CONSERVATION IN THE NATIONAL FORESTS OF CALIFORNIA

UNITED STATES DEPARTMENT OF AGRICULTURE - FOREST SERVICE

CONSERVATION IN THE NATIONAL FORESTS OF CALIFORNIA

A Unit of Study

By

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TO THE TEACHER

Here is material around which a unit of study on the national forests of California can be organized. It is directed at the level of grades 7 through 10. Key words, problems and references are included. Supplemented by the materials described in the leaflet *Educational Materials* mentioned at the bottom of page 57, a rounded-out unit can be developed. However, if less time is available, additional aids are not needed as all the more essential information, including maps, will be found in this booklet.

The publication has been reviewed by the Conservation Education Committee of the California Department of Education.

CONTENTS

YOUR NATIONAL FORESTS

Your National Forests

WE HAVE a feeling for this heritage of ours —for our forests, for our mountains. Have you heard the rush of mountain streams and felt the cool shade of the forest on a hot day? We like to smell pine needles fragrant under the sun, and we like to see the trees of the forest covering the hillsides with green. Forests are useful, and necessary to our daily living: They yield water; they make life comfortable by furnishing lumber for homes; they provide feed for sheep and cattle; they provide homes for wild animals and birds and fish. And forests are fun, too, because we can hike and camp and picnic in the woods.

In this booklet, we shall learn about the uses of the forest. We shall learn about the national forests of California in particular and what they do for us. We shall learn what "forest conservation" means. Not many people know the real meaning of conservation, what we must conserve, or how to go about it.

After studying this booklet you will know more about natural resources and what part they play in your life.

We may as well begin by describing the different kinds of forests and parks. Many people on vacation do not know whether they are in a national forest, or in a national park, or in a state

park. How many persons ever notice the sign at the entrance to such areas? Do you? It makes a difference, too, because the rules about camping, buying timber and such matters are different.

National parks and monuments are managed by the National Park Service of the United States Department of the Interior. These are areas of scenic, historical, or scientific interest set aside for the enjoyment of the public. They are usually left in a natural condition except for necessary tourist accommodations. Cutting of timber, grazing of livestock, and hunting are not permitted in these areas. A charge is made for cars that enter national parks but camping is free.

NATIONAL PARKS AND MONUMENTS IN CALIFORNIA

Parks:
- Yosemite
- Kings Canyon
- Sequoia
- Lassen Volcanic

Monuments:
- Lava Beds
- Muir Woods

Monuments—Continued
- Devil Postpile
- Death Valley
- Channel Islands
- Cabrillo
- Joshua Tree
- Pinnacles

State parks, beaches, and historic monuments are administered by the Division of Beaches and Parks of the California Department of Natural Resources. There are 90 of them — sandy beaches, rocky coast lines, lakes, lagoons, mountains, deserts, and timber areas, including groves of redwoods. Campgrounds are provided in about 30 of these areas, and a charge made for their use.

Some State Parks, Beaches, and Historic Monuments

Parks:
- McArthur-Burney Falls
- Humboldt Redwood
- Mount Tamalpais
- Big Basin
- Point Lobos
- Anza Desert
- Mount San Jacinto
- Big Sur

Beaches:
- Santa Monica
- Manhattan
- Alamitos

Beaches—Continued
- Sunset
- Carpinteria
- Van Damme

Historic monuments:
- Donner
- Marshall
- Fort Ross
- Fort Tejon
- San Juan Bautista
- Monterey
- Sonoma Mission
- And many others

State forests are administered by the Division of Forestry of the California Department of Natural Resources. There are 8 state forests, totaling about 70,000 acres. The Division of Forestry protects from fire 24 million acres of privately-owned lands that lie outside national forests and national parks. It administers the Forest Practice Act which applies to timber cutting on private land.

This booklet deals chiefly with national forests. National forests are administered by the Forest Service of the United States Department of Agriculture, under a policy of multiple use, which means that many uses of the forest may be permitted, all in the same area. For example, a mountain meadow may provide grass for cattle; a location for a boys' or girls' camp; a stream for fishing, swimming, irrigation, or electric power; and the surrounding timber may be cut, with care, for lumber. The purpose is to have each acre of national-forest land contribute the greatest good of the greatest number in the long run, whatever that good may be.

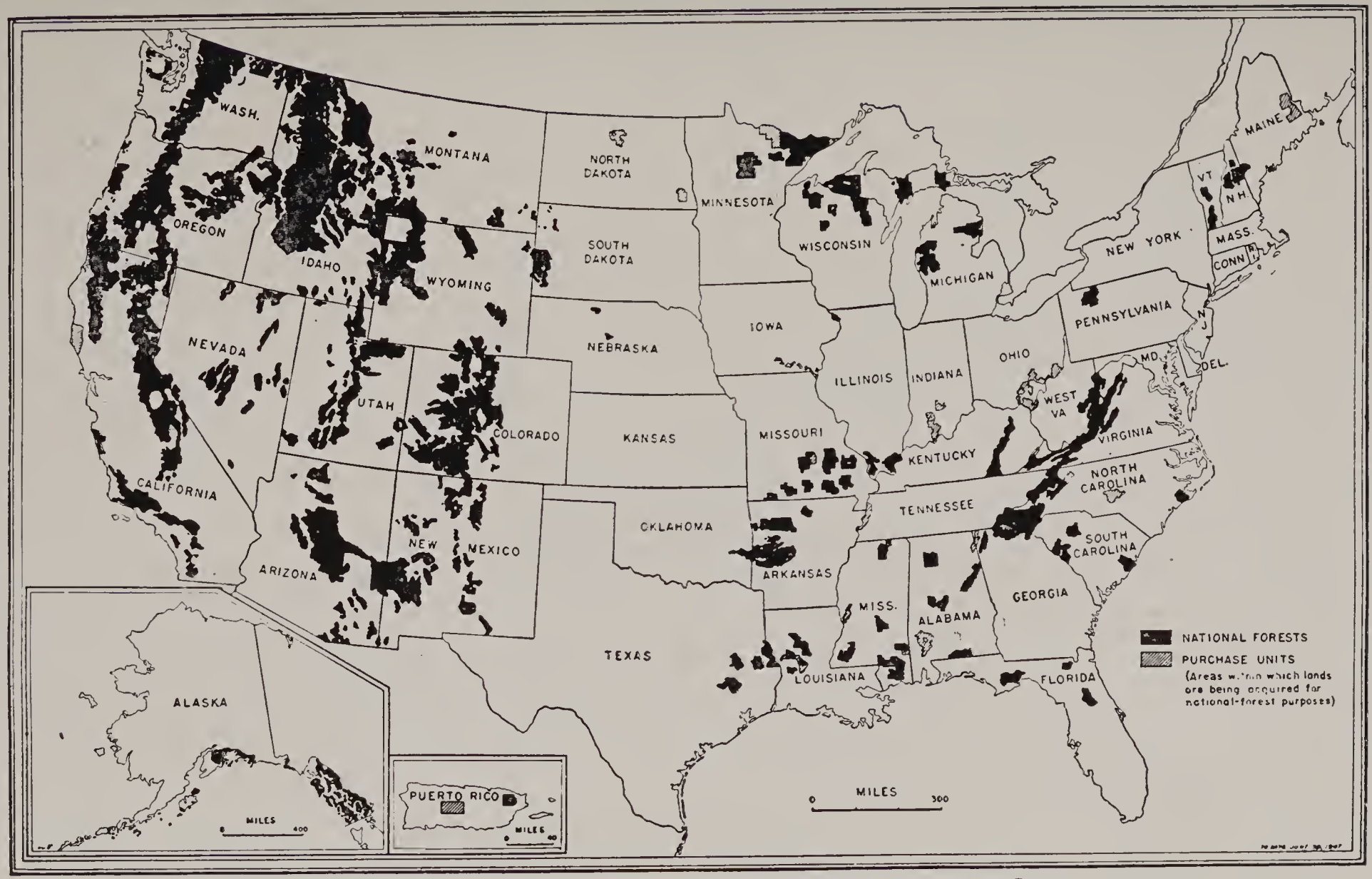
National-forest land belongs to the federal government, and

so it is not taxed like private land. If this land were privately-owned, the owners would have to pay taxes on it into the county treasuries. So it is only fair that county governments receive a share of money from the national forests. Actually, national forests *do* contribute to county treasuries.

Although national-forest land is not taxed, money is paid to counties *in place of taxes.* It is done in this way: Money is collected by national forests (1) from the sale of timber to lumbermen; (2) from owners of cattle, sheep and horses, who pay for grazing privileges; (3) from people who pay for use of the land for summer homes, resorts, power lines, etc. Then, of all the money earned by the national forests of California each year, 25 percent or one-fourth is returned to the State of California. It is distributed by the State among the counties that contain national-forest land, in proportion to the amount of such land in each. The counties must spend this money on schools or roads.

In addition, ten percent of the money earned by the national

A ranger station in a national forest.



