YOSEMITE NATURE NOTES

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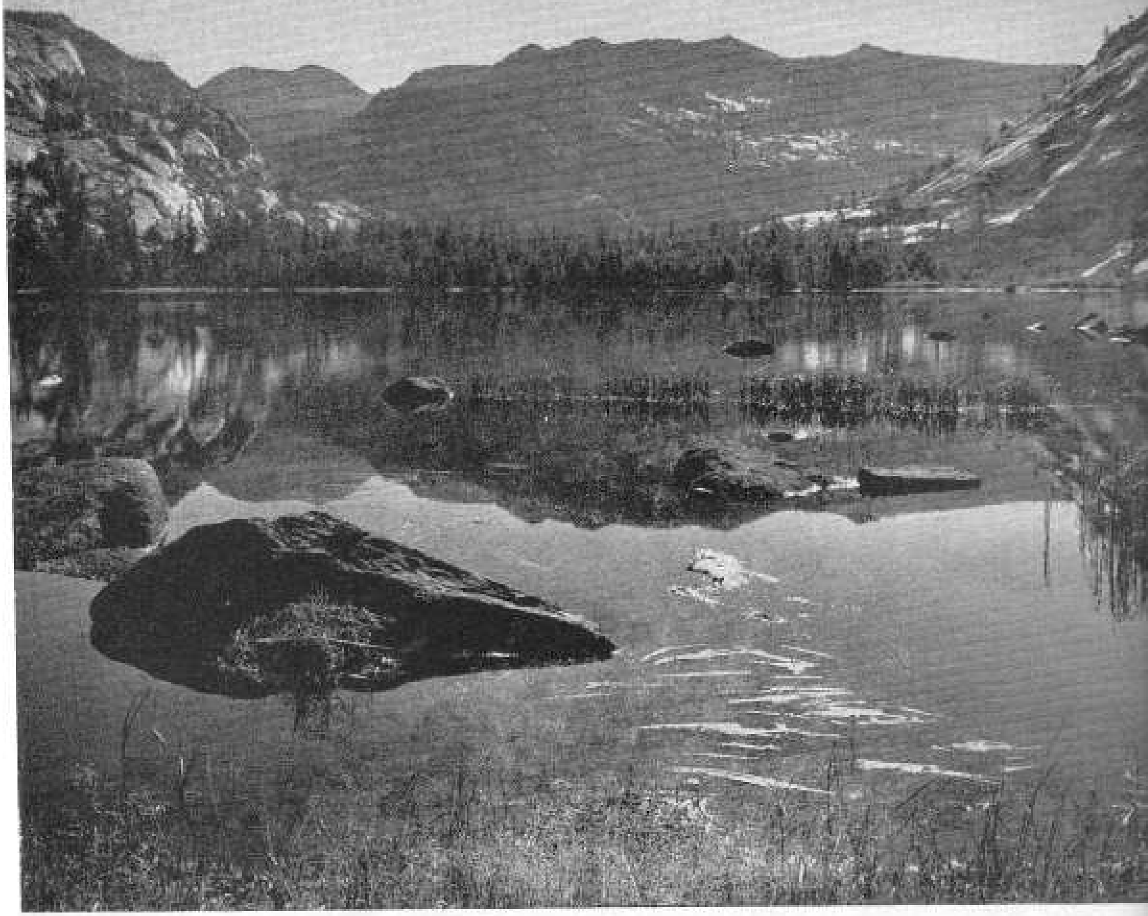
Top of Nevada Fall
—Ansel Adams



Merced Lake, Yosemite National Park, by Ansel Adams from "Yosemite and the Sierra Nevada."
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Cover: Top of Nevada Fall, by Ansel Adams.

Yosemite Nature Notes

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FOR BETTER FISHING

By Orthello L. Wallis, Park Ranger

Six anglers will fish in the waters of Yosemite National Park this season for every one who fished in 1935. Few new waters have been suitable for additional stocking during this period of less than two decades. With the competition for the available trout increased sixfold, no slackening of this fishing intensity is in sight.

