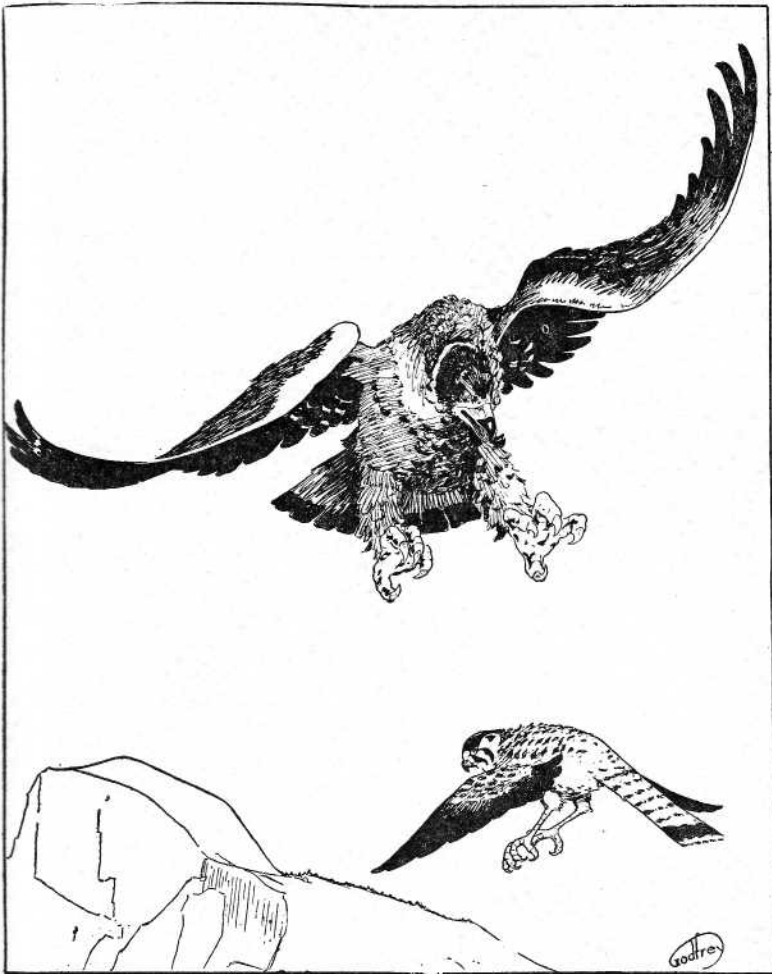


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Yosemite Nature Notes

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THE "WHY" OF SNOW SURVEYS

By C. Frank Brockman, Park Naturalist

During the last part of this month Yosemite rangers will once again make their annual trip to the Tuolumne Meadows section for the purpose of computing the depth and water content of the snow pack of that region. Snow courses at Snow Flat (8,700 ft.), Tenaya Lake (8,150 ft.), Tuolumne Meadows (8,600 ft.), Dana Meadows (near Tioga Pass, 8,700 ft.), and Fletcher Lake (near Wogelsang Peak, 10,300 ft.), will be measured. Three or four men will make the trip, and during the required period of about one week they will travel approximately 80 miles on skis. In addition, shorter trips will also be made under National Park Service supervision in Yosemite National Park to Gin Flat (7,000 ft.), Peregoy Meadows (7,000 ft.), and Ostrander Lake (8,200 ft.), for the same purpose. This work is done in conjunction with similar studies carried out on twenty-four watersheds in the Sierra for the purpose of furnishing data which will be utilized by the Division of Water Resources of the State Department of Public Works in computing the

amount of water stored in the Sierra snowpack.

The value of such data is obvious, for water has been correctly termed the "life blood" of this state. Crop irrigation, production of electric power, mining, manufacturing, and municipal needs for a greater part of California are all dependent upon an adequate water supply. So, since little if any rain falls here from June to the end of September, practically all water that is used during that period must be supplied from the precipitation of the preceding winter which to a large extent is held in natural storage by the snowpack in the vast watersheds of the Sierra Nevada. Here, at high altitudes, winter's precipitation falls entirely in the form of snow, and low temperatures prevent its melting until well into the summer. Thus streams emanating from this lofty mountain wilderness are generally characterized by an adequate flow of water until well into the dry season. Coupled with water holding reservoirs a sufficient supply for the varied needs of this region is assured through the year.

