

11 When the great rocks first fall from the cliffs they are devoid of visible life, but within a few years lichens begin to colonize the freshly broken granite. Slowly these simple plants begin the breakdown of solid rock into soil. When the soil is thick enough other plants move in. After mosses come grasses and as the soil continues to thicken leafy plants become established. You can see raspberry, cream bush and cinquefoil growing here. Finally, the leafy plants and brush are replaced by trees. The big leaf maple scattered along the trail is an example. This whole process of replacement is called plant succession.

12 The white lines running across the granite boulders are dikes. A dike is formed when molten rock of a different material is forced into a crack of the surrounding rock. This occurred deep beneath the surface of the earth during the formation of the Sierra Nevada. Large dikes can be seen across the canyon on the face of North Dome--and all around you. Blue-bellied fence lizards use nooks and crannies in the talus for nests and are often seen lying in wait for insects and small spiders.



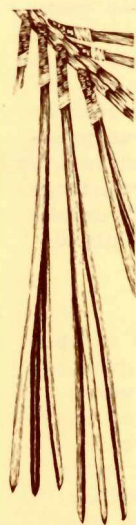
13 The marsh habitat, the swamp of cattails and willow, is particularly rich in life forms. The abundant birdlife is the most noticeable. Flashes of yellow betray the tiny Wilson's Warblers energetically searching for insects. Choosing an exposed perch, the Song Sparrow pours out his short, ringing melody and brilliant red shoulder patches mark the Red-wing Blackbirds nesting in the cattails. The elusive Swainson Thrush, with its whispered song, hides its nest in the trees bordering the meadow. In early spring, the songs are of a different sort--the song of the yellow-legged frog and the tree toad.

14 The meadow below is as temporary as the lake it replaced. Silt from the flooding river adds more earth. The plants themselves are a part of the process as their dead leaves and parts accumulate, building and enriching the soil. A drying trend in the weather over a period of years may allow a few trees to become established. They, in turn, use up water rapidly and further dry out their section of the meadow. Thus begins another stage in the succession as the meadow gives way to the forest. You can see 25 to 30 year old ponderosa pine (1970) which have become established on drier areas. It is also possible for the present trend to be reversed should the climate become wetter. Too much water will kill the trees, allowing the meadow to expand.



The small gray-green pine to your right is the single-leaf pinyon. This was the favorite nut pine of the Monache Indians. They knocked the green cones from the trees, roasted them until the exterior was ashy, and removed the succulent nuts by hand.

TRAIL JUNCTION - TURN LEFT



15 Probably the two most misunderstood animals of the western forests are the rattlesnake and the mountain lion. Both roam the meadow and forest in search of food, small rodents for the snake and larger mammals for the lion. Each play their part in keeping the fast multiplying plant-eaters from over populating the area. Both avoid man whenever possible. Running on trails, not watching your step, or leaving the cleared trail may bring you upon a startled snake. No park visitor has been bitten by a rattlesnake in Cedar Grove in recent years. Mountain lions are rarely seen because of their secretive habits.

16 This is the final stop on the meadow trail--but it is not the end of our story. For as we have seen, the meadow is a living, growing, dynamic complex of life forms which interact to produce a biological community or association. The shifting fortunes of certain members of the community, be they plant or animal, cause changes and such changes can affect other members of the community. Thus, the balance of nature is constantly shifting but always within a framework that guarantees continuity. Often in the past man has been an intruder, disrupting the processes that for millennia have insured a balance in nature. Some times he did so by design but more often he did so unknowingly, for nature's ways are complex and difficult to understand. But little by little we have begun to learn more about these natural processes, these building blocks of nature. We have learned that the laws of nature must be observed if we are to manage the materials of nature so as to serve our human needs in a constructive way. And in such wild places as this meadow we hope we have made a little clearer the meaning of some of these natural processes and the importance of them in the web of life. So enjoy the meadow, treat it with the respect it deserves and come back often. It will be waiting for you.



