National 4-H Forestry Quiz Bowl and Exam Study Guide

FOREST UNDERSTANDINGS AND FACTS

The following concepts and facts cover the broad range of forestry. An understanding of each statement will benefit resource managers, well rounded citizens, and forestry team members. Some are so logical or simple that they may be taken for granted and overlooked.

Characteristics, Distribution, and Status of Forest Resources

1. Trees have distinctive characteristics by which they can be identified.

2. Trees depend upon water, soil nutrients, sunlight, and air for growth.

3. Climate, soil, and topography influence the natural range and distribution of the different types of forest communities.

4. Forest communities influence their climate and their soil.

5. Forest litter, humus, and roots give forest soils an exceptional ability to absorb moisture and resist erosion.

6. In the forest some organisms are adapted to living in the forest soil, some on the forest floor, some in the undergrowth, and some in trees.

7. Forests are constantly undergoing change, and as they mature and are harvested or die, some species of plants and animals may be replaced by others.

8. The interrelationships among the plant and animal members of forest communities and their environments determine the characteristics of a particular forest.

    a. Each plant and animal in a forest community influence that community.

    b. Forest communities influence the plants and animals of which they are composed.

9. Fires, diseases, insects, man, and animals may be harmful or beneficial to the forest.

10. Some lands are better adapted for the growing of forests than for other uses.

11. Forests have certain characteristics which make them attractive for recreational activities.

12. An expanding population and new uses for forest products and services make necessary more intensive multiple purpose management of forest resources.

Understanding the Uses of Forest Resources and Their Importance to Man

1. The original forests of the nation were primary sources of building the nation.

2. Forests yield many essential products for man's use.

3. Many communities are highly dependent upon local forests, forest industries, and forest recreation for economic stability.

4. New uses for the products of the forest are being discovered through research and development.

5. Forests provide a wide variety of recreational opportunities.

6. Forests are important in helping to protect watershed from floods and droughts.

Understanding Problems and Techniques of Management

1. Forests can be managed to produce a continuous supply of wood and wood products, wildlife, water, and recreational opportunity.

2. Foresters use various practices in managing forest resources:
   a. Insects and disease control
   b. Fire control
   c. Harvesting practices
   d. Thinning and pruning operations
   e. Reforestation

3. Volume and growth data are essential in determining management practices necessary to produce the optimum amount of forest products.

4. Research is essential for the development of new and improved forest management practices and the more efficient utilization of forest products and services.

Understanding Policy and Administrative Techniques

1. Public use of forest land carries an obligation for good citizenship.

2. Small woodland owners control a major portion of commercial forest lands which are a potential source of larger quantities of forest products and services.

3. The woodland owner can obtain technical advice and assistance in forest management from many public and private organizations and agencies.

4. Current state and federal programs provide financial assistance as incentives for better management of forest resources.

5. Many progressive public and private owners of forest lands are managing forests for multiple uses rather than solely for timber production.

6. Forest owners have responsibilities as well as rights in the management and use of forests under democratic living.

7. Cooperation between public agencies, private owners, and the general public is necessary in protecting forests against fires, diseases, insects, and excessive animal populations.

8. Policy decisions must be made to settle differences of opinion which arise from competing uses of the forests.

Forestry Facts

1. America's forests cover about 737 million acres, or 32% of the nation's land area.

2. America's forests still cover about 70% of the area they covered when the Pilgrims landed in 1620.

3. Private individuals own about 59% of the U.S. forest land base; local, state and federal governments own about 27%; and the forest products industry owns about 14%.

4. Growth rates exceed harvest rates in America's forests by a wide margin. In 1992 net growth was 21.6 billion cubic feet and harvest was only 16.3 billion cubic feet.

5. More than 244 million acres, about 33% of America's forests, are preserved in wilderness areas, national parks, wildlife refuges, and other parks and preserves where no commercial activity is permitted.

6. The U.S. is a net importer of most raw materials used to sustain the domestic economy, including wood and wood products.

7. The U.S. population is presently growing at the rate of 1% each year. If this rate is sustained the population will double in less than 100 years.

8. The per-person use of wood in the U.S. is about 80 cubic feet each year, an increase of more than 30% since 1970.

9. Wood is the only natural resource on earth that is at once renewable, recyclable, reusable, and biodegradable.

10. The energy required to grow our wood supply is free. It comes from the Sun.

A SUMMARY OF FEDERAL LAWS AFFECTING FORESTRY

Laws form the legal basis for using and managing our nation's forests. Since 1890, more than 140 laws affecting forestry have been passed by the United States Congress and signed by the President. In the early years most laws enabled or authorized the protection and management of the nation's forests. Many of the laws passed in recent years restrict or regulate the use and management of these forests. Some of the more important Federal laws are described below:

Creative Act of 1891 -- Authorized the President of the United States to set aside public lands bearing forests as public reservations commonly called *Forest Reserves*.

