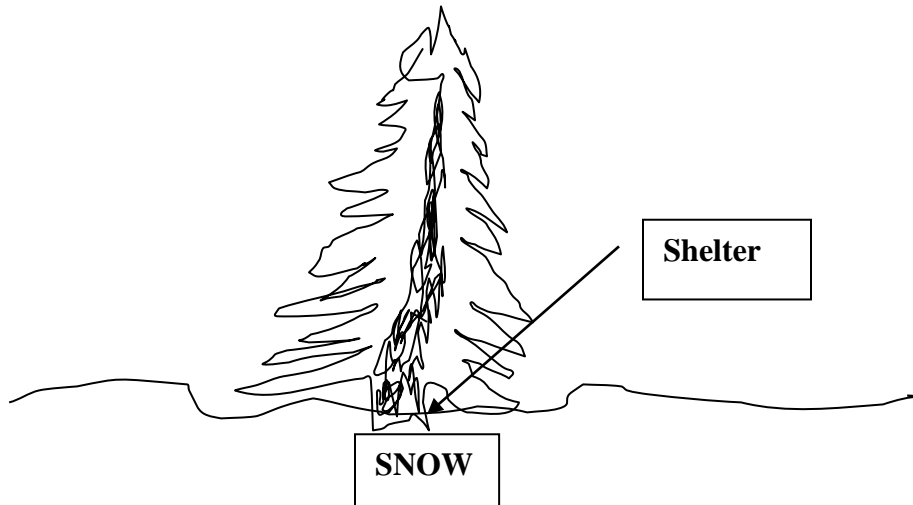
If one cannot be found – Make one

First night's priority – find or make a shelter

Second night's priority – improve the shelter

Natural Shelters

- Caves
- Ledge overhangs
- Roomy crevice
- Stand of conifers – especially spruce and balsam fir
- Under the branches of a conifer – if the tree is on the open, branches will usually extend to the ground



Snow shelters you can make:

- Should be small and windproof
- Should have adequate ventilation
  - A burning candle will test the oxygen supply
  - Will feel stuffy if oxygen is low
- Should be roomy enough to turn in and permit some movement, but small enough to heat easily and conserve body heat

Location should be away from:

- Cold pockets, falling rocks, dead standing trees, and areas with severe drifting

Location should be close to firewood, water, food, natural windbreaks, signal area, wreckage if present (boat, plane, vehicle)

Type of shelter depends on snow conditions (packed vs. powder)

Do not heat with gasoline stoves unless there is adequate ventilation