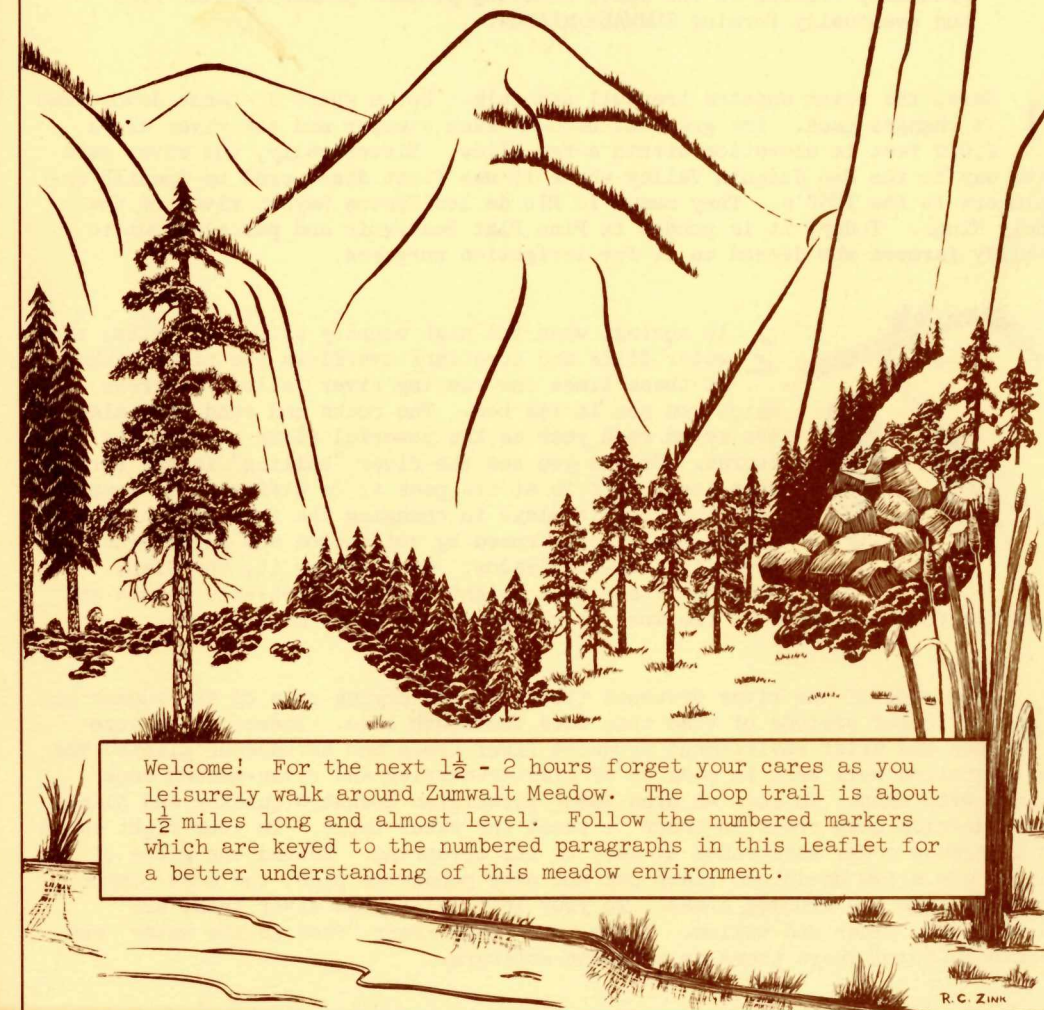
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I D E A S

Did you enjoy the trail? Was this leaflet helpful? Did we omit something? The space below is reserved for your comments. Simply jot them down, tear off this portion and return it to the Naturalist on duty at the Cedar Grove Ranger Station. Thank you.

ZUMWALT MEADOW TRAIL

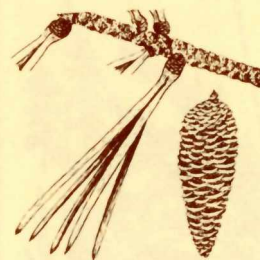


Welcome! For the next 1½ - 2 hours forget your cares as you leisurely walk around Zumwalt Meadow. The loop trail is about 1½ miles long and almost level. Follow the numbered markers which are keyed to the numbered paragraphs in this leaflet for a better understanding of this meadow environment.