Organic Administration Act of 1897 -- Provided that the Forest Reserves, later to be called *National Forests,* were established to improve and protect the forest, to secure favorable conditions of water flow, and to furnish a continuous supply of timber.

Transfer Act of 1905 -- Transferred the administration of the Forest Reserves from the United States Department of the Interior to the United States Department of Agriculture.

Twenty-five Percent Fund Act of 1908 -- Established the procedure for paying the states twenty-five percent of the monies received from national forest timber sales to benefit public schools and public roads in counties where national forests are located. These payments are made in lieu of taxes.

Weeks Law of 1911 -- Authorized purchasing and adding to the National Forest System forested, cut-over, or denuded lands within the watersheds of navigable streams which are necessary to regulate the flow of navigable streams or to produce timber.

Smith-Lever Act of 1914 -- Established a Federal-State Cooperative Extension program to provide education for the public in agriculture and natural resources.

Clarke-McNary Act of 1924 -- Authorized technical and financial assistance to the states for forest fire control and for production and distribution of forest tree seedlings. (Sections 1 through 4 were repealed by the Cooperative Forestry Assistance Act of 1978.)

McSweeney-McNary Act of 1928 -- Authorized a comprehensive Forest Service research program. (This act was repealed and supplanted by the Forest and Rangeland Renewable Resources Research Act of 1978.)

Multiple Use - Sustained Yield Act of 1960 -- Established a policy of multiple use, sustained yield management for the renewable resources of the National Forest System.

McIntyre-Stennis Act of 1962 -- Established a cooperative forestry research program for state land-grant colleges and universities.

Clean Air Act of 1963 -- Gave the Federal government enforcement powers regarding air pollution for the first time. This act and subsequent amendments impact the forest industry by affecting prescribed burning for forest management and emissions from forest products

manufacturing plants.

Wilderness Act of 1964 -- Established the National Wilderness Preservation System by setting aside sections of federal forest land as wilderness.

National Environmental Policy Act of 1969 -- Required that environmental considerations be incorporated into all Federal policies and activities, and that all Federal agencies prepare environmental impact statements for any actions significantly affecting the environment.

Federal Water Pollution Control Act Amendments of 1972 -- Established as a national objective restoring and maintaining the chemical, physical, and biological integrity of the nation's water and required area wide planning to prevent future water pollution that could be associated with growth, development, and land use, including timber management.

Endangered Species Act of 1973 -- Provided for the protection and conservation of threatened and endangered fish, wildlife, and plant species. Directs all Federal agencies to utilize their authorities and programs to further the purpose of the act.

National Forest Management Act of 1976 -- Established additional standards and guidelines for managing the national forests, including directives for national forest land management planning and public participation.

Cooperative Forestry Assistance Act of 1978 -- Authorized the Secretary of Agriculture to work in cooperation with State Foresters in nine cooperative forestry assistance programs. Among these programs is the *Forestry Incentives Program*, a federal cost-share program designed to encourage the management of private forest lands.

Renewable Resources Extension Act of 1978 -- Authorized expanding the forest and rangeland renewable resources portion of the extension education program.

Forest and Rangeland Renewable Resources Research Act of 1978 -- Authorized expanding forest and rangeland renewable resources research.

Reforestation Tax Incentives (part of the Recreational Boating Safety and Facilities Improvement Act of 1980) -- Provided tax credits and deductions for landowners who reforest their property, as an incentive to encourage reforestation.

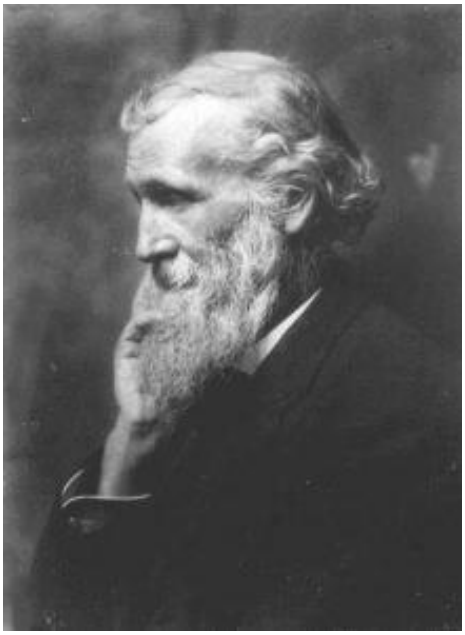
Food Security Act of 1985 (1985 Farm Bill) -- Established the *Conservation Reserve Program*. The program was designed conserve 40 to 45 million acres of highly erodible cropland by paying landowners to plant permanent vegetative cover, such as grass or trees, and maintain that vegetative cover for 10 years.

Food, Agriculture, Conservation, and Trade Act of 1990 (1990 Farm Bill) -- Established the *Forest Stewardship Program*, a program designed to encourage multiple resource forest management on nonindustrial private forest lands. A companion program, the *Stewardship Incentives Program*, was designed to provide cost-share assistance funding to encourage the implementation of management practices.

