



YMCA CAMP CLASSEN TRAIL GUIDE LAKE CLASSEN TRAIL



Trail Focus: Cycles in Nature
Length: Approx. 1 mile

14 Numbered Teaching Stations
Color Code: Blue

STANDARDS ON THIS TRAIL

- 5.PS2.1 Support an argument, with evidence, that Earth's gravitational force pulls objects downward toward the center of the earth.
- 5.PS3.1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
- 5.LS1.1 Support an argument that plants get the materials they need for growth chiefly from air and water.
- 5.LS2.2 Use models to explain factors that upset the stability of local ecosystems.
- 5.ESS3.1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environments.

Station Number	Title and Focus
1	Griffith Lodge Photo – Trail Introduction; Our Changing World
2	Dedication Rock – Comparison of the Photo and Reality
OPTIONAL	Sewage Lagoon – Human Impact
3	Lake Classen Dam – Human Impact, Cycles of a Small Lake Ecosystem (Water Cycle Song)
5	Grassy Opening – Succession
6	Hardwood Forest – Carbon-Oxygen Cycle, Nitrogen Cycle
7	Lake Overlook – Environmental and Human Influences
8	Marsh Overlook – Eutrophication and Layers of the Lake
9	Forest Opening – Niche
10	First Creek Bed Crossing – Tributaries and Watersheds
11	The Rotten Forest – Decomposition and Recycling
12	Second Creek Crossing – Erosion and Sedimentation
13	Lowland Forest – Plant Diversity
14	Classen Falls – Hydrology

TRAILS MATERIALS LIST

***To be supplied by campus**

*School supplied snack

Auger for percolation tests

Teaching and Hiking Suggestions

- Before beginning the trail, explain trail rules and what is expected of each student and counselor.
- Backpacks should only contain necessary trail items.
- Everyone should check for tied shoelaces.
- Position counselors at the end of their cabin group.
- Be observant of the surroundings and take advantage of “teachable moments”.
- At teaching stations, gather students close so that they can hear, attend, and be involved.
- Rotate cabin groups during the hike to give everyone a chance to be at the front.

Trail Rules

- Stay on trails and walk single file. This reduces erosion and helps maintain habitat for animals. Don’t shortcut the “switchbacks.”
- Don’t litter! Leave no record that you were here, except for footprints. Paper, water bottles, orange peels, piles of rocks, even broken limbs are sad signs of human impact.
- Be prepared. Dress for the weather. Bring water in hot weather. Don’t carry so much that you may tire yourself.
- Stay with your group. This keeps people safe and allows everyone to share in the learning. Keep one person at the end to “bring up the rear.”
- Use study materials. There are other trail guides, field guides, and other materials available to tell you more.
- Be patient and quiet. Getting there is half the fun. Slow down: noise scares away wildlife, and you will miss the things you came to see. Take time to learn and appreciate beauty.

Griffith Lodge Photo

Trail Introduction - Our Changing World

Look at this picture. What kind of things do you see? Think about how that compares to the Camp Classen you see today. This photo was taken in 1941 when Camp Classen was established; Named in honor of the family who gave a major gift to create camp. Camp Classen is still open for the purpose of group camping in ways that develop human potential in terms of spirit, mind, and body in an outdoor setting Identify various places in camp for comparison:

- Comparisons from photo and today:
 - Hills were bare; today . . .
 - Gravel covered road used to construct the dam; today . . .
 - Number of camp buildings; today . . . Nature Center built in 1990; Activity Center in 1992
 - Notice the type of car in front of the caretaker's house.
 - Notice the tower and the dock then; today . . .

VOCABULARY WORDS

Cycle: a pattern where something seems to move in a circle.

Dam: a barrier constructed across a waterway to control the flow or raise the level of water. **Ecology:** the study of relationships between living and nonliving things in the natural environment. **Environment:** all aspects of one's surroundings, especially natural surroundings.

Environmental Awareness: a sense of understanding and care regarding the natural world.

Impound: to confine and accumulate and store (water) in a reservoir.