Nearly a million trout have been planted in the streams and lakes of this park each year to assist in maintaining a sustained fishery. It has cost much to do this, while little effort and expense have been directed toward determining the desirable numbers of trout to stock and the frequency of planting necessary to support fishing in the various waters. Fact-finding surveys were few and inadequate.

In the fall of 1950, Mrs. Mary Curry Tresidder offered to sponsor financially the initial work of the Yosemite Trout Investigations. She made additional donations to further extend these activities in 1952 and 1953. My assignment was to organize and conduct the various projects of the investigations. In this effort I have been especially assisted by Park Ranger Glenn D. Gallison whose preliminary work on lake and stream inventory cards has proven to be most helpful.

The principal projects of the Yosemite Trout Investigations have consisted of the following:

1. Preliminary inventory surveys of lakes and streams to determine the suitability of the various waters for trout and the needs for stocking. These surveys will be discussed at greater length.

2. Studies of the fishing intensity within the park. The percentage of visitors who fished while in Yosemite was learned by surveys conducted at each of the entrance stations. The intensity of their activity was indicated by reports of the anglers, rangers, and packers.

3. Creel-census reports of the anglers' catches.

4. Studies at the Frog Creek Egg-taking Station to learn more about the population of trout from which eggs are taken each spring. Fingerlings from these eggs are hatched in the Yosemite Hatchery and are planted in back-country lakes.


California State fish hatchery at Happy Isles.

5. Study of past and present rules and regulations with the purpose of making recommendations for new and revised controls beneficial to the overall fishery situation. Among these recommendations which have been approved and are incorporated in the fishing regulations for 1953 are the establishment of May 30 through October 15 as the open season for fishing within the park, the prohibiting of the practice of chumming for trout with any substances whatsoever, the elimination of the size limit on trout which may be legally kept as part of an angler's creel limit, and the elimination of the weekly limit of 20 fish per week.

6. Formulation of a basic general trout management and stocking plan for Yosemite National Park based upon these investigations, and an individual management program for each lake and stream.

One of the most interesting and important phases of the investigations have been the lake and stream surveys. Many inquiries are made about those conducted at the lakes, and it is well to present a brief summarization of these studies.

Adequate accurate information concerning the biological and physical properties of the individual waters is necessary before a satisfactory management and stocking program can be established. With this objective in mind, preliminary studies were made in 177 lakes and a number of streams of the park during the first 2 years of the Yosemite Trout Investigations. These involved hundreds of miles of trail and cross-country foot travel.

Before the actual survey of a lake is undertaken, its past stocking records are reviewed to determine how many trout of each species have been planted and the dates of these plantings. Creel-census reports provide an indication of the size range and kinds of trout caught and the relative success of the anglers.

The lake is located on topographic maps and aerial photographs. Many of the lakes are unnamed and some are not even shown on the topographic map. The correct identification of the lake is important before the field studies commence.

On approaching the lake, its shape, shoreline vegetation, and type of terrain are observed. From the shoreline an intense observation of the water determines the size range of the trout seen near the shore, the kinds and abundance of aquatic vegetation and insects present, the kind of bottom materials, the nature of the shoreline, and the relative depth of the lake. Each of these factors governs the fitness of a lake for trout and the relative ease with which the water may be fished. Trout make rapid growth in lakes with an abundance of aquatic vegetation and bottoms covered with organic debris. More aquatic insects for trout food are produced in this type of lake than in waters with scant vegetation and rocky bottoms. In lakes which are too shallow, trout are unable to survive during severe winters.

An examination of the trout themselves from the lake provides much information about the general conditions and capacity of the body of water for supporting fish life. Fish are sampled from the lake by angling methods. Fishing is done at different depths and distances from the shore. The trout which merely follow the lures as well as those which are caught are observed. The fish which are caught are measured and their physical condition noted.

Good physical condition is usually denoted by fat fish with pink flesh. This often shows that the fish population is properly adjusted to the amount of food available. On the other hand, an overpopulation of trout is implied when all of the fish are small and some are skinny. When only a few large fish are caught or observed in a particular lake, it reveals that the plantings are about running out and that a need for more stocking is present.