NATIONAL FORESTS OF THE UNITED STATES

forests of California is returned to the U. S. Forest Service to be spent upon roads and trails in California. This 10 percent, added to the 25 percent mentioned above, means that 35 percent of the money collected is returned in place of taxes. In this way, in 1951, the "national-forest" counties in the State received $972,650 for schools and roads and there was $389,060 received by the U. S. Forest Service for forest roads and trails in California.

More and more the national forests are "paying their way." Some forests earn more than the government spends for their protection and management.

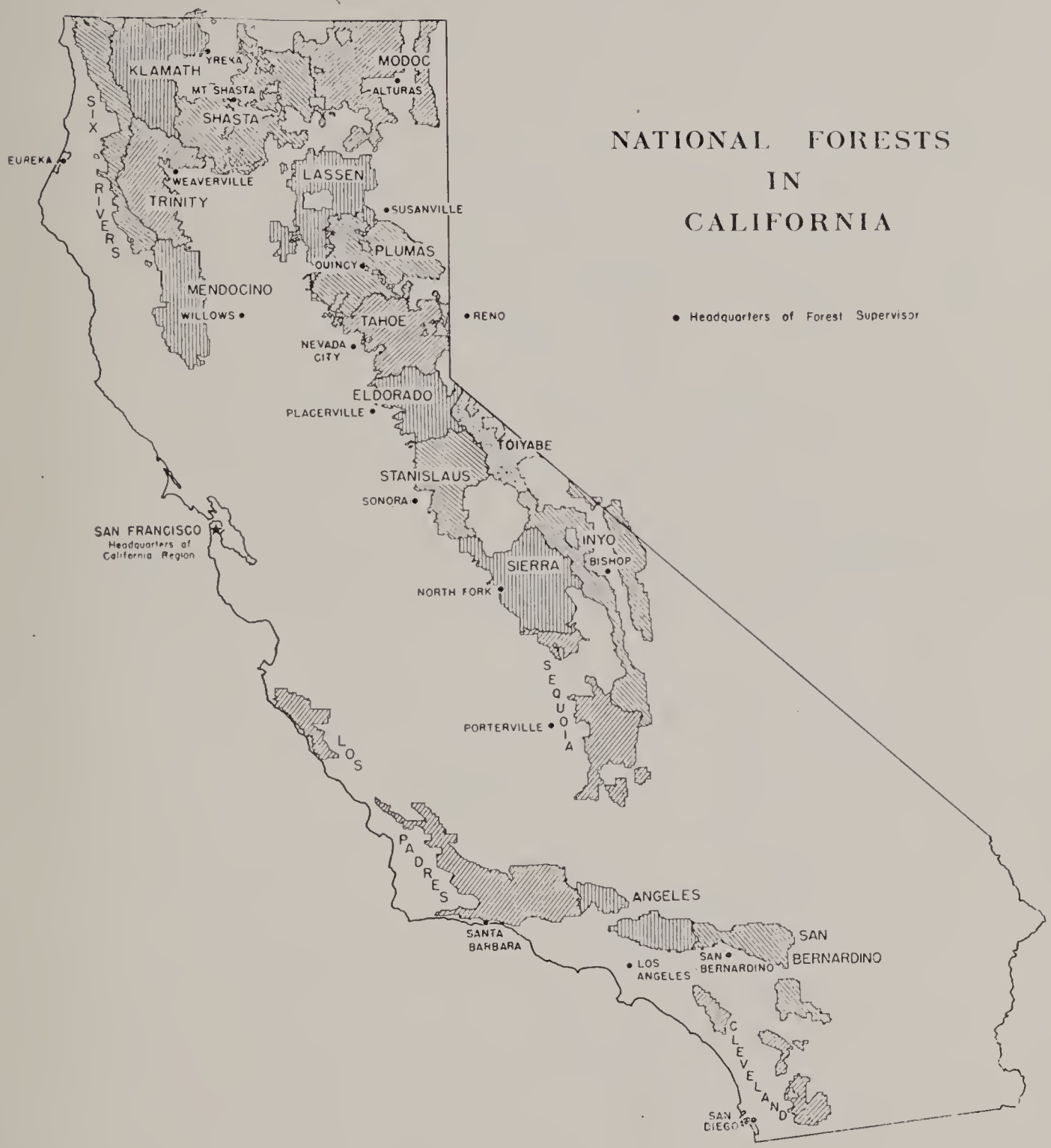
National forests are owned by all the people. In the United States, there are 180 million acres of national forests and 150 million people. So you see, everyone — including you — owns over one acre of national-forest. Examine the map on page five.

Most of the national-forest land is in the West—in the Rocky Mountain and Pacific Coast States. For convenience in administration, the country has been divided into 10 national-forest regions, of which California is one.

California has an area of about 100 million acres, of which about 20 million acres are in national forests—nearly one acre in every five. The map on page seven shows names of national forests in California.

A national forest contains about one million acres under the administration of a forest supervisor. There are 18 national forests in California. Each is divided into about five ranger districts. A district is administered by a district forest ranger.

The principal *forest and park agencies* in California, then, are four: (1) U. S. Forest Service; (2) National Park Service; (3) California Division of Forestry; and (4) California Division of Beaches and Parks. The first two are federal agencies and the last two are state agencies. Examine the outline on pages 59


NATIONAL FORESTS
IN
CALIFORNIA
• Headquarters of Forest Supervisor
KLAMATH
YREKA
MT SHASTA
SHASTA
MODOC
ALTURAS
SIX RIVERS
EUREKA
WEAVERVILLE
TRINITY
LASSEN
SUSANVILLE
PLUMAS
QUINCY
MENDOCINO
WILLOWS
TAHOE
RENO
NEVADA CITY
ELDORADO
PLACERVILLE
TOIYABE
STANISLAUS
SONORA
SAN FRANCISCO
Headquarters of California Region
INYO
BISHOP
SIERRA
NORTH FORK
SEQUOIA
PORTERVILLE
LOS PADRES
ANGELES
SANTA BARBARA
SAN BERNARDINO
LOS ANGELES
CLEVELAND
SAN DIEGO

and 60 of the Appendix to learn more about these units of your government.

While not primarily concerned with forests or parks, at least in California, the U. S. Bureau of Land Management administers large areas of land, often arid, that are useful for grazing purposes and as a habitat (home) for wildlife.

Most other state and federal agencies that deal with natural resources are concerned with *special functions* and not with administration of the land itself. For example, several agencies help the farmer to manage his farmland better: the U. S. Soil Conservation Service, the Federal Production and Marketing Administration, the State College of Agriculture, and the State Soil Conservation Commission. The California Department of Fish and Game manages hunting and fishing regardless of who owns the land, and so on.

The following words are "keys" to understanding what you have read. Make sure you understand them before studying further.

KEY WORDS

National forest
Multiple-use policy of land management
Payments in place of taxes
To administer land
To administer functions

PROBLEMS

1. Examine the map on page seven. What is the name of the national forest nearest your home, and where is its headquarters?
2. Name other national forests that are closest to your community. Where are their headquarters?
3. Examine the map on page five. What six states have large areas of national-forest land? Name six states which have no national forests.
4. What are the principal differences between the four important forest and park agencies?
5. Some agencies administer land while others deal with functions. What is the difference? Give examples of each type.
6. Do the national forests contribute to the treasuries of county governments? How? Which counties receive the money?

