



Winter Trek Express Conservation Education Program



Teacher's Handbook

Winter 2012
Lake Tahoe Basin Management Unit
US Forest Service



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What is Winter Trek

The Winter Trek Conservation Education Program was started in 1988. Working with local educators, the US Forest Service developed an outdoor winter education program specific to 5th grade curriculum. Until eight years ago, we used sites adjacent to Camp Richardson or Valhalla (both in the southwest portion of Lake Tahoe) to learn and experience winter ecology of the Lake Tahoe area on snow shoes.

In 2004 we initiated the new Winter Trek Express program working with Heavenly Ski Resort to allow a special learning experience in the snow at 9,100 feet elevation. The gondola rides are free; compliments of Heavenly Ski Resort. This program is a cooperative effort between the US Forest Service (Lake Tahoe Basin Mgmt Unit), the Tahoe Heritage Foundation (non-profit association), City of South Lake Tahoe (use of Explore Tahoe Visitor Center) and Heavenly Ski Resort (Fores Service Special Use permittee). The \$3 fee charged to each student covers maintenance and replacement of snow shoes and program material costs (cocoa & post-visit USFS Jr. Ranger booklets).

We take one class each day, Monday through Friday, beginning January 9th and continuing through March 30th. Classes meet at 10 am and depart at 1 pm after experiencing a life altering snow shoe adventure on the ridgeline of the Lake Tahoe Basin.

For more information contact:

Jean Norman, WinterTrek Program Manager (530) 543-2673, jdnorman@fs.fed.us

Lindsay Gusses, WinterTrek Coordinator (530) 543-2672, lgusses@fs.fed.us

Front Desk (530) 543-2694

USDA Forest Service, Lake Tahoe Basin Mgmt Unit
35 College Drive, South Lake Tahoe, CA 96150

Academic and Physical Benefits

The fifth grade curriculum covered in the Winter Trek Express environmental education program includes numerous subjects:

- (1) **Physical education**
- (2) **Science**
- (3) **Social studies/ history**
- (4) **Reading/Writing**

(1) Physical education- exercise while you learn:

- (a) Promote good physical health that can lead to a healthy life style.
- (b) **Burn 300-400 calories** while participating in this low impact safe sport.
- (c) You are participating in the President's Fitness Challenge by encouraging children to get active in winter with snow sports.

(2) Science curriculum is varied and extensive. Subjects include:

- (a) *Geology*: How Lake Tahoe Basin was formed
- (b) *Animal Strategies in the winter*: adaptation, migration, hibernation and torpor
- (c) *Natural history of the Lake Tahoe Basin*
- (d) *Water Cycle*: 3 states of water & importance of H₂O

(3) Social Studies and History are reviewed in the pre-visit materials included in this packet.

- (a) "Facts and Figures": makes Lake Tahoe Basin special.
- (b) "Early Human History": Washoe people and explorers to the region.

- (c) "Snow Shoe History": how and why snow shoes came about in our country.
- (4) Reading & Writing curriculum is available in the numerous pre-visit and post-visit material including:
 - (a) Three above mentioned Social Studies & History information
 - (b) Natural history subjects:
 1. Lake Tahoe Basin's Mammals & Birds
 2. Winter Animal Strategies
 3. Winter Adaptation (plus worksheet)
 4. Hibernation vs. Torpor
 5. Migration to/from the Lake Tahoe Basin
 6. Evergreens in the Lake Tahoe Basin
 - (c) Computer time: writing a blog after the field trip to express their experience on-line. (see What to Expect section, page 4)

Posters available: Teachers with interest in displaying Winter Trek subject-related posters (Adaptation, Hibernation, Migration, Tahoe Geology and the like), may go to our website and download information. Go to <http://fs.usda.gov/ltbmu> and navigate to Learning Center on left bar. Teachers may also print a copy of this Teacher Handbook from this same website.

Power Point Presentation: The Power Point presentation for the Winter Trek program along with its script is also available on line at the above website. The audio embedded version may be available on-line. With our new server, downloading this large document is now easier. Teachers may request this power point on CD with a written script or script in-bedded in CD by contacting Jean Norman at (530) 543-2673 a minimum of 5 business days prior to your scheduled field trip.

What to Expect

Explore Tahoe Visitor Center

Arrive at **10:00 am** by bus or private vehicle. Please do your best to be prompt. Late arrivals seriously impair the quality of the program. Buses may pull in at Transit Center Way across from the construction site off of Hwy 50 near Stateline. Students are dropped off adjacent the visitor center. Private vehicles must find their own parking. Free parking garages are nearby. Buses park in the Embassy Suite/Harrah's parking lot. Maps and directions are available in this section, pages 10 through 12. Students are encouraged to use the restrooms in the visitor center. All participants must carry their own backpacks with lunches and water. Nothing can be stored at the visitor center.

PowerPoint Presentation & Scavenger Hunt

This brief 20-minute presentation will outline what students will experience on Winter Trek, what to look for, expectations and some basic Lake Tahoe ecology. Teachers may opt to view this presentation in the classroom before the fieldtrip (see previous page for website). Following the presentation, Scavenger Hunt sheets are presented to the adults for each group. We use the Scavenger Hunt questions to keep the students focused on key concepts that are repeated in the program while taking the gondola ride.

Proper Clothing

Before departing the visitor center, we check all students for proper attire: gloves, hats, jackets and footwear. During extremely cold temperatures and poor weather, students not properly attired **will not** be permitted to attend the program due to health and safety concerns. A chaperone must remain behind with the student(s).

What to Expect- continued

Gondola Ride

We divide up into small gondola groups (one adult per 5, 6 or 7 students). Teachers may pre-select student groups. This can be a real time saver. After departing the visitor center, we walk to the Gondola Station (100 yards away). We go to the head of the line, get on empty gondola cars and first ride to the mid-station. From the mid-station, the ranger will present a short talk about geology, the states of water and general Lake Tahoe facts. We then return to the gondola and continue to the top of the mountain.

Snow Shoe Adventure

By **11:15 am** (latest) we should be at the top of the mountain. Rangers will distribute snow shoes to students and chaperones and then teach everyone how to put on and use snow shoes. This requires careful instruction. Good listeners are appreciated. After learning how to navigate in snow shoes the class will head off into the wilderness observing nature (tracks, potential winter homes for local animals and wildlife). Students are given safety instructions before our adventure.

Ranger Discussions

The rangers will make several short stops to discuss winter strategies for animals, especially the animal adaptors. We will identify tracks and signs of wildlife. Students will understand the importance of snow and public lands.

Lunch and Cocoa

We eat lunches at the top of the mountain on the snow. The exact location varies depending on the amount of time we have before

What to Expect- continued

departure. Students can bring their own plastic garbage bag to sit on so they don't get wet or cold bottoms. If time is short, Heavenly Ski Resort has given us permission to eat lunches in the gondola cars while riding down the mountain. Hot cocoa is supplied to all participants at the conclusion of the program at Explore Tahoe Visitor Center.

Departure Times

Departure times will vary with each group. We like to conclude the program at the top of the mountain around 12:30 pm. The gondola ride can take between 12 and 18 minutes depending on the weather (high winds means slower gondola cars). Restroom facilities are available at the top of the mountain and at the Explore Tahoe Visitor Center. Hence, students should then be on the bus by 1:00 to 1:15 pm.

Note if you must depart earlier, please notify the ranger immediately so we can alter our schedule. If you wish to have more time on snow shoes, arrangements can be made to arrive up to 30 minutes earlier (9:30 am) or stay later (2:00 pm). Please contact Lindsay Gusses at (530) 543-2672 to make arrangements for additional time for your class for our Winter Trek Express program.

Photographic Moments

Rangers photograph the students at mid-station and while snow shoeing. We email all photos to teachers by the following day.

