

## WILLARD CREEK TRAIL

**To get there:** Travel south of Helena on I-15 approximately 9 miles to the Clancy Exit, go south on service road to Alhambra then take Forest Road 226 (Warm Springs Road) approximately 6 miles to the Trailhead sign.



2880 SKYWAY DRIVE  
HELENA, MT 59602  
406.495.5201



MONTANA  
DISCOVERY  
FOUNDATION

## WILLARD CREEK TRAIL

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A COOPERATIVE PROJECT BETWEEN  
HELENA SCHOOL DISTRICT NO. 1  
HELENA NATIONAL FOREST  
MONTANA DISCOVERY FOUNDATION



Field Notes: \_\_\_\_\_

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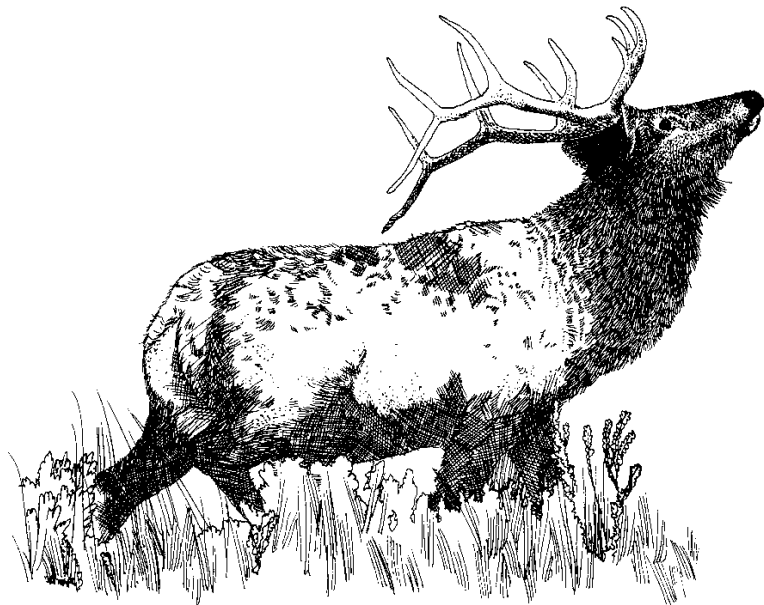
## WELCOME

Welcome to the Willard Creek Interpretive Trail. Look and listen carefully as you walk along: this mountain drainage has a story to tell. As you “wonder” along the trail, you can uncover clues of past fire, see different plant communities, encounter forest animals and their signs, and witness nature’s processes in action. Through these signs, nature tells her story.

The Willard Creek Trail leads about 1.3 miles down to McClellan Creek. At a leisurely pace, it takes about 40 minutes one way. Station numbers that correspond to numbered posts you will find stationed along the trail match the articles in this brochure. Each station contributes another clue as you unravel the story of the Willard Creek landscape.

In 1988, a major wildfire raced through this area burning much heavy timber and greatly changing the landscape. Now, over 20 years after that fire, re-growth is substantial. Here and there, you will see standing dead trees well-bleached by the sun. Please be alert: all snags will eventually fall, especially in windy weather.

Please help take care of public lands. Remember, they belong to you. If you pack it in, pack it out. Be sure to wear proper footwear and clothing suitable for the weather conditions expected. Binoculars are handy for spotting wildlife, and a camera might capture an unexpected critter. Respect the wildlife you see. Stay a safe distance away and remember: you are a visitor in their home.



## STATION 1: MICROENVIRONMENTS— THE DIFFERENCE WATER MAKES

Some clues about the landscape can be subtle; others very dramatic. What are the clues at this station? What is the predominant plant life?

You have just walked downhill from the trailhead into a depression at the head of the Willard Creek drainage and station 1. This low point is a “draw”. In a draw, the water table often intersects the surface of the ground. When this happens, you may find a spring has formed, or you may have a flowing stream or just wet ground. As the water table tends to move up or down over the course of the year, the degree of surface water in a draw will also change. Do you see water flowing here now as you are visiting?

Regardless of whether water is flowing at the surface or not, the ground water at the bottom of this draw is much more readily available to plants and so plants that thrive in wetter places thrive here. Aspen trees and mountain alder are the principal large plants here.