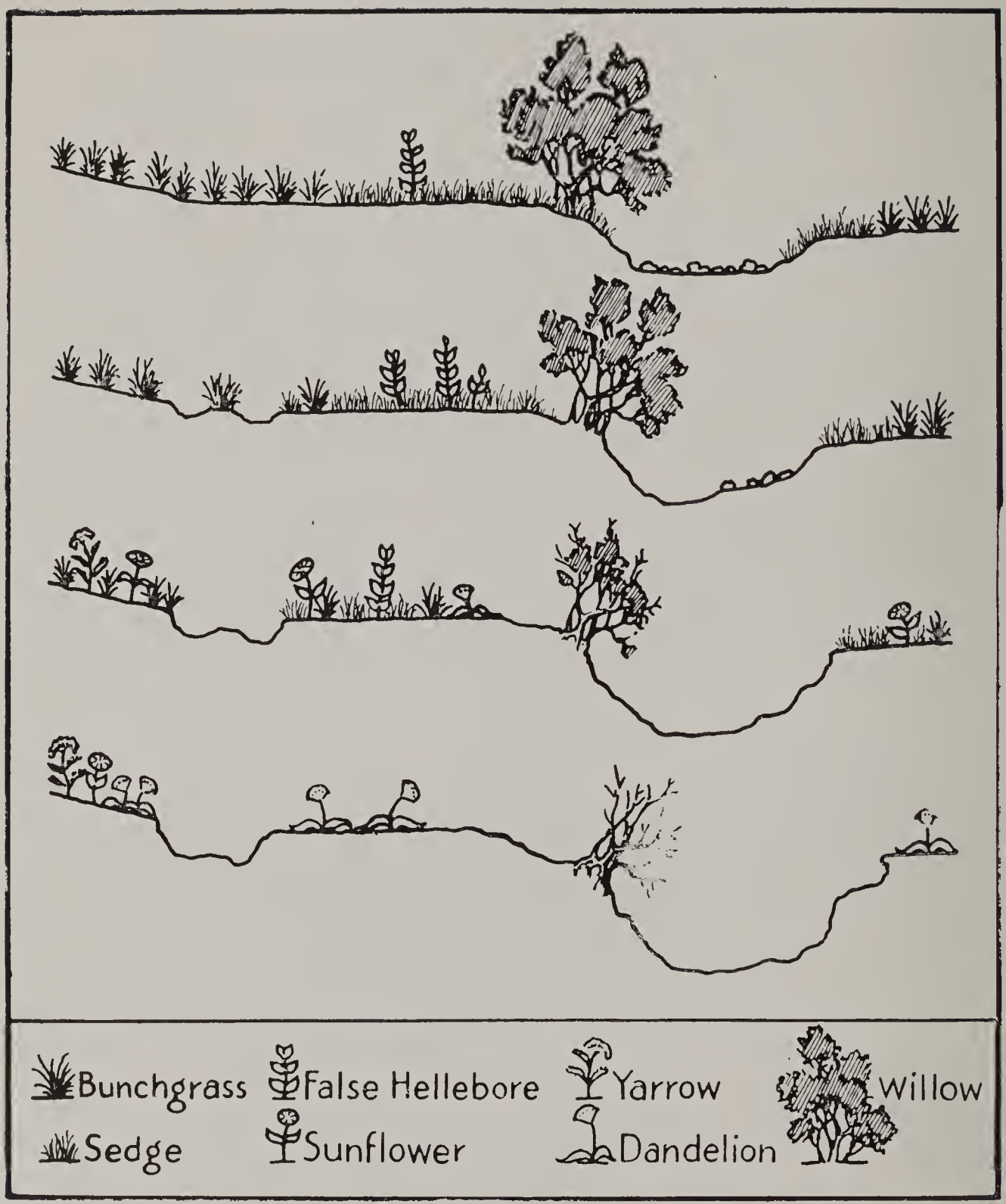
NATIONAL FORESTS FURNISH FORAGE

National Forests Furnish Forage

ON NEARLY one-half the national-forest land in California, grazing (obtaining feed) by livestock is permitted. Approximately 96,000 cattle, 91,000 sheep, and 5,000 horses and goats are permitted each year. A charge is made for this grazing. National forests where grazing is an important activity are: Modoc, Inyo, Klamath, Lassen, Shasta, Tahoe and Mendocino. Find these Forests on the map on page seven.

Some ranchers are issued permits to graze livestock in the forest during the summer. Livestock feed in pastures at the ranch at other seasons of the year, or are fed hay in the winter. The ranches are usually located in the foothills or low valleys, or in mountain valleys within the forest. National forest range is usually at higher elevations where the feed stays green longer in summer than it does in the low lands.

Good forage requires good soil conditions. "Forage" means plants eaten by wild or domestic animals; it includes grasses, weeds and low shrubs. The top layer of soil is called *topsoil.* Topsoil is the "food zone" from which roots take up water and dissolved minerals. It contains organic (living or once-living) matter. The subsoil (undersoil) is less fertile and less productive. Usually only worthless weeds will grow in it.



This shows typical changes in a meadow due to overgrazing. The more palatable and nutritious species such as grasses and sedges give way to weeds of little value. Erosion begins, gullies form, plants disappear from the stream channel. Plants become spaced farther apart. The surface becomes packed and the water table is lowered.

The decayed and decaying matter in the topsoil is called humus. Humus causes soil to be fertile because it is rich in nitrogen. Humus also adds "bulk" to the topsoil because it contains large air spaces. For this reason, soil with an abundance of humus soaks up and holds large amounts of water.

Without roots of plants to hold the topsoil in place, it may be washed off or blown away. Such loss of soil is called *erosion.*

When range ("wild-land pasture") is damaged, forage plants grow small and weak and scattered. On good range, the same kinds of plants grow large and strong and close together. On damaged range there is usually considerable bare ground, with small rocks and pebbles visible, showing that the fine grains of topsoil have been eroded.

Grazing should begin in the spring only after the forage plants have a good start in growth. Continued too-early grazing makes the plants weaker each year until they finally die out.

Good plants are good soil-builders. Through action of their roots, and with what fertilizer they add when they decay, they improve the soil. Allowing too many animals to feed will cause plants to die out, especially the better kinds. Then worthless plants and bare ground take their place.

A substantial amount of herbage must be left uneaten at the end of the grazing season if the range is to be kept in good condition from year to year. This means that if all the range is grazed each year, an average of about one-third of the height growth, or one-half of the dry-weight volume of the plants must be left. It is also advisable to postpone grazing until plant maturity on a different portion of the range each year.

Sometimes, damage is caused not so much by allowing too many cattle on the range, as by permitting them to congregate. Cattle like to stay close to water, particularly in shady places. Individual animals have favorite spots where they prefer to

Cattle harvest the forage on the meadows and in the open forests of the foothills.

stay. To get them to spread out and use the forage evenly, several devices are used:

1. Cattle may be "herded" by a cowboy to those parts of the range it is desired to graze.
2. "Drift" fences may be built to keep cattle on certain parts of the range and away from other parts.
3. Cattle crave salt. They also require water. So salt, usually in the form of blocks, is placed at some distance from springs or creeks. The cattle graze between salt and water, using parts of the range that would otherwise be untouched.

Sheep are herded from place to place each day by a herder. If sheep are allowed to use the same "bed ground" several nights in succession, damage from overgrazing and trampling will result. They should use a new bed ground each night. Sheep are

usually "salted" near their bed grounds. Salt in the form of large crystals or granules is commonly used. If sheep are herded over steep ground too frequently or in too large numbers, erosion usually occurs.

In some parts of California it is common practice to set fire to brush and burn off the range to encourage better growth of grass. Fire is always dangerous, even when it is used as a tool. Burning may be followed by a temporary increase in the cover of grass and weeds, but frequently the burned area remains bare and subject to abnormal runoff and erosion for several years. Good management calls for reseeding areas that may be burned. A great deal more scientific research is necessary before the use of fire can be understood well enough to forecast accurately whether benefits from burning a particular piece of land will outweigh damages.

Range management means using range wisely so that continuous crops of high-quality forage are grown in abundance.

Sheep graze at higher elevations, often above timber line.

The rules are simple, but it is not always easy to put them into practice.

Rules for Wise Use of Range

1. Allow livestock on the range when plants are ready in the spring—not before.
2. Allow proper numbers of livestock—not too many.
3. Keep livestock scattered on the range.
4. Leave a substantial amount of herbage uneaten each year.

Overgrazing may be due to too many animals, to congregating together, or to too-early use of the range. Overgrazed range is like a sick person that needs treatment. It may be necessary to keep off some, or all, of the livestock for several years so that the range may recover. Usually better scattering of the animals will help. Sometimes a later start for spring grazing will do the trick. Then if the range does not improve naturally, reseeding with grasses may be necessary. In some areas of California, such as the northeastern part, large herds of deer may cause overgrazing.

Brush often has to be removed before reseeding and the ground may have to be prepared by disking. Much range land is too steep or too dry for satisfactory reseeding. However, thousands of acres of damaged range in California could be successfully reseeded if funds were available. The high cost of reseeding brings out the importance of preventing damage in the first place by using range wisely.

Left—good range. Right—overgrazed range.

Forest rangers work with owners of permitted livestock to see that national-forest ranges are used in ways which will provide plenty of forage year after year. They prepare plans showing what parts of the range will be grazed at certain times, how salting will be done, and the routes by which livestock are to enter and leave the range.

KEY WORDS

Topsoil	Range management
Forage	Salting
Erosion	Overgrazing
	Reseeding

PROBLEMS

1. What are some of the signs that show a range has been overgrazed?
2. See if you can figure out why newly-reseeded range must be protected from use by livestock for several years.
3. What are the rules for wise use of the range?
4. What are some of the ways in which cattle may be kept from congregating?
5. How does continued too-early grazing affect forage plants?
6. Why is it good business to obtain sound advice before using fire on brushlands?


NATIONAL FORESTS GROW TIMBER

National Forests Grow Timber

IN THE United States, we have almost two billion acres of land. About 461 million acres of this are "timber" forest—land capable of growing good timber for lumber and other products. Another 163 million acres are "protection" forest and brush, valuable for protecting water supplies, but not suitable for growing good timber.

Of California's 100 million acres, about 17 million acres are timber forest, one-sixth of the State. Of this, only about 13 million acres are available for cutting. The rest is set aside in parks, or lies in country too rough to be logged.

National forests contain almost half of the timber-forest *acreage* in California that is available for cutting. The rest is privately-owned. In *amount* of available timber, however, there is half again as much private timber available—105 billion board feet. (Board feet means the amount of lumber in a board one foot long, one foot wide, and one inch thick.) National forests have 73 billion board feet. The private timber is being cut more rapidly as it is usually better timber, and found at low elevations on ground that is easier to log. In the future national forests will furnish an increasing percentage of our timber, when privately-owned timber becomes scarce.