R.C. ZINN

At first, this valley was "v" shaped, much like the valley downstream near Boyden's Cave. Then the climate changed and became colder. More snow fell than melted. Eventually, thru compaction, great masses of snow changed to ice. As the weight of the ice mass increased, the relentless pull of gravity caused it to move down-slope--a glacier was born. Following the "v" shaped valley, the river of ice flowing in a manner much like thick syrup, picked up gravel, rocks and boulders as it moved along. This material, imbedded in the ice, scoured, scraped and polished the valley floor and walls. Such erosion continued for centuries. Again the climate changed and gradually became warmer. As it did, the glaciers slowed their advance, stagnated and finally began to retreat. But the evidence of their having been here remains in the form of this "U" shaped valley, and the great masses of unsorted rock debris left behind in ridges called moraines. Thirty such moraines are found in the Cedar Grove area. It is theorized that one of these moraines, along with boulders from the canyon wall and outwash material from Granite Creek formed a natural dam. This blocked the flow of the Kings River, creating a lake. Over the years sediments collected--gradually filling in the lake, allowing pioneer plants to take root and eventually forming ZUMWALT MEADOW.

Here, the river appears tranquil and calm. But a short distance downstream it changes pace. The gradient becomes much steeper and the river drops 2,000 feet in elevation within a few miles. Historically, the river made its way to the San Joaquin Valley where it was first discovered by Spanish explorers in the 1850's. They named it Rio de los Santos Reyes, river of the Holy Kings. Today, it is ponded in Pine Flat Reservoir and parceled out to valley farmers who depend on it for irrigation purposes.



In spring, when the high country snow-pack melts, the water fills and sometimes overflows the river banks. At these times the roaring river felled the trees which you see in its bed. The rocks and sand bars also are moved each year as the powerful river changes its course. Unless you see the river "boiling" in the spring when the runoff is at its peak it is difficult to comprehend the role it plays in changing the face of the land. Across the river, framed by cottonwood and sugar pine, is beautiful Zumwalt Meadow. Overlooking it, the Grand Sentinel rises to a height of 8,504 feet--its seamed and massive face a tribute to the work of glaciers long since melted away.

This side of the river presents itself to the drying rays of the summer sun for longer periods of time than does the south side. Therefore, a more open and drier environment produces fewer trees and herbaceous plants. The well drained soil here is made up of glacier-carried and river-washed rock mixed with sand. In such an area water percolates downward quickly and plants must develop long roots in order to reach the water table. To your right is an old incense cedar surrounded by many of its offspring. Behind the grove of cedar are a few deciduous black oak and many ponderosa pine, the most common tree of such dry exposed areas. To your left, along the river bank, are cottonwood, alder and willow. These trees need their "feet in the water" and are only found where there is abundant moisture.



In Kings Canyon, near Cedar Grove, numerous Indian campsites have been found along the river. These sites were occupied by about 100 members of the Monache Indian tribe during late spring, summer and fall. These Indians were a hunting-gathering people whose full time job was the search for and preparation of food. They were the first true practicing ecologists and over the centuries they learned to live with and from the land without destroying their surroundings. To them the land was revered as a mother from which nourishment was gained and not as a resource to be sold and plundered.

The staple food of these Indians was the acorn which required a series of special preparations to render it edible. Look at the holes in the low, granite boulder in front of you. It was in these bedrock mortars that Indian women ground acorns to a fine flour. After the acorns had been shelled, dried and reduced to a flour, a shallow hole was dug in the sand near the river bank. The hole was filled with acorn flour and water poured over it. As the water drained away, it carried with it bitter tannic acid making the flour edible. Mixed with hot water to make mush or made into flat bread this food was very different from and much more difficult to obtain than the 'staff of life' we purchase at the supermarket.