What to Bring

How to Stay Warm

Proper clothing and footwear is essential to have a safe and enjoyable trip. At 9,200 ft elevation the conditions can be quite severe (windy, bright sun, snowing, and below freezing temperatures). Please review the entire list below with your students and chaperones. Students not dressed properly will not be permitted to join us due to health and safety concerns.

- ___ snow boots or waterproof hiking boots (leather sneakers OK)
- ___ snow pants or water-repellant treated pants
- ___ large plastic trash bag (stay dry while sitting in snow)
- ___ warm hat to keep head and ears warm and dry
- ___ warm socks (wool or polypropylene best; or 2 thick cotton pairs; above ankle)
- ___ thick water-resistant jacket for cold temperatures
- ___ gloves or mittens (water-resistant; not cotton or acrylic)
- ___ sunglasses; sunscreen (put on before you leave if you like)
- ___ lunch with extra water
- ___ day pack to carry gear

Please photocopy the letter to Students and Chaperones from the forest service at the end of Section one and send home with each student.

Bag Lunch and Water

Students and chaperones need to bring their own lunch and water stored in their own backpack. Students cannot carry a lunch in hand while snow shoeing—you need both hands free for safety reasons. Lunches or other items cannot be stored in visitor center.

What to Bring-continued

First Aid/ Medication/ Health Worries

Rangers have bandages and a basic first aid kit. Students with medical conditions should bring their medication. Students with asthma should bring their inhalers—the high altitude and physical exertion can often stimulate wheezing in asthmatics. Hypoglycemic students should bring extra snacks. Diabetics should closely monitor their blood sugar levels.

Generally, all fifth graders should be able to physically manage snow shoeing. Overweight students will find it more challenging than fit students but they can just take it a bit slower. We go at a moderate pace over level terrain and may climb short hills. We always have a ranger lead and another bring up the rear for stragglers.

Students must eat a good healthy breakfast the day of the field trip to keep blood sugar high for this high altitude, high energy day. We have had students faint because they forgot to eat breakfast and were sensitive to the low oxygen, high altitude.

Maps and Directions to Site

Two maps are included. The first is for general directions to the Stateline area near Heavenly Village. The second map is for the bus driver to show him/her clear directions to drop off/pick-up point and parking for the bus (Embassy Suites & Harrah's parking).

Directions and Parking

The Explore Tahoe Visitor Center is located adjacent to the Heavenly Village just over the border from Stateline, NV. The field trip takes place IN the state of California for those schools located across the border. Buses have permission to park in the Embassy Suites and Harrah's Parking area (see map). Private vehicles are discouraged from parking in these lots and encouraged to use the fee parking garage off of Bellamy Way (see map). Go to www.MapQuest.com for more maps (address: 4133 Lake Tahoe Blvd., South Lake Tahoe, CA 96150).

Coming from the West of South Lake Tahoe

Take Hwy 50 (Lake Tahoe Blvd.) through the town of South Lake Tahoe. As you approach the tall casino buildings, you'll notice the Heavenly Village (new complex) on the right. Just beyond Heavenly Village (before Embassy Suites) turn right on Transit Center Way, then take the loop to the right to the visitor center drop off/pick-up point. Follow the attached map for parking directions.

Coming from the East of South Lake Tahoe

From the Carson Valley, take Hwy 207 (Kingsbury Grade) or Hwy 50 (Spoooner summit) to Stateline, NV. Drive past the casinos; drive past the Embassy Suites on left; look for driveway labeled Transit Center Way (directly across from construction); follow the loop to the right for the drop off/ pick-up point at the visitor center. See the attached map for parking.

Map to Explore Tahoe for Winter Trek Express



Directions from Nevada:

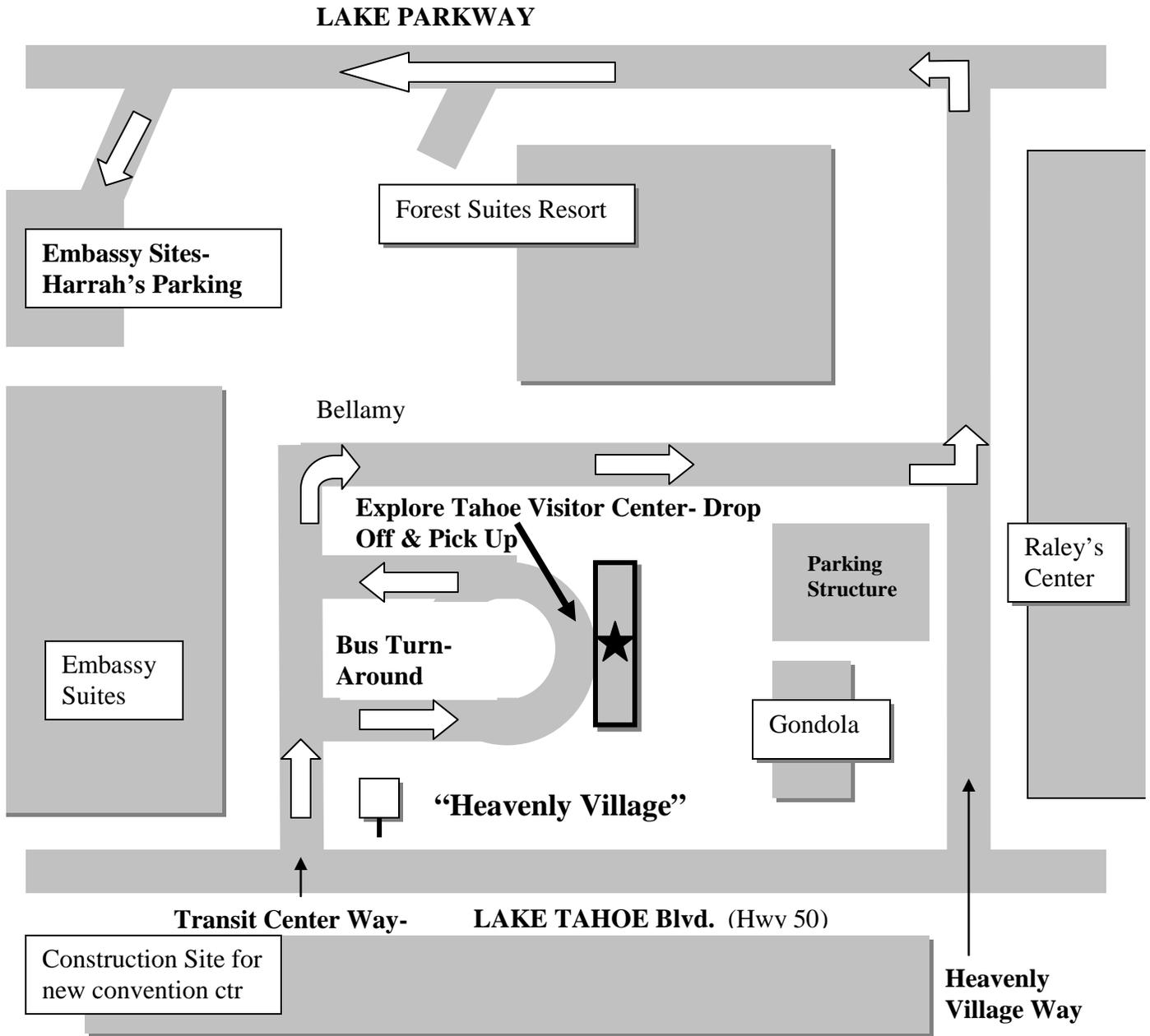
Take Hwy 50 west to South Lake Tahoe. Cross the state line into California, drive past Embassy Suites, turn left on Transit Way. Turn right into bus area.

Directions from California:

Take Hwy 50 east to Heavenly Village near Stateline. Drive past the Marriott Timber Lodge, turn right onto Transit Rd. Turn right into bus area.

Note: Busses are allowed on Transit Way for drop off and pick up only. Busses must park off site during program. Private vehicles are not allowed on Transit Way.