When trout of several size groups are found in a lake, it suggests that the trout population is taking care of itself by natural reproduction. The presence of many small fish along the shore is another indication of natural reproduction.

Most of the fish caught are carefully released after being measured. A few are kept so that their stomachs may be examined to determine the types of foods which have been eaten. The color and firmness of the flesh is noted.

The most common types of insects found in the stomachs are midge larvae, pupae, and adults, caddis-fly larvae, water bugs and beetles, and various kinds of terrestrial insects. During the summer many insects drop into the water from the land and are devoured by the trout, but foods of aquatic origin are the main items of diet throughout most of the year.

Anderson

Angling on the Merced River, Yosemite Valley.

The sex of the trout is determined by the shape of the head and body formation as well as by the presence of eggs or gonads. The state of maturity of the trout is also shown by the presence and size of the eggs or gonads. This state of maturity in relation to the length of the fish serves as an indicator of the physical condition of the trout population. To determine the age of the trout in a lake, of few scales are collected for later examination under the microscope.

Special attention is paid to the species composition of the trout catch from an individual lake. This reveals the relationship of one species to another and the apparent advantage of the water for a particular species. This can best be shown by the following example. Rainbow trout have been planted in Buena Vista Lake several times since 1932. Eastern brook trout were last planted there in 1929. Yet few rainbows are now caught in proportion to the number of brook trout which are taken. This indicates that the rainbow trout have failed to become established in the lake in competition with the brook trout population, which has maintained itself by natural reproduction. It demonstrates that future stocking of rainbow trout will be of little value and that further stocking of eastern brook trout might create an excessive population of stunted fish.

The outlet of a lake is examined to determine its width and depth, type of bottom, favorableness for fish, the kinds of trout present, and the general physical conditions. It must be learned if there are adequate spawning areas, if falls are present to prevent the fish from returning to the lake after spawning, and how permanent the water flow is. In many of our lakes the adult trout leave the lake to spawn and cannot return because of natural barriers. They are lost down the outlet. In several lakes, enlarged permanent outlets furnish the only available spawning area for rainbow trout.

The temperature of the water and air is taken with a thermometer at the lake shore, the inlet, and the outlet. The water temperatures indicate the suitability of the waters for trout production. Temperatures also govern the numbers of fish seen or caught near the shore. When the water along the shore is cool, generally more fish are observed; when it is warmer, the trout retreat to the cooler depths of the lake.

At the inlet the size, condition of bottom, distance accessible for lake fish, spawning areas, permanency, and kinds of fish present are noted. The inlet acts as the "reserve bank" for the lake. If the spawning conditions in the inlet are good, the lake trout population can support itself by natural reproduction. If the inlet is poor in this respect, the chance of having a self-sufficient population of rainbow trout is not good.

In a lake with little or no natural reproduction, trout fishing can be sustained on a maintenance basis by the periodic stocking of trout. These fish are permitted to reach their prime and gradually diminish in numbers by angling and natural causes. The lake is then replanted. In this type of lake better survival of the planted trout is realized when only one age class of trout is present. Competition and predation is greatest among trout of mixed age groups.

The eastern brook trout are able to spawn naturally in lakes with sandy and gravelly areas and springs; therefore, they are often able to maintain self-supporting populations in lakes where the rainbow trout can not.

Several photographs are taken to illustrate the shape of the lake and the type of terrain and vegetation along the shore. Evidences of the fishing intensity are observed. These clues include the amount of refuse found along the shore, the number of footprints, the number and use of the campsites, and the condition of the garbage pits.

