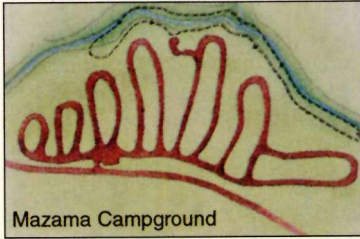


A TRAIL GUIDE TO Annie Creek



Steller's Jay (*Cyanocitta stelleri*)

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Mazama Campground

The Trail

Water is common, yet extraordinary. Annie Creek's water flows through history, courses through the veins of plants and animals, and sculpts the canyon's landscape.

Annie Creek Canyon Trail parallels the canyon rim, descends 200 feet to the valley floor, follows the stream, and ascends to the rim, completing a 1.7 mile (2.7 km) loop. Allow about 1.5 hours to walk the circuit because legs and lungs must work harder at this 6,000-foot (1818 m) altitude.

1: The Creek

The intense blue water of Crater Lake has captured the attention and imagination of people since its discovery in 1853. Stories of this spectacular scene drew a young woman, Annie Gaines of Ft. Klamath, to view Crater Lake and descend the caldera walls. She touched its blue water on October 9, 1865. Annie was the first woman to do so. The creek, winding its way through the canyon below, is named in Annie's honor.



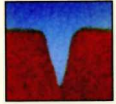
2: Water as Ice

When water freezes it expands, therefore, ice floats. On bodies of water an insulating layer of ice keeps the water below from freezing. Imagine a world where ice sinks. Seas, lakes, and rivers would freeze solid from the bottom up so that eventually no water would be available for plants, for animals, or for humans.

Crater Lake National Park receives an average 524 inches (1331 cm) of snow annually. Thousands of years ago, the snow compacted and ice covered this area year round; creating a scene quite different from today.



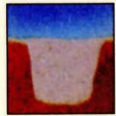
3: Annie Creek Canyon Forms



Streams cut a V-shaped canyon.



Glaciers gouge a U-shaped valley.



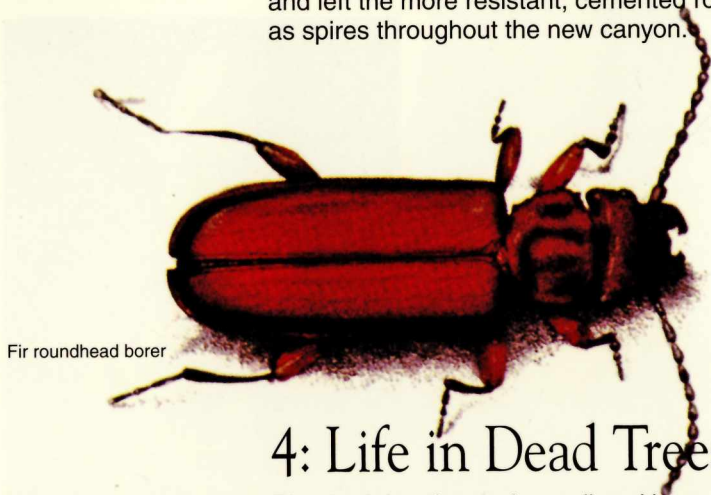
Mazama pumice fills valley.



Annie Creek carves new canyon in pumice.

Glaciers covered the flanks of Mt. Mazama before it collapsed and formed the caldera that holds Crater Lake. Using rocks carried in the ice as tools, glaciers carved and gouged this area and converted a stream-cut canyon to a U-shaped glacial valley.

From Mt. Mazama's climactic eruptions, (c. 5700 B.C.E.), glowing avalanches of superheated pumice and other rock fragments (pyroclastics) poured into this glacial valley. Hot gasses that seethed up through the 200-foot deep pyroclastic deposit emerged in cylindrical vents, called fumaroles. Rock particles inside the fumarole walls were cemented together by heat and by materials deposited from the gasses. When water flowed over these deposits, it washed away the loose pumice and left the more resistant, cemented rock as spires throughout the new canyon.



