Recreation
Tech Tips

United States Department of Agriculture
Forest Service
Technology & Development Program
March 2004
2300 0423-2303–MTDC

Advanced Tree Climbing and Rigging Training for Trail Workers

Susan Jenkins and Ian Barlow, Nez Perce National Forest; and Bob Beckley, Project Leader

Trail maintenance and construction require moving heavy objects (figure 1) in a variety of settings and conditions. With the use of rigging (a system of ropes, cables, and hoists), trail workers can safely and efficiently move items. Trail workers climb spar trees to set blocks, lines, and other rigging equipment. Skylines set high above the ground help move heavy objects over long distances and across uneven slope and terrain. On any particular job, the qualified rigger and climber do not necessarily have to be the same

Figure 1—Moving a log suspended from an overhead cable.

For additional information, contact: *Bob Beckley, Project Leader; USDA Forest Service, MTDC; 5785 Hwy. 10 West; Missoula, MT 59808–9361. Phone: 406–329–3996; fax: 406–329–3719; e-mail: rbeckley@fs.fed.us*

person, but workers need to be qualified for the tasks they perform.

Neither the Forest Service nor the U.S. Department of the Interior, Bureau of Land Management offers combined training in tree climbing and rigging. However, the California Department of Parks and Recreation offers a practical class that combines classroom instruction and "hands-on" experience through the William Penn Mott Jr. Training Center at Pacific Grove, CA. The State of California allows nonagency personnel to attend courses offered through the center, including *Advanced Climbing and Rigging.*

The Missoula Technology and Development Center was asked to locate sources of high-quality rigging training. The Advanced Climbing and Rigging course was the only regularly scheduled course we found for personnel involved in trails maintenance and restoration work. This tech tip's two primary authors attended the course in November 2001. This tech tip provides a review of the course and information on how Federal employees can attend. The course is open to a limited number of Federal employees and is offered every 2 years.

California State Parks Climbing and Rigging Training

During the past 30 years, the California Department of Parks and Recreation has improved its rigging and climbing procedures in cooperation with the U.S. Department of Labor, Occupational Safety and Health Administration, and timber industry personnel in logging systems and engineering. Changes were begun after safety reviews indicated that trail crews had the highest accidental and chronic injury rate of all field personnel (including firefighters) within the State. The listing of the spotted owl and marbled murrelet as endangered species, combined with tougher environmental laws, have increased the need for climbing and rigging skills.

Advanced Climbing and Rigging is a specialized course that provides technical training (figures 2a and 2b) in climbing and rigging, including the use of associated tools and equipment, with a strong emphasis on safety. The course covers: climbing using spurs or rope, Swedish ladders, arborist ascension methods, rigging sets, mechanical advantage, highleads and direct pulls, grip hoist applications, and mechanized winch applications. In addition, information is provided

Figures 2a and 2b—Detailed instruction in rigging is given in both classroom and field settings.

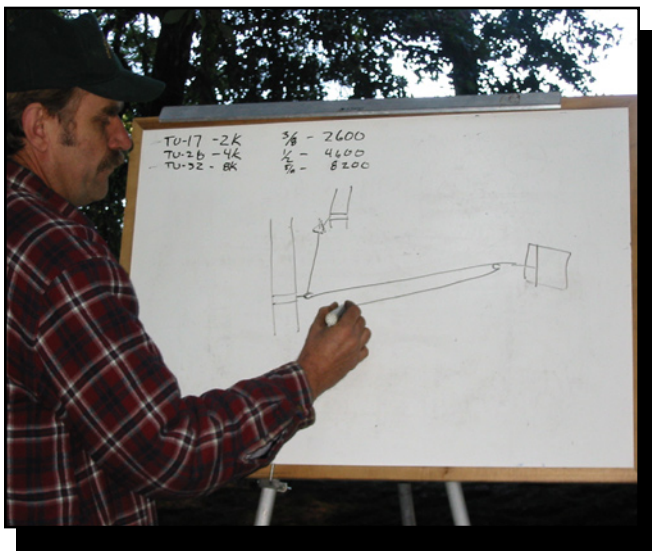

Figure 2b.

on setting bridge stringers and laying out skylines and haulback lines.

Course Evaluation

Ian Barlow and Susan Jenkins are trails and wilderness specialists on the Nez Perce National Forest. Both had experience with climbing and rigging. They felt that *Advanced Climbing and Rigging* was the most challenging and best-taught class they had taken during 35 combined years with Federal and State agencies.

The class they attended had 22 students, 9 instructors, and 4 extremely qualified assistants. Because of the low student-to-teacher ratio, all students had the time and opportunity to ask detailed questions regarding all aspects of the rigging and climbing applications. The student-instructor ratio is usually one instructor for every three students.

Course Components and Design

The success of the course lies in the combination of classroom teaching and practical training. Students learn the "big picture" of rigging applications and gain an appreciation for the range of possibilities that the equipment offers. Rigging is a viable alternative to the use of equipment such as helicopters for lifting heavy objects, at low cost with minimal resource impacts and minimal risk of injury for field workers, if conducted properly.

In the 12-hour classroom session, students are introduced to rigging and climbing equipment. Climbing and rigging safety are emphasized. As a group, students complete a thorough task hazard analysis (similar to the Forest Service's job hazard analysis) identifying major equipment safety concerns, such as cable tension, cable fly zones, system failures, equipment inspection, safe working loads for equipment, and the terrain at the worksite.

Lectures on rigging are combined with the principles of climbing because successful projects rely on both skills. The advantages and disadvantages of Swedish ladders, the use of spurs, and arborist methods are discussed as are climbing hardware, knot tying, and safety concerns for climbers and ground support personnel.

Climbing Labs

Rigging sets can be erected in a variety of ways, and the corresponding climbing methods may be selected by personal preference, impacts on the tree species, or the equipment that is available. The week of field training includes labs focused on three climbing methods: climbing with ropes, climbing with spurs or gaffs, and climbing with Swedish ladders (figure 3).

Figure 3—Increasing ladder heights by sections. The climber is secured to the tree by a climbing rope and the ladder is secured to the tree with a safety chain.

Rope Climbing

This method is common in urban forestry and also works well in backcountry settings, where it has less impact on trees than the other two techniques. It is a safe, effective way to haul and set rigging at any height. With the other methods, the climbers depend on a lanyard wrapped around the tree and need to use their legs at all times. With ropes, a climber is able to move up or down the rope (figure 4) with ease, independently of the tree. However, it is more difficult to move around the tree's bole to set rigging straps and blocks while suspended by a rope than with other climbing techniques. Equipment layout with this technique is slightly slower than when spurs or ladders are used.