As you walk toward the next station, notice how the vegetation along the trail changes as you move out of the draw onto a south-facing hillside. The hillsides along the trail are much dryer and warmer than the ground in the draw and the plant life will be much different. These small changes in characteristics that affect surface temperature, moisture, and plant growth also influence what animals you might find in these places as well. Collectively, these differences result into noticeably different small areas we call microenvironments. “Environment” is a word that refers to the physical characteristics of what is around you, so it can be a large area like the Elkhorn Mountains, or a small area like this draw or an open hillside.

## AFTERWORD



We hope this brochure has enhanced your enjoyment of the Willard Creek Interpretive Trail. Students at Helena High School in association with the U.S. Forest Service produced the first edition of the brochure. The Montana Discovery Foundation and the U.S. Forest Service revised and expanded the brochure in 2010.

As you return home, please feel free to keep this guide as a souvenir or return it to the kiosk, pass it on to a friend, or otherwise reuse or recycle it. If you have questions or comments, please contact the Montana Discovery Foundation at (406) 495-3711 or the Helena Ranger District at (406) 449-5201.



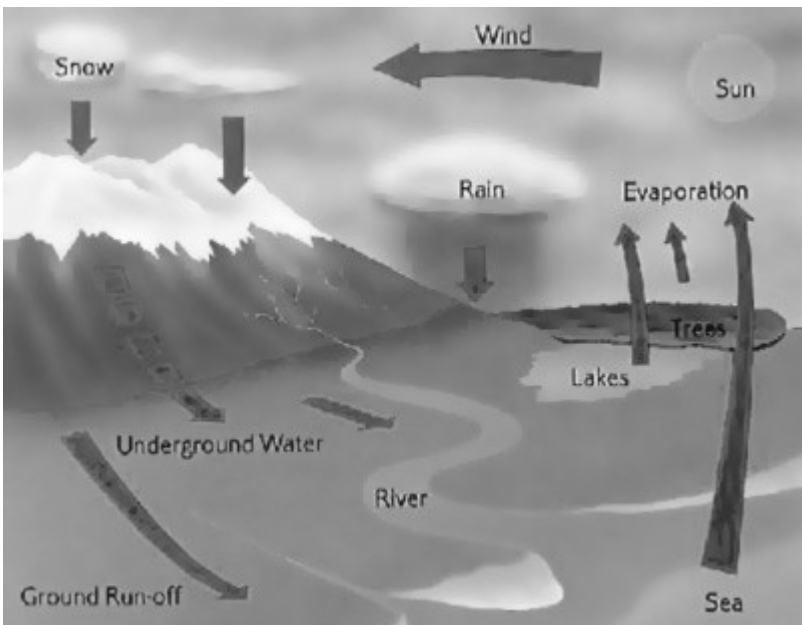
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At the bottom of the trail lies McClellan Creek. If it is a hot day, you may cool off in its clear waters and contemplate the water cycle.

Willard Creek is only 1.25 miles long, but is an integral component of a much larger water system. It flows into McClellan Creek, which flows through Prickly Pear Creek unto the Missouri – Mississippi Rivers and on to the Gulf of Mexico. Evaporation from the oceans brings rain and snow, which recharge the creeks and complete the cycle.

Remember, whatever happens here in the Willard Creek drainage can affect the rest of the system to which it is connected. This principle applies across our entire environment. As we use and enjoy the benefits offered by the forest, let us also focus on being good stewards and distinguish between wise and careless use.

Enjoy your walk back to the trailhead on the Willard Creek Interpretive Trail.



Plants you pass include bunch grasses that include varieties of fescue, as well as forbes such as buckwheat and shrubs including wild rose and kinnikinnik.



*Mountain alder*



*Aspen*



*Wild rose.*



*Kinnikinnik.*

## STATION 2: ADAPTATIONS FOR SURVIVAL

Look up the hill to the left of the station marker, and you will see a large old ponderosa pine tree. This tree, since killed by mountain pine beetle, survived the 1988 fire. Ponderosa is one of many species of trees adapted to live in habitats that are frequented by fire.

Just as the tiles on a space shuttle protect the shuttle, the ponderosa's thick bark protects it from heat. As fire heats the surface of the bark, pieces of it will pop off of the surface cooling it. The bark is thick enough that a typically fast moving fire passes by the tree before heat can penetrate the bark and damage the living layers of the tree that lie underneath. If you walk up to this tree, you will see that the scorched bark still presents a very dramatic picture on how it protected this tree.