Fir roundhead borer

4: Life in Dead Trees

Pine bark beetles and roundhead borers damage the cambium (growing layer) of

pinus and firs, killing these trees. The adult insects attack healthy or dying trees during June and July, laying eggs in crevices in the bark. Hatching larvae bore into the cambium layer and construct long, winding food burrows, firmly packed with pitchy dust. In autumn, pupae form in oval cells in the outer corky bark. Adults emerge the following summer.

These dead trees will remain for years because the organisms of decomposition, fungi, bacteria, and insects are active only during the short, dry summer.

5: Water

Precipitation necessary to maintain the rim forest comes as heavy snow in winter and occasional thunderstorms in summer, giving a total of 69 inches of moisture per year. An ample water supply does not guarantee heavy forest growth. In winter, low temperatures prevent water use by the dormant trees. During spring melt, porous soil is incapable of retaining moisture, so water quickly runs off or percolates through it, leaving it dry.

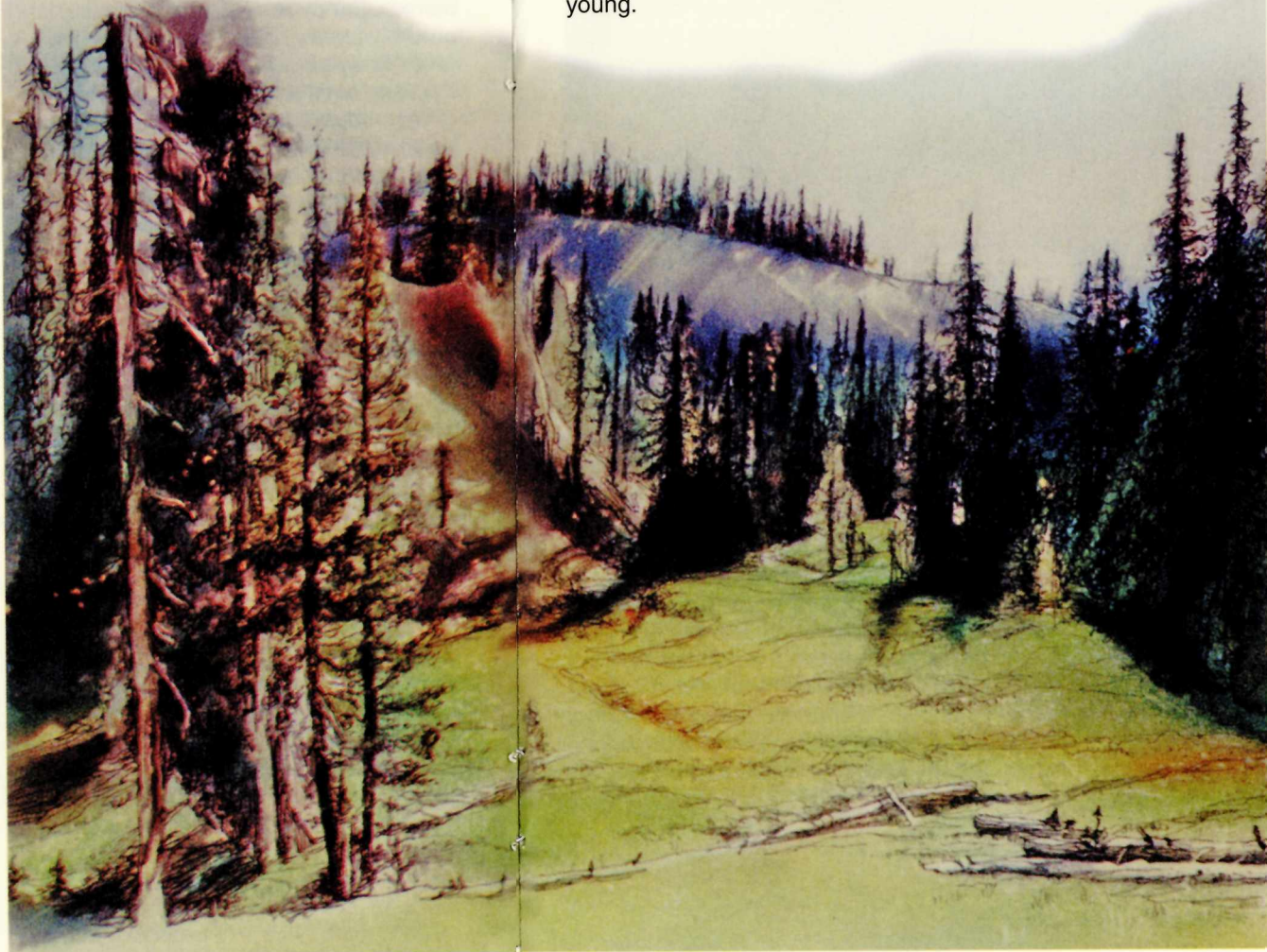
The stately red fir and short-needed mountain hemlock have adapted to this environment in various ways. Their leaves are small and waxy to prevent water loss, while extensive root systems quickly gather water. An abrupt change in vegetation occurs from this dry rim area to the moist, creek-fed valley floor.



