Outdoor Emergency Transportation

Principles of Toboggan Handling

NATIONAL SKI PATROL

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Principles of Toboggan Handling

The *NSP Policies and Procedures* manual as amended constitutes the approved national policies of the National Ski Patrol System, Inc. All other publications are educational documents and may or may not reflect current NSP policies.

NSP MISSION STATEMENT

- NSP provides education and training in
  - safety,
  - credentialed outdoor emergency care, and
  - transportation services.

  This enables members and other stakeholders to serve the outdoor recreation community.

- NSP continually explores new opportunities for membership and association enhancement.

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ISBN 0-929752-15-5

Printed in the United States of America
Printed on recycled paper

Acknowledgments

The National Ski Patrol extends a sincere thank you to all who volunteered their time and energy in the development, review, and editing of this manual. These contributions are widely recognized by the NSP Board of Directors, the division directors, the Transportation Program director and division supervisors, the patrol directors/representatives, the national education department, and other snowsports organizations. Those who lent their expertise in the creation of this manual are listed as follows:

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Introduction

PURPOSE OF THE MANUAL

The National Ski Patrol's *Outdoor Emergency Transportation: Principles of Toboggan Handling* manual is written for ski and snowboard patrollers who operate toboggans and for the instructors who train them in this specialized activity. The guidelines contained in this manual emphasize key skills for controlling a toboggan safely in the outdoor environment with proficiency, confidence, and awareness. Maneuvers are described for a variety of equipment, including alpine (fixed heel), telemark (free heel and nordic downhill), snowboard, or cross-country (track and skate).

This manual is intended to serve as a resource in conjunction with local protocols. It is as much a reference for instructors of toboggan handling as it is a guideline for toboggan operators. The principles of efficient skiing/snowboarding and toboggan-handling techniques apply to both contexts.

The concepts in this manual that relate to skiing and snowboarding techniques are based on materials published by the Professional Ski Instructors of America (PSIA) and the American Association of Snowboard Instructors (AASI). The National Ski Patrol does not provide ski/snowboard training beyond the skills specifically required for toboggan handling. Skiing/snowboarding proficiency is defined at the local resort by area management or the public lands administrator.

Disclaimer

Outdoor Emergency Transportation incorporates generally accepted training standards and procedures that have been written and reviewed by various NSP national committees. The NSP Board of Directors has approved the Transportation Program (formerly known as the Ski and Toboggan Program) as an appropriate standard of training for NSP members. The association, its board of directors, its employees, and its membership assume no liability whatsoever arising out of, or related to, any damage or injury that may occur due to the application of the information and principles presented in this manual.

RISK MANAGEMENT

There are inherent risks in skiing, snowboarding, and operating a toboggan. Individuals may mitigate many of these risks through training, practice, and attentiveness. Despite these efforts, however, the inherent risks of these activities may result in injury or even death.

Each participant in toboggan training and operation is responsible for conducting him- or herself in a reasonable and safe manner. The individual must evaluate the risks, determine how to manage those risks, and decide whether to proceed. No one should undertake any activity or maneuver for which he or she does not feel adequately prepared and equipped. Any misgivings in this regard should be immediately and clearly communicated to the instructor. In addition, each participant has a duty to inform the instructor of any medical, physical, or emotional situation that might increase or alter the participant's risk or that of another student, the instructor, or the skiing/snowboarding public. Each participant is also responsible for having and maintaining the appropriate equipment. Each instructor should be aware of the varying ability levels of each participant and not apply excess persuasion when an individual has expressed any misgivings regarding any activity or maneuver.

The key to good risk management is common sense. Honestly assess your skill level and physical conditioning; the terrain, snow conditions, and weather; and the

manufacturer's recommendations for any equipment you are using before you attempt to meet the training objectives. During toboggan training, if required by area policy, use a tail rope operator (referred to as "rear operator" when using a four-handle/fixed-handle toboggan) as a safety reserve. Additionally, begin training exercises on gentle to moderate terrain, progressing to increasingly challenging terrain based on the area's training protocols. *Again, every patroller must be responsible for identifying and evaluating any hazards and then mitigating the risk.*

Patrollers should also consult the most current edition of the NSP *Policies and Procedures* manual (available via the Member's Bookshelf on the NSP website, www.nsp.org) to find out more about risk management and liability insurance considerations.

PATROLLER RESPONSIBILITIES

Per the NSP's Joint Statement of Understanding with the National Ski Areas Association (NSAA), area management determines the responsibilities of a patroller. Unless explicitly trained and assigned to such tasks by area management, NSP members should not operate aerial lifts, use explosives, adjust bindings or other equipment, provide ski/snowboard instruction, or perform other services that are not part of a patroller's responsibility. Every patroller should undertake only those activities for which he or she has been specifically trained and assigned. By following this advice, patrollers will protect themselves against many areas of potential liability.

When participating in NSP training activities, NSP members are required to follow state laws (including any applicable portion of the state skier safety act), the written policies of area management, the NSP program guidelines, and Your Responsibility Code, a behavior standard promulgated by NSAA and endorsed by the NSP.

Your Responsibility Code

1. Stay in control.
2. People ahead have the right of way.
3. Stop in a safe place for you and others.
4. When starting downhill or merging, look uphill and yield.
5. Use devices to help prevent runaway equipment.
6. Observe signs and warnings, and keep off closed trails.
7. Know how to use the lifts safely.

Know the Code—Set the Example

Fitness

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Your fitness level will ultimately determine your ability to enjoy your sport, both as recreation and a vocation. Young or old, new pro or old hand, your fitness level will determine your risk of injury and ability to improve performance.

A total fitness program must balance the needs for flexibility, strength, and endurance. Alpine and telemark skiing and snowboarding tend to build strength disproportionately to flexibility and endurance. Cross-country skiers have the benefit of building both endurance and strength. Regardless of the particular combination of snowsports, any program should be supplemented with a well-rounded conditioning program that includes flexibility training.

Basic components of a conditioning program include activities that focus on the following:

- Motor control, such as coordination, balance, and agility
- Aerobic and anaerobic capacity
- Muscular strength and endurance
- Muscle flexibility and joint mobility

In addition to targeting the basic elements of conditioning, you can improve specific components of performance with exercises that imitate the movement patterns of a particular activity. This is the basic principle of training known as specificity. First you have to understand the movements of your sport. In simple terms, all snowsports involve progressing down (or up) a snow-covered slope in a controlled manner. When moving down the slope, turning is used to change direction and control speed. Therefore, a fundamental objective of snowsports is to maintain balance under dynamic conditions.

Be sure to check with your doctor before beginning any new regimen—especially if you no longer think of yourself as a "young pup." An evaluation by a healthcare professional such as a physical therapist or exercise physiologist can also provide the information you need to design a personalized workout program.

Students With Disabilities

NSP education programs are not subject to laws regulating public accommodations with respect to accessibility. Nevertheless, wherever possible, NSP desires to provide its education programs to all eligible persons who can meet the reasonable requirements of the program. Within the significant time and budget constraints of a nonprofit organization, NSP instructors will strive to provide reasonable accommodations to students with disabilities. It is incumbent upon prospective students to bring relevant disabilities to the attention of the instructor, and to propose and work out a plan with the instructor for reasonable accommodations that will meet the requirements of the program and the needs of the student.

The instructor has discretion to restrict the participation of a student in all or any part of the program. For instance, the instructor may restrict participation where, in the instructor's judgment, the student cannot complete the program objectives even with available reasonable accommodations. The instructor also may restrict the student's participation when it may be significantly detrimental to the other students' ability to complete the objectives of the program.

Sliding Equipment

Icons are used throughout this manual to identify the various types of sliding equipment commonly used by patrollers. If an icon is absent, the objective, major learning point, helpful hint, or exercise applies to all four equipment types identified as follows. It is area management's prerogative to determine whether patrollers are to use a specific type of sliding equipment in the course of their duties.

SLIDING EQUIPMENT ICONS


Alpine skiing (fixed heel)


Telemark skiing (free heel, nordic downhill)


Snowboarding


Cross-country skiing (track and skate)

Terrain

Any part of a slope or trail may be steep or flat, smooth or moguled, groomed or un-groomed, or any combination thereof. Here are some descriptions of the various terrain conditions and characteristics patrollers may encounter while maneuvering a toboggan:

- **Groomed.** Snow compacted and surfaced by grooming equipment.
- **Packed powder.** Snow compacted by skier/snowboarder traffic or grooming vehicles.

- **Moguls.** Spaced mounds of firm snow created naturally by skier/snowboarder traffic or artificially by grooming vehicles.
- **Heavy, wet snow.** Snow with a high moisture content caused by a storm or by melting and freezing.
- **Breakable crust.** A layer, usually on top, of densely packed or icy snow over soft snow, unable to support a skier/snowboarder's weight.
- **Crud.** Ungroomed, cut-up, or tracked snow.
- **Firm snow/hard pack.** Firm snow compacted by skier/snowboard traffic or grooming vehicles.
- **Powder.** Newly fallen unpacked snow.
- **Flat terrain.** A slope with minimal pitch.
- **Terrain drop.** Any abrupt negative slope deviation.
- **Uphill.** Any positive slope deviation.
- **Downhill.** Any negative slope deviation.

CUSTOMIZING THE MANUAL

The NSP National Transportation Committee has spent many hours culminating general principles, major learning points, and helpful hints for this manual based on the invaluable contributions of toboggan handlers and instructors throughout the country. The committee has pursued this endeavor in a good-faith effort to consolidate and focus the outdoor emergency transportation guidelines for toboggan operators and instructors.

The Transportation Committee recognizes that as you practice these principles you may discover that some of the toboggan-handling techniques with which you are familiar are not included in this manual but are derived from your personal experience or your instructor's knowledge and expertise. For this reason, *Outdoor Emergency Transportation* contains space for notes at the end of each chapter so you can jot down your own recommendations, tactics, or reminders to complement the information provided here. Likewise, if you are an OET instructor, you can use this space to keep track of useful training tools and perspectives that may not be reflected in this manual. (Additional instructor resources and continuing education information for toboggan training and programs are available via the NSP website at www.nsp.org.)

On a similar topic, the committee hopes that you will use the manual to enhance the insights and experience you have gained at the local level. Recognizing that some of these tips and exercises may pertain to local or regional approaches, the committee asks that you share these insights so that toboggan training across the country can be enriched for all patrollers. All of these local, customized techniques and perspectives may offer considerable value to your fellow patrollers in other divisions and across the great ski/snowboard resorts affiliated with the National Ski Patrol. You never know what idea could spark a new, more effective teaching approach.

Please take the opportunity to contribute to this process by sending your suggestions to: NSP Transportation Committee Chair, 133 South Van Gordon Street, Suite 100, Lakewood, Colorado 80228. You may also e-mail your comments to the NSP education department at education@nsp.org.

Your suggestions may be used in *Ski Patrol Magazine, Pointers* (the instructor's newsletter), and/or in future editions of *Outdoor Emergency Transportation*. Regardless of how they are disseminated, your insights and contributions may lead to improved procedures for the care and transport of injured or ill outdoor enthusiasts throughout the country.