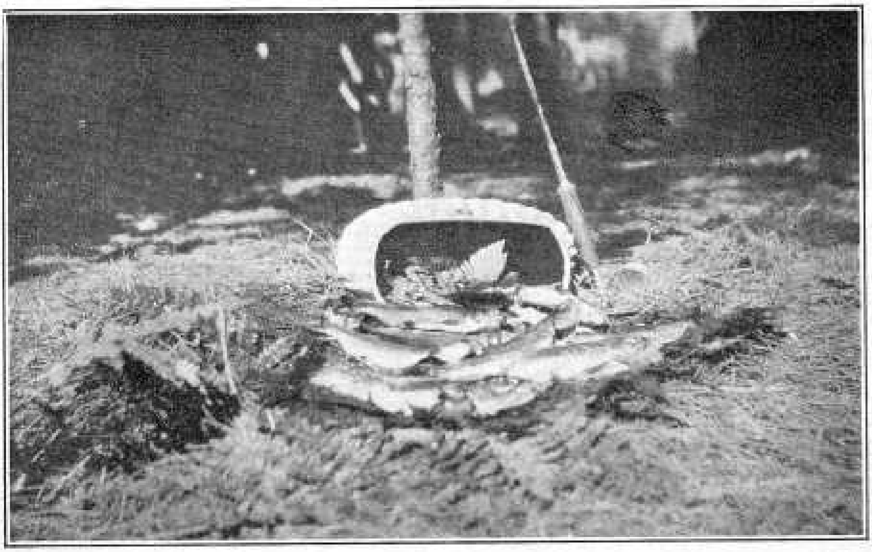
To assist in determining the surface area of the lake, a baseline is measured on the ground between two points which can be distinguished on the aerial photograph. The lake acreage can then be calculated by computing the ratio of this baseline to the measurement between the same two points on the aerial photograph, and by measuring the size of the lake on the photo.

Information secured on the lake survey is supplemented by reports received from rangers, packers, and anglers and by creel-census data. A preliminary stocking recommendation is made on the basis of this survey. This recommendation includes the numbers of trout to be stocked, the species to be selected, and the frequency of plantings.

A Lake Survey and Management Folder is completed for each of the lakes. These folders contain a report of the lake survey, maps, photographs, Yearly Reports of Fishing Conditions, a Stocking Record Summary, and the Trout Stocking and Management Form. The folders will be kept up-to-date by the addition of current information regarding the anglers' catches and success and the growth and establishment of the trout planted.

During the 1953 season the activities of the Yosemite Trout Investigations will consist of additional lake and stream surveys, continued studies at the Frog Creek Egg-taking Station, evaluation of the brown trout in the Merced River of Yosemite Valley, compilation of anglers' catch and fishing reports, and the completion of the Lake Survey and Management Folders.

The fishery resources of Yosemite National Park will be managed on a more scientific basis as the result of these studies of the Yosemite Trout Investigations.



EXPERIENCES WITH MILLIPEDES

By Daniel D. Deliman, Yosemite Field School, 1952

Not too long ago I believed quite firmly that a centipede had more legs than any creature. Then in the night an errant footstep left half-mangled in front of my tent a new animal to me—the millipede.

From this rather casual meeting several discoveries evolved that were to me quite noteworthy. The flattened specimen, in no way preserved, went the way of all flesh but certainly served as a step to more knowledge.

First, few people knew or cared much about the millipede. Whether it was in the repellent nature of the beast or in the seclusive habits, it was hard to say.

Second, it is not easy to observe or capture the millipede. It is not so fast, but is a night animal and is often the color of its surroundings.

The millipede belongs to the arthropod class of animals, or those with jointed legs, but it is studied separately from other such forms. Often black in color, here in Yosemite are found some with transverse bands of dark brown, alternated with a lighter shade of brown. Unfortunately a very fresh specimen, captured at night and with these markings as described, escaped from the wool stocking in which I had confined it. It is still a mystery, as the sock retained the knot of the heavy cord used to bind it.

Characteristic of this animal are the *two* sets of legs to each body segment, rather than one as in the centipede. The "hundred-legged worms," as centipedes are often called, may have from 15 to 173 pairs of legs in all, while some millipedes, or "thousand-legged worms," may have more than 400 legs.

Forward motion of the millipede becomes almost entrancing while watching the wavelike movements of the many legs. The activation begins near the tail and gradually undulates forward to the next group, "catches," and seems to wave on to still another group of legs.