Recreation: refreshment of one's mind or body after work through activity that amuses or stimulates; play.

Reservoir: a natural or artificial pond or lake used for the storage and regulation of water.

Water Cycle: the various "circular" paths of movement of water on a global scale.

Dedication Rock

Comparison of the Photo and Reality

Have the participants stand and face the lake. Share some of the differences that they can see of the view that differs from when the photo was taken.

- There are more trees, more buildings, and a different look to the lake itself

The concrete structure across the dam opening is called a spillway. This structure was placed here to relieve the overflow from the dam when the water level is too high. The original bridge was washed away in a severe storm that occurred in the fall of 1987. The water was high enough that half of the boathouse (across the lake) was underwater. The green cage like fixture is the drain to also help control water levels.

VOCABULARY

Spillway: a channel for an overflow of water, as from a reservoir

OPTIONAL

Sewage Lagoon

Human Impact

What do you think these ponds are for? Here at camp, we have our own waste management system. Every time that water is run from any of the facilities at camp it ends up down here. Within each pond there are bacteria and decomposers who break down all the different parts until it's just water again. There is plenty of algae growth here because of the high nitrogen and phosphorus levels.

Sewage lagoon: naturally processes all wastewater at Camp Classen and provides habitat for insects, birds, and other wildlife.

Lake Classen Dam

Human Impact, Cycles of a Small Lake Ecosystem

Lake Classen is a man-made lake. An ecosystem is an ecological community functioning together with its environment. Lake Classen is a **freshwater lake ecosystem** that formed after the dam was built and the valley filled with water. When the lake filled the valley, humans changed the area from a **terrestrial (land) ecosystem** to an **aquatic (water) one**. Most animals were moved out of the new water area. Aquatic plants and animals took up life in the lake. People stocked the lake with fish. The aquatic community stabilized, and a complete food web (with plants, plant eaters, predators, scavengers, omnivores, and decomposers) was established. The terrestrial forest ecosystem formed here through natural succession, a change from certain kinds of species to other species living in an area. What provides the **energy** for the water to evaporate? It is the **sun - solar energy-** that makes water go upward. **Solar energy and gravity do all the work to move water in its cycle.**

Traveling Tune: The Water Cycle Song (Tune: Coming Around the Mountain)

Water travels in a cycle, yes it does.

Water travels in a cycle, yes it does.

It goes up as evaporation

It forms clouds as condensation

And if falls as precipitation

Yes, it does!

Water cycle: thermal cycle-water is warmed in summer, cooled in winter; cold water settles to the bottom; if the water on the top is colder than the bottom water, as in the spring, the water at the bottom moves to the top causing seasonal turnover.

VOCABULARY

- **Aquatic:** referring to water
- **Ecosystem:** an ecological community together with its environment, functioning as a unit.
- **Extinct:** the death of an entire species, irreplaceable.
- **Food chain:** the process of organisms and animals consuming foods needed for survival in an organized progression.
- **Habitat:** the factors necessary for an organism to survive, such as food, water, shelter, and space.
- **Herbivore:** a plant-eating organism.
- **Natural succession:** the orderly process of the kinds of species which live in a certain place changing over time, resulting in a gradually changing ecosystem.
- **Seasonal turnover:** change in temperature layers of a body of water resulting in movement of water.
- **Species:** a category of organisms, which can interbreed and generate more of the same organisms.
- **Terrestrial:** referring to land.

GRASSY OPENING

Succession

Does it look like the grasses or the trees have control of the area? **This is a remnant prairie.**

Grasses, major plants of prairies, once covered vast areas here along with many varieties of wildflowers. Much of the prairie is now covered with Eastern Red cedar or Ash Juniper. In the past fire was one way to control the spread of larger trees and allow grasses to regroup continuing the prairie community and encouraging biodiversity. At Camp Classen some of the cedars are cut down or burned as resource management of the prairie and trails.

All plants and animals are constantly trying to grow as individuals and expand their range. The plants and animals compete, and other factors influence their success (factors like soil type, fire, drought, etc.). This is known as competition and succession. You can tell who the successors are in the environment because there is usually an abundance of them.