Coastal Zone Act Reauthorization Amendments of 1990 -- Required that states with Coastal Zone Management Programs develop and implement Coastal Nonpoint Pollution Control Programs to control sources of nonpoint pollution (including managed forests) which impact coastal water quality.

Forest History

John Muir (1838-1914)



Farmer, inventor, sheepherder, naturalist, explorer, writer, and conservationist – **John Muir** was born on April 21, 1838 in Dunbar, Scotland. In 1849, the Muir family emigrated to the United States, settling first at Fountain Lake and then moving to Hickory Hill Farm near Portage, Wisconsin.

In 1867, while working at a carriage parts shop in Indianapolis, Muir suffered a blinding eye injury that would change his life. When he regained his sight one month later, Muir resolved to turn his eyes to the fields and woods. There began his years of wanderlust. He walked a thousand miles from Indianapolis to the Gulf of Mexico. He sailed to Cuba , and later to Panama, where he crossed the Isthmus and sailed up the West Coast, landing in San Francisco in March, 1868. From that moment on, though he would travel around the world, California became his home.

It was California's Sierra Nevada and Yosemite that truly claimed him. By 1871 he had found living glaciers in the Sierra and had conceived his controversial theory of the glaciation of Yosemite Valley. He began to be known throughout the country. Beginning in 1874, a series of articles by Muir entitled "Studies in the Sierra" launched his successful career as a writer. In 1880, he married Louie Wanda Strentzel and moved to Martinez, California to manage his father-in-law's fruit ranch with great success. But ten years of active ranching did not quell Muir's wanderlust. His travels took him to Alaska many more times, to Australia, South America, Africa, Europe, China, Japan, and of course, again and again to his beloved Sierra Nevada.

In later years he turned more seriously to writing, publishing 300 articles and 10 major books that recounted his travels, expounded his naturalist philosophy, and beckoned everyone to "Climb the mountains and get their good tidings." Muir's love of the high country gave his writings a spiritual quality. His readers, whether they be presidents, congressmen, or plain folks, were inspired and often moved to action by the enthusiasm of Muir's own unbounded love of nature.

Through a series of articles appearing in *Century* magazine, Muir drew attention to the devastation of mountain meadows and forests by sheep and cattle. With the help of *Century*'s associate editor, Robert Underwood Johnson, Muir worked to remedy this destruction. In 1890, due in large part to the efforts of Muir and Johnson, an act of Congress created Yosemite National Park. Muir was also personally involved in the creation of Sequoia, Mount Rainier , Petrified Forest and Grand Canyon national parks. Muir deservedly is often called the "Father of Our National Park System".

Johnson and others suggested to Muir that an association be formed to protect the newly created Yosemite National Park from the assaults of stockmen and others who would diminish its boundaries. In 1892, Muir and a number of his supporters founded the Sierra Club to, in Muir's words, "do something for wildness and make the mountains glad." Muir served as the Club's president until his death in 1914.

In 1901, Muir published *Our National Parks* , the book that brought him to the attention of President Theodore Roosevelt. In 1903, Roosevelt visited Muir in Yosemite. There, together, beneath the trees, they laid the foundation of Roosevelt's innovative and notable conservation programs.

Muir and the Sierra Club fought many battles to protect Yosemite and the Sierra Nevada, the most dramatic being the campaign to prevent the damming of the Hetch Hetchy Valley within Yosemite National Park. In 1913, after years of effort, the battle was lost and the valley that Muir likened to Yosemite itself was doomed to become a reservoir to supply the water needs of a growing San Francisco. The following year, after a short illness, Muir died in a Los Angeles hospital after visiting his daughter Wanda.

John Muir was perhaps this country's most famous and influential naturalist and conservationist. He taught the people of his time and ours the importance of experiencing and protecting our natural heritage. His words have heightened our perception of nature. His personal and determined involvement in the great conservation questions of the day was and remains an inspiration for environmental activists everywhere.

Carl Schenck and the Biltmore Forest School: First in Forestry

In the late 1880s one of America's richest men, **George Vanderbuilt**, visited Asheville, North Carolina and fell in love with the beautiful mountain Town. He decided to build his sprawling **Biltmore** estate there. He hired famed landscape architect **Frederick Law Olmsted** to design the grounds and gardens of the 5,800-acre estate. Olmsted, in turn, wanted to make it a showcase for the world.

At Olmsted's urging, Vanderbilt decided to hire a forester to scientifically manage the woodlands. So in 1892 he hired **Gifford Pinchot**, who later became known as the "Father of American Forestry" and established the U.S. Forest Service. Over the next three years, Pinchot initiated the first large-scale

forest management plan in the United States, making a name for himself and the Biltmore Estate. Before Pinchot left in 1895, Vanderbilt purchased 100,000 additional acres of mountainous woodlands and asked Pinchot to find a man to manage the land. At Pinchot's recommendation, Vanderbilt hired **Dr. Carl Alwin Schenck,** a German forester, to replace him.