Marking a tree in a national forest, using a paint gun. The paint mark lets the fallers know they may cut this tree. Marking is a first step in good forestry practice.

Amount of Timber in the National Forests of California Available for Cutting

Species (kind)	Billion board feet
Ponderosa pine	24
Red fir and white fir	20
Douglas-fir	16
Sugar pine	9
Incense-cedar	3
Redwood	1
Total	73

In the United States as a whole, about 250 board feet of lumber are used yearly per person, but in California each of us

uses about 500 board feet per year. Why do Californians use twice as much lumber as the average person in the rest of the country? There are two reasons: (1) Population and business are growing. New homes, new factories, new stores, require lumber; even construction with concrete requires "forms" of wood into which the concrete is poured. (2) A great amount of lumber is required for crates and boxes in which the vegetable and fruit crops are packed.

California ranks second in lumber production, behind Oregon and ahead of Washington. But California produces only about four-fifths of the lumber it uses. Lumber is shipped from Washington, Oregon, and the Southern States to supply the demand for certain kinds, and California ships smaller amounts of its own lumber to the Eastern States.

Lumber Production in California

Year	State Production (billion board feet)
1950	4.1
1949	3.7
1948	4.0
1947	3.5
1944	2.5
1932	.7
1926	2.2

The above figures do not show production of timber for plywood, fence posts and other products, which added another .4 billion board feet in 1950.

National forests now furnish about 13 percent, or one-eighth of California's total production of lumber. Plumas, Lassen and Modoc National Forests lead in sales of timber to lumbermen; find them on the map on page seven. The four Forests in southern California sell practically no timber, since they are

mostly covered with brush and are chiefly valuable for watershed protection, flood control, and recreation. All other national forests in California sell considerable standing timber, the heaviest production being in the Sierra Nevada and lighter production in the national forests of northwestern California.

In California it takes about 100 years for a tree to grow to saw-timber size. ("Saw-timber" means timber which is sawed in manufacture; for example, timber sawed into lumber. Timber not sawed may be sold "in the round" or split out, like grape stakes.) If all the trees are cut at one time, it is necessary to wait 100 years or so until a complete new forest grows before timber can again be cut in the same area. However, if medium-sized and large healthy trees are left in the first cutting, they will keep growing and keep adding valuable wood. Then another profitable cutting can be made, perhaps 25 years after the first.

Good forestry practice in California consists in selecting individual trees, or groups of trees, for cutting, and harvesting them in such a way that a new forest will grow from seed, even planting young trees where the seed crop fails. The old, the slow-growing and the weak trees which are liable to be attacked by insects should be removed. Sufficient trees for seed and for later cutting should be left.

To encourage leaving more trees on private land for successive cuttings, fire protection should be made much better, and there should be better timber-tax laws so that lumbermen do not have to pay heavy taxes year after year for many years on the land where the young trees are growing.

Timber land is not always treated as though there were other years ahead. Forests are often cut without saving some of the

This forest was cut under good logging practice. The soil is protected and will not wash away. Fast-growing trees have been left for seed and for a later harvest. Small trees were not destroyed.

fast-growing trees. Trees may be cut high on the stump, wasting the best lumber. Small trees may be broken off because of carelessness in felling large trees or in taking logs out of the woods with tractors or drag lines. Forest fires may start and spread through the area, completing the damage.

Large amounts of wood are wasted in logging and at the sawmill. Some of this waste is avoidable, and some is not. We must find ways to manufacture this material into useful products.

Many communities depend upon logging or sawmills for their existence. As long as the timber holds out, these towns will continue to prosper. Men will work in the woods or in the mill, and raise families in prosperity. There will be churches, and stores, and banks, and schools, and homes. In any forest large enough to support a community, the cutting of timber can go on forever if it is planned properly. That is called sustained-yield cutting.

This forest was cut under bad logging practice. There are no trees left for seed or for the next cut. The soil is left unprotected. Wildlife and watershed values have been destroyed.

Natural resources like forests and grass and fish and game which "keep growing" do not have to be locked up and not used in order to have a future supply. But—they do have to be used wisely.

KEY WORDS

Timber forest	Timber crop
Protection forest	Sustained-yield cutting
Timber-tax laws	Marking timber

PROBLEMS

1. Name two things that will encourage lumbermen to leave more trees when logging privately-owned land.
2. Name four good forestry practices.
   (Example: Select certain trees to be saved for the next cut.)
3. Name four indications of bad logging practice.
   (Example: No plan for leaving certain trees for the next cut.)
4. What species of commercial timber grow in the national forests of California in the largest amounts?
5. What is the difference between timber forest and protection forest? In what part of California is the forest mostly of the "protection" type? What are the chief values of this kind of forest?
6. Where does California rank as a producer of lumber? How much lumber does the average Californian use as compared with the U. S. average? Why?
7. Why will the national forests be more important in the future as a source of lumber?

NATIONAL FORESTS PROVIDE FUN AND SPORT

National Forests Provide Fun and Sport

RECREATION is one of the most important "industries" in California. Along the seacoast, in the redwoods, in the mountains, in the desert, we find resorts and playgrounds. California's outdoors is used by a great many people for recreation. Besides a large number of residents, there are millions of out-of-State visitors. It is difficult to take care of the huge crowds in the national parks and national forests with the men and funds that are available.

The 18 national forests of California are visited by nearly 4 million people each year, who stop in the mountains to fish, hunt, swim, ride horseback, hike, and camp. National forests where recreation use is heavy include: San Bernardino, Angeles, Inyo, Stanislaus, Eldorado and Sierra. Find them on the map on page seven.

Some forests are year-round playgrounds because skiing brings thousands of visitors in winter. There are 50 popular winter-sports areas within the national forests. In many of them, mechanical ski-lifts are in operation. At others, only the simpler rope tows are provided. Many skiers prefer "cross-country" trips to the more crowded hills at resorts.

Following are some of the more important vacation spots in national forests. Have you visited any of them?

Well-Known National-Forest Recreation and Scenic Centers in California

Klamath River
Mount Shasta
Salmon-Trinity Alps
Yolla Bolly Mountains
Lake Almanor
Feather River
Lakes Basin
Lake Tahoe region
Pinecrest
Silver Lake
Bass Lake
Huntington Lake
High Sierra area
Mammoth Lakes region
Mount Whitney
Santa Ynez River
Mount Pinos
Angeles Crest Highway
Mount Wilson Observatory
Big Pines
Crystal Lake
Lake Arrowhead
Big Bear Lake
Rim-of-the-World Drive
Palomar Observatory
Laguna Mountain area

Each year about 13 million people drive through the national forests of California on business or to enjoy the scenery. To picture this, imagine a single line of cars stretching from New York to the Pacific Coast. There are rustic signs at the entrance to each national forest. Next time you drive through the mountains,

see whether you can tell by the signs whether you are in a national forest.

Portions of certain national forests, called *wilderness areas,* have been preserved in a wild condition for the enjoyment of those who want to live close to nature. No construction of roads, summer homes, or resorts is allowed. These are areas of rough mountains and forests, rich in scenic beauty, away from roads, where people can hike, take pack trips, fish, and camp in tents.

Fifteen of the national forests in California — all except Tahoe, Sequoia, and Plumas—have at least one wilderness area. Only a small part of the national forests, 1½ million acres in California, or eight percent, has been set aside for this purpose. On the remainder, continuous crops of timber are grown and harvested, cattle and sheep are grazed, roads are built, and the public is permitted to use the land in accordance with the policy of multiple-use.

There are over 1100 recreation areas in California in which the U. S. Forest Service has constructed over 9,000 family camp or picnic units similar to the one shown in the photograph below.

Each unit consists of stove, table, car-parking space, and a place for a tent. There are roads, water supplies, and toilets in all improved campgrounds. A small charge is made at a few of the larger campgrounds; in nearly all cases, however, there is no charge.

Youth camps, municipal recreation camps, summer homes, and resorts have been constructed under permit in the national forests. They are located in areas especially planned for the purpose. There is a charge for such uses. Simple design, quiet colors, and rustic appearance are encouraged.

Saddle horses, and pack horses or mules may be hired at resorts and ranches in the national forests for those who enjoy riding the trails. Guides may be hired also. Pack animals are sometimes taken on "walking" trips to the high country. They carry the camp equipment so that it is not necessary for the hiker to carry it on his back.

Open campfires and smoking are usually not allowed in most national forests when the fire danger is high and the surroundings inflammable. Be sure of the rules about fire—read the fire-

warning signs and ask the Ranger if in doubt.

Be a good citizen—enjoy your forests but protect them as well. Observe the Code of Outdoor Good Manners:

Don't deface trees and signs.
Clean up papers and rubbish.
Keep streams and lakes pure.
Be a good sportsman and obey the laws.
Prevent fires—keep your forests green.