But, what constitutes a snow survey? By what method is the necessary data secured? Casual measurements of depths are obviously not sufficient since depth tells only part of the story. It is not the snow but its water content that is the important factor. For instance, freshly fallen snow usually has a density of approximately 10 per cent; in other words, 10 inches of snow will yield 1 inch of water. After several days elapse, it generally attains a density of about 25 per cent so that 4 inches of snow yields 1 inch of water. As it continues to settle and pack, and as additional snow falls, the crystalline structure of the snowpack changes due to melting at the surface and the absorption of free water

by the lower layers. Eventually the snowpack may attain a maximum of 57 per cent. At this point water is no longer retained and begins to run off from the bottom.

The methods used in the evaluation of the water content are based upon original experiments conducted on the slopes of Mt. Rose in Nevada, near Lake Tahoe, by Dr. J. E. Church about 40 years ago. Dr. Church, an outdoor enthusiast, was Professor of Classics at the University of Nevada at that time. His work in this field, so far from his original profession, was first carried on as a hobby but rapidly attracted attention as to its practical value. Today it has assumed importance throughout many parts of the world where

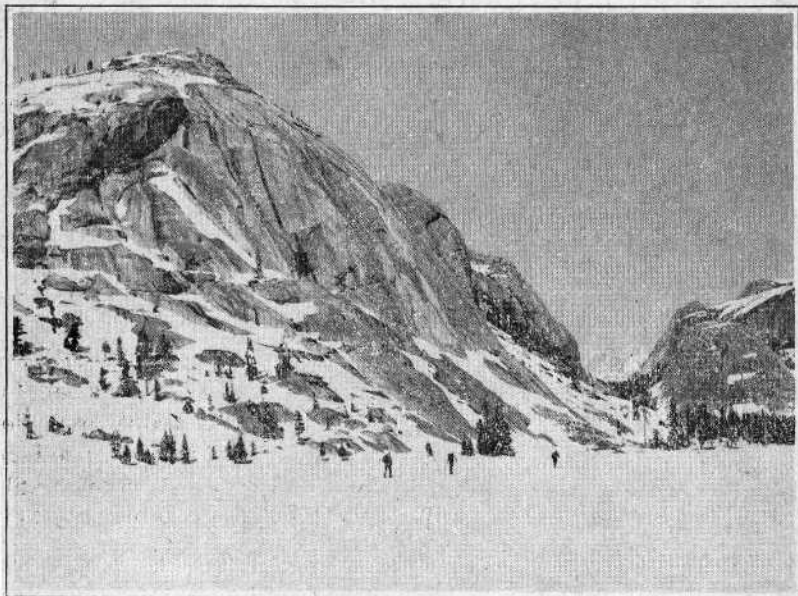


Photo by Ralph Anderson

Snow Surveyors Crossing Tenaya Lake



Photo by Ralph Anderson

**Tube with snow core being weighed to obtain water content
—Dana Meadows (9,700 ft.) near Tioga Pass.**

ever winter's snowfall is vital as a source of water.

The actual work of taking the data is predicated upon careful advance planning. Measurements are made at established pre-determined locations known as snow courses. These were established some years ago in open areas sheltered from drifting winds so that data taken will provide a representative index of conditions throughout a given area. The snow courses consist of pre-surveyed lines, arranged in the form of a rough cross, marked at the ends by conspicuous signs placed upon two prominent trees or similar landmarks. Roughly twenty points, ap-

proximately 50 feet apart, are located on these lines at which snow samples are taken.

This work is accomplished primarily by means of a long hollow tube of steel or aluminum composed of a number of sections each thirty inches long, which can be readily coupled together to permit the measurement of depths up to 15 feet. This tube is thrust through the snowpack to the earth and the depth of the snowpack, as recorded in inches on the surface of the tube, is noted. In thrusting the tube through the snowpack a core of snow is formed within the hollow tube, the length of which is also noted by

reference to the scale on the tube's exterior as it is withdrawn carefully from the snowpack. After carefully removing any dirt or other material which may have adhered to the base of the snow core the tube with its snow core is weighed upon scales designed to indicate the water content of the sample directly as inches of water. This process is repeated at each of the numerous points on the snow course; an average of all measurements eliminating errors due to drifted snow, uneven ground and other factors.