Bus Parking Information
 For
 Winter Trek Classes
 (Please copy for driver)



Lost? Problems? Need information?
 Call us Explore Tahoe Visitor Center: (530) 542-2908
 or USFS Office, S. Lake Tahoe: (530) 543-2694



United States
Department of
Agriculture

Forest
Service

Lake Tahoe Basin
Management Unit

35 College Drive
South Lake Tahoe, CA 96150
(530) 543-2600
(530) 543-0956 TTY

File Code: *

January 9, 2012

To: Students and chaperones attending Winter Trek Field Trip

From: Jean D. Norman
Winter Trek Program Manager
USDA Forest Service, Lake Tahoe Basin Mgmt. Unit

Re: Staying Warm, Dry and Healthy for Winter Trek Attendees

Date of Field Trip: _____

Snow shoeing at the top of Heavenly Ski Resort requires proper clothing and footwear to have a safe and enjoyable trip. At 9,200 ft elevation the conditions can be quite severe (windy, bright sun, snowing and below freezing temperatures). Students not dressed properly will not be permitted to join us due to health and safety concerns. Don't feel you need to purchase the items below. Ask friends and neighbors and borrow clothing. There's always the local thrift store if you get desperate.

- ___ snow boots or waterproof hiking boots (leather sneakers OK with long, warm socks)
- ___ snow pants or water-repellant treated pants
- ___ large plastic trash bag (to sit on in the snow if your pants are not water-proof)
- ___ warm hat to keep head and ears warm and dry
- ___ warm socks (wool or polypropylene best; or 2 thick cotton pairs; above the ankle)
- ___ warm water-resistant jacket for cold temperatures (layering is always good)
- ___ gloves or mittens (water-resistant; not acrylic or cotton PLEASE)
- ___ sunglasses; sunscreen (put on before you leave if you like)
- ___ lunch with extra water
- ___ day pack to carry gear

Parents, please give your child a **good healthy breakfast** to sustain them for this invigorating, high energy field trip. Students have fainted due low blood sugar (not eating a breakfast) and then working hard at a high elevation.

Thank you for making your child's experience a safe and enjoyable one.



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Lake Tahoe Facts and Figures

How large and deep is it?

Lake Tahoe is 22 miles long, 12 miles wide, and has 72 miles of shoreline. Lake Tahoe's greatest depth of 1,636 feet makes it the third deepest lake in North America and the tenth deepest lake in the world. The bottom of the lake is actually 92 feet below the level of Carson City, Nevada.

How much water is in Lake Tahoe?

Over 37 trillion gallons of water is estimated in Lake Tahoe. If completely drained, Lake Tahoe could cover a flat area the size of California to a depth of 14 inches. It would take over 700 years to refill it.

What's the elevation?

Lake Tahoe's average surface elevation is about 6,225 feet above sea level. This makes it the highest lake of its size in the United States. Its exact elevation depends on the amount of snowmelt and rainfall the basin receives. During drought conditions, Lake Tahoe can drop below the rim of its natural outlet at Tahoe City. When that happens, no water flows out of the lake into the Truckee River.

Where does the water go?

Sixty-three streams flow into Lake Tahoe, but only one flows out -- the Truckee River. The Truckee River then flows to Reno and continues to its destination— Pyramid Lake. Unlike most large bodies of water in North America, Lake Tahoe's water does not flow to the ocean. Lake Tahoe also loses much of its water to evaporation; if the water that evaporates from the lake every 24 hours could be recovered, it would supply the daily requirements of a city the size of Los Angeles.

Why is Lake Tahoe so blue?

Lake Tahoe appears so blue because of many factors. The most common factor is that we have so many days of blue sky. The lake reflects the blue sky. The great depth and clarity of Lake Tahoe also contribute to its vivid blue color. On stormy, winter days, the lake will appear gray like the clouds above.

How cold is Lake Tahoe?

The water surface temperature varies depending on the month. February/March = 40 to 50 degrees; August/September = 65 to 70 degrees. The lake has a constant 39 degree temperature at depths below 600 feet.

Lake Tahoe Geology

Three separate geologic events occurred to form Lake Tahoe and the lands surrounding it.

Faulting deep in the earth's plates created uplifting of land blocks and sinking of land between these two uplifted blocks. An easy way to picture this event is to put extra filling in an Oreo cookie and squeeze the sides together. The cookies' sides represent the mountain ranges and the filling is the land that collapsed between the two ranges. The two mountain ranges that were created were the Sierra Nevada Range on the west shore and the Carson Range on the east shore. A deep V-shaped canyon formed between the two mountain ranges. These mountain ranges connected to the south but remained open to the north allowing water to flow from its opening.

Volcanoes later erupted on the north shore blocking the water flow to the north. Mt. Pluto, home of today's Northstar-at-Tahoe Ski Resort, once an active volcano erupted with lava and steam. Similarly, Mt. Watson also located on the north shore contributed to blocking the mouth of this once steep V-shaped valley. Once the mouth of the deep valley was blocked, rain and snow-melt started to fill up this deep pit. It is estimated that it took between 600 and 700 years to fill Lake Tahoe.

Glaciers formed in Lake Tahoe Basin, especially in the southwestern portion of the basin (where Desolation Wilderness is today). An ice block formed at the lake's only outflow - the Truckee River (Northwest corner of the lake where Tahoe City is today). This increased the level of Lake Tahoe to 800 to 1,000 feet higher than it is today. The volcanic plug (inner lava of volcano that cools and solidifies) on the east shore known today as Cave Rock was created by wave action eroding the soil away from its rock hard lava core. This clearly demonstrates how high the water level was during the glacier period. Later, these glaciers melted and carved deep canyons in the granite walls of the southwest portion of the lake and later created Fallen Leaf Lake and Emerald Bay. The ice block at the outflow of Lake Tahoe (the Truckee River) melted, soon bringing down the level of the lake to its pre-glacial period.

The Order of Geologic Events above are sequential but do overlap as well. See the next section **Over Millions of Years** for the timeline.

Lake Tahoe Geology- continued

Over Millions of Years

4 to 25 million years ago: The primary uplifting force creating the lake's mountain ranges (Carson Range and Sierra Nevada Range).

5 to 25 million years ago: Series of volcanic eruptions around the lake.

1 to 2 million years ago: Mt. Pluto sealed the outlet near Truckee forcing the now Truckee River to flow east towards today's Reno.

20,000 to 2 million years ago: Glaciers blocked the outlet near Tahoe City thus the lake level rose 800 to 1,000 feet above its present level. Glaciers carved granite faces in the southwestern portions including today's Desolation Wilderness area creating Fallen Leaf Lake and Emerald Bay.

Early Human History

The **first people** to inhabit the Lake Tahoe Basin arrived between 8,000 and 10,000 years ago. These native people, known as the Washoe Tribe, migrated between the Carson Valley (Minden, Gardnerville and Carson City) and the Lake Tahoe Basin every year. Summertime in Carson Valley can be unbearably hot, so the Washoe lived in the Lake Tahoe Basin from late spring to early fall. Similarly, the Lake Tahoe region is extremely cold during the winter months, so the Washoe lived in the Carson Valley during the colder months. They traveled by foot and carried everything on their backs. The Washoe people have left recognizable sites at Kings Beach in the north shore and at the Taylor Creek area in the southwest shore. These native people traded pinion pine nuts (harvested in the fall in the Carson Valley) with surrounding tribes like the Paiute, Shoshone and Miwok. The Washoe people were gatherers and hunters. While in the Lake Tahoe Basin, the men and boys hunted fish (with spears and nets) and game (deer, rabbits, squirrels and whatever was available with spears, arrows and clubs). The women and girls gathered berries, roots and greens for meals and collected willow limbs to make baskets.