Schenck came to the United States knowing little about the forest conditions he faced. But word quickly spread about the tall man with the funny-looking mustache who could be seen on his hands and knees planting acorns, or refused to cut down every tree in the woods. Curious young men began showing up looking for work, and soon were asking questions about this new science called forestry. To answer their questions, Schenck opened the **Biltmore Forest School** (BFS) in 1898, the first school of forestry in America. Essentially a one-man operation, he'd lecture to them in the morning and show them the practical side in the afternoon. As Schenck noted with pride, "My boys worked continuously in the woods, while those at other schools saw wood only on their desks." Filled with school pride and thoroughly versed in the art and science of forestry after just a year's training, many of his students went on to become leaders of the forestry movement.

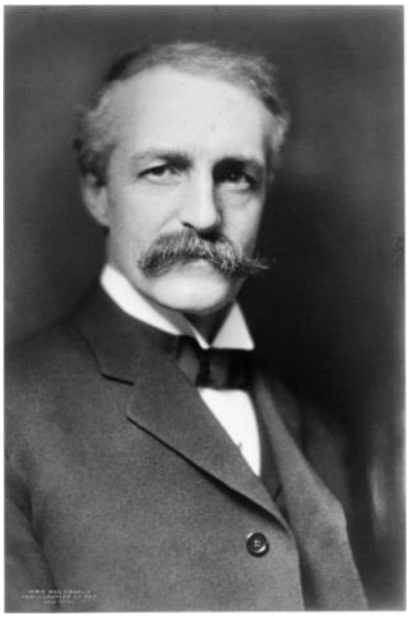
BFS students initially were sons of wealthy lumber and timber barons. However, within 15 years the school would graduate over 400 forestry students who introduced scientific forestry methods throughout North America. Established universities such as Cornell, Minnesota, and Yale each created forestry schools of their own shortly after the Biltmore Forest School experiment began. But unlike these university-based classrooms, Schenck's Biltmore School emphasized the practical side of the profession. Students devoted an intensive twelve months to forestry in the field. Following Schenck's course of work, BFS students could only graduate after completing an internship on the Biltmore Estate or elsewhere in the timber industry.

When Vanderbilt fell on hard times in 1909, he fired Schenck. Undeterred, Schenck simply took the school on the road, traveling across America and throughout Europe, showing his "boys" forestry and logging operations in different places. He taught them in railroad cars and lumber camps. Everywhere they went was a classroom. But when Schenck's school began losing money and students, he closed it and returned home to Germany in 1913.

He never forgot his boys, and they never forgot him. Some fifty years after the school closed, those students still remaining gathered at the old school grounds high in the mountains of North Carolina to

dedicate the Cradle of Forestry in America National Historic Site.

Gifford Pinchot (1865-1946)

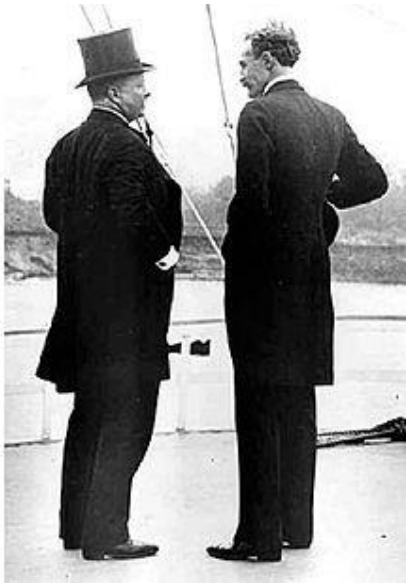


Perhaps no other American in history affected the quality of the landscape of our country as dramatically as did **Gifford Pinchot**. He was a man ahead of his time and implemented scientific forestry nationwide as the first chief of the National Forest Service. Pinchot advocated a balance between the total preservation hands off management policies advocated by his contemporary and political advisory John Muir and the industrial scale clear cut logging that had devastate the forests of Pennsylvania and the northeast by 1900.

"Conservation is the foresighted utilization, preservation and/or renewal of forests, waters, lands and minerals, for the Greatest Good of the Greatest Number in the Long Run"

The principal of managing forests to achieve greatest good for the greatest number first articulated by Pinchot is still one of the basic principles of American conservation.

Pinchot was born into a wealthy family that mingled with America's rich and powerful. The family estate, **Gray Towers**, in Milford, PA is a national historic site. Pinchot attended forestry school in Nancy, France. Becoming the first American born forester to have a formal education in the discipline. He was a personal friend and political ally of Theodore Roosevelt, a relationship that eventually led him into the halls of power in Washington DC. After serving as Chief of the Forest Service from 1905 to 1910 Pinchot lost his job in a political squabble. But the acreage of National Forest land more than tripled under his leadership.