KEY WORDS

Recreation resources

Campgrounds

Wilderness areas

Outdoor good manners

PROBLEMS

1. For what kinds of recreational structures have permits been issued in national forests?
2. How are wilderness areas different from other areas of national-forest land?
3. Is there a charge for entering a national forest? Is there a charge at most national-forest campgrounds?
4. From memory name 10 of the better-known recreational and scenic centers located in the national forests of California.
5. Suppose you wanted to camp in the national forest nearest you, outside a regular campground. Would you be allowed to do so? How would you go about finding out the rules?
6. What is your solution to overcrowding in campgrounds?
7. In your own words tell what the Code of Outdoor Good Manners means.


NATIONAL FORESTS PROVIDE A
WILDLIFE HABITAT

National Forests Provide a Wildlife Habitat

To BECOME abundant and keep healthy, wildlife must have favorable surroundings—a good *habitat.* The Forest Service maintains and improves the habitat of wildlife in the national forests.

Many of the 4 million people who stop and visit the national forests of California each year are fishermen or hunters. There are about one million persons in California who buy fishing licenses each year and a half million who buy hunting licenses. They are estimated to spend 250 million dollars a year in connection with their sport. California's fish and game resources, not including food value and commercial fisheries, are estimated to be worth over six billion dollars.

Rules and regulations concerning hunting and fishing are made and enforced by the Department of Fish and Game. This Department also determines the fees that will be charged. Their rules apply to national forests as well as to all other land in California. But both State and Forest Service work together in deciding what needs to be done to help produce good "crops" of fish, birds, and wild animals.

From the standpoint of wildlife, California is fortunate in having so much national-forest land. Most of the State's wild

land can be used for growing wildlife crops, because national forests cover nearly one acre out of every five in California, and national forests are open to the public.

Most of the trout streams and lakes of California are located within national forests. The principal kinds of fish are the various species of trout: rainbow, brook, golden, brown, cutthroat, and steelhead. Salmon are also found.

There are large numbers of deer and other animals in the national forests. In some parts of California there are so many deer that they have seriously overgrazed the range.

Census Estimates of Big Game in National Forests of California

Deer	411,000	Bears	16,000
Mountain Sheep	500	Antelopes	2,700
Elk	120		

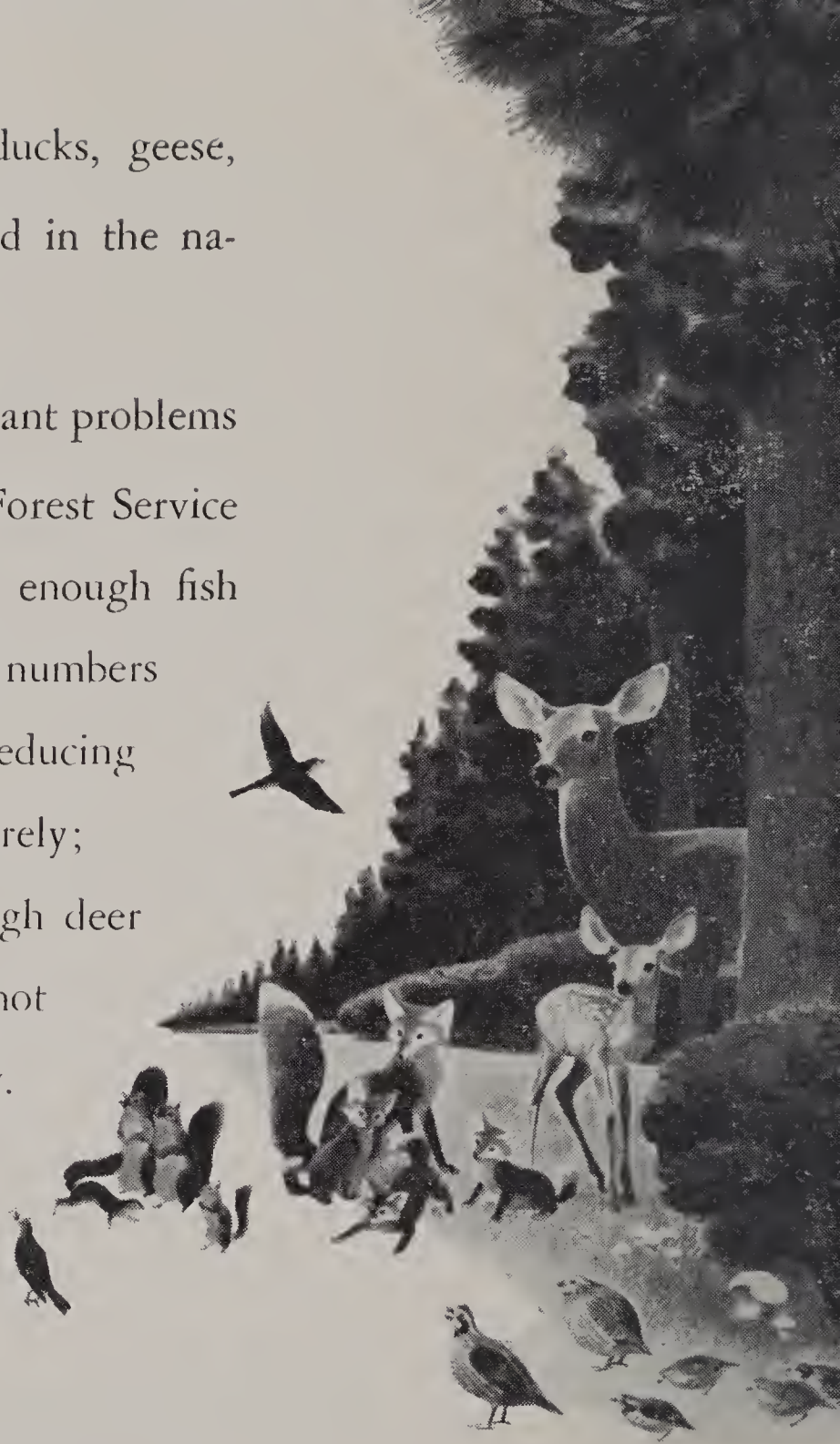
Most of California's population of fur-bearers lives in the national forests, too. Some species such as wolverine, otter, marten and fisher are becoming scarcer.

Kinds of Fur-Bearing Animals in National Forests of California

Fox	Beaver	Marten
Mink	Rabbit	Skunk
Badger	Weasel	Fisher
Wolverine	Muskrat	Ring-tailed cat
Otter	Opossum	Raccoon

Game birds, such as ducks, geese, quail and doves are found in the national forests, also.

Two of the more important problems facing the State and the Forest Service are: (1) How to restore enough fish and game for increasing numbers of sportsmen without reducing limits or seasons too severely; and (2) how to get enough deer harvested so they will not overtax their food supply.



Some of the things that tend to keep down wildlife population are:

Trapping, shooting and fishing by man.
Man's misuse of soil, water, forests or forage.
Lack of food.
Lack of suitable cover.
Losses due to predators, disease and parasites.

There are certain protective devices for increasing wildlife populations:

Set limits on the kill of fish, birds and game.

Set seasonal opening and closing dates for taking wildlife.

Close certain areas to hunting or fishing.

Close the season on certain species.

But these last measures are "negative." They are methods that say "No" to the sportsman, and for that reason they are unpopular. Among the "positive" protective measures for improving wildlife populations are these:

Transplant native species.

Introduce new species.

Raise upland birds on game farms.

Improve the habitat.

The last measure in the list—improving the habitat— has received the least consideration so far. Yet it can be of great benefit. Good living conditions give wildlife a chance to raise

Valley Quail—California State Bird.

Small dam at outlet of lake maintains enough water in stream below to support fish life during the summer.

a family with some degree of security and a better chance for survival. Of course, there is a limit to the number of fish, birds, and wild animals any given habitat can support. Improving the habitat will not provide wildlife in sufficient numbers to satisfy every hunter and fisherman. Neither will any of the other protective measures, but they help.

Wildlife management attempts to improve wildlife populations and bring them into balance with food supply. Wildlife crops can, and should be, harvested for the benefit of man, the same as any other crop.

Rangers in the national forests are usually appointed as deputy game wardens to help the State game wardens enforce the laws. But the Ranger's principal job in wildlife management is not law enforcement. It is (1) to see that timber cutting, grazing, recreation use and construction on his district are so planned that

wildlife habitat is improved; and (2) to improve the habitat directly by—

—constructing small dams to maintain stream flow for trout;
—developing watering places for birds and game animals;
—sowing grasses, or planting trees or shrubs to improve food and shelter.

KEY WORDS

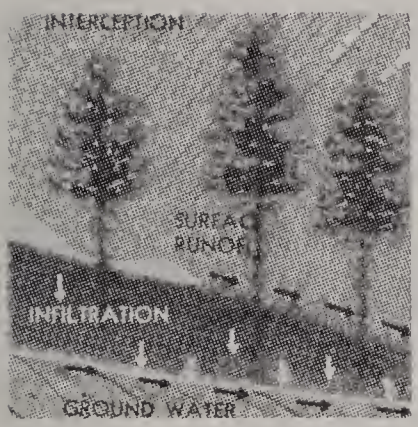
Wildlife crops
Protective measures
Improving the habitat

PROBLEMS

1. What agency makes and enforces the fish and game regulations?
2. List all the factors you can think of that tend to keep down wildlife populations.
3. List as many as you can of measures that may be taken to increase wildlife populations.
4. What is the effect on fish of dumping wastes into water? How does a forest fire along a stream affect the fishing? (Answers not in the text.)
5. Why isn't stocking with young fish (or game birds) by itself a satisfactory method of improving fishing (or hunting)?
6. What are the principal jobs of the District Ranger in connection with wildlife in a national forest?