VOCABULARY

Abiotic: nonliving or inorganic

Biotic: living or organic

Biodiversity: the number of different species of organisms in a certain area.

Competition: the process resulting when several organisms or species simultaneously seek to expand yet needed resources are limited.

Indicator species: organisms which, taken together, identify a particular ecosystem or community.

Remnant prairie: the part of a prairie that remains though other ecosystems may encroach.

Resource management: the process of making and carrying out effective decisions regarding natural resources, such as plant and animal populations.

HARDWOOD FOREST

Carbon-Oxygen Cycle and Nitrogen Cycle

What type of gases make up the atmosphere? Nitrogen is the most common gas in our atmosphere. **Carbon/Oxygen Cycle** Carbon dioxide and oxygen are two vital gases needed by living things. This occurs through photosynthesis, respiration, and breathing.

Nitrogen Cycle: Nitrogen in the air close to the soil is 'grabbed' by bacteria on the nodules of the **legume plants**. (i.e., peas, beans, bluebonnets) Nitrates are released by **nitrogen-fixing bacteria** into the soil for plant use. Herbivores eat plants. These animals die and decompose.

De-nitrifying bacteria come along in the decomposition process, changing nitrates back into nitrogen and releasing it back into the atmosphere.

VOCABULARY

By-products: something left over from a process.

Cellular Respiration: process during which all organisms use oxygen to release energy from glucose. Makes up $\frac{1}{2}$ of the carbon-oxygen cycle.

Nitrogen Cycle: process where nitrogen is taken from the air, made into a usable form, used by living things, and released back into the atmosphere.

Photosynthesis: process during which producers use solar energy, water and carbon dioxide to make glucose (food). Makes up $\frac{1}{2}$ of the carbon-oxygen cycle.

Transpiration: to give off vapor containing unused products, as through animal or plant pores.

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LAKE OVERLOOK

Environmental and Human Influences

Compare this area to a parking lot. Where does the rainwater go when it hits a parking lot? Rainwater runs off the parking lot, rather than percolating into the soil. Point out the pile of brush. Why is this necessary? (to slow erosion) Doesn't the ground absorb the water? How quickly is the water absorbed? Let us look at the factors involved in understanding the answers to these questions.

PERCOLATION TEST: (Conduct both tests in the area. One with the clay and the other near the trees)

Percolation is the process of water moving through a porous medium. Here are the steps for a percolation test:

- a. Dig a hole using a soil auger approximately 2 centimeters (one inch) wide, and 10 centimeters (four inches) deep. Paint on the auger marks the correct depth.

- b. Pour a known amount of water into the hole in the ground. We will pour in one-fourth liter (about one cup). Use a water bottle for this procedure.
- c. Begin to time as soon as the water is poured in. Stop timing when you can see the mud in the bottom, and no water is left pooling at the bottom.
- d. Record the location and percolation time as well as ground characteristics. (Appendix: percolation test data sheet) Pour in the water in a similar manner every time you do the percolation test. The variables (things that can change) in this experiment are the location and the time of percolation. The constants (things that do not change) are the size of the hole, the amount of water, and the method of conducting the test. Fill the hole in with dirt, and try to leave no trace.

There is more clay here than at the first percolation test. The clay soil particles are very small, and water cannot get through clay easily- **impermeable**. It can absorb only a small amount of water. **Erosion** begins when the **substrate** (ground) becomes **saturated**. When no more water can percolate down, it flows on the surface. Plants do not grow easily here because plant roots have a difficult time establishing themselves and getting nutrients from the clay soil. If plants were growing on the hill, this would slow the flow of water naturally. The deep, straight gullies indicate that the water flows down this hill with **high energy**, taking many soil particles to the bottom of the hill.

A major human impact (**cultural** factor) on the natural environment is the interruption of natural cycles. A parking lot interrupts percolation. An impounded stream (to form Lake Classen) slows the job of drainage the stream does. How does a building interrupt the water cycle?