He became Pennsylvania's Forest Commissioner in 1920 and instituted programs that resulted in more effective public relations and fire detection as well as an increased focus on professionalism and the contribution of wise use of forest resources to economic development. A skilled politician Pinchot served two terms as Governor of Pennsylvania. 1922-1926 and 1930-1934. In 1946 Gifford Pinchot died at the age of 81. One year later his autobiography "Breaking Ground" was published. In the final chapter he wrote:

> "The conservation policy has three great purposes. First, to wisely use and renew the natural resources of the earth. Second, to control natural resources and their products in the common interest. Third, to see to it that the rights of the people shall not be controlled by the great monopolies through their power over natural resources. "

A State Park in Pennsylvania and a major National Forest in Washington State are named in Gifford Pinchot's honor. Pinchot's legacy of sustainable principles continue today as the standard for forestry management practices nationwide.

Smokey Bear

The **Smokey Bear** campaign's power is reflected by the fact that anybody over the age of 4 knows who Smokey is and his favorite one liner: "Only you." Smokey was born out of a fear for our natural resources. World War II brought a concern that our forest resources might be attacked or sabotaged at a time when they were greatly needed. The U.S. Forest Service organized a fire prevention program in 1942 to encourage citizens to make a personal effort to prevent forest fires. To help convey this message an organization called the War Advertising Council began a campaign that encouraged people to assist in the war effort by doing what they could to prevent forest fires. Timber was after all a primary commodity for many products used in warfare. In 1944 they produced a poster featuring the Walt Disney's Bambi character. The success of this poster demonstrated that an animal of the forest was the best messenger to promote forest fire prevention.

On Aug. 9, 1944, the forest service and the War Advertising Council introduced a bear as the campaign symbol. This bear was to be black or brown and his expression intelligent, appealing and

slightly quizzical. To look his part, he would wear a traditional campaign hat. As the campaign grew Smoky reached out to Americans from posters, billboards, magazines, newspapers and over the air from hundreds of broadcasting stations. Many corporations donated valuable advertising time and space. The result was a great success for the Smokey Bear symbol and a decrease in human-caused forest fires. Smokey's fame snowballed from there.

In 1950 a burned bear cub survived a terrible forest fire in the Lincoln National Forest near Capitan, New Mexico. News of the bear won the love and admiration of the American public, and so many people mistakenly believe the cub was the original Smokey Bear. But in reality Smokey advertising was already six years old. After being nursed back to health, the cub was named Smokey and came to live at the National Zoo in Washington D.C. as a living counterpart to the fire prevention program.

The original Smoky died in 1976. I was in college studying forestry that year, and we all wore black armbands the week he died. That's how powerful this symbol is. Smokey continues to tell us to be careful, and his message is even more important now that many people are choosing to build homes in or near forests. There is also the challenge of teaching the public that fire properly used can be a tool to improve some forests. "Prescribed fire" requires special knowledge and skill to carry out properly and safely. The forest continues to be an important resource for our nation, and the need to prevent wildfire and use prescribed fire is greater than ever. Remember: "Only you" can prevent forest fires.

The Tree Scale Stick or Cruiser Stick

Based on the relatively simple trigonometric principle of similar triangles, a **tree scale stick or cruiser stick** is a yardstick-styled "instrument" used to measure tree diameters and tree heights without climbing the tree or wrapping a tape around the trunk. Using this one stick, a tree's dimensions can be easily determined very quickly for approximate values and checking eyeball estimates.

Foresters often use the cruiser stick tool to keep their ocular estimates honed but most timber estimation data is measured and compiled using more sophisticated and accurate tools like diameter tapes and clinometers to measure diameter and heights.

The cruiser stick was developed for forestry students in the late 1800's at Professor **Carl Schenck's Biltmore Forest School** on the Biltmore estate near Ashville, North Carolina. The instrument has passed the time test and is included in every forester's tool kit.

It is fascinating to think that you can use a two dimensional stick scale to measure the diameter of a tree. Remember that the diameter of a tree is the measured length of a straight line running through the center or pith of a tree from bark edge to bark edge. That is compared to radius (measured from tree center to bark edge) and circumference (measuring the entire circular bark edge).

This concept is captured in the mathematics and by using a fairly simple concept dealing with the principle of similar triangles. Use the math, define the points and you have a very useful tool that will accurately estimate diameters at breast height (DBH). The reason for breast height diameters is that most tree volume tables are developed at DBH or 4.5 feet from the tree stump.

The tree height scale on the edge or flip side of a cruiser stick is just as important as the diameter side. You have to record both the tree's diameter and the tree's height to calculate tree volume. These two measurements are used to estimate the usable wood content. There are hundreds of tables that use diameter and height to determine volume.

Merchantable tree height refers to the length of the usable part of a tree. Height is measured from stump height, which is usually 1 foot above ground, to an end point where the tree's marketable wood potential stops. This cutoff height will vary with the wood product(s) being considered and where excessive limbs or top diameter becomes too small to The tree height side of the scale stick has been calibrated so that if you stand 66 feet from the tree being measured and hold the stick 25 inches from your eye in a vertical position, you can read the number of merchantable logs, usually in 16 foot increments, from the stick. Like with the diameter side, it is important not to move the stick or your head when taking a measurement. Position the bottom of the vertical stick at stump level and estimate the height where merchantable height stops.