Skiing and Snowboarding Skills for Toboggan Handling

As a patroller you are entrusted with the important task of using toboggans to transport injured or ill outdoor enthusiasts from the slopes or backcountry trails to the next level of care. To control a toboggan in the safest, most expedient manner possible, you must have a solid basis in fundamental skiing or snowboarding skills. This chapter contains general recommendations to help you learn more about these skills as they pertain to toboggan handling.

Included are descriptions of these movements, suggestions for learning activities, guidelines on warmup and stretching activities, and examples of skiing/snowboarding and toboggan-handling exercises. Practicing these movements often will help you become more versatile and confident during actual toboggan operations.

SLIDING EQUIPMENT ICONS

- A Alpine skiing (fixed heel)
- T Telemark skiing (free heel, nordic downhill)
- S Snowboarding
- C Cross-country skiing (track and skate)

GENERAL PRINCIPLES

- Demonstrate the essential movements of efficient skiing/snowboarding as defined by the Professional Ski Instructors of America (PSIA) and the American Association of Snowboard Instructors (AASI) and as described in PSIA-AASI training materials.
- Use the PSIA and AASI skill levels—which instructors use to identify a skier/snowboarder's overall proficiency—as reference points in toboggan training.
- Enlist the expertise of PSIA- and AASI-certified instructors when learning skiing/snowboarding techniques. Also use them as a resource for providing appropriate exercises for fundamental skills.
- Identify and comply with the level of skiing/snowboarding proficiency that area management or the public lands administrator requires of its patrollers. This entity—not the patrol—determines the required proficiency levels of its patrollers and the equipment they will use in the course of their duties.
- Recognize the need to prepare your body for skiing/snowboarding, toboggan handling, and training activities. Follow general guidelines for warming up, stretching, and using proper lifting techniques. Acknowledge your comfort level, and make it a priority to stay healthy and injury-free.

OPERATOR FUNDAMENTALS

This section contains the general criteria for the skiing/snowboarding movements required to serve as the front or tail rope operator of a toboggan (table 1.1). Also included are the primary toboggan-handling maneuvers for operators on alpine skis, telemark skis, a snowboard, or cross-country skis.

Always use good judgment when performing these or any other patroller training exercises. Try to find a spot for training and practice that is away from slope-side traffic. Also, make sure your equipment is tuned and in good condition, and try to stay on slopes that are appropriate for the activity as well as your proficiency level.

Objectives

The toboggan handler will

- demonstrate proficiency in the maneuvers required to control a toboggan in varied conditions, and
- demonstrate maneuvers on alpine, telemark, snowboarding, or cross-country equipment as defined by area management or the public lands administrator.

Major Learning Points

Demonstrate the fundamental movements common to skiing and snowboarding.

Balancing movements

1. Maintain equilibrium (fore and aft; side to side).
2. Make movements to regain balance.

Edge control movements

1. Use your ankles, knees, hips, and spine to adjust the degree of your body's tilt in relation to the equipment.
2. Apply and adjust the angles between your equipment and the snow.

Rotary movements

1. Make movements that occur in a circular motion around a vertical axis of your body.
2. Make movements that originate from certain joints (your hips and ankles, but not your knees).
3. Actively guide or steer your equipment (with your femurs).

Pressure control movements

1. Leverage your weight to control the equipment.
2. Adapt to terrain changes using propulsion movements of your ankle, the ball of your foot, your knee, hip, and spine (as in skating and sidestepping).

Blend the fundamental movements in various snow conditions, including powder, packed powder, moguls, groomed snow, hard pack, crud, and on flat terrain. Be able to

- demonstrate the ability to maintain a centered and balanced stance,
- use edge/pressure control through angulation of the hip,
- exhibit rotary movement—steering and pivoting with the whole body and with upper/lower body separation, and
- practice a solid stance with upper and lower body separation.

Helpful Hints

- Match the basic skills and technique adaptations with the terrain and snow conditions on any given day, practicing these techniques in corridors.

PHOTO 1.1 Alpine skier

TABLE 1.1 SKIING/SNOWBOARDING MANEUVERS RELATED TO TOBOGGAN HANDLING

Alpine and Telemark Skiing	Snowboarding	Cross-country Skiing
Wedge	Climbing/stairstep (rear foot out of binding)	Diagonal stride (traditional)
Wedge turn	Skating (one foot out of binding)	Double pole (with and without kick)
Sidestep	180-degree jump turn	Sidestep
Sideslip	Sideslip, toeside and heelside	Wedge
Stem turn	Skidded turn	Wedge turn
Moving direction change (transition)	Switch (fakie)	Herringbone
Short-, medium-, and long-radius turns	Falling leaf, toeside and heelside	Kick turn
Falling leaf	Pivot transition	Stem turn
Traversing, both sides	Moving direction change (transition)	Traversing (climbing and descending)
Herringbone	Traverse, toeside and heelside	Short-, medium-, and long-radius turns
Parallel turn (skidded)	Short-, medium-, and long-radius turns	Step turn
Skating	Carved turn	Diagonal V-skate
Kick turn		Skating (V1, V2, and V2 alternate)
Parallel turn (carved)		Sideslip
Telemark turn		Falling leaf
		Parallel turn
		Telemark turn

- Adapt follow-the-leader exercises to various training situations.
- Master one skill in a progression before moving to the next. For example, begin with edging exercises, then add rotary movement drills.
- Do traverse exercises and progressions, steering exercises and progressions, angulation exercises of the knee and hip, and exercises for upper and lower body separation as described in PSIA-AASI publications.
- Experiment with different stance angles and fore-and-aft binding placement to determine how they affect the operation of your snowboard.
- Incorporate transition moves into a flat spin on unchallenging terrain (on snow, not jumps), rotating clockwise, then counterclockwise.

PHOTO 1.2 Telemark skier

FUNDAMENTAL MOVEMENTS

Skiing, snowboarding, and toboggan handling—in addition to the training you do to prepare for these activities—are all physically demanding pursuits that should be preceded by gentle warm-up and stretching exercises. You can avoid residual discomfort and the potential for injury by taking the time to adequately prepare your muscles for high-energy movements and tests of endurance.

Take the time to do these activities before practicing the fundamental movements of skiing and snowboarding. Then, work on the fundamentals in safe, unchallenging situations until you have increased your confidence and proficiency to the point that you are ready to move on to the next level of difficulty.

Warm-up and Stretching

Flexibility is an important area that is all too often neglected during training activities. Flexibility can be defined as the ability to flex, extend, or rotate the body's joints through their extended range of motion without loss of strength. The first rule of any training activity is to limit the risk to yourself and the other participants. Always warm up and stretch the muscles before engaging in strenuous physical activities such as skiing, snowboarding, and toboggan handling. It is essential that each training session begin with ample time for warm-up and stretching activities.

Flexibility and conditioning don't happen overnight; it takes time, repetition, and discipline to improve in this area. That said, physical conditioning is not a focus of this manual, and each individual is responsible for his or her own level of fitness. In general, instructors should take into consideration their students' overall fitness when determining the type and level of activity to incorporate into the training session.

Contrary to popular opinion, warming up and stretching are not the same thing. Before stretching, it is extremely important to warm up. Stretching a cold muscle could lead to injuries, including muscle tears. Five

to 10 minutes of a light cardio exercise can help warm up the muscles and get the body ready for the stretching and training activities. A warm-up is thought to improve the body's range of motion and prevent soreness. Warming up means loosening the muscles and raising the body temperature and heart rate gradually to prepare the body for exercise—an important factor in the cold, outdoor environment.

Select a 5- to 10-minute warm-up activity based on the location and training environment. This could consist of a simple hike to a meeting location or a smooth warm-up run on an easy trail.

Begin the stretching routine "from the head down" as suggested in the following example:

- Do 10 to 15 head rotations in both directions: roll your chin down to your chest, then to the left, to the rear, and to the right, then back to the chin. (Be sure not to overextend your head backward, which can cause excess compression of the cervical vertebrae.) Next, do 10 to 15 forward shoulder rotations, gently rolling the shoulders in small circles while keeping your hands at your sides. Repeat in the opposite direction.
- Extend your arms horizontally out to the sides and make 10 to 15 small and large circles in both directions. Repeat in the opposite direction.
- Rotate your hips in increasingly larger circles, with your hands on your hips for balance. Do 10 to 15 rotations in both directions.
- Swing each leg forward and then backward 10 to 15 times, using ski poles for balance.
- Keeping one foot flat on the snow, step forward with your other foot and hold for 15 to 30 seconds to gently stretch your calf. Repeat on the opposite side.
- Slowly stretch the inner thigh by stepping sideways, keeping one leg straight and flexing the opposite knee laterally. Hold for 15 to 30 seconds. Repeat on both sides with increasingly greater flex.
- With skis on and using poles for balance, gradually turn one leg out so that the tip of your ski is pointing toward the back and the tail is pointing toward the front. Hold for 15 to 30 seconds and repeat on the other side. This exercise stretches both the quadriceps muscles and the hamstring muscles.

Note: Remember *not* to force the muscles, but to slowly increase the range of motion to resistance.

Drills and Exercises for Skiing Movements and Skills

Reprinted, by permission, from Alpine Technical Manual: Skiing and Teaching Skills. *©2002 by the Professional Ski Instructors of America.*

Sometimes when teaching, you need to focus on one particular movement or skill. The drills and exercises presented below are suggestions for teaching particular movements and skills to alpine and telemark skiers, but it is important for you to realize that they are not progressions. Instead, they are used to isolate and highlight particular movements and skills. Use them as part of a progression and tie them back into blended skiing. Recognize that many more exercises exist than are listed here. Also notice that many of the exercises that you use to enhance one movement or skill can carry over to another. Remember, the focus that you and your students choose is what makes the exercise work.

Balancing and Stance

●●●●●

- Hop in ski boots, but without skis and poles
- Hop with skis, on flat terrain
- Shift weight fore and aft on two skis while stationary to feel the ball, arch,

and heel of the foot (rocking horses)
- Get super tall and super short while doing a straight run on two skis
- Hop with both skis while in a straight run

■■■■■
- Ski without poles
- Thousand-step turns on gentle terrain (constant baby steps throughout the turn)
- Small leaper and hop turns (slight hop into the air at the start of the turn; land and finish the turn on the ground)

◆◆◆◆◆
- Thousand-step turns
- Leaper and hop turns with and without ski poles
- Spiess turns (180-degree turn in the air; land parallel and on edges with a solid pole plant, then jump up and turn 180 degrees in the air)
- Javelin turns (pick up the inside ski and cross its tip diagonally over the outside ski throughout the turn, keeping the inside ski suspended through the arc of the turn)

Edging Movements

●●●●●
- Sidestep up a gentle slope without skis
- Sidestep up a gentle slope with skis on
- Gentle traverses on a green slope
- Herringbone up a gentle slope
- Wedge stops on a gentle slope

■■■■■
- Skate without poles across flat terrain
- Thousand-step turns
- Sideslips and hockey stops

◆◆◆◆◆
- Spiess turns
- Javelin turns
- Edge-set releases in a traverse (traverse across the hill with your edges engaged; release your edges and slip down and across the hill, then reengage your edges and continue across the hill)
- Railroad track turns (start in the fall line in a fairly wide parallel stance; make large, patient sidecut turns in the fall line by merely tipping both legs at the same time, engaging the edges and allowing the skis to turn; the terrain should be fairly gentle as speed increases when done cleanly)
- 180 and 360 spins on the snow on gentle terrain

