



Figure 4—Climbing and descending trees by ropes is covered extensively in this class.

Spurs or Gaffs

This technique may damage thin-barked trees, but is the fastest way to climb and to set rigging. With spurs and lanyards, an experienced climber can eliminate the time an arborist climber spends in setting up throw lines and rope sets. A great deal of proficiency is needed to throw a lanyard to scale large-diameter trees, such as redwoods, old-growth fir, and cedar. Both the rope-climbing method and spurs or gaffs have advantages for backcountry or wilderness projects because the equipment is lightweight and easy to pack.

Swedish Ladders

Swedish ladders provide another way to scale a tree with minimal impact. The ladders are light, come in 10-foot sections, and have a secure locking mechanism. These ladders are ideal for short-term hikes in and out of project sites. They are useful when climbing the same spars repeatedly during large projects, such as bridge construction. However, they may be a cumbersome addition to a packstring's load in wilderness or backcountry settings. The ladder sections are expensive, costing \$300 apiece, but may be a practical purchase for highly accessible project sites. Many forests already use Swedish ladders.

Rigging Labs

During these labs, topics covered included the basics of rigging, forces, lines, and anchors. The goal was to give students a working knowledge of the use of equipment and rigging applications for field projects that require moving and placing heavy loads.

Mechanical Advantage—Students are introduced to rigging through the use of direct pulls, change of direction, choker rolls, and mechanical advantage (figure 5). Load calculations for tension are completed before each practice set and tested with a dynamometer to make sure that the sets are within the equipment's safe working capacity.



Figure 5—Grip hoists are used to tighten rigging cables.

High-Lead Systems

This type of system is used for bridge placement or other types of engineering and construction projects. As a rule, high-lead systems are more efficient for transporting and setting a limited number of logs, stringers, or timbers with extreme precision. A high lead uses at least two hoists placed at opposite ends of the system. Lines run from the anchored hoists up through blocks suspended from the spars or towers down to each end of the load being moved. The rigger in charge communicates with the hoist operators and directs individuals to tension or slack their equipment. Sometimes side or directional winches or hoists are added. The timbers or bridge stringers can be moved and placed close to the desired locations. During this set, instructors stressed the importance of lifting angles and anchor placement. Rigging straps were installed as high as possible and anchors were placed so that the tension of the load could be handled safely by the system. With these high-lead systems, students were able to move the load and place it in the desired location.

Skylines

A skyline is a length of wire rope suspended by rigging straps and blocks hung from spars or tripods. Often, skylines are used for moving many loads through the air from one location to another. A running block that straddles the line suspends loads beneath it as it travels by gravity in a downhill run or by being pulled by haulback lines in the other direction. Once a load is attached to the running block by a choker, drum, or basket, the hoist is anchored at one end of the system and tensioned. The load rises between the spars. This session was the most intricate lab, evolving from simple skylines to complex systems of skyline/high-lead combinations where loads became multidirectional and moved in several planes. Communication between operators and rigging masters was crucial and exact. These systems can be set up quickly. Rock, logs, gravel, fill materials, and construction materials can be moved considerable distances. Skylines excel in steep, rugged terrain where materials are rarely near the worksite. The work is demanding on muscles, but is easy on joints and tendons. In rugged terrain, a well thought-out skyline system is much cheaper than using helicopters or heavy equipment.

Tripods

Tripods (figure 6) are usually portable three-legged steel towers that can be used in sensitive riparian areas or other locations where spars are scarce. A block is mounted beneath the tripod and the skyline is run from the hoist or anchor, through the block, to the next tripod or spar and down to the ground. Tripods offer an alternative to spar trees for setting high leads and skylines. One of the instructors designed the system used in this session. It had footings that could be placed on wet or unstable ground. Students moved several objects, weighing between 200 and 400 pounds. The setup time is generally half an hour or less.

Safety was emphasized throughout the class. Every session started with the development of a sound plan for each rigging system, complete with a review to:

- Keep angles straight, reducing unwanted side pulls on trees.
- Place back ties properly.



Figure 6—Portable tripods can be used in areas where trees are scarce.

- Place rigging anchors as high and as level as possible.

Students were responsible for proper identification and communication of all cable fly zones and other potential hazards. The rigging boss was responsible for assigning tasks to each individual during the rigging process.