VOCABULARY WORDS

Cultural: having to do with the activity of humans

Erosion: process of removing and carrying away material from the surface.

Ethics: relating to issues of good and bad, right, and wrong

Impermeable: state where liquid cannot penetrate the material

Permeable: state where liquid can penetrate the material

Saturate: filling a permeable substance to capacity

Substrate: material immediately below us; the ground, soil, or bedrock

Zone: to designate certain geographic areas.

MARSH OVERLOOK

Eutrophication

The dam end of the lake is approximately two telephone poles deep and is the deepest area of the lake. This area in front of us, where Lick Creek empties into the lake continues to deposit sediment significantly decreasing the depth at that end making it only deep enough to stand in. Sediments filling a lake and making these islands bigger is called **sedimentation**. Natural succession of the lake collecting sediment and becoming shallower is occurring. Eutrophication is the process whereby plant life, especially algae, grows abundantly, eventually reducing the dissolved oxygen content and often killing off other organisms. As the islands get bigger, the middle of the island becomes drier and water-loving trees grow. More sediment accumulates, and the lake changes to a marsh, then a meadow (small grassland) then a forest. A **marsh** is a type of wetland characterized by soft, wet, low-lying land with **herbaceous** vegetation. It differs from a swamp because it doesn't have trees or woody vegetation. The boundaries of a marsh may be hard to determine since wetlands may gradually fade into land at one end, and into a waterway at the other. This marsh performs many functions: to help control flooding downstream by acting as a protective natural sponge, capturing, storing and slowly releasing water over a long period of time. Plants in the marsh take up and filter some pollutants.

VOCABULARY WORDS

Anaerobic: without oxygen.

Benthic zone: the bottom of lakes, ponds, oceans and tidal zones.

Dredge: to clean, deepen or widen with a mechanical scoop

Emergent: rising above a surrounding medium, as in wetland plants protruding above the water level.

Eutrophication: a process affecting waters that are rich in mineral and organic nutrients, whereby plant life (especially algae) proliferates, eventually reducing the dissolved oxygen content and often killing off other organisms

Herbaceous: green and leaflike in appearance or texture, not woody.

Limnetic zone: the open water area away from the shore of a body of water

Littoral zone: the shallow water near the shoreline of a body of water

Marsh: a wetland characterized by soft, wet, low-lying land, marked by herbaceous vegetation

Muck: dark, fertile soil containing a high percentage of organic material.

Plant Community: the many plants that share an area characterized by certain conditions.

Sediment: different sizes of rock pieces and organic matter (plant parts, etc.)

FOREST OPENING

Niche

Look around at these trees do you think they are dead or alive? Each area of an ecosystem adapts for survival. Each of these organisms fit in a certain **niche** within the lake's food web and possesses certain adaptations, structural and behavioral features that qualify them for their respective roles. Examples of adaptations include: webbed feet of beaver, sharp teeth of a mouse, and the habit of a turkey to scratch in the ground. Take a minute to list a few adaptations of things that live here. Every organism here fills a **niche** in the ecology of Lake Classen. **Niche means "Place in the ecosystem," or, simply, 'a job in nature.'** Every organism (plants, animals, every living thing) has a niche in nature, and there is only **one** niche for each organism. The concept of niche is very important to understanding ecology. **An organism's niche is how we describe its link to the natural environment.** All the niches in an ecosystem are complementary to each other and make the system complete. If a change in the ecosystem occurs, the niches of affected organisms must change, too. When an organism cannot fulfill its niche, the entire ecosystem may change. This is what is meant by "**the balance of nature.**"

For example, let's look at the different niches within our trail group.

Student's job: Learning

Parent's job: Cabin counselors to; nurture and help you

Teacher's Job: Trail guide and naturalist.

Describe an organism's niche by answering the "W" questions:

1. **Where** does it live?
2. **What** does it eat and need to live? (Basic needs)
3. **What** does it do to live?
4. **When** does it do what it does?
5. **Why** does it do what it does?