Rotary Movements

●●●●●
- Turning movements while off the skis
- Make "figure 8s" on two skis in a large circle on flat terrain
- Hop to a wedge position on flat terrain
- Turn skis to a wedge position on flat terrain

■■■■■
- Sideslips on a gentle slope
- Hockey stops
- Foot arcs without skis (use poles for balance)

◆◆◆◆◆
- Pivot slips (sideslip, then spin skis 180 degrees while on the snow; then sideslip, all while maintaining a constant speed)
- Spiess turns
- Stem turns (use one ski as a platform while you place or skid the other ski out to start a turn)
- Step turns (stand firmly on the downhill ski while it is edged; pick up the uphill ski and place it either parallel, diverging, or converging to the downhill ski, then step onto that ski and move into the new turn)
- Javelin turns

Pressure Management

●●●●●

- Hop in ski boots, but without skis and poles
- Get super tall and super short while doing a straight run on two skis
- Hop with two skis on flat terrain
- Shift weight from foot to foot (lift the ski that you are not on)
- Press shins into fronts of the boots (take shins off the fronts of the boots; repeat several times)

■■■■■

- Small leaper and hop turns
- Traverse across small bumps (practice absorbing terrain, keeping contact between the skis and the snow)
- Sideslips and hockey stops
- One-ski turns on flat terrain (lift inside ski off snow through the turn)

◆◆◆◆◆

- Spiess turns (land soft like a cat, then hard like an elephant)
- Extension turns (change edges with an extension move)
- Skiing gentle bumps with no pole plant or pole touch
- Retraction turns (change edges with a retraction move)

Blending Movements

Movements and skills can be viewed and developed independently of each other. Most of the exercises listed previously involve some type of blending of more than one movement or skill. For example, when focusing on a clean and precise edge set and edge control while practicing spiess turns, you still have to rotate your legs 180 degrees to get to the other set of edges. You also need to manage pressure when you land so that you do not jar your back and legs. Last but not least, remember to land in a balanced stance so your skis do not shoot out from under you.

PHOTO 1.3 Snowboarder

Adaptations for Snowboarding

The following drills and exercises are suggestions for teaching particular movements and skills for snowboarding, but it is important to realize that they are not progressions. Again, recognize that many more exercises exist than are listed here.

Balance Skills

- Switch traverse—Move across the fall line in a backward direction.
- Forward traverse—Move across the fall line in a forward direction.
- Hopping—Hop up and land softly, simultaneously on both tip and tail.

Edging Skills

- Heelside and toeside sideslips in a narrow corridor—Vary the edge angle to vary the speed.
- Falling leaf—Initiate a traverse, return to a neutral edge, reverse direction.
- Thrusting—Accelerate by extending flexed legs on a downslope.
- J turns—Make a turn in a single direction until coming to a stop uphill.
- Garlands—Steer the board from a traverse into the fall line, then back to the original direction, and continue this series of maneuvers.
- Hopping uphill—Hop uphill toeside or downhill heelside.

Upper and Lower Body Separation Skills

- Stationary jump turns—Make a 180-degree jump turn, landing in the same location.
- Power stop (hockey stop)—Flex the ankles, knees, and hips while pivoting both feet across the fall line to come to an immediate stop.

Transition Skills

- Forward to switch—While moving forward and leading with the tip of the snowboard, perform a 180-degree maneuver and continue in the same direction, now leading with the tail.
- Switch to forward—While moving forward and leading with the tail of the snowboard, perform a 180-degree maneuver and continue in the same direction, now leading with the tip.
- Heelside to toeside—Change the point of snow-to-board contact from the heelside edge to the toeside edge by way of upper and lower body rotation as well as weighting and unweighting.
- Toeside to heelside—Change the point of snow-to-board contact from the toeside edge to the heelside edge by way of upper and lower body rotation as well as weighting and unweighting.

Other Maneuvers

- Jump turn, spin right; and jump turn, spin left.
- Sidestep ascent with one foot free.
- Wedge dance—Push or step on one foot, then the other, while moving down the fall line.

Adaptations for Cross-country Skiing

The following drills and exercises are suggestions for teaching particular movements and skills for cross-country track and skate skiing, but it is important to realize that they are not progressions. Again, recognize

PHOTO 1.4 Cross-country skier

that many more exercises exist than are listed here.

Balance Skills

- Diagonal stride—Move the arms and legs in a cross-lateral (opposite) motion, as in walking.
- Step turn—Make a turn by maintaining one ski as a platform and stepping the other ski into a converging, diverging, or parallel position.

Edging Skills

- Herringbone—Step uphill with the skis in a V-shaped position.
- Skating—Position the skis into a V shape and make a strong push-off from ski to ski, so that you are gliding onto the diverging ski and then back to the original ski.
- Skate turns—Accelerate around corners with the skis in a V-shaped position. Step off of one ski, then onto the diverging ski, and bring the other ski parallel.

Upper and Lower Body Separation Skills

- Diagonal stride with poles—Alternate the movements of the arms and legs (as in walking) to glide.
- Sliding on skis—Shuffle the feet without lifting them.
- Gliding on skis—Move both skis with a static body position; move from ski to ski, shifting weight to the gliding ski and remaining centered over that ski.
- Double poling—Use both arms to push on the poles simultaneously for forward momentum.

Wedge Skills

- Skidded and carved wedge comparisons
- Gliding and brake wedge comparisons

Transition Skills

- Wedge transitions (pivot and skid)
- Sideslip transitions

Other Maneuvers

- Kick turn left and right, with and without poles.
- Sidestep up and down the hill.

ADAPTING BASIC SKILLS TO CARRYING EQUIPMENT

The realities of the outdoor environment are such that patrollers must travel on skis or a snowboard while carrying a variety of equipment from one location to another, be it down an icy ski slope or across a rugged backcountry trail. It is essential that patrollers transport equipment in such a manner as to reduce the potential for injury to themselves and others.

Applying basic movements of efficient skiing/riding as described in PSIA-AASI training materials is essential when carrying and transporting equipment. (*Note:* It is important to never demonstrate incorrect methods, as this could cause injury.)

Here are some suggestions for how to carry out this function safely and efficiently.

Objective

The toboggan handler will demonstrate effective fundamental skills while transporting a variety of equipment on different types of terrain and snow conditions.

Major Learning Points

- Adjust your speed and skiing/riding style to the equipment you are carrying, the terrain, the weather, the snow conditions, and the skiier/snowboarder traffic, if necessary.
- Use both hands, if possible, to better support the weight of the equipment, maintain balance, and manage any wind resistance.
- Recognize that your turns may be less polished than when free skiing or riding.
- Maintain a clear field of vision.
- Emphasize caution and good judgment while transporting any equipment.

Helpful Hints

- Use an available empty toboggan to transport equipment to the scene.
- Use a large bag with shoulder straps to store equipment in the toboggan and keep it dry. This also makes carrying the unused equipment easier and safer.
- Use tape to secure loose items into one compact bundle, which will make items easier to carry.

SUMMARY

Moving a toboggan down a steep, icy slope or across a backcountry trail requires considerable stamina, skill, and confidence. Be sure to prepare yourself sufficiently for the task at hand: warm up and stretch before you ski or snowboard, operate a toboggan, or engage in any other rigorous activity. Incorporate efficient skiing/snowboarding movements into your transportation techniques to help strengthen your proficiency and reduce the chance of injury and fatigue. Finally, don't forget to comply with proper lifting principles whenever possible.

These common-sense patrolling credos are well worth heeding. They can benefit you personally while contributing to the safe, efficient transport of your patients across the snow-covered slopes and trails.

TRAINING EXERCISES

There are numerous drills designed to help patrollers strengthen their overall skiing and snowboarding proficiency, which will increase their versatility and confidence when transporting a toboggan. Individual drills described in previous sections can be made even more challenging when combined as follows:

- Have trainees start from a straight run and pivot skis into a sideslip (trying both right and left).
- Encourage the group to vary the speed at which they pivot their skis into a sideslip (slower can be harder but is more measured).
- Tell the patrollers to do a straight run, then move into a sideslip, falling leaf, and back to a straight run.
- Have the trainees try kick turns on flats and varying inclines, with and without poles.
- Have the trainees practice a skating traverse to maintain and gain altitude (the downhill ski skates, and the uphill ski steps up the slope on a steeper pitch).
- When combining sidestepping with a forward glide, the trainees should focus on stepping the tail of the ski a little higher than the tip of the ski.
- Before trainees try this with a toboggan, have them try different hand positions while performing the above tasks. For instance, they can practice with their hands on their hips or on their heads to develop better balance. Also they can try this with backpacks of different weights. Point out to the group that they may discover it is easier to turn their legs under a "heavier" torso provided they are progressive in their steering and pivoting.
- Practice "mirror" or "copy-cat" skiing with any of these maneuvers. Have the trainees follow an experienced skier/snowboarder or instructor, mimicking their actions on a variety of terrain and conditions.
- *Mogul conditions:* When skiing moguls, trainees should concentrate on establishing a rhythm, weighting the outside ski fully on its inside edge and maintaining continuous, fluid vertical motion. At the initiation of each turn, they need to remember to project the body down the hill in the direction of the new turn. To unweight, they should try turning on the tops of the moguls. As they approach the mogul, they should keep their knees loose and flexing to absorb the

continued >

TRAINING EXERCISES, continued

mogul. The trainees should touch the inside pole to the snow slightly forward and downhill when cresting the mogul, steer the skis around the pole, and press the skis down against the backside of the mogul to complete the turn in the trough. Have them vary the edge angle to make carved or skidded turns. The group should practice absorbing moguls between turns while maintaining a constant speed.

- *Powder conditions:* Turning in powder is a slower process than turning on packed snow. Have the trainees start with a strong up-unweighting at the beginning of the turn. They should actively steer the inside ski to help initiate the turn. Tell them to extend and use a twisting/pushing motion with both feet to guide the ski tips toward and across the fall line. They should flex to absorb and finish the turn. Have the group start with long- and medium-radius turns, then progress to short-radius turns. On short-radius turns, when the trainees feel the resistance of the snow against their skis at the end of one turn, they should relax and let the snow push their feet, skis, and knees upward (unweighting). Then they need to push, twist, and steer the ski tips toward and across the fall line and the tails of the skis sideways. On steep slopes, tell them to push the skis down into the snow at the end of the turn to control speed.
- Adapt the above exercises for snowboard maneuvers where applicable.
- Using commercial and fabricated toboggans, have trainees work on developing stamina and endurance over distance and varied terrain, with necessary patient care equipment (O_2 pack, backboard) loaded in the toboggan.
- Have the group practice carrying a small bundle of untied bamboo on varied terrain to strengthen their balancing skills and confidence.
- Have the trainees practice carrying other patient care equipment on varied terrain to strengthen their balancing skills and confidence.

Notes:

Toboggans and Related Equipment

Because you may need to operate different types and configurations of toboggans in the course of your duties at an alpine resort or backcountry area, you should familiarize yourself with all of the transportation equipment available at your area and learn to use it before the occurrence of an actual emergency situation.

This chapter contains useful information on the design components and performance characteristics of various toboggans. Also included are generally accepted guidelines on the storage, inspection, and care of toboggans and other transportation equipment.