The **first Euro-Americans** first discovered Lake Tahoe from afar on Valentine's Day, February 14, 1844. John C. Fremont with his mapmaker Charles Preuss first sighted the lake from Red Lake Peak to the south of Lake Tahoe. Mr. Preuss named this beautiful blue lake, Mountain Lake. Mr. Fremont named it Lake Bonpland. One hundred years later and six names later, Lake Tahoe became the official name on all maps.

The **word Tahoe** is derived from the Washoe's name for the lake, "Da-ow-ga." There are three interpretations of the word "da-ow-ga": (1) Big Water, (2) Lake of the Sky, and (3) Edge of the lake. "Da-ow-ga" is most commonly believed by today's Washoe to mean "edge of the lake." "Da-ow-ga" was shorted to "da-ow" (which simply means "lake") and finally anglicized to "ta-ho" and lastly the spelling was changed to Tahoe. Hence, Lake Tahoe means Lake Lake.

California's Gold Rush (1860's -1870's) located in the foothills (Coloma, Grass Valley and Nevada City) and the **Comstock Silver and Gold Mining** (1870's- 1890's) in Virginia City brought miners back and forth through the Lake Tahoe Basin. Non-Indians settled in the basin and soon displaced most of the Washoe. Current day Washoe mostly live between the Carson Valley and Reno.

Lake Tahoe Basin's Mammals and Birds: Winter Choices

MAMMALS: defined as the class of warm-blooded, vertebrate animals (including humans), characterized by the presence of hair and milk-producing (mammary) glands in the females, give birth to live young and possessing solid bones.

Gray Squirrel: This large gray squirrel sports a big gray and white plume tail. It adapts during the winter months by storing pinecone nuts in its tall tree home. It adds an extra layer of soft inner fur to stay warm for the winter. Common squirrel in Lake Tahoe Basin; found at all mountain elevations.



Yellow-Bellied Marmot: This large rodent lives in high alpine forests with rocky terrain like the Desolation Wilderness. It has a high pitched whistle and has been known to chew on unsuspecting backpacker's hiking boots while they sleep at night. This woodchuck or groundhog-like rodent is the largest true hibernator.



Black Bear: There is believed to be about 200 black bear in the Lake Tahoe Basin. These omnivores choose a diet rich in berries, nuts, insects and greens. They eat very little meat. Black Bears come in all colors: blond, brown, black and cinnamon. Bears do not hibernate; but experience torpor (a milder form of hibernation). Mama bears give birth in January or February and protect and nurse their cub(s) until warmer spring temperatures arrive.



Coyote: This wild canine adapts throughout the winter by listening for rodents under the snow, pouncing on them, digging through the snow and devouring their prey. Coyotes also hunt in packs to take down larger game. Domesticated dogs and cats unfortunately fall prey to Coyotes throughout the year.



MAMMALS: continued

Snowshoe Hare: This speeding herbivore adapts in the winter by changing its brown fur to white to camouflage itself from predators like the coyote. It also grows hair between its toes which enables its feet to act like snowshoes. When grass is not available during the winter months, it will resort to eating pine needles and bark.



American Marten: This weasel-like carnivore changes its activity period from night-time (nocturnal) to day-time (diurnal) during the winter months to better locate prey like squirrels, mice and birds. These curious mammals have been seen during Winter Trek. They bound through the snow with their long slinky bodies leaving cat-like prints in the snow.



Chickaree or Douglas Squirrel: This chatty little squirrel sports an auburn orange chest. It stores nuts in its secured home in the trees. It adapts in the winter by adding an extra layer of a soft undercoat of fur. Its foot prints are commonly seen in the snow during Winter Trek.



Other Mammals: Some lake-side mammals include the beaver (who adapts) and the skunk (who migrates or adapts). Other furry critters in the basin include: porcupine (migrate), Golden-mantled Ground Squirrel (hibernate), weasel (adapt), picas (adapt), deer mice (adapt), red fox (adapt or migrate), bats (migrate or hibernate), and chipmunks (hibernate).

BIRDS: characterized by honey-combed light-weight bones; feathers cover its body; produces eggs; warm-blooded; flight and walking is commonly its means of locomotion.

Stellar's Jay: These noisy vibrant blue birds are usually heard before they're seen by their loud screeching call. Most Stellar's Jays migrate for the winter, but a few stay behind and attempt to adapt to the cold temperatures. It's characterized by its deep blue wings, tail and breast with a Mohawk-like crest on the top its head.



Birds- Continued

Clark's Nutcracker: This large jay-like bird squawks and lets its presence known on the mountain. This striking black and white bird is known by the name the Weather Forecasting Bird because it screams the loudest (from pain) when a cold front (bad weather) is coming. Sometimes it relocates to a lower elevation just to reduce the painful pressure in its head. It adapts to Tahoe winters.



Mountain Chickadee: This common Tahoe bird is also known as the Cheeseburger bird because its mating call in the spring sounds like "cheeseburger". During the winter months, its call sounds like its name, "chick-chick-chick-a-dee". This small plump bird adapts in the winter looking for insects and nuts stored in the bark of trees. It has a black cap, black bib under its chin and a white line over each eye.



Bald Eagle: Usually seen at lake level year round. These eagles migrate to Lake Tahoe for the winter from Canada. They usually eat fish and can be seen skimming the surface of the lake or nearby streams for its slippery prey. It has a wing span of 6 to 7 feet and shows off its beautiful white head and tail as it soars above us.



Canada Goose: Like the Bald Eagle, the geese population in Tahoe actually increases in the winter since they migrate from Canada and Alaska to our somewhat warmer winter in Tahoe. These common geese enjoy hanging out in parks and on golf courses year-round.



Other Tahoe birds: American Robin, sparrows, Western Tanagers, Dark-eyed Juncos, blackbirds, Mallard Ducks, woodpeckers all migrate.

Winter Animal Strategies

There are three main winter strategies for animals: hibernation, migration and adaptation.

Hibernators basically sleep through the winter and use up their stored body fat to survive the cold, harsh winters. A milder form of hibernation is called **torpor**. This is a strategy that our bears use to get through the winter months.

Migrating animals "get out of town" to avoid the frigid winters of Tahoe. They fly or walk to an area that is warmer and offers plenty of food.

Adaptors choose to stay in areas of cold temperatures and change in one or more ways (physically change or change their time of activity).

Most animal species choose one distinctive winter strategy. However, depending on the severity of the winter and the individual, some animals may choose to adapt one winter and then later choose to migrate for a different winter.

During Winter Trek, we may see some adaptors or signs of them but never migratory animals or hibernators. Sometimes, we see signs of bears that wake up periodically throughout the winter. These animal signs include bear scratch marks on trees or foot prints in the snow.

Winter Adaptation

Many Lake Tahoe Basin mammals and birds adapt (change) to our harsh winters. This is one of three strategies an animal must choose before the onset of winter. The other two strategies are hibernation or migration. Adaptors stay here and change in some way to survive throughout our severe winter months. Staying warm and finding food are the two key factors for survival.

The most obvious way to stay warm in the winter is to grow more fur or feathers. Usually animals grow a soft downy under-layer of fur or feathers. In addition, birds fluff up their feathers to trap a layer of insulating air. Lining their home with grass for insulation is another good method to keep warm. A warm shelter or home is essential for survival. Think of possible locations for a warm shelter for our bird and mammal adaptors.

Some animals like tree squirrels store their food for the winter while others venture out into the cold and search for food. If food is scarce during their normal activity period, an animal may change its activity period. For instance, the American Marten (weasel-like animal) is normally active at night (nocturnal) during the warmer months. However, no food is available at night during the winter months, so the marten switches to being active during the day-time (diurnal).

Snow shoe hares change their color of their fur to blend into the white snow to avoid predators like coyotes. They change back to gray/brown coloration in the spring.