The millipede has simple eyes, but judging from his crawling habits they are of close vision only. He will crawl forward apparently aimlessly until an object is placed in front of him. Then he will come to the very object, maintain contact, and, if it cannot be crawled over, he will only then veer around.

The habitat is usually damp, rotted areas and places of humus conditions. These are often under boards, old logs, piles of leaves, and similar forest situations. My tent in Camp 19, with a moderately preserved board floor, seemed to meet these conditions. I was able to observe four millipedes during my 7-week stay in Yosemite National Park.

The millipede's food seems to be decayed vegetable matter and some form of broad leaves, but they will also eat animal matter. Some species attack growing crops in damp soil, eating either the roots or the leaves that lie close to the ground.

In the matter of defense, the millipede's first instinct, as with most wild animals, is escape. When this fails it will fall back on another ruse of wildlife—a gland secretion. The millipede emits a "repugnant fluid," a yellowish secretion from a set of glands in each segment. Usually anyone who has picked up one of these cylindrical, many-legged creatures has experienced the obnoxious odor and the staining of fingers.

The potency of the volatile discharge is vividly illustrated by the experience related by Dr. Robert C. Stebbins:*

> A subadult western skink (*Eumeces skiltonianus*) . . . had been confined for 2 weeks in a quart jar with a loosely fitting lid. It appeared to be in good physical condition when two millipedes . . . were dropped into the jar with it. This was done because of lack of any other suitable container to restrain the diplopods—I wished to keep them alive for study. When I returned three hours later, the skink was dead. The jar smelled strongly with characteristic millipede odor. I assumed, tentatively, that the reptile had died as a result of inspiration of the fumes emanating from the bodies of the diplopods.

Dr. Stebbins goes on to describe another instance where, to check the results of the above theory, a young alligator lizard was placed in a pint jar with a tightly fitting lid along with a large millipede. The millipede had been placed in a double-walled wire-screen cage to prevent the reptile from coming into direct contact with it. The plan was to subject the lizard only to the volatile elements in the fluid secreted by the millipede. After a few minutes, during which the air in the jar was being charged with "millipede gas," the lizard began blinking. Its eyes were opened for increasingly shorter intervals until at last they were held tightly closed. Thereafter they were exposed only when the reptile was startled by shaking the jar and then they were blinked incessantly and were finally closed when the animal became calm. The vapor apparently irritated the sensitive surfaces of the eyes.

About 57 hours after its entry in the jar, the reptile was dead, having shown signs of grogginess for some time. The last time the millipede was observed alive was about the 40th hour. No marks of violence were seen on either animal. Seemingly both were killed by the millipede's gas in the narrow confines of the jar.

In order to eliminate the possibility that the lizard might have died of suffocation, due to the limited amount of air in the jar, another and larger individual was placed by itself in a container of the same size with a tightly fitting lid. It was removed after a week in good condition.

Evidence seems to point to inhalation as the cause of the lizards' death, rather than absorption of the fluid which produced the gas, as the reptiles' impervious skin would no doubt prevent entrance of the fluid.

Concerning the chemical nature of the fluid in question, it is known that with the majority of millipedes it is chiefly prussic acid, together with quantities of iodine and chinone. Prussic acid is a hydrocyanide and is highly toxic. Perhaps, in gaseous form (as hydrogen cyanide), this substance is picked up by the hemoglobin in the blood stream, replacing the oxygen, leading to suffocation of the victim.

The survival value of such a defensive mechanism is so obvious as to need no discussion. It is a repelling, and when concentrated, can be a lethal, substance.

Dr. Stebbins also adds that millipedes, despite their general repugnance, are eaten by other creatures. Salamanders and coyotes have been observed doing so and with no ill effects.

It is my own impression, as observer of antics of the millipede in lesser lights, that this field offers a wide latitude in potential discoveries of this myriad-legged denizen of a dark and damp environment.

*"Lizards Killed by a Millipede." *The American Midland Naturalist* 32(3):777-8, November 1944.