SLIDING EQUIPMENT ICONS

- A Alpine skiing (fixed heel)
- T Telemark skiing (free heel, nordic downhill)
- S Snowboarding
- C Cross-country skiing (track and skate)

GENERAL PRINCIPLES

- Understand all of the components of the area's toboggans and learn the methods for using all accessories and anchors.
- Be familiar with the features of different toboggans and learn which types are best suited to certain situations (depending on terrain, weather, snow conditions, distance to destination, and the operator's mode of travel, i.e., skis/snowboard or a snowmobile or other all-terrain vehicle).
- Develop systematic, routine habits for inspecting all components of each type of toboggan used at the area.

TOBOGGAN TYPES

Depending on the environment in which you patrol (an alpine resort versus a backcountry area) and the policies of the local area management or public lands administration, you may use one or more different types or configurations of toboggans. Patrollers in the alpine downhill environment (alpine skiers, telemark skiers, and snowboarders) tend to use two-handle (locking-handle) or four-handle (fixed-handle) toboggans whereas patrollers in the backcountry environment tend to use commercial portable types or improvised toboggans fashioned from skis, poles, and other items they carry to the incident scene.

Two-handle (locking-handle) toboggans (photo 2.1) consist of a shell that is usually made of fiberglass or Kevlar material; attached metal handles; and a tail rope. The front handles may be placed in a hinged position for a flexible up-and-down movement during unloaded travel, or they may be secured with locking mechanisms, making them inflexible in a fixed position. This locked-handle position enables the operator to apply or reduce pressure to the body of the toboggan, which enhances the operator's control when the toboggan is loaded. The tail rope attached to the rear of the toboggan allows for the tail rope operator to perform back-up braking and control slippage.

Four-handle (fixed-handle) toboggans (photo 2.2) usually consist of a bathtub-shaped shell made of fiberglass or metal with four separate metal pole-style handles that can be inserted and locked in a fixed position. When the four-handle toboggan is loaded, the two operators have a different kind of control over the toboggan than they would with a two-handle toboggan. In other words, because each person has two handles, they both have a direct connection to the toboggan. This requires particularly coordinated teamwork to operate efficiently. Four-handle toboggans are used most often in off-trail rescues and in steeper, more adverse conditions.

PHOTO 2.1 Two-handle toboggans

PHOTO 2.2 Four-handle toboggan

Commercial portable toboggans (photo 2.3) are relatively lightweight two-piece units that are carried by the patrollers and assembled at the scene. These are typically used at nordic centers or in the backcountry.

Improvised toboggans (photo 2.4) are created from materials and equipment that the patrollers have on hand, such as skis, poles, and tarps. These are used when no commercial toboggans are available.

Objectives

The toboggan handler will

- describe the features of the four toboggan types identified in this manual, and
- identify the types of toboggans used at the home area.

Major Learning Points

Two-Handle Toboggans

Here are some common features of two-handle toboggans:

- You have more flexibility with unlocked handles. The toboggan is easier to maneuver and transport at high speeds while still allowing the fins to dig in and track through the snow. (*Note:* It is strongly advisable to lock the handles when transporting heavy loads such as a patient or equipment so you can use the chain brake for control.)
- When the handles are unlocked, you can flex or pivot the toboggan, enabling it to be towed by a mechanical device.
- You can unlock the handles and fold them down for easier storage and uphill transportation.

Four-Handle Toboggans

Here are some common features of four-handle toboggans:

- When two people are operating the toboggan, they can "make light" (i.e., elevate the toboggan running surface above the snow) over flat terrain when the toboggan is loaded, thus eliminating resistance from the snow surface and allowing easier and quicker transport over flat terrain or in wet, heavy snow.

PHOTO 2.4 Improvised toboggan

PHOTO 2.3 Commercial portable toboggan

- With two operators, the four handles provide added stability when traversing and when belaying into and out of a site.
- The four handles provide added maneuverability in deep snow and the ability to make the toboggan light enough for the snowpack.
- The rear operator provides additional stability, allowing the team to make tighter turns and make the toboggan light, enhancing its suitability for off-trail terrain.
- This type of toboggan provides the operators with the option to use the chain brake for even more control.

Commercial Portable Toboggans

Here are some common features of commercial portable toboggans:

- This type of toboggan is a lightweight two-piece unit that can be disassembled and carried to the incident scene, then quickly assembled to transport the patient to the destination.
- The operators can use the commercial portable toboggan either with or without the handles.
- This toboggan is appropriate for use in all seasons because it can be set on a litter wheel apparatus.
- This toboggan is appropriate for use in low-angle rescues because it is light and easy to transport.

Improvised Toboggans

Here are some common features of improvised toboggans:

- They are portable; they can be assembled and disassembled easily.
- They are relatively lightweight, which makes them ideal for longer evacuations as well as uphill and downhill transport.
- They are fashioned from materials the rescuers carry with them along with the patient's skis and poles.
- They have a harness, allowing for hands-free operation.

Helpful Hints

- For details on improvising toboggans, please refer to *Mountain Travel and Rescue* (NSP 1995) and *Nordic Training Manual* (NSP 1998).
- Familiarize yourself with the various toboggans used at your home area.
- Be aware of when and why these toboggans are used based on their features and performance characteristics.
- When visiting other areas, observe which types of toboggans the patrol uses; find out why the patrol uses a particular type of toboggan for a specific situation so you can learn more about possible applications and adaptations.

TOBOGGAN COMPONENTS

Features vary on different toboggan types, but here are some common components among the equipment used in outdoor emergency transportation scenarios.

- **Shell** (photo 2.5). The main body of the toboggan, this is the curved "sled" that carries and supports a patient and/or equipment. It may be constructed of fiberglass, Kevlar, aluminum, or wood, depending on the model. The front of the shell is referred to as the "bow," and the rear is referred to as the "stern."
- **Fins** (photos 2.6, 2.7). These metal pieces vary in length and width to support tracking and maneuverability in different terrain and snow conditions. Bolted to the bottom of the toboggan, the fins serve as its "edges."
- **Handles** (photos 2.8, 2.9). These sturdy handholds provide a direct connection between the operator and the toboggan. They may consist of stainless steel, aluminum, titanium fiberglass, rope, webbing with padded shoulder or waist harnesses, or other fabricated devices. Handles can be attached in a fixed or hinged manner to the front and/or back of the toboggan. The operator(s) uses the handles to control speed and direction.

PHOTO 2.5 Shell

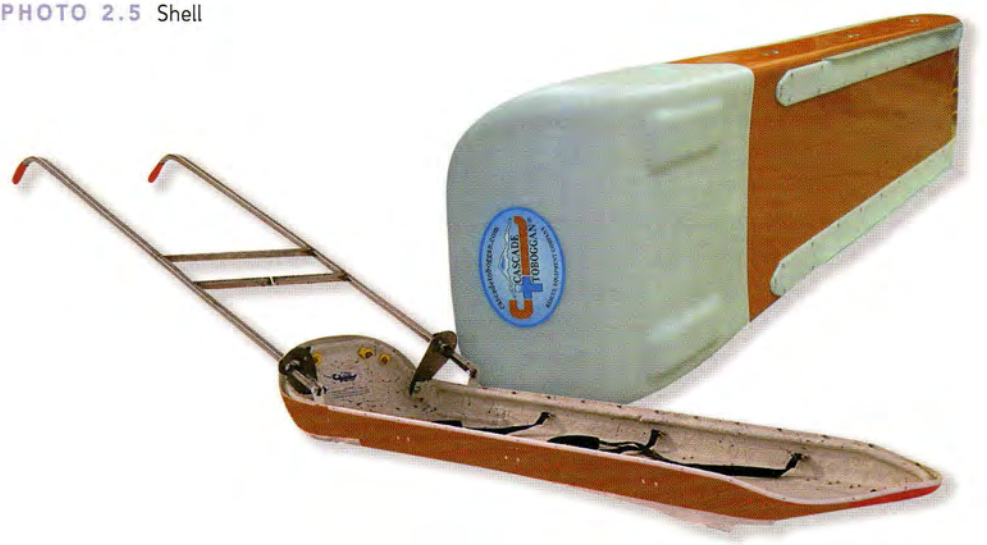


PHOTO 2.6 Fin

PHOTO 2.7 Fins

PHOTO 2.8 Handles, two-handle toboggan

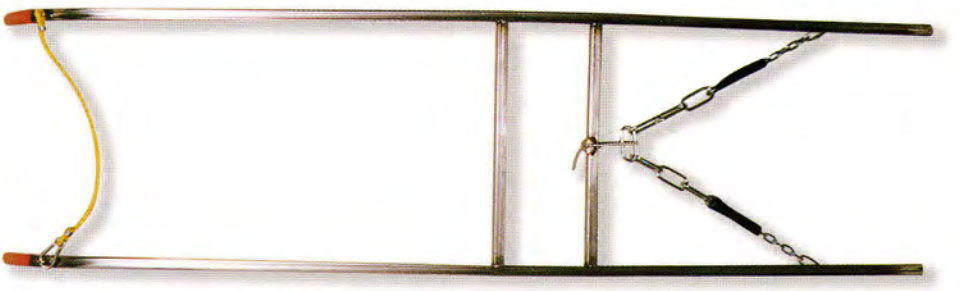


PHOTO 2.9 Handles, four-handle toboggan

- **Locks** (photos 2.10). These devices are attached to the toboggan shell and serve to hold the handles in a stationary position. They appear in various configurations: aluminum plates, rigid casting, and hinged fiberglass plates.
- **Chain brake** (photo 2.11). This length of chain is attached to the front, or bow, of the toboggan and is used to control speed during steep descents and on icy terrain. When not in use, the chain is attached to the crossbar of the handles by a bungee cord, wire hook, or other device.
- **Tail rope** (photos 2.12, 2.13). This length of rope is attached securely to the back of the toboggan and is used by the tail rope operator to help control speed and direction.
- **Patient straps** (photo 2.14). These lengths of webbing or other material are used to secure the patient or equipment in the shell of the toboggan.
- **Accessories.** These additional items or tools may be used to enhance the performance characteristics of the toboggan, simplify transport, and keep the patient safe and comfortable. Numerous examples are provided in the Major Learning Points (see pages 24–26).

Objective

- The toboggan handler will identify and describe how each toboggan component contributes to effective operation.

PHOTO 2.10 Locks

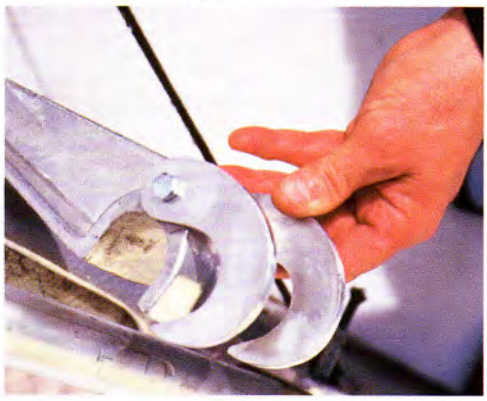
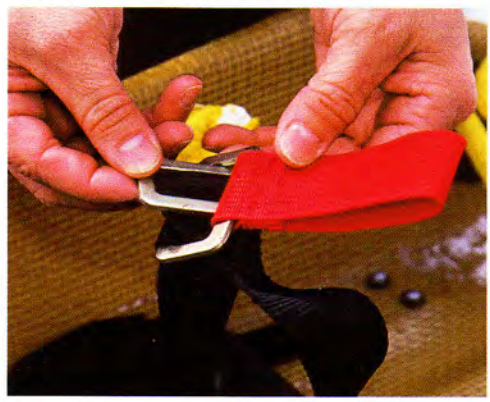


PHOTO 2.11 Chain brake

PHOTO 2.12 Tail rope

PHOTO 2.13 Tail rope attached to toboggan

PHOTO 2.14 Patient straps



Major Learning Points

Shell

- Is usually one-piece but can be two-piece.
- Features an anti-suction tunnel and cambered base.
- Has a wide nose.
- Has a rolled edge to keep snow out and provide for easy lifting.
- Contains accessories attached at strategic locations that serve as belay points.
- Is constructed with metal skid plates that minimize the drag on flat terrain and provide abrasion resistance to rocks, ice, etc.
- Is constructed with bow guards that act as a buffer between the shell and the chain brake.