Availability of Training

To learn more about attending the Advanced Climbing and Rigging course, visit the California Department of Parks and Recreation's Web site at: <http://www.parks.ca.gov>. The William Penn Mott Jr. Center link provides up-to-date information on the enrollment process, directions to course locations, staff contacts, training catalogs, and training schedules. The center's phone number is: 831-649-2954.

Basic trail construction and maintenance classes are a prerequisite for the class in advanced climbing and rigging. Applicants from other agencies who have not attended the basic classes can submit a summary of their experience to determine their qualifications for admission to the class. The next class will be offered in the spring of 2005. Usually, half of the student slots are available to individuals from outside agencies.

Additional References

The *Riggers Bible* (figure 7) by Robert P. Leach is a good reference book on rigging. The book is sold by the Leach family for \$35 and can be ordered by calling 417-869-9236. Copies may also be found by searching for used books on the Internet. While the *Riggers Bible* is an excellent source of technical information, individuals must make themselves aware of all current safety rules and regulations. Your regional safety officer may be able to help you find current rules and regulations.

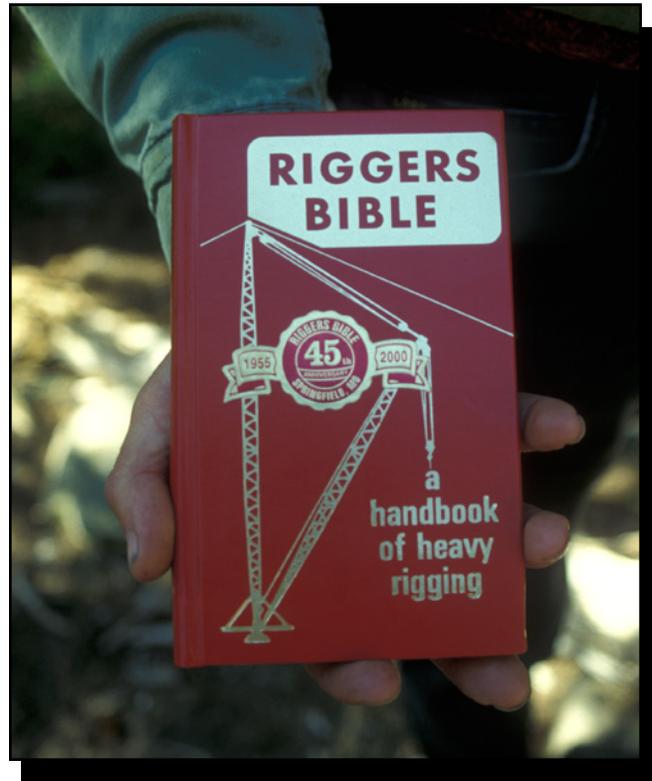


Figure 7—*The Riggers Bible* is an excellent source of technical information on the subject of rigging. Individuals must make themselves aware of current safety rules and regulations.

About the Author

Susan Jenkins began working for the Forest Service in 1994 and has spent most of her career working on fire assignments and trail projects. She has been instrumental in developing trail and watershed restoration projects that use dry stone masonry techniques and rigging applications. She has helped conduct training sessions and built strong partnerships across disciplines within agencies and with contractors, tribal organizations, and volunteers.

Ian Barlow began working for horse outfitters in the Canadian National Parks in 1973. He came to work in trails and horse packing for the USDA Forest Service in 1979. Traveling on foot and horseback for more than 17,000 trail miles while working has allowed Ian

to develop a strong sense of what does and doesn't work in trail construction techniques. Fifteen years of teaching and continuing to learn from others has fostered Ian's strong desire to work with others in developing and improving trail construction techniques that meet new demands on our trail systems.

Bob Beckley received a bachelor's degree in political science from the University of Montana in 1982. He began his Forest Service career as a timber technician on the Nez Perce National Forest. Bob was a smokejumper when he came to the Missoula Technology and Development Center in 1990 to work as the center's public and governmental relations specialist.

Library Card

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Describes the advanced tree climbing and rigging class taught at the California Department of Parks and Recreation's William Penn Mott Jr. Training Center at Pacific Grove, CA. Neither the USDI Bureau of Land

Management nor the USDA Forest Service offers a combined class in climbing and rigging. Rigging, a system of ropes or cables and hoists, allows trail workers to move heavy objects safely. The class in advanced climbing and rigging is taught by the State of California every 2 years and is open to a limited number of employees from other agencies.

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