Hibernation vs. Torpor

Hibernation is one winter strategy animals may choose to survive a cold winter. Usually these animals cannot adapt to the harsh climate because their food source is no longer available during the winter months. Sleeping through the winter is one strategy. True hibernators "shut down" their bodies (effects nervous system, circulatory system and internal organs) and go into a deep sleep. Their heart rate and body temperature is drastically reduced and they cannot feel their surroundings.

It's a distinctive six-week cycle in which they slowly go into a deep sleep at the beginning. They are at the peak of deepest sleep at three weeks. Lastly, towards the end of six weeks, hibernators begin to wake up, sense their environment and determine if they should fully wake up or go back to sleep for another six-week cycle. Hibernators do not defecate or urinate during hibernation. They store up their body waste until spring.

The largest true hibernator is the marmot (a groundhog-like large rodent). Lake Tahoe Basin hibernators include ground squirrels, reptiles (Garter snakes & fence lizards) and amphibians (bull frogs and tree frogs), yellow-bellied marmot and some insects like ladybugs.

A milder form of hibernation is called **Torpor**. This is the winter strategy our Black Bears use each winter. They fatten up (put on three inches of blubber over their entire body) for the winter to stay warm and to use it as their food. Bears sleep but not as deeply as true hibernators. They feel their surroundings and wake up easily. Females give birth in January or February each winter while "sleeping." The new mothers keep their cub(s) warm and nurse them with warm milk until spring. Bears do not urinate or defecate throughout the winter months (similar to true hibernators).

Research more on hibernation and torpor.

Scientists are recently researching how bears do not loose muscle mass during their winter sleep. Why is it that people bed ridden for months are extremely weak and have to learn how to walk again due to losing muscle mass, and bears are not affected by the lack of activity during the winter months? NASA has been researching this since astronauts in outer space lose muscle mass due to lack of activity. See what you can learn on this subject.

Migration to/from the Lake Tahoe Basin

Another winter strategy animals may choose is to "get out of town" or migrate to a warmer location (going down in elevation such as the Carson Valley, California's Central Valley or coast or going south to the desert or Mexico). These animals can travel great distances by "foot or wing".

Mammals such as the mule deer choose to forage at golf courses and people's front yards in the Carson Valley (Minden, Gardnerville & Genoa). Very few mule deer actually live in the Lake Tahoe Basin even during the warmer months since we have limited grasses (meadows) and their migratory paths have been blocked by highways and large commercial businesses such as Costco and Wal-Mart. Our flying mammals, bats, may choose to migrate south or hibernate in the Lake Tahoe Basin.

Our local birds may choose to adapt or migrate. Some migrating birds include the Great Blue Heron, Snowy Egrets, Kingfisher and American Robin. The Stellar's Jay may migrate or adapt. Lake Tahoe's Canada Geese populations actually increase during the winter months. Hence, these geese migrate to the Lake Tahoe Basin and adapt here during the winter months. They forage at our golf courses. Tahoe birds that adapt include the Mountain Chickadee or the Clark's Nutcracker.

This migration winter strategy requires a lot of energy to travel such great distances. Some weaker animals (too old or injured) may die during this exhausting migration. The successful migratory animals travel to get to warmer weather and to find food.

Winter is difficult for what ever strategy an animal chooses.

Humans can adapt or migrate. Do you know of someone who owns two homes—one in a warmer area like Florida or Arizona for the winter months and another home here for the summer months?? Some people refer to these migratory humans as "snow birds."

Winter Adaptation Worksheet

Many of Lake Tahoe Basins' animals choose to adapt (change in some way) to the extreme winter conditions each year. Some winter adaptations are needed for the animal to stay warm through the cold winter months. Other strategies are needed to avoid predators or to find their prey. There are several adaptive strategies animals can choose from:

- a. Grow more fur or feathers for an extra layer of warmth; fluff up feathers to trap a layer of insulating air
- b. Change color of fur to avoid predators
- c. Change activity period from nocturnal (night-time) to diurnal (day-time) to locate different prey
- d. Store food for the winter
- e. Construct a warmer "home"

Below is a list of Lake Tahoe Basin animals that adapt during the winter months-- many of which you may see during Winter Trek. Circle one or more letters below from the winter strategy list above for each animal you believe it might use to survive a Tahoe winter.

- Western Grey Squirrel a b c d e
- American Marten (weasel-like mammal) a b c d e
- Deer Mouse a b c d e
- Snowshoe Hare a b c d e
- Chickaree (Douglas Squirrel) a b c d e
- Mountain Chickadee ("Cheeseburger bird") a b c d e
- Coyote a b c d e
- American Beaver a b c d e

What winter strategies do all these animals have in common? _____

Which animals have unique strategies? _____

How do humans adapt in the winter? List at least three winter strategies.

(1) _____

(2) _____

(3) _____

Answer Sheet: Winter Adaptation

Western Grey Squirrel a, d, e

American Marten (weasel-like mammal) a, c, e

Deer Mouse a, d, e

Snowshoe Hare a, b, d, e

Chickaree (Douglas Squirrel) a, d, e

Mountain Chickadee ("Cheeseburger bird") a, d, e

Coyote a, d, e

American Beaver a, d, e

Common adaptive strategies: a, d, e (grow hair/feathers, store food, warmer home)

Animals with unique strategies: American Marten (c): changes activity period to locate prey that are active during the warmer daytime temperatures. Snowshoe Hare (b): changes fur color to white to blend into snow so coyotes will have difficulty locating them.

Human winter adaptations:

- (1) Put on warmer clothes: jacket, scarf, gloves, water proof pants, etc.
- (2) Turn up heat in your home
- (3) Travel in snow by snow shoe or skis.

Evergreens in the Lake Tahoe Basin

Evergreens are "forever green." These trees have green needles (not leaves) all year round. The Lake Tahoe Basin has fir trees and pine trees.

There are two varieties of fir trees: red fir and white fir. These "Christmas tree-like" evergreens look very similar. They have short single needles that sprout from all parts of the branches and trunk; making them appear "furry." The more common white fir located at lake level is bushier with straight needles and has white bark. The rarer red fir has hockey stick-shaped needles that tend to curve up from its branches. Its limbs are more tiered and further apart.

There are several pine tree varieties in the basin. Pine trees look very different from fir trees. A pine tree's needles grow in group from the ends of the limbs and have cones. The common pine tree at lake level is the Jeffrey Pine. It has puzzle-piece like bark that smells like butterscotch or vanilla and has long needles in clusters of three.

The most common pine tree at the top of Heavenly Ski Resort is the Lodgepole pine. It has short needles in clusters of two with cornflake-like bark.

When comparing evergreens at lake level (6200 ft) and at the top of the mountain (9,000+ ft), notice the height difference. Since temperatures and general conditions are more severe in the winter at higher elevation the trees are stouter (shorter and broader). Why?? Think about the surface area. Also, the shorter needle length of trees at high elevation makes them less prone to frost bite.

Trees make excellent homes for animals. The dead snags are best because they're hollow in the middle. Can you think of some animals that might want to live in a snag during the winter months? Remember to choose from the winter adaptors list.

Winter Trek Posters Available On-line

Go to <http://fs.usda.gov/ltbmu> and navigate to Learning Center on left bar; then click on Winter Trek; scroll down to Teacher Resources and click on a poster.

Down load and print on your school's plotter to enhance the students' experience before and after their field trip on snow shoes.

Posters include:

Adaptation

American Marten

Hibernators

History of Snowshoes

Lake Tahoe Geology

Migration

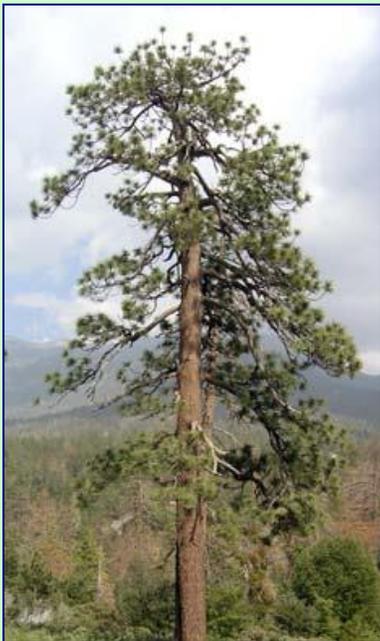
Tree Identification

Water

Wildlife Tracks

Samples of a few of these posters are available in the next few pages.