NATIONAL FORESTS ARE WATERSHEDS

National Forests Are Watersheds



WATER IS USED in many ways—for drinking, for bathing, for washing and cooling, for navigation, recreation, irrigation, and for generating electricity. What would life be like, for even one day without water?

Forests can not "produce" water, but they *yield* water. Forty-five percent, or nearly half, of California is covered with forests or brush—a vast watershed. A watershed is an area where rain falls or snow melts to supply water to springs and creeks.

Most of the water in California, whether it comes from a faucet, a hydrant, a pump, a river, an aqueduct, or an irrigation ditch, is yielded by forest or brush watersheds. The national forests yield about 50 percent of the water that comes from California's watersheds.

The forests of the Sierra Nevada and Cascade watersheds yield water for several huge water systems:

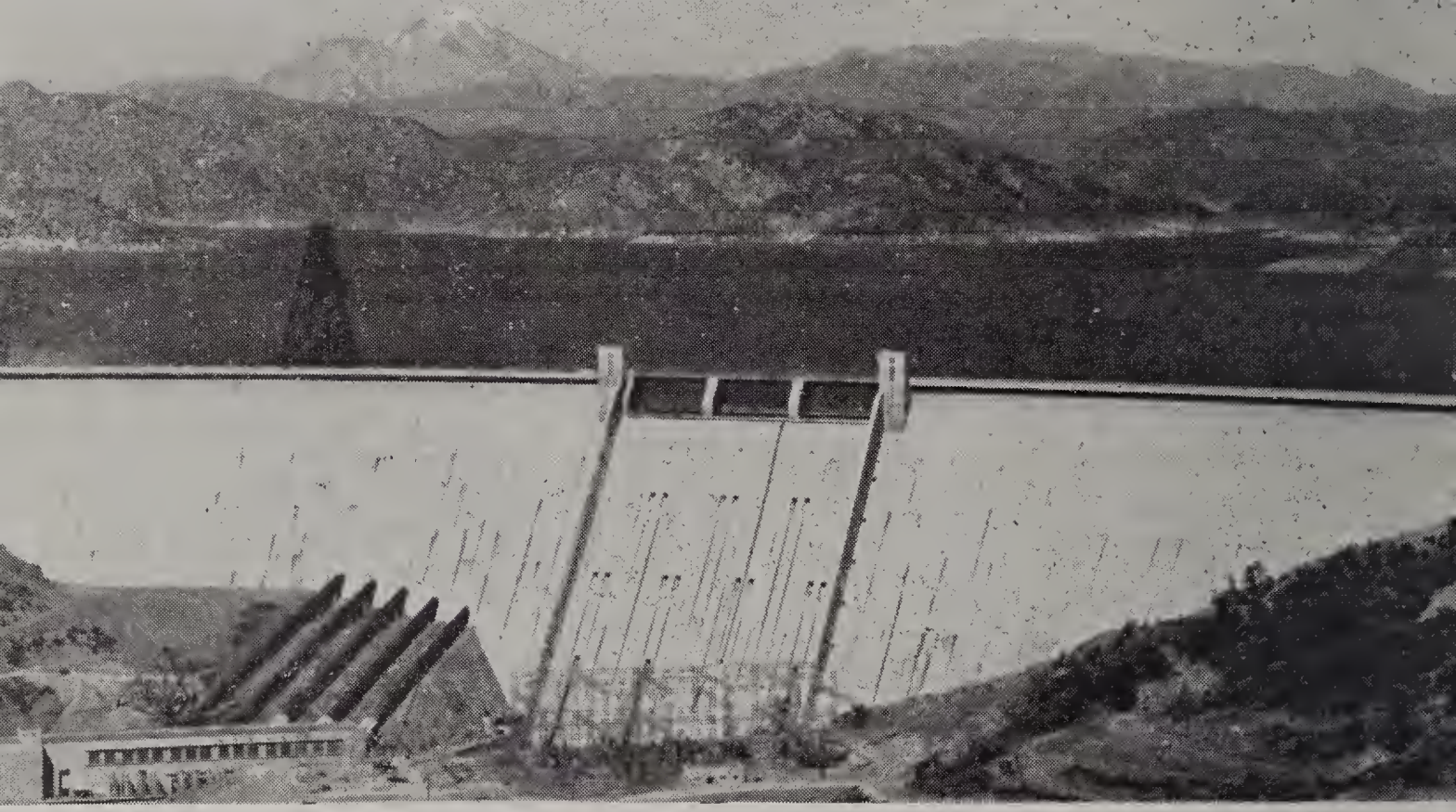
Hetch Hetchy Reservoir—which supplies San Francisco and some Peninsula cities.

Pardee Reservoir—which supplies Oakland and other East Bay cities.

Owens River Reservoirs—which supply part of the water for Los Angeles.

Central Valley Project Reservoirs—which supply part of the water for irrigating the San Joaquin and Sacramento Valleys.

National forests supply about 60 percent of the water used



Shasta Lake helps prevent floods, furnishes water to the Central Valley, provides recreation; and electricity is generated at Shasta Dam.

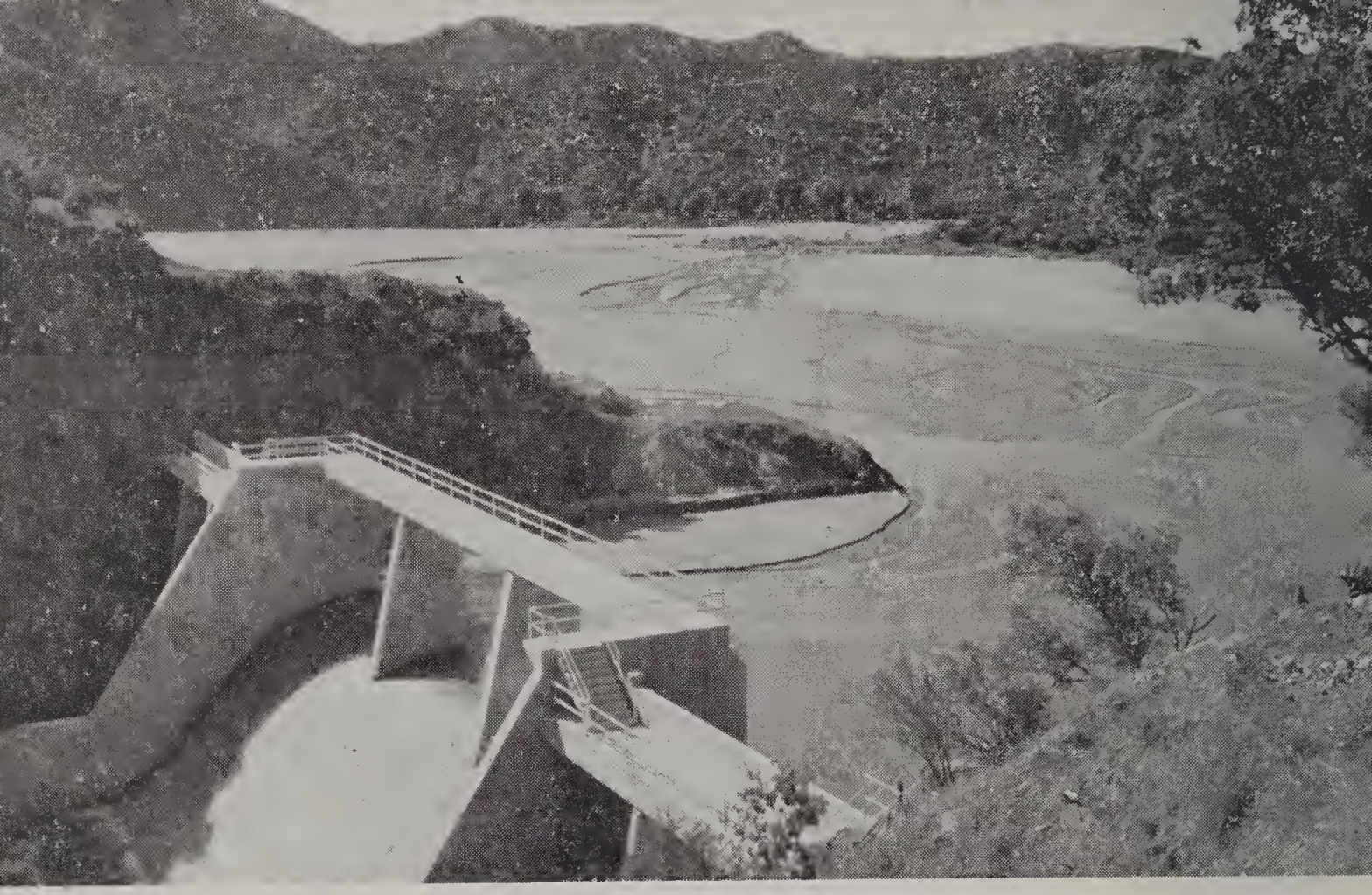
in the Central Valley. The San Joaquin Valley obtains water from the national forests of northern California hundreds of miles distant, as well as from the closer Sierra watersheds. This is because water is transmitted south through the Sacramento River and thence, by a series of pumps and canals, to the San Joaquin Valley.