6: The Meadow

Wildflowers catch the eye with brilliant color displays in spring, summer, and fall. Buttercups, monkeyflowers, scarlet paintbrush, sedges,

and horsetails thrive in the moist soil. The water of Annie Creek creates and maintains this diverse and active meadow where winter snows fall, thaw and flow away; green plants produce food, flowers, and seeds; insects chew leaves, gather pollen, and lay eggs; birds build nests, hunt seeds and insects, and rear their young.





7: Hydrologic Cycle

Water is on the move — a journey with no beginning and no end. Annie Creek's water enters plants, or percolates slowly into the earth, or rushes to the Klamath River and eventually reaches the Pacific Ocean. The creek's water participates in the hydrologic cycle — the exchange of water between earth and atmosphere.

How is this exchange accomplished? Through energy provided by the sun, water evaporates from wet ground, growing plants, lakes, rivers, and oceans. Evaporated water is carried in the air as water vapor. When water vapor condenses it changes from a gas to a liquid or a solid and falls as rain or snow, which returns to land or ocean to go through the cycle again.

8: Erosion

Rain beats at the canyon's wall with an astonishing erosional force. Millions of raindrops strike the soil, break fragments from rocks, gouge holes, and splash particles into the air. Dislodged rock fragments blow away in the wind or form mounds of debris at the cliff's base. Annie Creek's rushing water carries the debris downstream to continue the process of erosion.

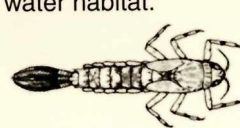
Ancient fumarolic action cemented loose pumice. Erosional forces expose resistant materials as spires along Annie Creek Canyon walls.



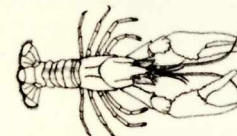
9: Life Underwater

Explore the creek to discover a variety of inhabitants. The flat-bodied mayfly nymph and tadpole species with suction discs cling tightly to rocks. Hiding beneath and between rocks, crayfish avoid the current. Caddisfly larvae live in weighted cases made of pebbles, twigs, or sand. Evolving over millions of years, each species adapts for survival in fast-flowing water.

Slowly moving eddies reduce the need to struggle against the current. Insects adapted to feed and burrow in the creek bed thrive in this slow-moving water habitat.



Mayfly nymph (6-22mm)



Crayfish (15-130mm)

10: The Dipper



With perfect ease the dipper, or water ouzel, dives into Annie Creek, walks across the bottom, and forages for caddisfly larvae, stonefly nymphs, and other insects. In deeper water it swims to the bottom by flapping its stubby wings. A chunky, blue-gray bird, the dipper bobs on a rock or flits up and down the creek. Thick plumage insulates the dipper and a well-developed oil gland waterproofs it. Even in winter, when ice and snow fringe the creek, the dipper plunges in to feed.

11: Mossy Banks

Fallen logs in Annie Creek create a series of tiny waterfalls to quicken the pace of the water. Listen to the noisy flow and ponder how growing plants draw water to sustain their silent chemistry.