*Ponderosa pine bark*

Ground fires typically burn through ponderosa stands and burn underbrush to create pine parklands – areas with low grasses growing between large, old trees. Ponderosa pine, Montana's state tree, is often found on warm, dry south-facing slopes similar to this one.



The mountain pine beetle, which is natural to this area, began to expand its population significantly beginning about 2005. Warm dry summers, and dense stands of uniformly old

## STATION 10: DOWN TO MCLELLAN CREEK

As you complete the walk to McClellan Creek, you pass through a rapidly regenerating lodgepole pine forest intermixed with both standing and fallen trunks of fire-killed trees.

When fire kills a tree, it creates a new home for wildlife. Animals need dead trees for food and homes. Dead, dying, and hollow trees provide such food and shelter for a wide variety of animals.



Insects are the first animals to move into the dead trees by burrowing into the trunk. These critters attract nuthatches and woodpeckers. Owls and squirrels exploit holes in dead trees often first opened by the woodpeckers.

A good example of a multiple use snag can be seen just as the trail begins to come around to the left and drop toward the creek below. This and most of the snags left are now too old for woodpeckers, but the birds have left their mark. (You may find woodpecker activity in recently killed trees.)



As the trail continues to descend, it is surrounded by thickly growing lodgepole pine. This is the direct result of the Warm Springs Fire. Old lodgepole pines store many of their seeds in resin sealed cones. These cones require fire to melt the resin and release the seed – a characteristic called serotiny. Many seeds released by the fire scattered on this hillside. Because they all seeded at the same time, this forest site is quite homogeneous with the trees predominantly the same species and age.

*Continued on the next page*

## STATION 9: CHANGING NEIGHBORHOODS

You probably noticed that the trail has descended steadily from where you started hiking. Here the trail has entered a cooler, wetter area near the bottom of Willard Creek. Looking around, you may notice a different type of forest habitat. The trees are larger and older. You may see some large Douglas fir as well as Englemann spruce. Spruce, in particular, like these cooler, wetter areas. These trees did not burn, so they predate the 1988 fire. Fires often burn in a mosaic pattern leaving islands of unburned brush and trees. These islands can serve as sanctuaries for animals as well as seed sources for natural forest regeneration. What factors can you identify that might cause a fire to skip around a spot like this?

These trees provide cover for many mammals, birds, and amphibians. Can you hear or see any songbirds hiding in the thick spruce branches? Can you tell which trees are spruce, Douglas fir? Hint: compare the needle leaves... spruce needles have square edges and are stiff and prickly; Douglas fir needles are round and not as prickly. See if you can find some cones and compare them. Long bracts protruding from the cone (sort of looking like the hind quarters of a mouse with a tail in the middle) signify a Douglas fir cone – no bracts protrude from the spruce cone. Compare these characteristics to pines you see elsewhere on the walk. Looking from a distance, you may notice that the overall tree shape is different as well with the spruce generally showing a narrower, sharper profile.



Douglas Fir



Englemann Spruce

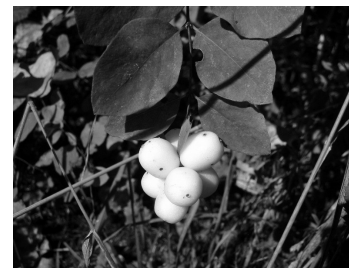


trees and the lack of extremely cold days in winter, are among the factors that have led to the population surge. In summer, after having matured in the living tissue (phloem) under the bark of a tree, the *Mountain pine beetle* beetles emerge and fly in swarms to find another pine tree where they can bore into the bark, lay eggs, and start another growth cycle. When under attack, a healthy tree has moist sap that flows out of the hole bored by the beetle. This may carry the beetle out of the hole and trap it there thus protecting the tree. But when many beetles attack at the same time, they overwhelm the tree's capability and the beetles then can successfully lay eggs in the phloem. Look closely at this old fire survivor, and you will see numerous old "pitch tubes" that formed when the beetles attacked the tree. "Pitch" is dried sap. Sap flowing out against a burrowing beetle serves as a defense mechanism for the tree. When you see great numbers of pitch tubes on the trunk of a pine – even one that still has green leaves – you will know it has suffered a mass attack by Mountain pine beetles and is or will soon be dead.



Pitch tubes

Ground cover plants in the vicinity of this old snag include snowberry, Oregon grape, kinnikinnick, wild rose, and pine grass.