Lower Mountain Conifers



Jeffrey Pine

Pinus jeffreyi



80-130 feet tall
2-4 foot trunk

Reddish-brown, thick
scaly plated bark,
Strong vanilla smell

Needles in groups of 3
5-10 inches long

Jeffrey Pines are common at lake level and lower mountain areas.

White Fir

Abies concolor



Thick, ridged, grayish
bark



70-160 feet tall
1-4 foot trunk

White firs
grow closer
to lake level,
with long,
light, flat
needles.



1.5-2.5 inch needles
Flat along branches



60-120 feet tall
1-4 foot trunk

Red Fir

Abies magnifica



Thick, reddish-brown
bark



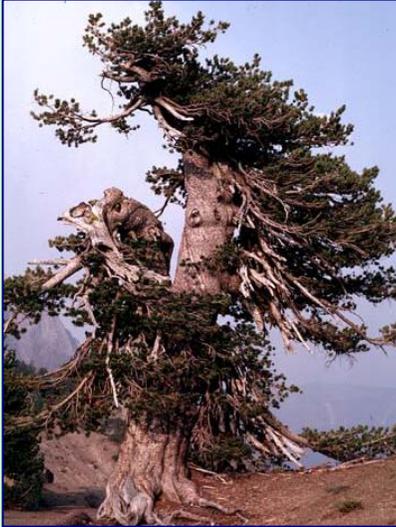
.5-1.5 inch needles
Upward along branches

Red firs
grow higher
in the
mountains,
with short,
dark, dense
needles.

Upper Mountain Conifers

Whitebark Pine

Pinus albicaulis



20-50 feet tall

1-2 foot trunk

Whitish-gray bark

Smooth to scaly

Needles in groups of 5

1-3 inches long

Whitebark pines are common on windy mountain slopes.

Lodgepole Pine

Pinus contorta



20-80 feet tall

1-3 foot trunk

Light, thin, scaly bark,

Looks like cornflakes

Needles in groups of 2

1-3 inches long

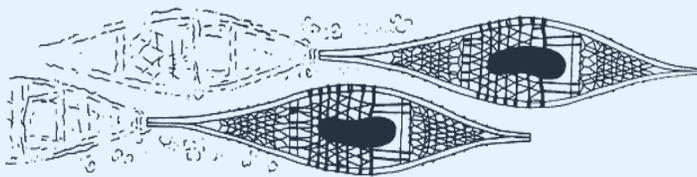
Lodgepole Pines are the most common trees where we snowshoe.

The History of Snow Shoes

The "shoeski" was invented in 4000 BC in Central Asia. It was a solid piece of wood with a crude binding. The first people that migrated over the Bering Land Bridge into North America used these.

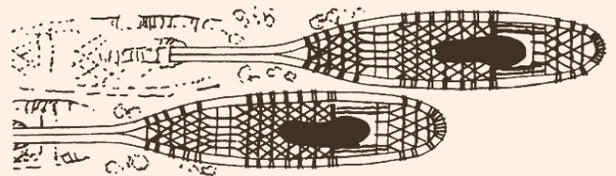


Athaspaskan Indians of the northwest coast and the Algonquin Indians of the Great Lakes area perfected the laced-frame snowshoe which later developed into various styles below. Materials were made from wood and animal hide or sinew.

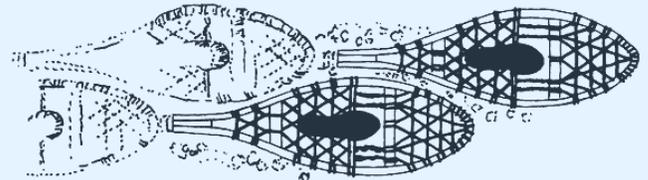


Ojibwa (Cree)- pointed, upturned toes with tail. Great for breaking through crusty snow.

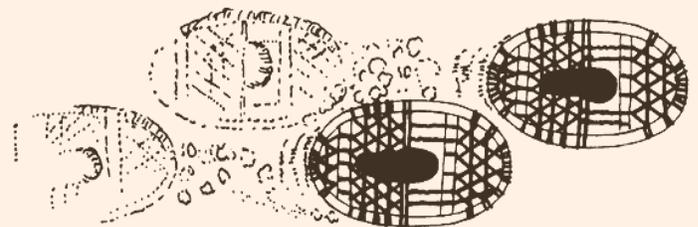
Alaskan (Yukon)- Long, narrower shoes with rounded, upturned toes. Best for open country in deep snow.



Canadian snowshoe club 1800's



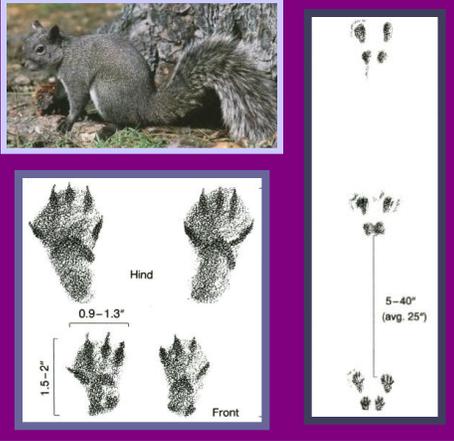
Michigan (Beavertail)-medium surface area with rounded toe and pointed tails. Combination of the above two styles.



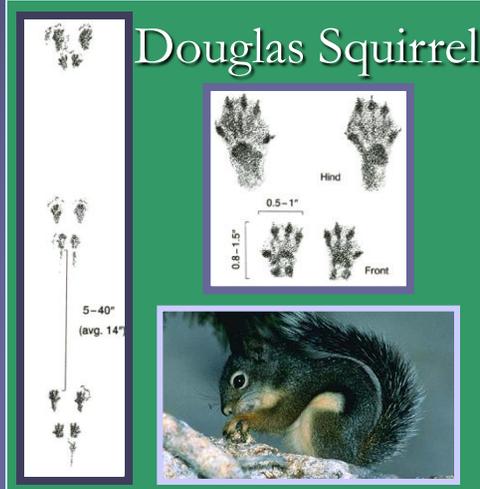
Bear Paw - oval in shape, lacking tail- for use in thick woods and hilly areas; slow but maneuverable.

