Teacher's Handbook

Winter Trek

Conservation Education Program

Winter 2022
Lake Tahoe Basin Mgmt. Unit
USDA Forest Service

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Section 1: Introduction

What is Winter Trek?

The Winter Trek Conservation Education Program was started in 1988. Working with local educators, the U. S. Forest Service developed an outdoor winter education program specific to 5th grade curriculum. Until fourteen 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 snowshoes.

In 2004 we initiated the new Winter Trek 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 U. S. Forest Service (Lake Tahoe Basin Mgmt. Unit), the Great Basin Institute (partner non-profit association), Lake Tahoe Visitors Authority (use of Explore Tahoe Visitor Center) and Heavenly Ski Resort (Forest Service Special Use permittee).

The cost of the program is $75 per class. This helps cover costs associated with the program such as snowshoe maintenance, hot cocoa, and materials. In the case that your fieldtrip is cancelled due to gondola operations and weather conditions, please note that you have the option to reschedule your fieldtrip given the availability. If unable to reschedule, then GBI will refund your payment.

We take one class each day, offered on **Tuesday and Wednesday beginning Tuesday, February 8th and continuing through Thursday, March 30th (program dates are subject to change)**. Classes meet at 10:00 am and depart at 1 pm after experiencing a life altering snowshoe adventure on the ridgeline of the Lake Tahoe Basin.

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Academic and Physical Benefits

The fifth-grade curriculum covered in the Winter Trek 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 lifestyle.
- (b) **Burn 300-400 calories** while participating in this low impact and 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 Tribe and explorers to the region.

(c) "Snowshoe History": how and why snowshoes 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.

Pre-Visit Video: This 13-minute Pre-Visit Video for the Winter Trek program is available online at the above website. This new video prepares students for their field trip and **is required** that all students view it prior to their field trip. It reviews expectations, clothing, materials covered and an overall understanding what their field trip entails.

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 Chateau at the Village Shopping Mall on Hwy 50 near Stateline. Students are dropped off adjacent to the visitor center. Private vehicles must find their own parking. Fee parking garages are nearby. Buses may park in the MontBleu/Bally's parking lot. Maps and directions are available in the Maps and Directions section on pages 9 through 10. Students are strongly encouraged to use the restrooms in the visitor center before the program begins. All participants must carry their own backpacks with lunches and water. Nothing can be stored at the visitor center. All students, teachers, chaperones, and USFS rangers will be required to wear a mask while inside the Explore Tahoe Visitor Center, bathrooms, gondola cars, other indoor facilities, and outdoors if social distancing cannot be maintained. Each school district's policies will be followed in addition to these USFS and Heavenly guidelines.

Scavenger Hunt

Scavenger Hunt sheets will be emailed to teachers before their trip date to be printed and shared with chaperones for each small gondola group to use during the program. The Scavenger Hunt sheets have questions on one side with the answers on the back. The adult responsible for the small gondola group is in charge of reviewing all questions with the students they are assigned to. 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, footwear, and face masks. 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).

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 snowshoes to students and chaperones and then teach everyone how to put on and use snowshoes. This requires careful instruction. Good listeners are appreciated. After learning how to navigate in snowshoes 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.

What to Expect- continued

Lunch and Cocoa

We eat lunch at the top of the mountain on the snow. Please make sure students have snow pants or other waterproof pants to sit on the snow or have something else to sit on so they don't get wet or cold bottoms. The exact location varies depending on the amount of time we have before departure. 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 available to all students at the conclusion of the program at Explore Tahoe Visitor Center. These are subject to change due to COVID mitigations and alternative options will be discussed.

Departure Times

Departure times will vary with each group. We like to conclude the program at the top of the mountain around 1:00 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. Reminder: masks must be worn when entering indoor facilities and gondola cars. Hence, students should then be on the bus by 1:15 to 1:30 pm.

If you must depart earlier, please notify the ranger immediately so we can alter our schedule. If you wish to have more time on snowshoes, arrangements can be made to stay later (2:00 pm). Please contact Elisa C. Escobar at elisa.escobar@usda.gov to make arrangements for additional time for your class for our Winter Trek program.

What to Bring

How to Stay Warm

Proper clothing and footwear are essential to have a safe and enjoyable trip. At 9,100 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 before your trip. 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
__ mask to wear when indoors and inside gondola cars
__ hand sanitizer to use as needed

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 snowshoeing—you need both hands free for safety reasons. Lunches or other items cannot be stored in the 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 snowshoeing. Students may respond to the altitude differently and are encouraged to go at their own pace. 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.

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

Written Directions

The Explore Tahoe Visitor Center is located adjacent to the Heavenly Village/Stateline Transit Center 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 may park in the MontBleu/Bally's parking area (see map). Private vehicles are discouraged from parking in these lots and encouraged to use nearby fee parking garages including one that is managed by the City of South Lake Tahoe at 1 Bellamy Ct., South Lake Tahoe, CA 96150.