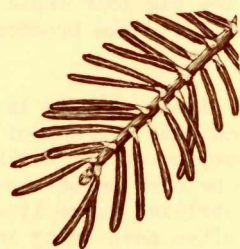
Fifty feet beyond the bedrock mortar holes on a large granite boulder is a plaque commemorating Jesse and Abraham Agnew who were father and son, both California pioneers. In 1889-1891 Jesse Agnew and his employer D. K. Zumwalt acquired 120 acres of land in Kings Canyon. D. K. Zumwalt, after whom the meadow was named, was a Southern Pacific Railway Company attorney who worked to have this land protected from settlement as a forest reserve.

This picturesque suspension bridge was constructed by the Forest Service during their tenure as administrators of this area before the national park was created. The structure has been damaged many times during years of high water by logs brought down by the flooding river. From the center of the bridge, look upstream for a beautiful view of the river, meadow and high mountains beyond. Got your fish pole? These cold, clear waters containing rainbow and brown trout are a favorite of fishermen. Perhaps you'll want to try your luck, also. Downstream the river changes from placid to powerful as it suddenly drops down a 50 foot step in the valley floor.

TURN LEFT AT TRAIL JUNCTION

Mountain glaciers exert a powerful force in shaping the land. Across the river, towering North Dome, reaching a height of 8,657 feet, illustrates this fact. During the final period of glacial advance, ice filled this valley to a depth of 1,600 feet. As it moved along, plucking rocks from the canyon wall, it formed the sheer face of North Dome. The two rounded tops above the sheer face, not visible from here, represent the depth of ice during earlier ice ages. The total drop is over 3,500 feet, almost identical to the height of Yosemite's El Capitan. Here in the black oak is part of a fence which stretched across the west end of Zumwalt Meadow and the old southside trail. This helped keep grazing stock animals from wandering downriver.

Just across Sentinel Creek, which is often dry, the forest opens up to reveal the cliffs above and a jumble of broken trees and sprouting stumps. A snow avalanche occurred here during the exceptionally heavy snows of 1968-69. The power of such a mass movement of seemingly light snow is easily grasped when you see the destruction around you. The tremendous pile of rocks which make up this slope have also tumbled down in eons past from the fractured mass of the canyon wall.



Notice the change! The protection offered by the half-mile high cliffs of the Grand Sentinel makes it cooler and wetter here. Thus, a dense forest of white fir is able to prosper. Notice also the lack of understory plants and shrubs. Although the soil is fertile and water plentiful, the dense forest canopy allows little light to reach the forest floor. Therefore, only those plants able to grow in the absence of direct sunlight can survive. Behind the big rock are five apple trees planted by Ruth Goins and Viola Kanawyer in the early 1900's. Ruth Goins at one time owned one third of Zumwalt Meadow, which her husband, Walter Goins, inherited from D. K. Zumwalt in 1904. Viola Kanawyer and her husband Apollo operated a hotel at the east end of the canyon. Undoubtedly, fruit from these trees graced the hotel dining table. Now birds, deer and other animals feast on the few small apples before they are ripe enough for human consumption.



Rocks forming this slope have fallen from the cliff due to the action of water and gravity. Water, freezing in the cracks and crevices of the cliff face, expands. As it does, the crack becomes wider and wider until finally the pull of gravity causes the boulder to break loose with a roar on some quiet winter day. Other names for such an accumulation of rock are scree or talus. The trail here is rocky and was blasted through the talus in order to avoid the fragile meadow. It is similar to the high elevation trails in the country to the east beyond the end of the valley. Along the margin of this wet meadow grow wild rose, willow, cottonwood and creek dogwood.

CAREFUL! GRAVEL ON A ROCK SURFACE IS SLIPPERY

Take a moment, enjoy the solitude of this grand valley, sit quietly, rest and listen to the sounds around you. The wet meadow margin is a particularly inviting place for wildlife. Much as we who live in suburbia can sample both the pleasures of the country and the city so it is with the birds and animals who utilize this edge environment. For here they are close to an abundant supply of food in the meadow and yet close to the safety of the forest.