Preliminary preparation for this work was made last fall. Cabins were stocked with food, bedding and fuel. Snow surveying tools were carefully checked and cached at convenient locations. Markers on winter trails were also checked so that the routes could be followed under all conditions. Then as winter snow enshrouded the high country in a blanket of ermine, progress surveys were made monthly—in the latter part of January, February and March—at the more convenient locations. The surveys made during the latter part of March, however, are the most extensive and important since they are made at the time when the winter's snowfall has usually achieved its maximum depth and density preliminary to the beginning of the spring run-off. All data secured is transmitted to the main office of the Division of Water Resources in Sacramento where it is

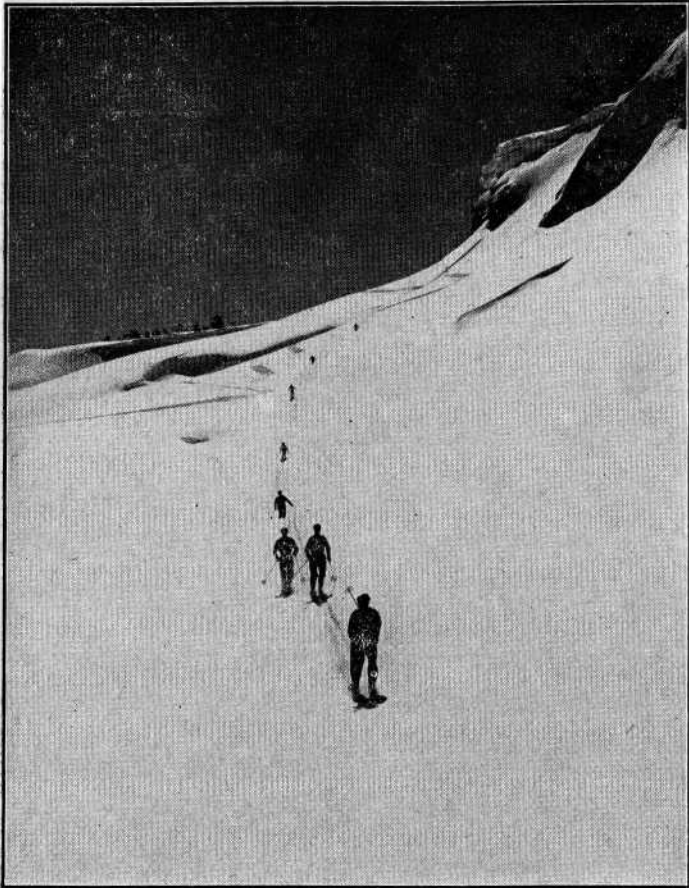
analyzed, carefully checked for possible errors, correlated with similar data received from surveys of other Sierra watersheds, and compiled for publication preparatory to being made available to all cooperating agencies.

The practical application of this knowledge is wide and varied. If a heavy run-off in the spring and early summer is indicated by a deep snowpack with a high water content, storage reservoirs can be held to a low level in anticipation of the abundant water later on, as long as sufficient snow remains in the mountains. Reservoirs can be filled later. This has a double advantage of absorbing the shock of the excessive run-off, thus preventing floods along the lower stream courses, and conserving the abundant moisture for later in the summer when it will be at a premium. If surveys indicate a probable water shortage at a later date, all available water can be carefully conserved for diversion at the proper time where the needs are most pressing.

Those who venture into the Sierra winter wilderness at this season are, of necessity, experienced men familiar with the demands of winter travel and capable of meeting the emergencies which occasionally arise. Care and safety are the watchword at all times since an accident not only causes hardship to the individual concerned, but to his

companions as well. Under such conditions skiing assumes a very conservative pattern, sharply divorced from the speed and thrills of well-packed runs situated in close proximity to ready aid in case of accident. But it has its rewards in the silent beauty of the sparkling winter

wilderness remote from the "beaten path," the awe-inspiring power of boisterous winter storms which often sweep over the mountains, the myriad animal tracks which are often indications of some drama of the high country, and the camaraderie of the outdoors.