Fins

- Long fins provide better tracking when the toboggan is turning.
- Short fins enhance the toboggan's short-radius turning ability.
- Deep fins are used in soft snow.
- Shallow fins are used in harder snow.
- Canted fins offer a more positive connection to the snow on a steep traverse.
- Offset fins offer better snow-surface grip in irregular terrain.

Handles

Fixed handles offer the following benefits:

- They provide better speed control because you can increase or decrease the weight of the load on the chain break.
- They provide better tracking of the toboggan because you can increase or decrease the weight of the load on the fins' edges.
- They allow you to lift the toboggan directly.
- Hitch pins allow you to secure handles as needed (photo 2.15).

Hinged handles (photo 2.16) offer the following benefits:

- They provide better handling in undulating terrain.

PHOTO 2.15 Hitch pin for fixed handles

PHOTO 2.16 Hinged handles

- They allow you to fold the handles back for ease of storage and uphill transport.
- They allow you to attach towing accessories at pivot anchor points.
- You can attach the handles to the toboggan with locking bolts or captive pins.

Locks

- They allow for easy storage and uphill transportation.
- They allow for ease of handling; they are unlocked when the toboggan is empty and locked when it is loaded.

- They allow the operator to effectively apply the chain brake and release the braking action when required.
- They appear in various configurations of aluminum plates, rigid casting, and hinged fiberglass plates (photo 2.17).

Chain Brake

- The front operator applies weight and pressure to the bow of the toboggan to engage the chain into the snow for speed control.
- The chain can be strapped or tied rearward to maintain engagement.
- The chain is strapped to the handles when not in use.
- Adaptations include the use of multiple chains and rope leashes.

Tail Rope

- Enables the tail rope operator to assist the front operator with braking the toboggan as needed.
- Allows the tail rope operator to help the front operator maintain the track of the toboggan during steep traverses.
- Allows the tail rope operator to help the front operator pull the toboggan through flat terrain, wet snow conditions, and on uphill stretches.
- Can be used as a belaying device.

Patient Straps

- A variety of strap types are used for commercial and fabricated backcountry toboggans:
  - 1-inch nylon webbing using a 1-inch metal-plated, spring-loaded buckle long enough to secure different-sized patients.
  - Webbing with Fastex™ buckles or Velcro,™ cravats, duct tape, and rope.
- Patient straps are often used to secure the tail rope and toboggan pack in an unloaded toboggan.

PHOTO 2.17 Handle lock

Accessories

- **Patient cover/tarp**—Shields the patient from inclement weather, snow, or other debris and helps to keep the person warm, dry, and feeling secure without compromising access to the patient's head for monitoring or treatment.
- **Patient pad**—A durable padding (e.g., foam) that provides additional insulation for the patient.
- **Webbing**—Flat woven nylon that is either single thickness or tubular. Because of its strength-to-weight ratio, it is preferred for such applications as slings and harnesses.
- **Carabiner**—A hinged, gated device that provides a quick attachment method between ropes and a piece of hardware, eliminating the need for tying and untying knots. It also provides a smooth sliding surface for belay systems.
- **Prusik cord**—A pre-tied loop of small-diameter rope (5 to 7 mm) that is applied as a hitching implement to another rope of greater diameter. When weighted it grips the larger rope with considerable friction; when unweighted it may be slid along the line without resistance. The prusik cord is used primarily in ascending rescues to prevent the toboggan from losing elevation during extraction.
- **Pulleys**—A free-wheel device used to provide a mechanical advantage so less effort

is needed to raise or move loads. Pulleys also reduce rope friction and prevent unnecessary damage to the working rope.

- **Locking carabiners**—Carabiners that contain an additional twisting, locking collar to prevent the gate from opening. (The ANSI B77.1: American National Standard for Passenger Ropeways requires the use of this hardware for ropeway rescues.)
- **Rope**—A connective hauling device used to link rescue equipment to rescue personnel. Rope is usually made of nylon or polyester fiber in varying diameters and tensile strength.
- **Belly chain**—A secondary braking device attached and secured to the bottom-middle of a toboggan. The belly chain is used on extremely steep, icy, and hard-pack conditions for added sliding friction.
- **Specialized rescue equipment**—This category includes items such as harnesses, belaying ropes, crampons, anchoring devices, etc.
- **Snowmobile tow bar** (photo 2.18)—Heavy-gauge steel tubing with a swivel hitch that attaches to a snowmobile so it can pull a toboggan along cat-tracks, downhill, through the backcountry, or other terrain.
- **Litter wheel** (photo 2.19)—A specialized transportation device used to move toboggans or rescue litters over all types of terrain without dragging or sliding. The litter wheel is used mostly when there is no snow on which a toboggan or litter can be slid.
- **Carry handles**—Loops of rope or webbing attached to each end of a toboggan to allow for easy gripping and lifting of the equipment. The handles are usually positioned in pairs at the front and rear

PHOTO 2.19 Litter wheel

PHOTO 2.18 Snowmobile tow bar

for easy access. They also serve as a good anchoring attachment for securing a toboggan at an incident site.

- **Snow/spray guard**—A protective device that can be attached on the snowmobile tow bar and the front of the toboggan to help protect the patient and other contents from the snow spray created by the snowmobile.
- **Chairlift carrier, loaded and unloaded**—A device that is designed to assist the patroller in transporting toboggans uphill, via a chairlift. There are numerous configurations of this equipment. (*Note:* Use only per area protocols.)
- **Backrest**—Structural material that is placed in a toboggan so the patient can sit up and lean against it during transport.

Helpful Hints

- Many areas have more than one style of toboggan; others may have the same style of toboggan but with different configurations. Become familiar with all types of toboggans and toboggan adaptations at your area.
- Devote adequate time to training and practice with each *before* an actual emergency occurs.

TOBOGGAN STORAGE AND INSPECTION PROCEDURES

The maintenance of toboggans and toboggan accessories will contribute greatly to the durability and performance of the equipment. Make sure to store all equipment appropriately, complying with the area's procedures. Also be sure to conduct regular, careful inspections of the equipment to ensure that everything is in good working order at all times.

Objectives

The toboggan handler will

- stow the toboggan in the appropriate storage location using area procedures and while giving consideration to the environment,
- inspect a stored toboggan utilizing a systematic procedure to check components for safety and function,
- inspect a toboggan positioned in a standby location using a quick-check procedure, and
- follow area protocol to determine reasonable condition of a toboggan and procedures for repair or removal from service.

Major Learning Points

Storage

- Choose storage locations that protect the toboggan from grooming equipment and the general public but that are still accessible to the patrol. Useful locations include the top of a rise, near snowmachine storage, and near high-traffic intersections (photo 2.20).
- Use mid-mountain storage locations in addition to mountaintop locations so that toboggans are readily available to incident sites lower on the mountain too (photo 2.21). Likewise, develop emergency caches throughout a nordic trail system to enable ready access.
- Consider using a simple culvert or pup-tent style storage unit on the hill.
- Provide appropriate flags or markers to identify toboggan locations.

Setup

- Position the toboggan so that the contents and the toboggan itself are protected from inclement weather, sun exposure, and wildlife. Anchor the toboggan securely.
- When setting up for the day, make sure the bottom of the toboggan is facing away from the sun. If the bottom is heated it will stick to the snow. On stormy days, reverse this procedure so equipment will not fill up with snow or rain.

PHOTO 2.20 Toboggans are placed at the top of the mountain for ready access

Inspection

Patrollers refer to daily toboggan checklists as well as quick checklists for toboggans in standby locations to ensure that transportation equipment and rescue packs are in good condition and are ready for service at all times. Table 2.1 (page 28) outlines the procedures commonly included in both types of checklists.

Helpful Hints

- Store the equipment in such a way as to minimize exposure to the elements and prevent problems with snaps, buckles, and tie downs.
- Prevent common problems by setting handlebar locks, securing handlebar pins in place, repacking old rescue pack components, inspecting the bungee cord on the chain brake, checking the tail rope length (usually 20 to 30 feet), preventing the buildup of snow or ice on the bottom of the toboggan, and storing it away from direct sunlight.

PHOTO 2.21 A toboggan "teepee" situated in a strategic spot on the mountain—near a busy intersection

TABLE 2.1 TOBOGGAN CHECKLISTS

Daily Toboggan Checklist

1. Remove the toboggan from storage or dig it out of the snow.
2. Inspect the control surfaces for ice and snow, and clear them as required.
3. Inspect the shell, frame, and fins for structural integrity.
4. Inspect the handles, handle locks, captive bolts, lynch pins, and rope-carrying handles, looking for defects at welds, joints, fasteners, anchor points, and other stress points.
5. Verify that the chain brake and leash are functioning and secure.
6. Verify that the tail rope is secured, not frayed, and of appropriate length.
7. Inspect the fins to ensure that they are secure and free of defects.
8. Inspect all straps and buckles.
9. Inspect the contents of the rescue pack to ensure that all the required supplies are there and in good condition.
10. Follow local procedures for repairing equipment.
11. Check the contents of the portable toboggan.

Quick Checklist for Toboggan in Standby Location—Quick-Check Procedure

1. Inspect the toboggan components.
2. Unlock the handles and check that pins are securely fastened.
3. Position the chain brake (normally off).
4. Inspect the handles, handle locks, and rope-carrying handles, looking for defects at the welds, joints, fasteners, anchor points, and other stress points.
5. Check to ensure that the rescue pack and straps are secured in the toboggan.
6. Secure the tail rope or rear handles in the toboggan.
7. Check and clear running surfaces.

- Use the same method of inspection from front to rear. Develop a routine.
- If you carry a toboggan and don't set it up very often, carry a "cheat sheet" with instructions for setup procedures.

RESCUE PACKS

To a large degree, your ability to provide quality patient care depends on whether you have access to appropriate and useable equipment. The emergency care supplies and equipment used in patrolling may vary depending on the environment in which you work (i.e., the materials used by alpine patrollers will differ to some extent from the materials used by cross-country patrollers). The following section addresses the proper preparation of this equipment so it can be stored in a toboggan for later use.

Objective

The toboggan handler will demonstrate the proper preparation of a rescue pack for storage in a toboggan.