Although not connected with the spectacular projects, there are many local watersheds in California that are important. These yield water for many community reservoirs and for pumping. Examples of "local" watersheds are found in the forest and brush lands of the Coast Range, and those of southern California in the vicinity of Los Angeles, San Bernardino, and San Diego. National forests furnish about 60 percent of the local yield of water in southern California. Despite the great aqueducts that "import" water, most of the supply for southern California comes from nearby watersheds, such as those of Los Padres, Angeles, San Bernardino, and Cleveland National Forests.

Forest soil is a natural reservoir for the water that enters it from rain or snow-melt. This water gently seeps through the mat of dead leaves and twigs that covers the ground. Then it slowly works its way down through the soil pores, along root channels and through tunnels made by insects and worms. This is like "filtering" and is known as *infiltration*. When the soil has absorbed all the water it can hold, the surplus slowly seeps to the underground rock, which is porous enough to hold considerable water. Then it finds its way to springs and creeks. This action is slow.

Water pumped from underground came from a watershed many miles away. It traveled through sand and gravel and porous rock. It collected in underground reservoirs. Then men put down pipes and pumped it for their use.

Because they receive water slowly, streams with forested watersheds are less subject to bad floods or serious water short-



Reservoir constructed to catch silt from burned watershed upstream, thus protecting water-supply reservoir below.

ages. Such streams flow clear even after heavy rains or rapid snow melt. Instead of running dry early in summer, they continue to carry water for a longer period. Forests *stabilize* stream flow; that is, they keep the flow more steady.

Where there is no cover of vegetation, raindrops beat directly upon the bare or packed-down soil with great force. Soil particles are "kicked up" and fill the pores of the soil at the surface, preventing the water from soaking in. It runs off the surface quickly, causing high water in streams, perhaps a flood. This fast-moving water may carry fertile topsoil with it. The soil carried away may fill a reservoir downstream with silt, ruining it.

Sometimes there is more water from streams than can be used at one time, and at other times there is not enough. So reservoirs are constructed to catch and store stream flow in times of surplus

or flood, for release to cities or irrigation canals when needed later.

Reservoirs are also constructed to store and supply water for power projects. Water that comes from national forests generates over 90 percent of California's hydroelectric power.

Forests of Colorado, Wyoming and Utah furnish water by way of the Colorado River to Hoover, Parker, Davis, Imperial and Laguna Dams. The reservoirs at these dams furnish water and electric power to southern California.

Engineering works such as dams, levees, and concrete-lined channels are usually necessary for flood protection downstream in flood areas. Great flood-control projects in California have been constructed in and near Los Angeles and in the lower Sacramento River Valley. If the watershed is in good condition, and if there are adequate storage reservoirs upstream, the life of expensive reservoirs downstream is greatly increased.

Water shortages have always been common in California, and the years 1945-1949 were particularly bad. In many years rainfall is short, and a large and growing population is using more and more water. Several communities in southern California have had to "ration" water, others have drawn upon supplies of nearby cities, and some have had to haul water in tanks.

All the national forests in California are important watershed forests. Each one contributes not only to the welfare but to the existence of farms and towns and cities by safeguarding water supplies. As water supplies become shorter, forests become more important. You will probably hear much more about watershed management as you grow older. Forests can not increase the amount of snow and rain that falls, but they can help snow and rain to become usable water.

KEY WORDS

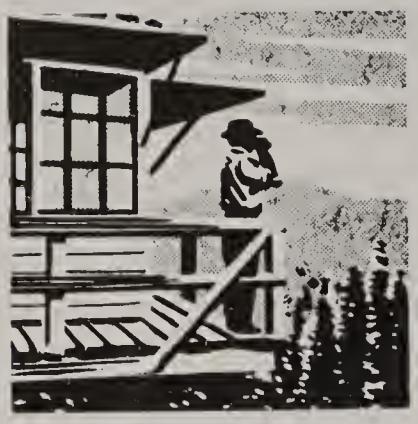
Infiltration	Watershed	Water yield
Usable water	Water shortages	Flood control
Silting of reservoirs	Stabilize stream flow	

PROBLEMS

1. What is the "delta" of a river? How is it formed? Why is it fertile?
2. How do forests help prevent water shortages? Help reduce flood damage?
3. How do forests stabilize stream flow? Prevent silting of reservoirs?
4. Describe the watershed from which your community obtains its water.
5. Find out the extent of damage from silting in the reservoir of your local supply. How can it be reduced?
6. Examine the map on page seven and name the national forests in the Cascade and Sierra Nevada Mountains that supply water for the Central Valley, from Redding to Bakersfield.


NATIONAL FORESTS NEED PROTECTION

National Forests Need Protection



FIRE, DISEASE, and insects are the principal enemies of the forests. Insects and diseases sometimes break out in epidemics which sweep across forests. The great year-after-year loss from less violent attacks of both insects and disease probably exceeds the loss by fire, although less spectacular.

One of the most serious diseases is blister rust. It attacks the "white" or five-needle pines, one of which is sugar pine. Control of the disease has been under way for many years. Blister rust travels from infected pines to currant and gooseberry bushes, where it lives for part of its life. Then it spreads back to the pines. The disease is controlled by interrupting its life cycle. Currant and gooseberry bushes are grubbed out by the roots, or sprayed with chemicals. This kills the bushes, stopping the spread of the disease.

Bark beetles are responsible for costly damage to various species of pines in California's forests. They are controlled by felling insect-infested trees, peeling the bark and burning it. Chemical sprays are also used.

Fire is a great destroyer. In 1950, for example, six fires burned at one time in Los Padres National Forest, covering 65,000 acres, followed by the Conejos fire in and near Cleveland National Forest covering 63,000 acres. In 1950, California experienced its

Pine forest killed by bark beetles.

worst year for fires since 1924. Thousands of small fires are controlled every year before they reach large size.

The national forests where fires are likely to be especially severe and fast-spreading are: the four in southern California—Angeles, Cleveland, Los Padres and San Bernardino, and, in northern California, Modoc, Shasta, Lassen, Plumas and Mendocino. Find them on the map on page seven.

Every national forest has an organization of men to detect and control forest fires. Lookouts report "smokes" to dispatchers who send men and tools. Small crews of fire-fighters are usually sent as the "first-attack force." If reinforcements are needed, large crews are hired in nearby towns. Planes, helicopters, tank trucks and bulldozers are used in fighting fires, as well as hand tools such as shovels, grub hoes, axes and brush hooks. The rule

for fighting fire is: first remove all the fuel from the path of the fire in order to stop its spread, then put it out.

Over 15 million acres are burned every year in the United States. There are over 3,000 fires each year in California. They burn nearly 400,000 acres of timber, brush and range. That is the equivalent of a strip over a mile wide extending from San Francisco to Los Angeles burned every year.

The shameful fact about these fires is that only two out of every ten in California are due to natural causes, chiefly lightning. Eight out of ten are caused by people. One of the eight is intentionally set and the other seven are due to carelessness or ignorance.

Fires destroy trees that may have been growing for hundreds of years. Along with the old trees they destroy young trees, shrubs and grass. Timber is lost that could have been used for lumber, boxes and plywood. The forest of the future is lost because young trees have been killed. Forage for domestic livestock is burned. Food and shelter for wildlife are burned. Water supplies are endangered because reservoirs may fill with silt. Water may run off the hillsides in quick floods destroying crops and other property.

It takes at least a hundred years for land to become covered with forest again if seed-trees escape the fire. If all are killed, the land must be replanted before a new forest can grow. This is expensive. Forest land that has been burned may become covered with brush if it is not replanted immediately.

The nurseries of the U. S. Forest Service near McCloud and Oakdale are the only ones in California capable of producing

This fire was caused by carelessness.

large numbers of young trees for reforestation. How many years would be required to plant the best of the burned land in California that once was growing trees and should be growing trees now? It would require 16 years, and 10 nurseries the size of the large one at McCloud. Reforestation is very expensive; total costs run about $35 per acre.

In some parts of California, erosion will begin immediately after a fire, if the slopes are steep. If plants can be established quickly, their roots will hold the soil and prevent erosion. A quick-growing plant cover is especially important in southern California, where brush lands often protect reservoirs. Mustard is frequently sown as a "first-aid measure" after fires, using planes or helicopters. Grass seed is sometimes added to the mustard. If sown in the fall before the rains, a thick cover is produced the following spring. Such a quick-growing cover prevents great quantities of silt from washing into reservoirs. In places where

water is always short, a reduction in the capacity of a reservoir is serious business.