Typically cruiser sticks are marked for whole logs. The shortest sticks are generally marked for 1 thru 4 full 16 foot log heights. Some may even include a mid-point mark to indicate half logs. The starting point for the first log mark should be calculated from the left end of the stick according to the following consecutive point list. From the left and zero end of the stick, the first 16’ log mark will be at 6.1 inches; the second 16’ log (32 feet) at 12.1"; the third 16’ log (48 feet) at 18.2"; and the fourth 16’ log (64 feet) at 24.2".

The formula for each hypsometer increment:
Hypsometer (Height) Increment = (Biltmore Length x Log Length) / 66 ft.

Land Surveying

Various units of length used for surveying in the English-speaking world, all consisting of 100 links. The surveyor’s chain of 100 links is identified with Edmund Gunter, who introduced such a chain in *1620*, although chains divided decimally had existed earlier. The convenience of this decimal division was the cause of the chain's success; among other advantages, an area 1 chain by 10 chains was an acre.

There are two kinds of chain in common use, the Surveyor's (or Gunter's) Chain, and the Engineer's Chain. **Gunter's chain** is 66 feet long, and its use is confined chiefly to land surveying on account of its simple relation to the acre and to the mile. The 66' long chain is divided into 100 links, each link measuring 7.92", and is very convenient when it is required to calculate areas in acres and decimals of an acre, since 10 sq. chains = 1 acre : also when linear dimensions are required in miles and furlongs, since 10 chains = 1 furlong and 80 chains = 1 mile. When the term "chain" or "link" is used in a general sense, without reference to any particular unit of measurement, the Gunter's chain is inferred.

1 Gunter's Chain = 4 Perches or Rods = 100 Links =1/10 furlong = 66 feet
1 Mile = 80 Chains
1 Acre = 10 Square Chains

The Chain is generally divided into 100 links, sometimes into 50- but there are several varieties and lengths in ordinary use. The links are composed of lengths of iron or steel wire, and—except at the center of the chain, and at the 25th link from each end, where swivel joints (Fig. 2) are provided—these are connected at their extremities by three small oval rings, preferably welded. At every 10th link from each end of the chain a brass tag or teller is fastened to the small central connecting ring. The teller which has only one point indicates ten links from either end of the chain—i.e. the 10th or the 90th link measuring in the same direction; that with two points marks the 20th or the 80th link ; three points indicate the 30th or the 70th link; four points the 40th or the 60th link; and a circular tag the center of the chain. The ends of the chain are furnished with brass handles attached by means of swivel joints, and the length of 100 links is measured from the outside of one handle to the outside of the other.

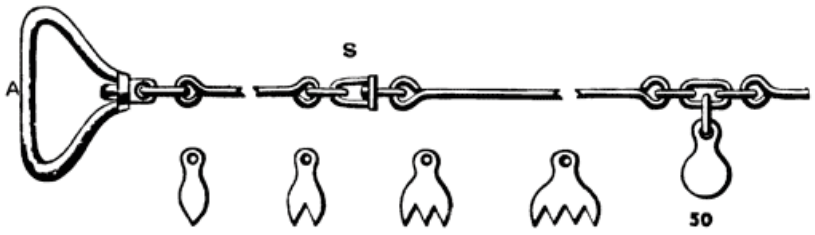


FIG. 2.—Brass Tellers.

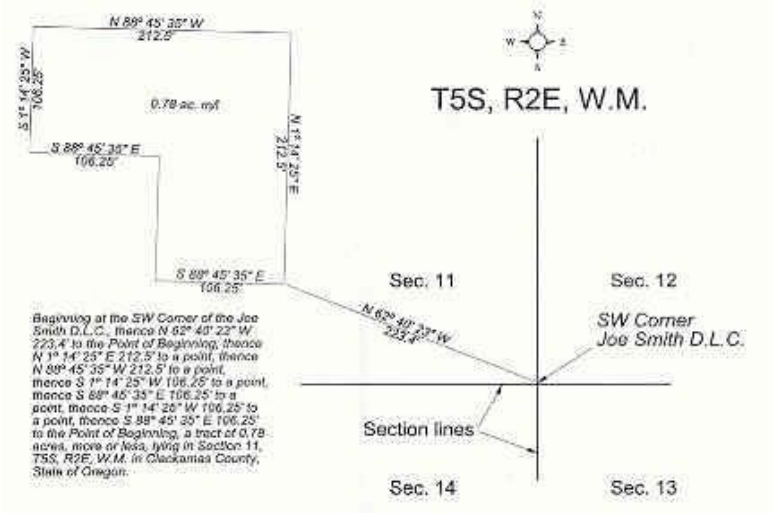
Land descriptions within the United States can generally be classified as one of these basic types (1) the "metes and bounds" system; (2) the US Public Land Survey system (PLSS); and (3) the "lot and block" survey system. Most forest lands are either described in metes & bound or PLSS.