Snowberry



Oregon Grape

## STATION 3: CLUES AS OLD AS THE ROCKS

Trees have grown considerably since this station was put in, so you may need to move down the trail a few feet in order to look across to the other side of the Willard Creek drainage.

The collection of boulders on the opposite hillside gives clues to the area's geological history here. The Elkhorn Mountains were formed by an uplifting volcanic mass known as a batholith. As the several intrusions that formed the batholith cooled slowly, they crystallized into the various granites that are found throughout the area. Called the Boulder Batholith, this large uplift extends from Helena to Butte and is the source of the mineralization that resulted in the founding of Helena, Butte, and other mining communities in the area.

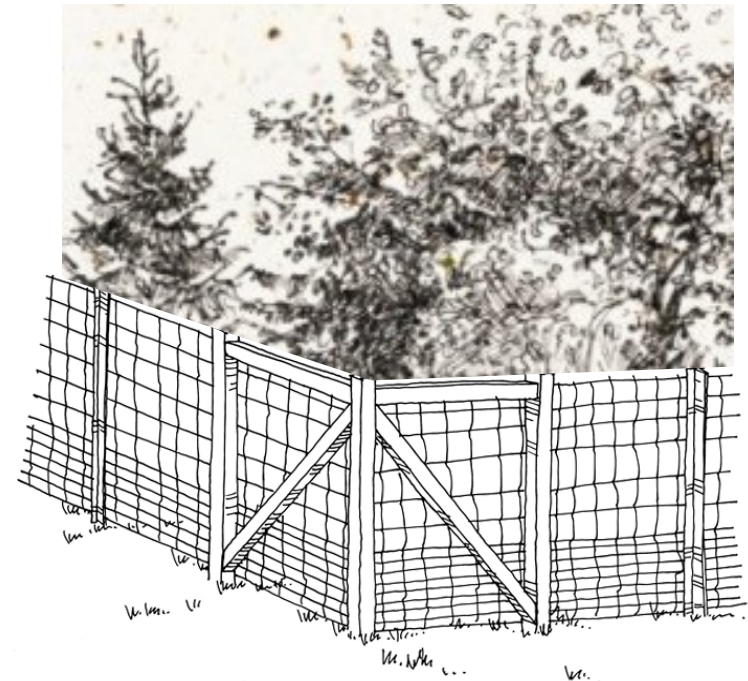
David Alt and Donald Hydman describe granitic rocks in their book, *Roadside Geology of the Northern Rockies*, (1972) as very common pink or gray intrusive igneous rocks having individual mineral grains large enough to be seen easily without magnification. The minerals are quartz, which looks glassy, feldspar, which may be either pink or white, and a nearly black mineral, which is usually either mica or hornblende.

While “granite” is almost always associated in popular writing as the icon of hardness and solidity, the granite you see in this part of the Elkhorn Mountains erodes quite readily. Mountains erode and decay in different ways. The result is an infinite variety of shapes and structures reflecting different forces. Weathering of the large-grained granite around you has resulted in the characteristic rounded shapes of the large boulders and the prevalence of the grainy or sandy soils evident under foot. This material, known as “decomposed granite” is a popular landscaping surface material in the area.

## STATION 8: ANIMAL EXCLOSURE

From the station sign, a short, faint side trail can lead you up to a 20 foot by 20 foot fenced area. Most fenced areas are built to keep things in... your dog, your cattle, etc. This one is designed to keep things out, and so it is called an enclosure as opposed to an inclosure. This one is designed to keep browsing animals such as moose, deer, and cattle out and away from the food they might find here. Why would anyone care about that?

Scientists and land managers use enclosures like this one to measure the effect of grazing animals on the growth, types, and variety of vegetation with and without grazing. From this information, they can learn more about the role of grazing on the health of the ecosystem and thus improve management decisions and understanding the role the large animals play on the land.



## STATION 7: THOSE WHO CAME BEFORE US...

Humankind has long lived in and near the Elkhorn Mountains. Rich archeological finds in the Montana City area attest to ancient Paleoindian habitation in the area. From where you now stand you may see evidence of more recent habitation by someone who may have been a miner (maybe with the group who built the ponds), settler, or other sort of pioneer. There is the stump of a tree, now long gone, that is quite different from the other trees you have passed along the trail. It is the skeleton of an apple tree that may have been planted by that miner to provide a sweet addition to his diet or just a memory of his eastern home.