You can help teach others that most fires don't "just happen," that they are caused by people. There are a few simple rules. They can easily be learned. Practice them, and see that others practice them—not once in a while, but every time fire is used.

The Fire Prevention Rules

1. Crush out cigarettes, cigars, pipe ashes—play safe. Use ash-trays in cars.
2. Break your match in two. When you can hold the burned end between your fingers, you know no fire is left.
3. Drown your campfire; then stir the coals and drown it again.
4. Burn debris in a safe manner, and get a permit if required.

KEY WORDS

Bark beetles
Blister rust
Man-caused fires
Reforestation
First aid for watersheds

PROBLEMS

1. What are the principal enemies of forests?
2. How is blister rust controlled? What valuable species of tree in California does it attack?
3. How are bark beetles controlled?
4. Think back over what you have learned about fires. Then name some of the important things our country loses when forests and brushland watersheds burn.
5. Give four rules for preventing forest fires.
6. What is the purpose of sowing mustard and grass seed after brush fires in southern California?
7. What is the rule for fighting fire?

Forest Conservation

AT THE BEGINNING of this booklet, this sentence occurs: "We shall learn what forest conservation means." Perhaps you feel that you now have a better idea of its meaning. A good, brief definition for conservation is simply *wise use.* That means use for the greatest good of the greatest number in the long run. It means managing our resources so that they will serve the people of the United States in the best possible ways for the longest possible time.

As for forests, to sum up:

Forest Conservation Means—

—Stopping man-caused fires.
—Preventing erosion on watersheds.
—Reducing waste from careless logging and sawmill methods.
—Finding ways to manufacture and sell wood now wasted.
—Practicing good forestry in removing the timber crop.
—Keeping down losses caused by insects and disease.
—Planting young trees where forests will not restore themselves naturally.
—Grazing forest ranges moderately.
—Providing a good habitat for wild animals, birds and fish.

As a nation we are learning that we can not afford to make the same mistakes over and over. We must renew and restore our soil and forests and grass where they have been damaged. We must safeguard water supplies. We must prevent destruction of our resources—the only real wealth we have—only to turn around and spend tremendous sums of money to repair the damage — provided it hasn't already gone so far it can't be repaired. Abundant natural resources enabled the United States to become a rich and powerful country. It is not too late to begin living more sensibly with nature—but it means changing some of our ways of using land.

REVIEW PROBLEMS

1. What are the nine points of forest conservation?

2. Select a panel of five composed of a leader, and four members representing these types of forest users: A sportsman who hunts and fishes, a building contractor who uses lumber, a cattle raiser, and an irrigation farmer. Have a roundtable discussion on the subject "What the National Forests of California Mean to Me."

3. Test Words

   The following are important words and phrases—the "keys" to this unit on national forests. They should be clearly understood.

   National forests
   Multiple use
   Erosion
   Range management
   Timber crop
   Recreation resources
   Man-caused fires
   Improving wildlife habitat
   Watershed
   Infiltration
   Silting
   Stabilize stream flow
   Forest conservation

APPENDIX

Teaching Aids

Selected graded readings about national forests

The Little House on Stilts, by Lucia Patton, Albert Whitman & Co., Chicago, 1948. Judy and Johnny visit a lookout station in a Colorado national forest and stand by while the Ranger fights a forest fire. Authentic background. Fully illustrated in color by the author, 32 pages. Grades 3 and 4. Price $1.50.

Gabby and the Forest Fires. American Tree Association, 1214 Sixteenth Street, N.W., Washington 6, D. C., 1947. A squirrel and a forest fire. Drawing with text on facing page in large capitals, 50 pages. Third grade. Price 10 cents.

Conservation in America, by Mary I. Curtis, Lyons and Carnahan, New York, 1947. Covers all renewable resources, with emphasis on forests and their influences. A good job of confining subject matter to conservation principles. Seventy-seven illustrations from photographs, 118 pages. Large type, clear language. Grades 5 and 6. Price $1.16.

Hank Winton, Smokechaser, by Montgomery M. Atwater, 1947. A young man at work in a western national forest. Illustrated, 210 pages. Grades 6 to 10.

Rangers of the Shield, by Ovid Butler. American Forestry Association, Washington, D. C., 1934. A collection of stories by men of the national forests of the West. 270 pages, 9 illustrations. Price $1.00.

Fire, by George R. Stewart. Random House, New York. 1948. A popular book-club novel, covering eleven days in the life of a forest fire. Scene laid in an imaginary national forest in the Sierra Nevada. Good plot and action with the fire as the principal "character." 336 pages. Price $3.00; also in inexpensive paper-cover edition.

Forest Fire and Other Verse, collected and edited by John D. Guthrie, Dunham Printing Co., 116 Second St., Portland, Oregon. Verses about the U. S. Forest Service by lookouts, rangers, etc.; some are surprisingly good. 321 pages.

Green Kingdom, the Way of Life of a Forest Ranger, by William A. DuPuy. Row, Peterson & Co., Evanston, Illinois, 1940. Forestry as a career. 64 pages. Price 96 cents.

Men and Trees, by Joseph Gaer. Harcourt, Brace & Co., New York, 1939. Forest conservation and the story of the U. S. Forest Service. 118 pages, many good photographs. Junior high, up. Price $1.75.

Breaking New Ground, by Gifford Pinchot. Harcourt, Brace & Co., New York, 1947. A history of the forest-conservation movement in the United States, from the earliest beginnings, by the first Chief of the Forest Service and a lifelong leader. Illustrated, 552 pages. Adults. Price $5.00.

Your Forests, by Martha Bensley Bruere, J. B. Lippincott Co., New York, 1945. Forests and forestry in the United States. Carefully written, non-technical presentation; authentic material. Fifty-six photographs, index, 159 pages. Grades 11 and up. Price $2.50.

Behold Our Green Mansions, by Richard H. D. Boerker. Chapel Hill, University of North Carolina Press, 1945. A book about American forests—management, restoration, uses, enemies, problems. College, or high school reference. Price $4.00.

Materials from U. S. Forest Service

Material may be obtained to supplement this booklet and to round out any work on forest conservation, including

Free booklets, charts, maps and posters.
Motion pictures.
Forest-adventure series on records.
Color-slide sets.
Study-print sets.

To obtain information on the above, write to Division of Information and Education, U. S. Forest Service, 630 Sansome Street, San Francisco 11. Ask for leaflet *Educational Materials.*

Activities

1. Sponsor a Penny Pines Plantation. A contribution of $68 or more sent to the Forest Service will be used to plant 6800 trees on at least 10 acres of burned area in a national forest. A sign will be erected bearing the name of your group.

2. There are 18 Forest Supervisor's offices and nearly 100 Ranger's offices in California. One of them may be near you. The teacher may arrange with any of these officers for a field trip to see national-forest activities. Addresses of Supervisors are shown on the map on page seven.

3. Prepare and present a school assembly. Obtain a speaker on forest conservation, show Forest Service motion pictures, arrange a panel discussion among students or trained foresters. This is a good project for Conservation Week, observed March 7-14 each year.

4. Contact the nearest fire-warden or ranger and plan a visit to a burned area of forest or brush land. Study effects on soil, future vegetation, water supplies, wildlife, recreation.

5. Visit a sawmill, or a local lumber yard. Find out species used, amount of waste, examples of good conservation, where supplies are obtained.

6. Visit a large pasture, or a range, used by livestock of any kind. Examine condition of vegetation and soil, examples of poor conservation practices, good practices, whether the range is improving.

7. Carry out forest-conservation projects in Boy Scouts, Girl Scouts, Campfire, 4-H, FFA, etc. Such projects can be tied in with awards and advancements.

For suggestions, specific information on whom to contact, materials, etc., address:

Division of Information and Education
U. S. Forest Service, 630 Sansome St.,
San Francisco 11, California,

or your nearest national-forest Supervisor or Ranger.

PUBLIC AGENCIES ADMINISTERING FORESTS AND PARKS IN CALIFORNIA

Federal

Forest Service—Department of Agriculture

18 national forests.

19¼ million acres.

Protects national forests and administers them for production of timber and yield of water. Wildlife and recreation are managed for the public benefit.

Timber is sold, and cattle and sheep can use the grass and other forage plants.

Multiple-use management.

National Park Service—Department of the Interior

4 national parks.

8 national monuments.

1¾ million acres.

Administers national parks and monuments of scenic beauty, historic value, and scientific interest. Interprets their meaning to visitors. Manages fish, wildlife and water production for public benefit. Timber cutting or grazing not permitted.

State

Department of Natural Resources

Division of Forestry

6 forestry districts.

Protects 24 million acres of privately-owned forest land from fire.

Administers 70,000 acres of State forests.

Administers Forest Practice Act of 1945, which provides that the logging industry regulate itself for protection, reforestation, and proper cutting.

Division of Beaches and Parks

90 state parks, beaches and monuments.

500,000 acres.

Administers areas of scenic beauty, historic value or scientific interest for the enjoyment of the public. These lands are owned by the State. In purchasing many of them, the State paid half and local governments, organizations, or individuals paid the other half.