Wildlife Tracks

Western Gray Squirrel



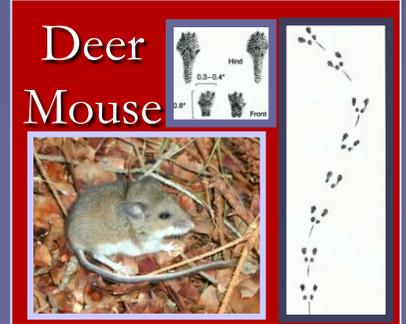
Douglas Squirrel



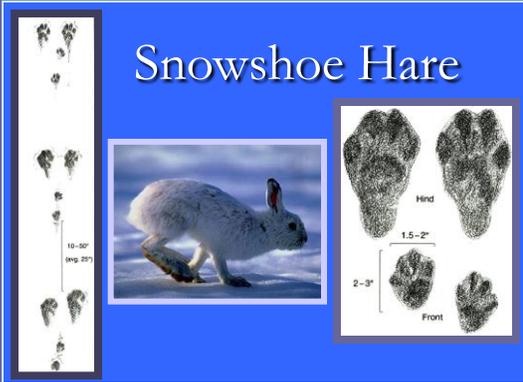
American Beaver



Deer Mouse



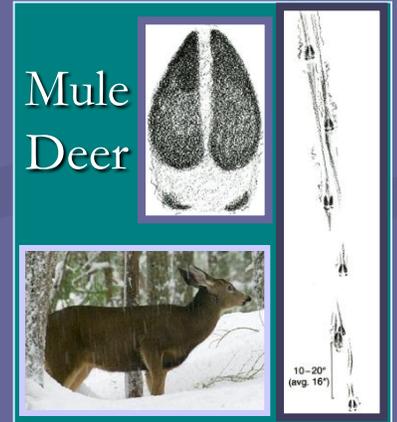
Snowshoe Hare



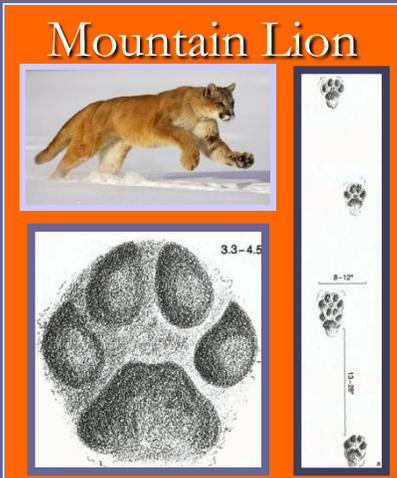
American Marten



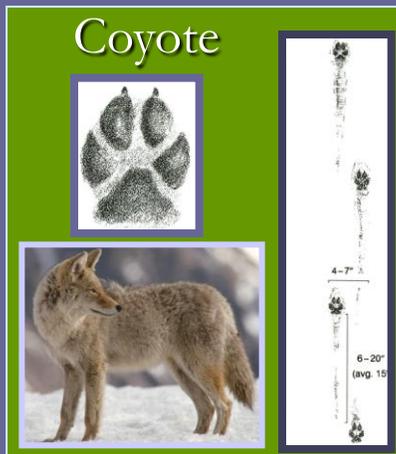
Mule Deer



Mountain Lion



Coyote



American Black Bear



Who have you seen walking through the snow?

American Marten

Scientific Classification

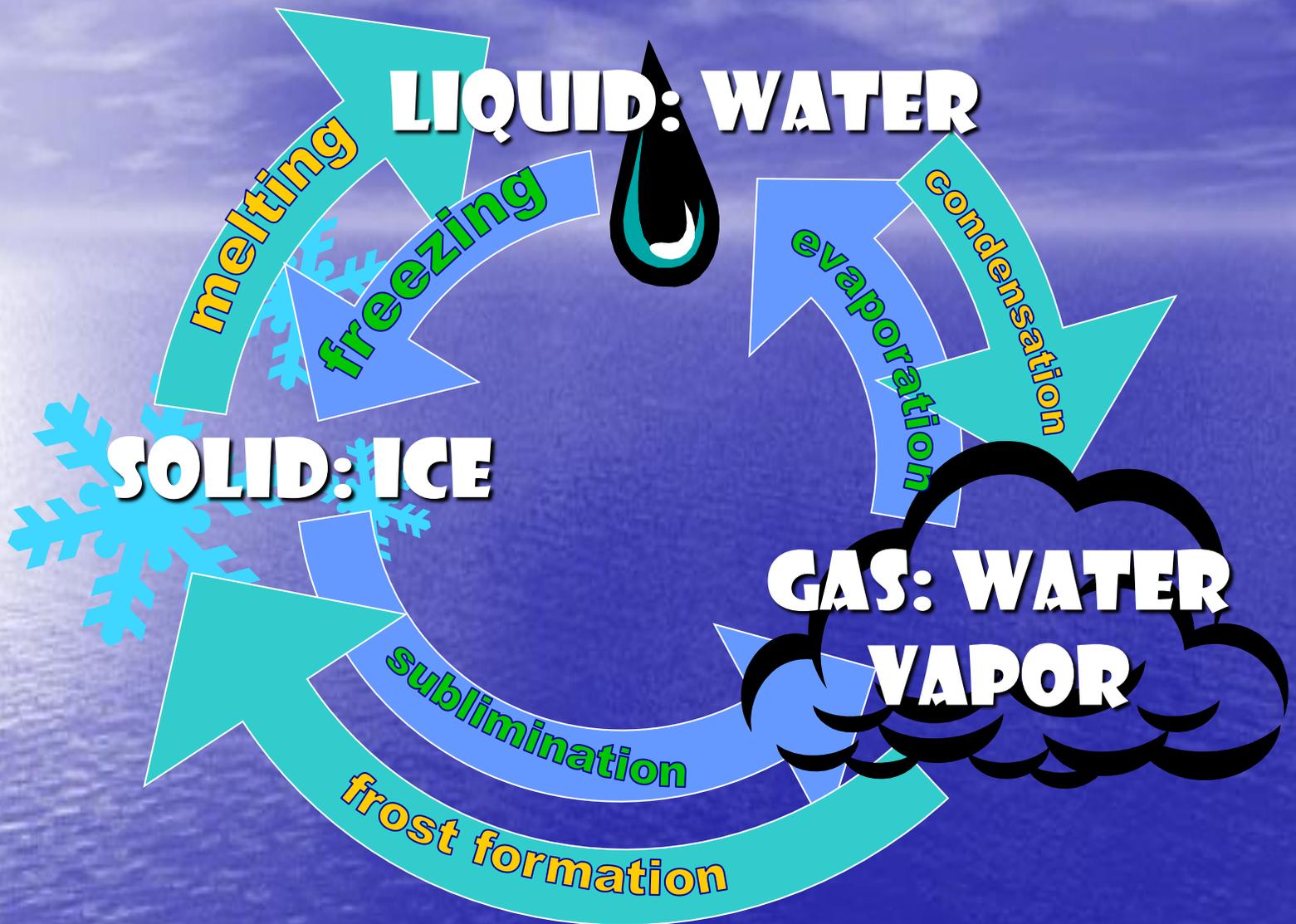
Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Carnivora
Family: Mustelidae
Genus: Martes
Species: americana



Tree-dweller; sensitive species studied at Heavenly Ski Resort; boulder

WATER

Water exists in 3 states on Earth



Why is water so important?

- We make energy using water at hydroelectric power plants.
- We irrigate our crops with water for healthy food.
- We use water every day in our homes for drinking, washing and cooking.