Coming from the West of South Lake Tahoe

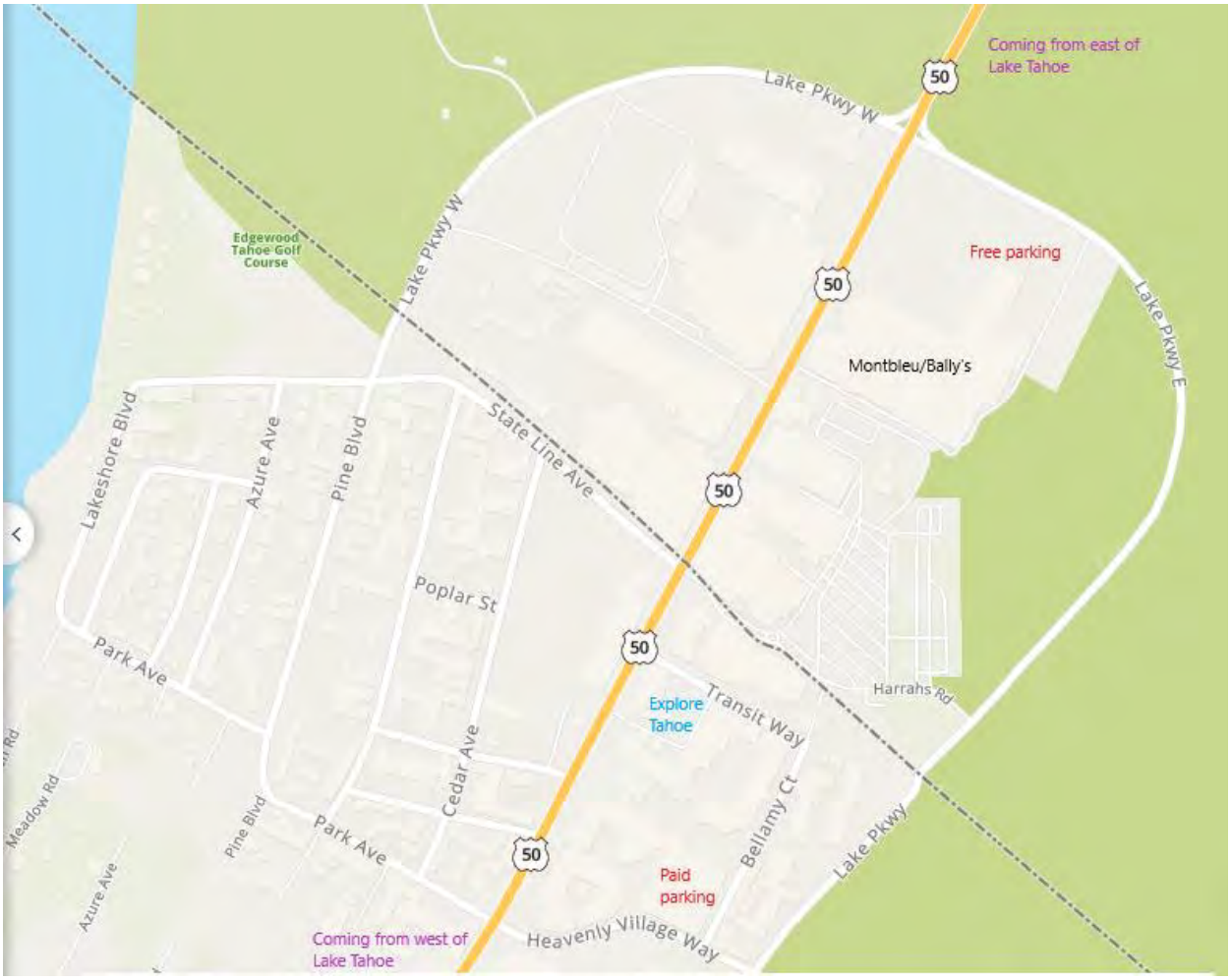
Take Hwy 50 (Lake Tahoe Blvd.) through the town of South Lake Tahoe. As you approach the tall casino buildings, you'll notice the Heavenly Village on the right. Just beyond Heavenly Village (before Lake Tahoe Resort Hotel) turn right onto Transit Center Way, then take the loop to the right to the visitor 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 (Spooner summit) to Stateline, NV. Drive past the casinos; drive past the Lake Tahoe Resort Hotel on left; look for driveway labeled Transit Center Way; follow the loop to the right for the drop off/ pick-up point at the visitor center. See the attached map for parking.

Parking

This map shows the drop off/pick up location in front of the Explore Tahoe Visitor Center, bus parking at MontBlue/Bally's, and paid parking at the Heavenly Village.



Section 2: Educational Materials

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 American, 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 °F; August/September = 65 to 70 °F. The lake has a constant 39 °F 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. As 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 snowmelt 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 sited 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 bears 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.

Pacific Marten: This weasel-like carnivore changes its activity period from night-time (nocturnal) to daytime (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 footprints 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 includes: 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 are commonly its means of locomotion.

Steller's Jay: These noisy vibrant blue birds are usually heard before they're seen by their loud screeching call. Most Steller'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. (6)

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 wingspan 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 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 footprints 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 (caches) 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 Pacific 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 daytime (diurnal).

Snowshoe 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 are 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 (like true hibernators).

Research more on hibernation and torpor.
Scientists are recently researching how bears don't lose muscle mass during their winter sleep. Why is it that people bed ridden for months are extremely weak and must learn how to walk again due to loss of 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 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 Steller'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 whatever 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 "snowbirds."

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 (daytime) 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, waterproof pants, etc.
(2) Turn up heat in your home
(3) Travel in snow by snowshoe 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.

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Winter Trek Posters Available Online

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.

Download and print on your school's plotter to enhance the students' experience before and after their field trip on snowshoes.

Posters include:

Adaptation

American Marten

Hibernators

History of Snowshoes

Lake Tahoe Geology

Migration

Tree Identification

Water

Wildlife Tracks

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.

Website References

Snowflakes

www.suite101.com/article.cfm/science_for_kids/111983

www.weather-facts.com/snowflake-facts.php

States of Water

http://ga.water.usgs.gov/edu/

http://home.howstuffworks.com/science-for-kids-states-of-matter.htm

Animal Strategies

http://www.sciencemadesimple.com/animals/html#ANIMALS

http://animals.howstuffworks.com/animal-facts/animal-migration.htm

http://animals.howstuffworks.com/animal-facts/hibernation.htm

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