Major Learning Points

Toboggan Rescue Packs

- Package a toboggan rescue pack to secure the contents and protect them from the elements, using the area's standard equipment and following local policies and procedures.
- Wrap the pack tightly, pulling the cover snugly around it.
- Secure the pack in the toboggan in a way that keeps the pack tightly together, leaving space for a toboggan strap to pass through to hold it in place.
- Make sure that the pack contains the

area's standard list of supplies and is packed the same way each time. This approach will ensure a consistent set of supplies at each incident site.
- Identify and follow the local procedures for storing and recycling rescue packs and their components for future use.

Helpful Hints

- Laminate copies of the area's rescue equipment list and put one in each rescue pack.
- Rotate rescue packs among toboggans. Air out used packs to allow the contents to dry. Replenish the contents and rotate them back into service.
- Refer to NSP's *Outdoor Emergency Care* manual (most current edition) for a complete list of rescue pack equipment.
- Refer to the appendix of this manual for a list of equipment suggestions for the cross-country patroller—basic patrol pack, group equipment, emergency cache, etc.

SUMMARY

Toboggans are just like any other mode of transportation in that the people who operate them must first learn about the unique performance characteristics of the equipment and devote ample time to training. Set a personal goal to learn as much as you can about the subtle (and not so subtle) differences among the transportation equipment used at your area—and how those differences may be amplified by certain terrain or snow conditions. It is important to get in the habit of inspecting and maintaining not only the toboggans but also their contents so that everything is in top working order each time you receive the inevitable call for assistance. In addition, keep your skills sharp by continuing to practice with the transportation equipment at your disposal whenever possible.

Careful attention to these areas can increase your chances of having a safe, efficient toboggan-handling outcome, regardless of the contributing factors.

TRAINING EXERCISES

- Divide trainees into pairs. Have the partners tell each other all about the toboggan types used at their home area, making sure to identify the components and performance characteristics of each.
- Have the trainees describe the major differences between a two-handle and a four-handle toboggan. Discuss the running stability of this equipment.
- Develop a team competition with the objective being the construction of an improvised toboggan using skis and poles.
- Provide scenarios in which the trainees discuss the features and benefits of various toboggans. Alternatively, have trainees explain which toboggans are suitable for specific situations.
- Develop an activity that provides the trainees with an opportunity to explain the importance of each component (how and when to use).
- Have trainees practice how to properly store toboggans in designated locations with appropriate identification markers. *Adaptation:* Tour toboggan storage locations at your area.
- Have trainees practice anchoring toboggans in setup positions under various mountain conditions.
- Set up a toboggan with defective parts and an incomplete rescue pack. Have trainees inspect and point out problems.
- Have trainees assemble an improvised toboggan on a regular basis.
- Assign partners to mentor and check each other's procedures on inspecting the toboggan's components and conducting the initial setup.
- Have trainees practice packing a rescue pack and securing it in a toboggan.

continued >

TRAINING EXERCISES, continued

- Ask the trainees to compare the contents of their area's packs with the contents suggested in NSP's *Outdoor Emergency Care* manual (most current edition) for various rescue packs.
- Have trainees practice with the equipment they will use when handling toboggans, that is, put on the handles, inspect the rescue package and secure it in the toboggan, attach the tail rope appropriately, and attach/remove the backboard.

Notes:

Terrain and Route Selection

Terrain, weather, snow conditions, the location of the incident, the distance to the aid room or other destination, skier/snowboarder traffic, the nature of the patient's injury or illness, and even the type of toboggan—all affect your decisions about which route to take when transporting loaded and unloaded toboggans across downhill slopes or backcountry trails. This confluence is further complicated by the unpredictability of the outdoor environment, the sense of urgency to protect the patient from the elements, and the need to get the individual out of the cold and to the next level of care.

In route selection, what works in one instance may not work in another, requiring you to constantly consider new variables. This chapter contains guidelines for evaluating all the factors so you can make the right choice for the situation.

SLIDING EQUIPMENT ICONS

- Alpine skiing (fixed heel)
- Telemark skiing (free heel, nordic downhill)
- Snowboarding
- Cross-country skiing (track and skate)

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GENERAL PRINCIPLES

- Learn the best routes on each trail, that is, which are the most appropriate for various circumstances. Realize that the condition of a route may change from one day (or hour) to the next. Each situation presents a unique mix of environmental and logistical considerations.
- Be knowledgeable and experienced in toboggan-handling maneuvers before attempting them in actual situations. This is particularly important when applying new skills on challenging terrain or in difficult snow conditions.
- Try to practice on various types of terrain and snow conditions when attempting to master new skills and techniques.
- When selecting a route, at all times make choices based on the safety of the toboggan handlers as well as considering the safety and comfort of the patient.
- Realize the importance of traversing skills and practice them religiously; you will use them often to access the best route.
- Become comfortable descending in the fall line when on steep, smooth, or mogul-ed terrain; this will help you prevent the toboggan from slipping out unexpectedly.

TERRAIN AND SNOW CONDITIONS

The characteristics of the terrain and the ongoing changes in snow conditions may be such that the quickest or most direct route isn't necessarily the right one for the situation (photo 3.1). Given these uncertainties, toboggan handlers must know how their skis/snowboard and the toboggan tend to react to specific terrain and certain types of snow so they can make informed decisions on which route to take.

PHOTO 3.1 The most direct path of descent may not translate into a comfortable ride for the patient

Objective

The toboggan handler will recognize how terrain and snow conditions affect toboggan maneuvers and demonstrate how these factors influence route selection.

Major Learning Points

Flat Terrain

- Decreases your speed.
- Increases your level of fatigue.
- Increases your need to manage your energy level (pace yourself).
- Usually requires you to lift the front of the toboggan when approaching the flats so you can maintain momentum through the area.
- May require you to obtain mechanical assistance (i.e., a snowmobile or other all-terrain vehicle).
- May require additional personnel to pull the toboggan (photo 3.2).

Trails

- Limits your ability to traverse.
- May involve a high-traffic area.
- May limit space for diagonal stride or skating.
- Sometimes makes it difficult for you to check your speed.

Terrain Drop

- Limits the contact between the toboggan's running surface and the snow (photo 3.3).
- Increases your speed.
- Reduces your braking effectiveness.
- Limits your options for traversing.
- May be uncomfortable for the patient, depending on the nature of the injury or illness.

Uphill

- Decreases your speed.
- Increases your level of fatigue.
- Increases your need to manage your energy level (pace yourself).
- Sometimes requires ascending belay techniques or climbing traverses.
- May require you to obtain mechanical assistance (i.e., a snowmobile or other all-terrain vehicle).
- May require additional personnel to pull the toboggan.

Backcountry

- May require orienteering (use of a map and compass or global positioning system [GPS]) to determine the quickest, safest route to and from the incident.

Groomed, Packed Powder

- Tends to provide a more comfortable ride for the patient.
- Enhances your edge control.
- Enhances your braking effectiveness and turning ability.

PHOTO 3.2 Transporting a patient across flat terrain in the backcountry

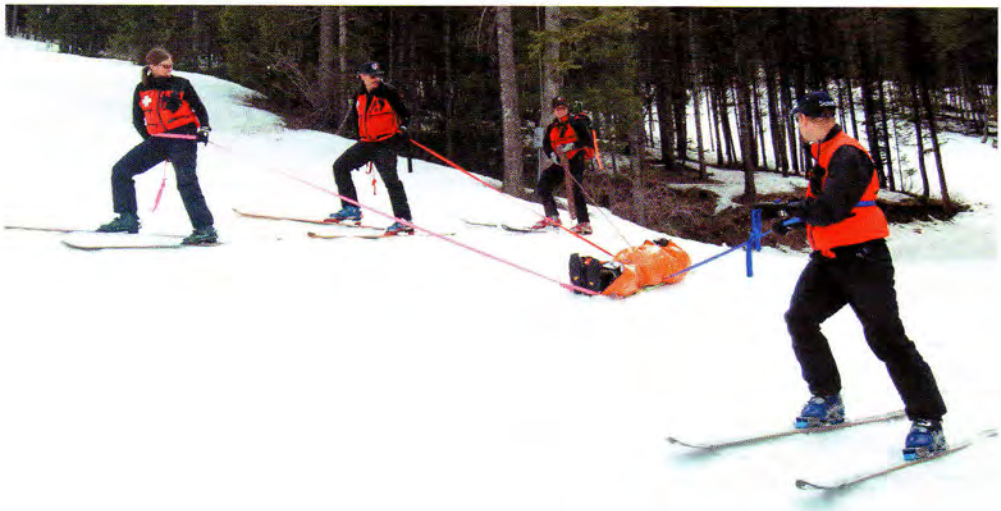


PHOTO 3.3 Maneuvering a toboggan over a terrain drop

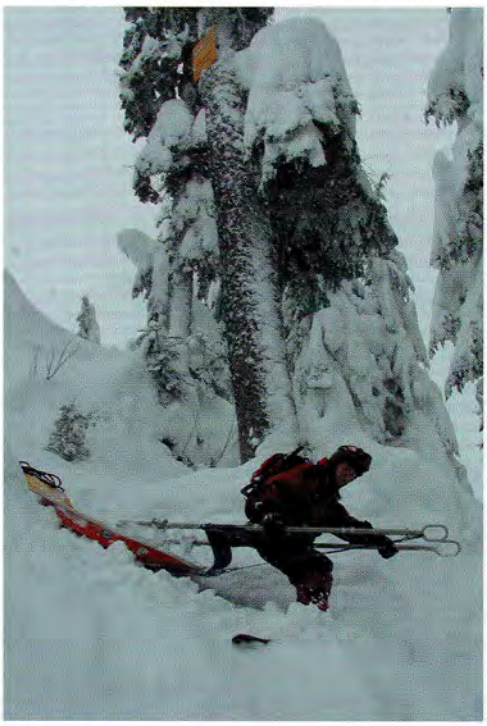
Moguls

- May be uncomfortable for the patient.
- Limits your route choices.
- Reduces your braking effectiveness.
- Challenges your ability to maintain consistent speed control.
- Produces varied snow conditions, requiring you to make frequent transitions in your technique.
- May cause a fin(s) to release, requiring you to keep moving the toboggan so the fin(s) will reengage with the snow and force the toboggan back behind you.
- May require you to avoid the ridges and troughs of the moguls so you can keep the bow of the toboggan in the trough.

Deep, Heavy, Wet Snow

- Causes snow to build up in front of the toboggan and the front operator.
- Reduces your speed (photo 3.4).
- Often conceals underlying terrain and snow conditions.

PHOTO 3.4 The slow process of moving an unloaded toboggan through heavy, wet snow



- May require additional personnel to pull the toboggan across a long span of flat terrain or a cross-country evacuation.
- If you are on a snowboard and the other patroller is on skis, you may want to be the front operator so you can help break trail with a slight falling leaf.

Breakable Crust or Crud

- May cause the toboggan or your skis/snowboard to break through the snow, impeding your progress.
- Decreases your speed.
- Is sometimes best negotiated by moving somewhat diagonally to the fall line with a static direction change.
- Tends to be less strenuous for a snowboarder than for a skier.
- May slow cross-country rescue operations and require mechanical transport (i.e., a snowmobile or other all-terrain vehicle).
- May require you to sidestep or belay down difficult terrain.

Firm, Icy Snow

- Offers the potential for higher speeds.
- Reduces your braking effectiveness.
- Sometimes requires you to belay the toboggan in difficult areas.
- Makes traverses less effective and may require strict adherence to the fall line.
- Requires you to keep your equipment well-tuned (i.e., sharp, smooth edges).