Winter Trek Word Search Puzzle

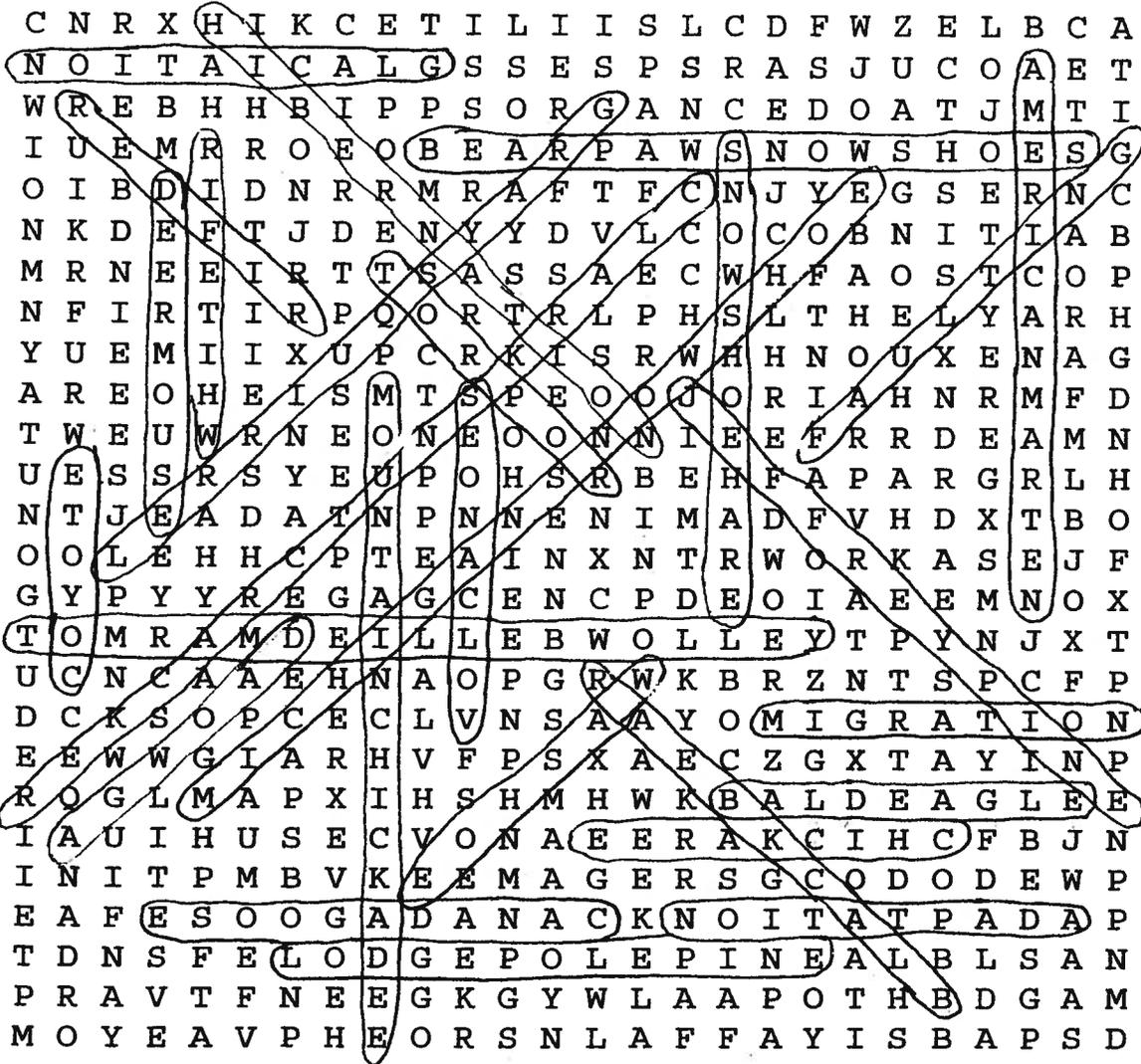
C N R X H I K C E T I L I I S L C D F W Z E L B C A
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 W R E B H H B I P P S O R G A N C E D O A T J M T I
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 M R N E E I R T T S A S S A E C W H F A O S T C O P
 N F I R T I R P Q O R T R L P H S L T H E L Y A R H
 Y U E M I I X U P C R K I S R W H H N O U X E N A G
 A R E O H E I S M T S P E O O J O R I A H N R M F D
 T W E U W R N E O N E O O N N I E E F R R D E A M N
 U E S S R S Y E U P O H S R B E H F A P A R G R L H
 N T J E A D A T N P N N E N I M A D F V H D X T B O
 O O L E H H C P T E A I N X N T R W O R K A S E J F
 G Y P Y Y R E G A G C E N C P D E O I A E E M N O X
 T O M R A M D E I L L E B W O L L E Y T P Y N J X T
 U C N C A A E H N A O P G R W K B R Z N T S P C F P
 D C K S O P C E C L V N S A A Y O M I G R A T I O N
 E E W W G I A R H V F P S X A E C Z G X T A Y I N P
 R Q G L M A P X I H S H M H W K B A L D E A G L E E
 I A U I H U S E C V O N A E E R A K C I H C F B J N
 I N I T P M B V K E E M A G E R S G C O D O D E W P
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 T D N S F E L O D G E P O L E P I N E A L B L S A N
 P R A V T F N E E G K G Y W L A A P O T H B D G A M
 M O Y E A V P H E O R S N L A F F A Y I S B A P S D

ADAPTATION
 AMERICAN MARTEN
 BALD EAGLE
 BEAR PAW SNOW SHOES
 BLACK BEAR
 CANADA GOOSE
 CHICKAREE
 CLARK'S NUTCRACKER
 COYOTE

DA-OW-GA
 DEER MOUSE
 FAULTING
 GLACIATION
 GRAY SQUIRREL
 HIBERNATION
 JEFFREY PINE
 LODGEPOLE PINE
 MIGRATION

MOUNTAIN CHICKADEE
 MICHIGAN SNOW SHOES
 MIGRATION
 RED FIR
 SNOW SHOE HARE
 TORPOR
 VOLCANOES
 WASHOE
 WHITE FIR
 YELLOW-BELLIED MARMOT

Winter Trek Word Search Puzzle



- | | | |
|---------------------|----------------|-----------------------|
| ADAPTATION | DA-OW-GA | MOUNTAIN CHICKADEE |
| AMERICAN MARTEN | DEER MOUSE | MICHIGAN SNOW SHOES |
| BALD EAGLE | FAULTING | MIGRATION |
| BEAR PAW SNOW SHOES | GLACIATION | RED FIR |
| BLACK BEAR | GRAY SQUIRREL | SNOW SHOE HARE |
| CANADA GOOSE | HIBERNATION | TORPOR |
| CHICKAREE | JEFFREY PINE | VOLCANOES |
| CLARK'S NUTCRACKER | LODGEPOLE PINE | WASHOE |
| COYOTE | MIGRATION | WHITE FIR |
| | | YELLOW-BELLIED MARMOT |

Winter Trek Post-visit Assignment

- 1.) Describe two or more tracks you observed. Include the animal behavior associated with these tracks (stride, location, size of tracks, food nearby?)
- 2.) Describe two interesting facts you learned from the mid-station discussion.
- 3.) Describe one variety of tree you observed during our exploration. Include bark and needle description; if any animal habitat was observed; how common of a tree.
- 4.) Write two paragraphs on the back of this paper describing your favorite and most challenging moments of Winter Trek.

Winter Trek Math Questions

(1) Gondola Cable Length (difficult)

If the gondola cable is 4.8 miles long (2.4 miles each way) and the section of cable is 21 inches long and weighs 15 lbs, how many pounds and tons is the entire length of the gondola cable?

Solution:

$$15 \text{ lbs} / 21 \text{ inches} = ? \text{ lbs} / 12 \text{ inches}$$

$$? = 8.57 \text{ lbs} / 12 \text{ inches or } 1 \text{ foot}$$

$$\text{If } 1 \text{ mile} = 5,280 \text{ ft, then } 4.8 \text{ miles} \times 5,280 \text{ ft/mile} = 25,344 \text{ ft}$$

$$\text{Then } 8.57 \text{ lbs/ft} \times 25,344 \text{ ft} = 217,198.08 \text{ lbs of total cable}$$

To convert to tons: divide by 2,000 lbs.

$$\text{Then } 217,198.08 \text{ lbs} = 108.6 \text{ tons of cable}$$

(2) Difference in Elevation (easy)

If the bottom of the Gondola (or lake level) is an elevation of 6,225 ft and the mid-station's elevation is 9,123 ft, what is the difference in elevation? Similarly, if our last stop for snow shoeing is at an elevation of 9,156 ft, what is the difference in elevation? (Hint: you can also substitute your hometown elevation for the lake level elevation to get different numbers.)

$$\text{Solutions: Mid-station: } 9,123 \text{ ft} - 6,225 \text{ ft} = 2,898 \text{ ft}$$

$$\text{Last stop: } 9,156 \text{ ft} - 6,225 \text{ ft} = 2,931 \text{ ft}$$

Website References

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Geology & Natural History of Lake Tahoe

www.ceres.ca.gov/tcsf/tahoe-local/geology.html

History (John “Snowshoe” Thompson—local legend)

www.ronwatters.com/SnowShoe.htm

www.tahoecountry.com/oldtimetahoe/snowshoe.html