What other changes on the landscape can you attribute to the activities of people? Trails, fences, weeds... landscape management?

Something else to notice in this place is how different it is from the draw you may remember from the first station. Here, the hillside is rounded outward toward the south. It is much drier than it was in the moist draw. Grasses and small forbs (broadleaf plants with no woody stems) dominate the hillside. This difference largely represents the warming of the dry ground from its exposure to the sun. Why might a warm, open hillside like this be a place to find an apple tree? How might an early miner have thought about this place?



## STATION 4: TAKE A CLOSER LOOK!

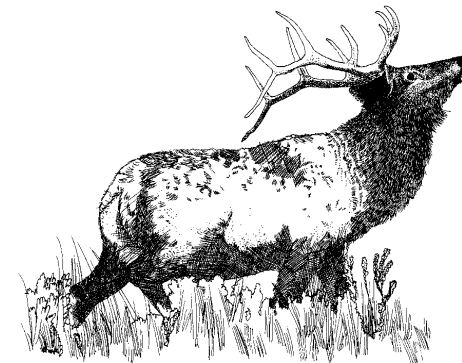
At first glance, the ponds in the moist drainage bottom below you may appear to be beaver ponds. They are, however, man made. Early miners built them to store water for their mining operations. Beaver ponds are dammed by the animals using woody debris, mud, and rocks.



Today, the ponds serve as microenvironments supporting small ecosystems within each pond. Birds, amphibians, mammals, and insects along with water-loving plants find a home in and near the ponds.



Right around you is a grassy meadow. Sometimes wildlife find this a good spot to take a break. If there are mashed down spots in the grass about the size of a deer or elk that is a good indication that this was a recent bedroom for such an animal.



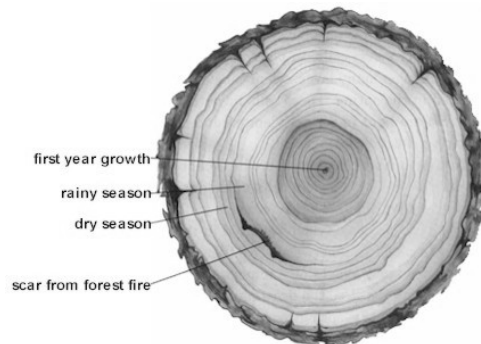
## STATION 5: IF TREES COULD TALK...

Did you know that locked within the trunks of trees are clues to environmental events?

Each year a tree adds new wood to its trunk as it grows. In a temperate environment like ours, there is a period of rapid growth in the spring when water is plentiful and slower growth later in the summer as the environment dries. The wood produced during the rapid spring growth has larger cells and is less dense than the wood produced during the slow growth period. If you view a tree trunk in cross section, you will see rings of darker, denser wood alternating with lighter, softer wood. You can determine how each dark ring relates to one year of growth. By starting at the center of the cross-section of a tree and then count the number of rings to the outside edge can help you estimate the age of the tree.

These rings, when looked at from different directions, comprise the “grain” of the wood – an important characteristic of wood for its appearance and strength as well.

Since tree growth is so sensitive to available water and other growth factors, close study of the rings can tell you what years may have been wetter. They can also tell you years when the tree may have withstood a fire or an insect attack as well.



## STATION 6: NATURE'S CREATIVE FORCE

Fire is one of the most dramatic natural processes of the Rocky Mountain ecosystems. Forest scientists recognize that fire is essential to maintaining a healthy forest ecosystem. Some types of forests require fairly frequent fires to maintain them; others have evolved to require fire only rarely. Understanding the complex relationships between a healthy forest environment, fire, and human values is often difficult. Learning more about the role of fire in the forest will help you form an understanding of the choices facing both private and public land managers and forest stewards.

When a forest burns, as the forest around you did in an abrupt and frightening manner in 1988, a great deal of damage can be done. But fire also unleashes nature's creative and healing forces as well. After the fire burned here, grasses quickly regenerated and created effective ground cover. The ash left by the fire produced a flush of nutrients that formed a fertile bed for plant growth. Other growth followed, and soon tree saplings became young trees and 20 years later, we are surrounded by a vigorous young forest benefiting wildlife, hunters, and hikers.

Is fire good or bad? Is the answer absolute or are there pros and cons? What facts help lead you to your view?