Powder

- May require you to provide additional coverings for the patient.
- Often conceals underlying terrain and snow conditions.
- Is often best negotiated by following a fall-line route or a route slightly off the fall line.
- May require you to avoid flat terrain.
- Usually requires you to ski/snowboard at a certain speed to maintain buoyancy.

Helpful Hints

- Observe other toboggan handlers as they maneuver through various terrain and snow, and recognize how these conditions affect their route selection decisions.
- Move from one mogul to another by linking the sidewalls and faces of the moguls.
- Avoid the ridges and troughs.

ROUTE SELECTION

As a toboggan handler, you must learn to expect the unexpected and have alternate plans for every contingency when selecting the route to and from the scene of the incident. Choosing the appropriate route entails more than assessing the terrain and snow conditions underfoot and within sight; you must also think ahead, and be prepared to change your plan depending on various contributing factors as described in the following section.

Objective

The toboggan handler will demonstrate the ability to choose the most appropriate route to and from the incident location, to the next level of care, under a variety of conditions.

Major Learning Points

Guidelines for traveling with a toboggan to or from the incident site:

- Determine the safest and quickest route based on
  - terrain,
  - snow conditions,
  - type of equipment,
  - location of the patient,
  - the patient's position, injury or illness, and comfort,
  - skier/snowboarder traffic,
  - trail mergers, and
  - patroller safety.
- Always take a moment to look uphill and downhill before departing.
- Look uphill before traversing.
- Ski or snowboard at a safe and controlled speed.
- Be aware of your surroundings at all times.
- Avoid or alert unwary public of your approach or presence.
- Use a direct fall-line descent when it is practical and provides for smooth transport.
- Use the sides of the trails to provide the smoothest, least-crowded descent.
- Alter the route as needed to avoid obstacles.
- Be aware of trail intersections and mergers and approach them with caution.
- Be aware of trail hazards and try to avoid them.
- Be familiar with orienteering skills and equipment. In the backcountry, route selection is a key to quick transport to and from the incident scene.

Helpful Hints

- Slow or stop away from the incident scene (not directly above or below) to anticipate your site approach and departure.
- Do not descend in a fall-line route directly above the site when getting close to the site, if possible.
- If you are in a position to provide the toboggan handler with approaching instructions to the incident site, position yourself 30 to 50 feet away from the site to allow him or her to slow and stop safely.
- Consider using a whistle or calling out "On your left!" or "On your right!" to warn others of your approach through a crowded area.

SUMMARY

Outdoor emergency transportation requires patrollers to identify and prepare for the numerous contingencies that may arise when moving a patient in a toboggan across snow-covered slopes and trails. Whereas one route may be the most expedient, it may be too steep or icy for the safe transport of a toboggan. Whereas another route may provide a comfortable ride for the

occupant, it may be too flat for the toboggan handlers to sustain momentum and deliver the patient to the next level of care within a reasonable time.

Regardless of the situation, toboggan handlers must be familiar with the nuances of the terrain and knowledgeable about the cause-and-effect relationships of conditions and equipment. They must learn to think ahead—to have alternative plans so they don't have to problem-solve at a time when they need to focus on other concerns. Above all, they must keep the safety and comfort of the patient foremost in their minds, and be aware of their surroundings at all times so as not to jeopardize themselves or others.

TRAINING EXERCISES

Working in various types of terrain and conditions should help the trainees master new skills and techniques. Toboggan instructors should realize that trainees will approach terrain, route selection, and conditions differently, depending not only on such factors as hill and snow conditions, but also on the person's strengths and limitations. The following exercises are a good way to help trainees develop the individual skills and confidence required in toboggan handling.

- Use a trail map to familiarize trainees with appropriate access and egress routes with regard to positioned rescue equipment.
- Identify snow conditions following a particular weather pattern, and have trainees discuss how each type of snow might affect route selection when operating a toboggan.
- Have trainees practice route selection by doing follow-the-leader (with or without toboggans) over varied terrain.
- Have trainees visually inspect each trail at the area to determine possible routes and approaches for various types of incident scenarios. Quiz patrollers on route choices depending on the specific trail and type of incident.

Notes:

Operating an Unloaded Toboggan

Taking an unloaded toboggan to an incident scene may seem like one of the "easier" parts of the patrol's response, yet it is a critical step in the emergency transportation sequence and presents its own set of concerns.

Although the toboggan may be empty, delivering it to the scene is no less urgent (or stressful) a task than if it were occupied. Someone who is injured or ill needs to be transported off the slopes or trails, and the toboggan is the device that will deliver the individual to the warmth and safety of an aid room, awaiting ambulance, or other destination.

The action of bringing an unloaded toboggan to an incident scene requires

SLIDING EQUIPMENT ICONS

- Alpine skiing (fixed heel)
- Telemark skiing (free heel, nordic downhill)
- Snowboarding
- Cross-country skiing (track and skate)

preparation, training, and awareness. As with other aspects of toboggan handling, you should spend considerable time practicing the techniques described in this chapter and preparing for all contingencies. Table 4.1 outlines the basic maneuvers that are used when transporting an unloaded toboggan.

Note: It is the prerogative of area management or the public lands administrator to determine whether an unloaded toboggan will be operated by one person (a front operator) or two people (a front operator and a tail rope/rear operator). This chapter addresses primarily the front operator's function in transporting an unloaded toboggan to the incident scene without the assistance of another patroller.

GENERAL PRINCIPLES

- Choose a safe, expedient route with consideration for the skiing/snowboarding public and snow conditions.
- Operate at a safe, constant, and controlled speed within personal limitations, while using a variety of toboggan-handling maneuvers such as traverses, moving direction changes, and static direction changes.
- Be prepared to do a power stop in the event of an unforeseen obstacle or event.
- Look around periodically to be aware of your environment and surroundings.
- Approach the scene in a judicious manner, taking into consideration such factors as scene safety, patient location, and terrain features.

PHOTO 4.1 This operator makes toboggan handling look easy

TABLE 4.1 TRANSPORTATION MANEUVERS

Whether patrolling on skis or a snowboard, all patrollers demonstrate a variety of movements to control the speed and path of a toboggan (photo sequence 4.1). Here are the skiing/snowboarding maneuvers commonly used when transporting an unloaded toboggan.

Alpine and Telemark Skiing

- Position in the handles
- Descent
- Traversing
- Moving direction change (forward and backward)
- Static direction change
- Power stop

Snowboarding

- Position in the handles
- Descent
- Traversing
- Moving direction change (heel and toe)
- Forward and switch
- Power stop

Cross-country Skiing

- Position in the handles
- Traversing
- Descent and ascent, and flats
- Moving and static belays (wide and narrow trail and side hill)
- Moving direction change (forward and backward)
- Static direction change
- Power stop
- Tail rope assistance

POSITION IN THE HANDLES

Whenever you transport a toboggan you make constant adjustments in your body position and the placement of your hands on the toboggan handles. The following section examines how these movements can alter the direction and speed of an unloaded toboggan.

Objectives

The toboggan handler will

- demonstrate how to affect the toboggan's operation by moving the body into different positions relative to the handles, and
- demonstrate how to affect the toboggan's operation by moving the hands to different locations on the handles.

Major Learning Points

- Maintain a neutral, centered stance.
- Grip the handles so that your hands are slightly in front of your body and are approximately hip high.
- Rotate your upper body to face the fall line as much as possible.
- Maintain a comfortable position in the toboggan handles.

Helpful Hints

- When operating an unloaded toboggan, unlock the handles so you can prevent the toboggan from swinging around on its nose.
- For more control in hard snow conditions, use the chain brake and unlock the handles.
- Press down on the handles to apply more pressure to the chain brake as needed. Keep your body in proper alignment so the line of force exerted against the spine occurs in an essentially straight line down the vertebrae. This helps you maintain control of the toboggan, supports the downward pressure you apply on the handles, and helps reduce fatigue.
- Realize that a toboggan containing lots of equipment may perform like one containing a patient.
- Move forward in the handles to allow for ski clearance when you are making a telemark turn.

DESCENDING AND ASCENDING THE FALL LINE/MOVING DIRECTION CHANGE

Descending and ascending the fall line with an unloaded toboggan requires consistent, strong skiing/snowboarding skills. The need to arrive on the scene safely and expediently is imperative, requiring you to transport the toboggan over any type of terrain and snow condition without incident. You will need to execute the principles of efficient fall-line skiing/riding and, to that end, make any necessary transitions or direction changes with confidence and speed (photo 4.2).

Objectives

The toboggan handler will

- demonstrate how to operate an unloaded toboggan while descending or ascending the fall line on a variety of terrain and snow conditions,

PHOTO 4.2 Transition during a fall-line descent

- demonstrate how to execute turns and transitions while operating an unloaded toboggan on a variety of terrain and snow conditions, and
- demonstrate recovery maneuvers on a toboggan that begins to slide below you.

Major Learning Points

- Control direction and speed by using appropriate turns (linked wedge, stem, parallel, telemark) and sideslipping maneuvers depending on your ability level, the terrain, and the snow conditions (photos 4.3–4.5).
- Maintain a fall-line descent or ascent as much as possible, keeping in mind the terrain, weather, snow conditions, the location of the incident, the distance to the aid room or other destination, the skier/snowboarder traffic, the nature of the patient's injury or illness, and even the type of toboggan.
- Position the toboggan behind you, generally in the fall line, to keep it moving as smoothly as possible.
- Minimize your upper body movements to keep the toboggan from swaying.
- Maintain a constant, controlled speed during the descent, turns, and transitions (photo 4.6).

PHOTO 4.3 Wedge

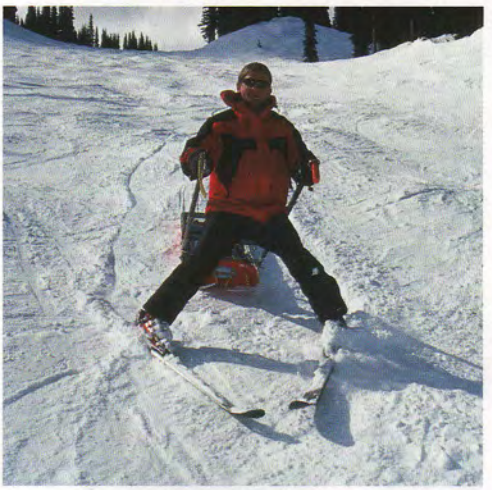


PHOTO 4.4 Transition

PHOTO 4.5 Sideslip

PHOTO 4.6 A speedy run

PHOTO 4.7 Heelside

PHOTO 4.8 Toeside

- To recover a toboggan that has slid around in front of you, drive the toboggan into an across-hill position in which you are operating the toboggan like a wheelbarrow. Drive the toboggan with the downhill fin until it is across the hill and in a safe position to stop. Then reestablish your hand positions on the toboggan and continue downhill.
- S Depending on your ability, the terrain, and the snow conditions, use appropriate heelside and toeside sideslips to control your descent and speed (photos 4.7, 4.8).
- When ascending the fall line, a second or third patroller should swing forward to assist the front or uphill patroller.
- If conditions dictate, perform a static or dynamic belay. Refer to chapter 6, Operating a Loaded Toboggan, for information on tail rope operator functions.
- When moving an improvised toboggan, consider using a harness (such as a backpacking belt) to free up your hands so you can use your poles for forward movement.