DIARY OF A TRIP TO MOUNT DANA

By Joseph E. Wright, Yosemite Field School, 1951

Such a pleasantly filling meal those lima beans and salt pork had made last night, after the trip from Yosemite Valley. But whatever the cause, noticeable results appeared this morning—stomach disorders of varying intensity in more than half of our group, including me. It must not interfere with the climb today.

My nose is red, as you can see. It may peel, and there will be new skin. The burning will soon be forgotten. But I have memories. Believe me, I have memories. The basis for some of them I'll tell you. (You'll never know all until you meet exactly the same circumstances, and maybe you will.)

Mount Dana is that reddish mass of mountain almost directly east of Tuolumne Meadows. It's a mere obstacle of 13,055 feet. Its color is that of older metamorphic rocks, rocks which have changed in form. It is the third highest peak of Yosemite National Park, exceeded only by Lyell and Rodgers, and all three are within 40 feet of each other's height.

It was a lovely mountain morning—still and clear, with a livening crispness—as we left the Tioga Pass Ranger Station, walking past meadow ponds and skirting willows and pines. John Muir once remarked: "Girl graduates, said to be sweet, are not so sweet as girl mountaineers. May their tribe increase until all the mountains echo with their happy voices." We were fortunate in having nine of this charming tribe in our group.

Our gradual ascent was on easy switchbacks through variable flower gardens having tall blue lupines especially prominent, and through whitebark pines to a grassy meadow garden, or alp. Refreshing streams had cut their way a foot or more beneath the spongy sod surface. How long it must have been before sufficient soil could be produced to support such plant life! There were no trees from this point to the top, a bit less than halfway at this place. This alp was a spot in which to lie and dream, or to look from, a place to study flowering plants seemingly without end.

Two or three of our group actually did find this alp especially appealing for several hours. Later, as we descended from the summit, we met them still courageously ascending, apparently much refreshed.

Following the dominant lupines came giant delphiniums, phlox, and sky pilots of delicate blue. Among the boulders the golden heads of *Hulsea* brightened the darkness.

Above the alp we passed a couple of small snow spots before we reached a benchlike area at 11,300 feet. A rock cairn is there to show that others have come before. (In fact, Carl Sharsmith has been up Dana more than 50 times and cherishes every trip!) You might desire to pause for a spell, not because of any physical need, of course, but because it is truly a view with room. You can look down and see your beetlelike cars in the distant parking area at Tioga Pass. You can visit with "Old Joe," the busy marmot, and perhaps with Josephine and some little Jo-jo's.

Up over the dark rocks of considerable color variation we climbed, until suddenly we reached a snow cornice and looked over a rocky shoulder at distant Mono Lake, gloriously blue in the haze overhanging the desert. Closer, beneath us in Glacier Canyon, were two lakelets of a darker blue, fed by Dana Glacier below and to our right. Immediately beyond these lakelets was Dana Plateau, itself 11,500 to 12,000 feet high and mostly below and slanted toward us.

On top we signed the register; some of us ate our trail lunches, supplemented by juice-flavored snow, and we all looked far and wide. There were many lakes, like eyes, round and oval. Helen Lake to the south was high in a cirque on the shoulder of Kuna Crest. Many unnamed, lesser lakes were off to the right. Northerly lay long Saddlebag Lake, outside the park. To the left of it at some distance was the steep south wall of impressive Mount Conness. Down and westward, far off, Tuolumne Meadows was a patch of green velvet.

In looking eastward and to the right, one could see a pine forest (called Jeffrey pine by Carl Sharsmith, but so far that I could not tell), jutting like a hand into the desert—evidence of a lower point in the range which allowed moisture-laden air from the westward slopes to pass through to that part of the desert beyond.

All in all, it was a place from which to review where one had been and to consider future action. At this point you might consider your shoes, your feet, your hiking condition. You'll become aware of what to do better next time.

If you want lasting memories, you've got to go after them. Exercise those muscles of yours, and you'll find countless sights on which to feast your eyes.

Climb a real mountain—Dana!

Anderson

View south from Mt. Dana's summit. Mt. Lyell and Lyell Glacier to right of center.