Mosses cling to rocks and logs close to the water. For mosses, ferns, and other lower plants, survival itself is contained in a single drop of water. Sperm cells swim in water to fertilize egg cells. From each union a tiny upright stalk topped by a cup-shaped capsule grows up from a leafy shoot of the moss. Wind later scatters the mature spores. Conifers and flowering plants claim drier land and their fragrance fills the air, but spore bearers hold dominion over moist, shady banks.

12: Moisture Contrasts

Hillsides may produce striking climactic variations within a short range, depending on slope and elevation, exposure to sunlight and wind, and water retaining properties of the soil. Grasses, sulfur eriogonum, skyrocket gilia, rabbitbrush goldenweed, and cascade asters thrive on this slope with greater exposure to the sun.

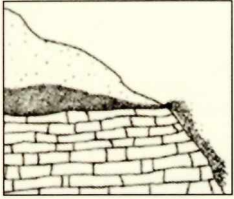
Across the creek, on the more shaded slope, water evaporation is reduced and spring thaw is slowed. Water seepage enhances the growth of mosses, sedges, and monkeyflowers.

Mass-wasting (land sliding) also occurs on the far slope because water lubricates the soil and gravity tears large soil blocks from the slope. An erosional process evident along the creek, mass-wasting continues to widen Annie Creek Canyon.

Sulfur eriogonum
Eriogonum umbellatum



Skyrocket gilia
Gilia aggregata



Springs emerge where the water table meets the land's surface.

13: Springs

The character of a soil determines the amount of water able to penetrate it. When a soil is dry and porous, like the pumice here, large amounts of water seep downward until blocked by non-porous rock. There it spreads out horizontally so that vast volumes of earth become saturated with water. The top of the saturation zone is called the water table. Look at the abrupt change in vegetation part way up the slope; this line marks the water table's surface. Water from this zone emerges at the surface in springs, pulled by gravity from beneath sloping terrain. Annie Creek's water comes from various, similar springs along the canyon. Annie Spring, the headwaters of this creek, remains at a constant 35°F, making it the coldest spring in the park.

14: Waterfalls

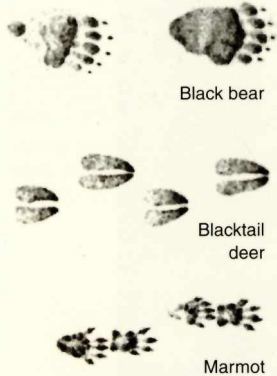
The water rushes quickly as it plunges over a series of ledges. The creek abruptly crosses from andesite lava rock to soft pumice; the loose pumice is rapidly worn away, leaving a lip. The force of dropping water digs holes at the base, undermines the cliff, and causes the lip to cave in. These occasional cave-ins cause the falls to recede upstream and restore the creek's original, less precipitous bed. Waterfalls are accidents of erosion, but are very common features in the Cascade Mountain Range.



15: Vegetation as Food

Each animal in Crater Lake's forests lives within a specific niche. Steller's jays, chipmunks, and black bears have adapted over millions of years to live with conditions offered by the forest. The boggy meadow across the creek contains two varieties of huckleberry, willows, and lush herbaceous plants. Birds hunt seeds, mule deer and marmots nip tender shoots, and black bears browse juicy huckleberries. The red fox preys on golden-mantled ground squirrels, and insects wait to devour the remains.

16: Tracks



Annie Creek provides water essential for forest animals, who usually descend to the creek under the cover of night. Tracks along muddy edges of the creek reveal their presence. Large, broad, five-toed tracks belong to the black bear, frequent visitors to this canyon and the campground. Blacktail deer leave delicate hoofprints as they drink from the creek. Marmots, longtail weasels, porcupines, golden-mantled ground squirrels, and red foxes often visit the creek and leave their smaller footprints.



17: Water's Power

As you gaze down the canyon, let the fading voice of Annie Creek remind you of water's power. Annie Creek's water gives vitality to the plants and animals that depend upon it for survival. Water has shaped the canyon's landscape: glaciers carved, saturated soils crept downward, and turbulent waters eroded. All these processes continue today in the changing environment, protected for you within Crater Lake National Park.

More information on Annie Creek and other park features is available at Park Headquarters or the Visitor Center at Rim Village.

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CRATER LAKE

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