VOCABULARY WORDS

Adaptation: a part of an organism's anatomy, physiology, or behavior which enables it to function in its environment

Niche: the function, position or job of an organism or a population within an ecological community.

FIRST CREEK BED CROSSING

Tributaries and Watersheds

After a rain, this creek is full of water draining to the lake. Other times, it is dry. This is an **intermittent stream**. Water for this stream is rainfall falling directly into the stream or is moving here by **gravity** from the watershed. The force of water movement is the result of the pull of gravity. The beginning of a stream is its **origin**, and the place it empties out the **mouth**. **Watershed** is the entire land area that contributes surface runoff to a drainage system. Consider the streambeds and what makes water flow downhill. Gravity pulls water toward the lowest point in the terrain. Think of a raincoat- "shedding water." If water were to land on your shoulder, predict which direction the water would run. The ridge of a watershed is called the **divide**. North America's Continental Divide is in the Rocky Mountains. The divide of your body's watershed is the top of your head and shoulders.

♣ Water drains in from the sides as well as from the higher part of the valley.

- ♣ Water running down from the watershed to this creek bed forms small streams, which join into bigger streams, then coming together to form this intermittent stream and flowing into Lake Classen.
- ♣ Smaller streams, which join bigger streams, are called **tributaries**, looking like branches of a tree.
- ♣ When a stream hits flat land, it will slow down, and often break into several channels, which weave about, called braiding.

The soil here at the mouth of this intermittent stream becomes **saturated** for long periods of time during heavy rainfall. Air and some moisture usually occupy the pore spaces in the soil near the surface of the ground. Water now occupies the spaces once occupied by air. Once those pore spaces are full of water the soil reaches its saturation point and water is perched on top of the soil. Wetlands usually form in areas where the soil is saturated for long periods of time or where the soil is impermeable or poorly drained.

Stream processes, main land shapers, formed the valleys at Camp Classen, and in most places in the world. Rock and organic material are carried away, and a valley results. Sediment carried by slower moving water drops to the stream bottom as **alluvial** material. A delta forms when alluvial materials drop into still water.

VOCABULARY WORDS

Alluvium: sediment deposited by flowing water; alluvial refers to the process of erosion and sedimentation.

Braiding: pattern of many overlapping strands.

Dendritic: treelike pattern.

Intermittent: alternately containing and not containing water

Mouth: a natural opening, as the part of a stream or river that empties into a larger body of water

Origin: beginning

Saturation: soil that is soaked to capacity with water.

Tributary: a stream that flows into a larger stream or other body of water.

Watershed: the entire land area that contributes surface runoff to a given drainage system.

THE ROTTEN FOREST

Decomposition and Recycling

The Nutrient Cycle

Plants get nutrients from soil; **herbivores** eat plants, **omnivores** and **carnivores** act as **consumers**. Animal waste is decomposed as organic fertilizer. Organisms die, they decompose, and complete the cycle. When forest animals die, their remains are seldom seen, and trees decay slowly, providing evidence of orderly change.

Decomposition occurs when decomposing organisms get to the remains. Examples: termites, insect larvae, worms, fungi, bacteria, vultures, bacteria and fungi. accomplish most of the decomposition. A decomposer is any organism that eats organic material, breaks it down through digestion, and leaves waste. Waste matter from decomposers returns nutrients to soil, making them useful for other plants and trees. Look for a **dead oak** tree. Inspect it for signs of decomposers: insects, fungi, pillbugs, woodpeckers, squirrels. Alive, it provided habitat for wildlife. Dead, it falls to the forest floor, becoming a decomposer habitat..

VOCABULARY WORDS

Decomposer: an organism that breaks down once living material

Fungi: a major group of flowerless plants (as molds, mildews, mushrooms) that lack chlorophyll and are parasitic or live on dead or decaying matter

Nutrient Cycle: process where nutrients move through the soil to plants, primary and secondary consumers, then decomposers, and back to the soil and air.

Traveling Tune: The Decomposer Song (Tune: The Worms Crawl In, The Worms Crawl Out)

The worms crawl in, the worms crawl out,

The worms leave
droppings all about.