Metes and bounds has been used in England for many centuries, and is still used there in the definition of general boundaries. By custom, it was applied in the original Thirteen Colonies that became the United States, and in many other land jurisdictions based on English common law.

Typically the system uses physical features of the local geography, along with directions and distances, to define and describe the boundaries of a parcel of land. The boundaries are described in a running prose style, working around the parcel in sequence, from a point of beginning, returning to the same point; compare with the oral ritual of beating the bounds. It may include references to other adjoining parcels (and their owners), and it, in turn, could also be referred to in later surveys. At the time the

description is compiled, it may have been marked on the ground with permanent monuments placed where there were no suitable natural monuments.

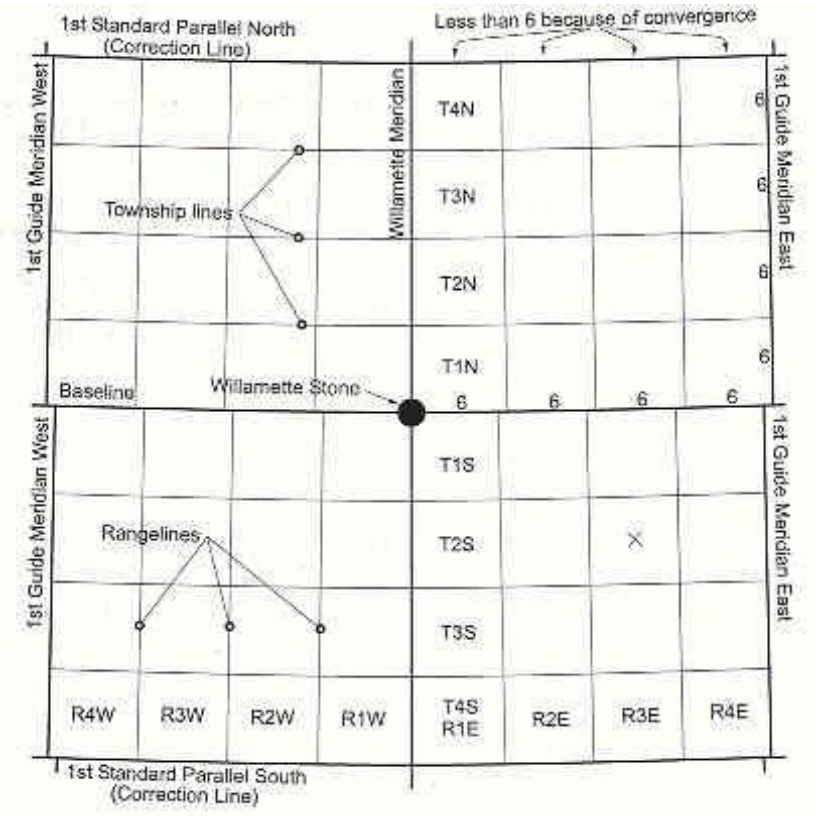
- **Metes.** The term "metes" refers to a boundary defined by the measurement of each straight run, specified by a distance between the terminal points, and an orientation or direction. A direction may be a simple compass bearing, or a precise orientation determined by accurate survey methods.
- **Bounds.** The term "bounds" refers to a more general boundary description, such as along a certain watercourse, a stone wall, an adjoining public road way, or an existing building.



The **Public Land Survey System (PLSS)** or rectangular land survey system was adopted by the federal government in 1785. It is used in all states except for the original 13 colonies, the states created from these colonies and Kentucky, West Virginia and Texas.

There are geographical locations all over the US that serve as a base reference in land surveys. The principal meridians running North-South and East-West intersect at these locations.

In Florida for instance, they cross at a point in Tallahassee. Beginning at these points, the surveyors established lines every 6 miles North, South, East and West of the crossing point. Each of these squares are called townships. They are 6 miles by 6 miles, thus have an area of 36 square miles. lines running East-West are called township lines. The lines running North-South are called range lines. They are further divided up into areas of 1 square mile called sections. Thus there are 36 sections in a township. Each section contains 640 acres.


1st Standard Parallel North
(Correction Line)
Less than 6 because of convergence
1st Guide Meridian West
Willamette Meridian
1st Guide Meridian East
T4N
T3N
T2N
T1N
Township lines
Baseline
Willamette Stone
6
Rangelines
T1S
T2S
T3S
R4W
R3W
R2W
R1W
T4S
R1E
R2E
R3E
R4E
1st Standard Parallel South
(Correction Line)

GLOSSARY

Abney Level - An instrument used to determine the percent of slope of a site.

Aspect - A compass reading taken facing down a slope in the direction water would run, the compass direction a slope faces.

Best Management Practices (BMPs) - A practice, or combination of practices, determined by a state to be the most effective, practicable means of preventing or reducing the amount of pollution generated by nonpoint sources (such as managed forests) to a level compatible with water quality goals.