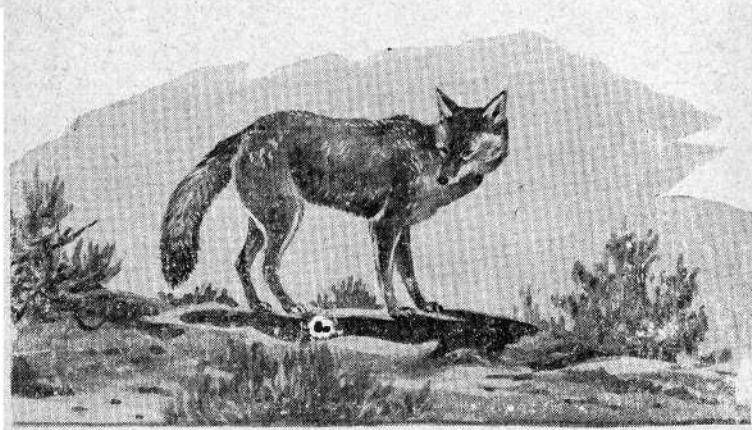
VOICES IN THE NIGHT

By M. V. Walker, Associate Park Naturalist

The night had been quiet and peaceful, as nights can be in Yosemite Valley late in the fall. Suddenly we were awakened by the most hideous yet pathetic "squalling" of an animal that seemed to be fighting for its very life. The first shriek was so sudden that it was apparent the animal had been taken by surprise. It continued to cry and "squall" but the sounds became weaker and weaker as they faded away into the distance. It was evident that the victim was being carried away by the victor.

The quietness of the night re-

turned, but only for a few minutes. Suddenly a large owl broke the silence by its resonant, deep-voiced "hooting." The disturbance of a few minutes before had no doubt attracted the attention of the owl, and it had moved in closer to investigate. A few more minutes of stillness prevailed when suddenly—from very close in—there came the mournful barking of a coyote. That first cry of distress seemed to be a signal recognized by all the animals of the night. They were moving in, either to look with envious eyes at the victor devouring the prey, or perhaps





to retrieve a few bits which might be left after the glutton had had his fill.

From observations made both before and after the incident it was possible to reconstruct the episode about as follows:—California ring-tailed cats had been present in this area for some time and on different nights they had made frequent visits to the garbage cans seeking food. On this occasion a ring-tail had apparently been carefully "stalked" by either a fox or coyote which quickly "pounced" upon the hapless victim before it could reach a tree or other safe retreat. The very first blow had not been fatal and the ring-tail proceeded to fight back as best it could, but the gradually diminishing cries were indicative that it was weakening rapidly. The long period of silence that followed was proof that

the ring-tail had not been stalked in vain.

NATURE NOTELETS

During a recent snow survey trip to Ostrander Lake (Jan. 30-Feb. 1) it was apparent that coyote and marten were quite numerous in that vicinity. Although none of these animals were seen, a maze of tracks formed patterns in the snow—indicative of their wanderings and their activities. Chickaree tracks were also numerous. Strangely, the tracks of one bear were also observed in the Bridalveil Creek drainage just west of Horizon Ridge. The activity of this animal at that time of the year and at that altitude can probably be accounted for by the fact that all during January the weather had been

quite mild for the season, and characterized by but little snow. An average of only about five feet of snow was noted at the snow course near Ostrander Lake. The bear, his winter nap apparently interrupted by the mild and rather unusual weather, undoubtedly became restless and decided to "rush the season" a bit. His decision likely proved to be poorly founded for a few days later the Sierra was visited by a severe storm which brought with it a considerable amount of fresh snow.

Red-breasted
Nuthatch



Few birds were observed during the two day trip. But one lone grouse was seen and other than the nasal notes of nuthatches and the busy twitterings of chickadees the woodlands, muted by a blanket of snow, were silent and austere in their winter beauty. (C. F. B.)

A weasel in its white winter coat was observed foraging about the meadow in the vicinity of the Yosemite Park and Curry Co. shops late in January by Mr. Jack Greener. As no snow covered the ground at that time it was quite conspicuous among the brown meadow grasses.

With the advent of the heavy fall of snow early in February (nearly two feet fell on the Valley floor) its protective coloration became more suited to conditions and its movements were not so easily detected. (C. F. B.)

The storm early in February brought certain of our wildlife into sharp focus. Varied thrushes assembled in rather compact groups as they sought food at each and every place where bare ground was visible. Along the roads of the Valley floor, cleared by the snowplows, great numbers of these birds congregated—thus making the presence of these winter visitants most evident to park visitors. The museum staff was besieged with inquiries as to their identity. Other species also congregated in compact groups. Juncoes worked over small patches of exposed earth in their search for food and band-tailed pigeons worked about the edges of the snowbanks in an effort to obtain the acorns that lay beneath the snow. (C. F. B.)

During the storm the work of school children was interrupted when a large buck approached the windows of the school house and for a considerable period sedately gazed into the warm interior, observing educational activities which were in progress, through the melee of swirling snowflakes outdoors. (C. F. B.)



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Dan Anderson