Bacteria grows, and
fungus spreads, Mo-
o-ld sprouts and
insects are fed.

To decompose, you need to know, Nutrients come, and nutrients go.

SECOND CREEK CROSSING

Erosion and Sedimentation

Cobble creek flows with much energy during rainstorms and dries up soon after. The large cobbles in the bed help indicate its high energy. The stream's energy rubs off particles and carries them suspended in the current. The **soil profile** shows exposed alternating layers of soil and cobble (rocks and boulders). The rocks and boulders could have been eroded from upstream outcroppings or possibly washed down from the adjacent hillside. Look at the tree and plant roots in the eroded stream edge. High-energy (fast) streams are straight and have big rocks in them. Low energy (slow) streams have fine sediments in the streambed, and curve ("meander") a lot. Gravity's pull causes the stream to flow downhill. High-energy streams can carry larger particles. Small particles carried in a stream are called suspended sediments. Wherever the stream drops its load, is called the **zone of deposition**.

VOCABULARY WORDS

Gradient: the degree of slope.

Sedimentation: process where suspended sediments settle down through a liquid medium.

Soil Profile: cross sectional view exposing various layers of soil.

Zone of Deposition: the place where deposition occurs

Zone of Erosion: the place where erosion occurs

LOWLAND FOREST

Plant Diversity

Any organism's body and behavior must be adapted to the available resources. The plants you see here must be well adapted to this amount of sunlight. During the growing season the canopy of this hardwood forest captures most of the sun's rays, limiting the survival potential of those trees growing beneath. This is characteristic of a mature forest.

If the next generation of plants can live under the conditions left by the preceding generation, the ecosystem is said to be a climax community. Ecologists believe that a hardwood forest is a climax community. The struggle for life is nowhere greater than in a forest, and the survival of one mature tree can mean the life and death of many others. During these growth periods the competition for space, moisture and sunlight is the measure of success. 100 years or more of plant succession have yielded a mature hardwood forest. Still the competition continues, with seedlings and saplings moving upward through the forest layers towards sunlight.

VOCABULARY WORDS

Climax Community: an ecosystem, which maintains essentially the same organisms and functions in a stable manner over long periods of time. The organisms do not change their surroundings to the extent to which they cannot reproduce and live in the same ecosystem.

Fungi: any of a major group of flowerless plants (as molds, mildews, mushrooms) that lack chlorophyll and are parasitic or live on dead or decaying organic matter

Lichen: any of numerous complex plants made up of an alga and a fungus growing together on a solid surface (as a rock or tree)

Moss: a simple plant in the classification mosci, and, with liverworts, is in the bryophyte grouping.

Vine: a plant growth pattern, characterized by long, slender plant stalks which utilize support from other plants rocks, or other structures

A gouge pool: pool of water beneath the falls. Energy from the falling water has eroded this pool. Two kinds of erosion have occurred:

- physical, from the water wearing on the rock
- chemical, because water is acidic, and the limestone bedrock is alkaline.

Erosion has occurred on the side of the rock face, too, making miniature caves. Water will easily erode limestone. The waxy blue green color of the water is due to lime in the water. This water is relatively clean and provides a good habitat for fish. The water of Lick Creek is heavily laden with calcium carbonate which is deposited on the rocks and hardens into some spectacular travertine formations. Lick Creek originates as a spring fed stream in the ranch land to the west and meanders for miles through the lowlands of Camp Classen, receiving water from several other springs before flowing over Classen Falls.

VOCABULARY WORDS

Acidic: a chemical condition characterized by an abundance of free hydrogen ions.

Alkaline: a chemical condition characterized by an abundance of free hydroxide

Aquifer: a rock layer capable of holding water.

Calcium Carbonate: lime, CaCO_3

Chemical: relating to chemicals.

Hydro: water. **-ology:** Greek; logos, symbol, study.

Physical: relating to matter.

Travertine: a deposit of calcium carbonate looks like tan colored hardened, boxy foam.