Biltmore Stick - A tool calibrated to measure the diameter of a tree at breast height. Biltmore sticks can be calibrated with different scales depending on the users' arm length.

Board Foot - A unit for measuring wood volume in a tree, log, or board. A board foot is commonly 1 foot by 1 foot by 1 inch, but any shape containing 144 cubic inches of wood equals one board foot.

Clinometer - an instrument used to determine tree height as well as slope percent.

Coppice - A stand of forest originating from the stumps or roots of trees previously cut. Most hardwood species sprout readily when cut young. Very few conifers will sprout from the stump.

Crown Class - Tree crowns are classified as to the position in which they are found. The following are the main generally recognized classes:

> **Dominant** - Trees with crowns that extend above the average of the tree crowns and receives light from directly above and some from the sides.
>
> **Co-Dominant** - Trees with crowns that form the general level of the crown cover and receive full light from the top, but very little from the sides.
>
> **Intermediate** - Trees that are shorter than the two preceding classes but with some branches extending into the general crown cover. Receives little light from above and none from the sides.
>
> **Suppressed** - Trees with crown entirely below the general crown level and receiving no direct light either from above or below.

DBH - The standard measurement of a tree's diameter, taken at 4 ½ feet above the ground on the uphill side of the tree (if the tree is on a slope).

Erosion - The wearing away of the soil and minerals by climatic agents such as wind and water.

Forest Land Capability Classes - The productivity of the land for growing trees as it relates to soil depth, slope percent, aspect, and slope position: Class 1 = Excellent; Class II = Good; Class III = Fair; Class IV = Poor.

Forest Types - A classification of forest land indicating the majority of the tree species represented in an area.

Germination - The beginning of growth of a mature, generally dormant seed — characterized by rupture of the seed coat, and the emergence of a radicle or root.

Harvest - The removal of marketable products from the forest.

Mature Tree - A tree that has reached a maximum growth that the forest manager decides is a merchantable product.

Merchantable Height - The distance from the stump height to the top of the merchantable material in the tree and varies depending on the products to be made from the tree, implies the ability to cut lumber, veneer, or other products from the logs.

Merritt Hypsometer - A scaled instrument used for measuring heights of trees.

Plantation - Forest stand originating from planted seedlings; regenerated artificially either by sowing or planting.

Pole Timber - Trees 4 to 10 inches in diameter at DBH

Prescribed Burn - A management tool which can be used to manage competing vegetation, prevent fuel accumulation, and improve wildlife habitat without damaging crop trees, also known as a controlled burn.

Salvage - The removal of dead, damaged, or diseased trees to recover maximum value prior to deterioration.

Sanitation Harvest - The removal of dead, damaged or susceptible trees; essentially to prevent the spread of pests or pathogens and so promote forest hygiene.

Sapling - Trees from 1 to 3 inches in diameter at DBH

Sawtimber - Trees more than 10 inches in diameter at DBH

Seedling - A tree grown from seed; used to define a young tree before it reaches sapling size, less than 1” in diameter at DBH.

Site - The habitat or environment in which a plant or plant community lives.

Slope Percent - The number of feet of rise or fall in 100 feet of horizontal distance.

Slope Position - A particular location on a slope as upper, middle, or lower slope; ridge top; or bottom land. A specific topographic location.

Soil Depth - The distance from the soil surface down to unweathered rock or an impermeable layer which restricts water movement and root penetration.

Sprout - A tree originating from a root or stump; a tree growing from a cut stump or previously established root system.

Stocking - A measure of the proportion of the area actually occupied by trees, used to describe how well the trees in a stand utilize the available space. Stands are often classified as understocked, well-stocked or overstocked.

Tree scale stick - A calibrated stick used to estimate wood volume in a tree.

Wildfire - Fires burning out of control regardless of how or why they were started.

SUGGESTED REFERENCES

1. *Important Trees of the Eastern United States*. FS-466. October 1991. USDA FS 112pp. (Available from the USDA Forest Service or your State Forester.)

2. *Know Your Trees*. Identification Book of the American Forestry Association. American Forestry Association, 1319 Eighteenth Street N.W., Washington, D.C. 20036. 374 pp.

3. *The Stewardship of Northern Hardwoods: A Forest Owner's Handbook*. 1995. State University of New York, College of Environmental Science and Forestry, 1 Forestry Drive, Syracuse, NY 13210.

FORESTRY BOWL AND WRITTEN EXAM REFERENCES

1. National 4-H Forestry Manuals - Units A, B, and C; available from the "Training References" section of the Invitational web site.

2. Information presented within the "official" Invitational web site links for species of trees, insects or diseases. The "official" links are the web pages to which each tree, insect or disease species is linked from the Invitational's web site. Refer to the "Training References" section of the Invitational web site for the "official" tree, insect and disease training pages and the web site links to each tree, insect or disease species.

3. *National 4-H Forestry Invitational Handbook*. USDA, Extension Service, 44 pp.

4. *National 4-H Forestry Invitational Glossary* USDA, Extension Service, 18 pp.