Helpful Hints

- "Twist" the toboggan to set its control surfaces for tracking, that is, push down on the downhill handle while pulling up on the uphill handle. This will twist the toboggan slightly, engaging the downhill fin with the snow surface for more effective tracking.
- Look ahead and anticipate the unexpected so you can select the most appropriate route. Watch for changes in snow conditions and pitch, and be aware of moguls, trail mergers, and skier/snowboarder traffic.
- Try to keep the toboggan in the fall line as much as possible for efficient operation.
- Maintain awareness of your surroundings at all times.
- S Ride on the heelside during a fall-line sideslip to utilize your strongest leg muscles (the quadriceps).
- S Transition to toeside when conditions permit so you can rest a particular muscle group or look uphill.

TRAVERSING

Traversing, or moving perpendicular to the slope, is useful for controlling speed when descending. It is also a good technique for ascending a steep incline, as the criss-crossing approach isn't as energy-depleting as a direct ascent.

Be cognizant of the need to keep the toboggan under control at all times during a traverse. Make sure there is good traction with the fins so the toboggan doesn't slide down sideways on the slope. Also, avoid getting into a "parallel-to-the-fall-line" traverse situation, which can make it difficult for you to turn in the opposite direction. Practice often with an unloaded toboggan so you can develop awareness of the necessary turning radius in these situations.

Objective

The toboggan handler will demonstrate a smooth and confident descending or ascending traverse with an unloaded toboggan under a variety of terrain and snow conditions.

Major Learning Points

- Maintain your hand position on the handles with the uphill hand slightly forward, toward the end of the handle, and the downhill hand slightly back.
- Push down on the downhill handle while pulling up on the uphill handle. This will twist the toboggan slightly, engaging the downhill fin with the snow surface for better tracking.
- Pressure your ski or board edges as appropriate to enhance tracking.
- End a traverse by initiating a turn or bringing the toboggan to a position in the fall line.
- Maintain momentum to enhance the tracking of the toboggan.
- Use the traverse as infrequently as possible to reduce response time to the incident scene.
- A T C Keep your legs bent and comfortably apart, with the uphill ski slightly advanced to enhance stability.
- S Keep your lower body flexed and relaxed, with your knees together when possible and your weight slightly forward.
- C If you are the tail rope operator, use a static or dynamic belay to assist the front operator with an ascending traverse.

Helpful Hints

- Look uphill and downhill frequently for skier/snowboarder traffic.
- Plan your route to minimize traverses.
- Use a toboggan with relatively long, deep fins when you anticipate the need for stable traversing.
- Anticipate turning points and additional traverses so you can prepare to change your technique or route if needed.
- A T S To minimize exposure to skier/snowboarder traffic, try to avoid traversing across a trail to reach an incident scene.
- Should the toboggan slip, be prepared to bring it into the fall line by conducting the emergency recovery maneuver (the wheelbarrow) described on page 41.
- When conditions warrant (e.g., icy, hard-packed, steep), use a moving belay during a traverse.

STATIC DIRECTION CHANGE

At one time or another, you will need to make a static direction change while operating a toboggan. While the toboggan is stopped, you do a stepping wedge, a kick turn, or switch (if you are a snowboarder) so you can head in the opposite direction. This is generally done on steep terrain, or where there is no place to make a regular turn with the toboggan because of a rock, adjacent tree, very deep/crusty snow, or other obstacles that prevent the toboggan from continuing on its path.

Objective

The toboggan handler will execute a balanced and stable static turn while operating an unloaded toboggan.

Major Learning Points

- Stop the toboggan in a safe and secure location.
- Move toward the end of the handles.
- Execute a balanced, stable, static direction change while holding onto the handles of the toboggan. Use either a stepping wedge turn, kick turn, or switch (if you are on a snowboard).
- Make sure your skis/snowboard do not make contact with the toboggan or a terrain feature.
- Facing the new direction, resume a running position in the handles.
- Twist, then pivot the toboggan in the new direction as you resume the descent.

- You can ride switch and accomplish a static direction change without having to turn the snowboard around. This means you can ride from right to left or from left to right without having to change the current edge (heelside or toeside). If you wish to ride a new edge, you can perform an on-snow transition soon after resuming the descent.

Helpful Hints

- Stomp out a secure, flat platform before making a static turn.
- With a step or wedge turn, use as wide a stance as possible.
- Look to the direction you are turning when making a kick turn.

POWER STOP

Anyone who operates a toboggan must be prepared to make an immediate, unexpected stop at any time, and in such a manner as to maintain complete control of the toboggan. This may be required to avoid a skier/snowboarder who moves into the toboggan's path, or to avoid an unforeseen terrain feature or other hazard. The maneuver used to stop the toboggan immediately is called a "power stop," that is, pivoting both feet across the fall line as you apply increasing pressure and edge angle to stop the toboggan. This section examines how to conduct these stops safely and efficiently with an unloaded toboggan (photo 4.9).

Objective

The toboggan handler will demonstrate a power stop within a reasonable distance in all conditions.

Major Learning Points

- Maintain the toboggan in the fall line during a power stop.
- Sideslip to bring the toboggan to a stop as soon as possible.
- From a neutral yet fairly tall stance, simultaneously flex your ankles, knees, and hips while pivoting both feet across the fall line. Apply increasing pressure and edge angle until the toboggan stops.
- Maintain balance over the center of your skis or the middle of your snowboard.
- Be sure to maintain the toboggan in the fall line during the emergency stop to retain control.
- Apply appropriate downward pressure on the handles to enhance the effectiveness of the chain brake.

PHOTO 4.9 Power stop

Helpful Hints

- Keep your upper body facing downhill, while reaching downhill and pushing your uphill hand/shoulder forward.
- A T S Keep the edges sharp on your personal equipment.
- S Work on obtaining a low (flexed) ending position without using the toboggan or toboggan handles for support.

FOUR-HANDLE TOBOGGANS

Most of the techniques for transporting an unloaded four-handle (fixed-handle) toboggan are the same as for two-handle (locking-handle) toboggans; however there are some special considerations, such as making sure that the rear handles are detached and secured in the toboggan when you are operating it unloaded. This precautionary measure will help prevent added rear torque that can cause the toboggan to swing.

Objective

The toboggan handler will transport the unloaded four-handle toboggan safely and expediently to the incident site.

Major Learning Points

- Secure the rear handles inside of the toboggan to prevent unnecessary torque.
- Review all of the Major Learning Points for the unloaded toboggan maneuvers listed in this chapter.
- If operating a four-handle toboggan alone, move back closer to the toboggan so you can hold the handles at their mid-shaft. This will allow you to place your hands at hip height, which will give you more control.
- Make timely decisions appropriate to the terrain, weather, snow conditions, and your abilities to achieve a smooth, quick descent and a safe arrival at the destination (photo 4.10).
- Refer to chapter 6, Operating a Loaded Toboggan, for more information on operating a four-handle toboggan.

Helpful Hints

- Using a four-handle toboggan requires a team effort and constant communication.
- Both operators must work to keep the fins engaged while using a fall-line descent to keep the toboggan shell from slipping.

PHOTO 4.10 Transporting an unloaded four-handle toboggan

SUMMARY

When the call for a toboggan comes in, time is of the essence and the patrol must dispatch the equipment to the scene as safely and expediently as possible. Because the toboggan is empty, and you don't have to worry about whether the ride is comfortable for the patient, you can focus on getting to the scene quickly. Even so, you must remain keenly aware of your surroundings, and constantly be on the lookout for other skiers and riders. In addition, you must not jeopardize your own safety in the pursuit of a speedy arrival.

TRAINING EXERCISES

Practice the following training exercises using two- and four-handle unloaded toboggans, as well as commercial and improvised toboggans (as appropriate). The more time the trainees have to experience the performance characteristics of various equipment, the more versatile they will be with the different types of toboggans and in different operator roles.

- Have trainees discuss, simulate, and demonstrate the proper front operator position with a stationary as well as a moving toboggan in various terrain and conditions.
- To help trainees build confidence, have them practice their braking maneuvers before they move any distance with the toboggan.
- Introduce trainees to the **fin-set drill** using either a locked two-handle or four-handle toboggan on a well-groomed, low intermediate slope with no traffic.
  1. Push down on the end of the handles to apply pressure on the bow, thus releasing the fins. This will cause the back of the toboggan to come around toward the side.
  2. When the toboggan is about 90 degrees out of the fall line, lift up the handles to set the edges of the fins back into the snow.
  3. When the toboggan is back in line, repeat the maneuver on the other side.
- A T C Have trainees skate on flat or very gentle terrain to develop edging and pressuring skills with an unloaded toboggan. When done in a straight line (point to point), edging skills can be isolated from rotary movements and also can develop weight transfer awareness through side-to-side and fore-and-aft movements. Skating also helps develop independent leg action and flexing/extending movements.
- C Have patrollers on cross-country gear practice moving an improvised toboggan using basic diagonal striding and skating techniques. Progress to slightly more challenging terrain as the group's skills improve.
- In moguls have trainees practice how much braking capability they can obtain by adjusting their hands or body position in the handles in order to keep the toboggan out of the troughs during a descent.
- Have trainees demonstrate sideslips, turns, and transitions during a descent with an unloaded toboggan.
- C Have patrollers on cross-country skis demonstrate various ascent techniques with an unloaded toboggan.
- Have trainees demonstrate toboggan-handling techniques for terrain drops.
- A T C Have trainees play follow-the-leader through changing terrain at a consistent speed. Encourage them to control speed by varying the size of the wedge and the edge and angle of their skis. Select terrain that is irregular (unchallenging, then more challenging; flat, then bumpy; smooth, then with icy patches or soft snow, etc.).

continued >

TRAINING EXERCISES, continued

- Have trainees discuss and simulate the proper position on a static and moving toboggan in various terrain and conditions.
- Introduce a training progression in which trainees practice making as many turns as possible, progressing from using bamboo or rope drills in pairs to simulate turns with the toboggan and then to an unloaded toboggan.
- Show trainees how to do the **wheelbarrow maneuver**. In a controlled clinic situation this is a tremendous tool for teaching people how to perform an emergency recovery maneuver on an out-of-control toboggan.

  If the stern, or back, of the toboggan begins to slip down in front of the front operator, he or she will be unable to sideslip below it to correct the position. As the toboggan comes around, the front operator should do the following:

  1. Release the up-slope hand from the up-slope handle as the toboggan moves even with the operator.
  2. Move the up-slope hand onto the downhill handle as the toboggan comes around.
  3. Use the "old" down-slope hand to grasp the free (up-slope) handle.
  4. Hold onto the toboggan as it continues to come around in front.
  5. Grip the handles as if the toboggan were a wheelbarrow.
  6. Sideslip the toboggan backward to a safe place (i.e., out of the line of skier/snowboarder traffic) where you can turn it around.
  7. Resume regular running procedures.

Tips:

- Tell trainees to make sure they weight the downhill ski for more control.
- Remind them to let go of the uphill handle at the appropriate moment, that is, as their shoulders start to turn out of the fall line uphill. It is important not to let the shoulders twist uphill; keep them facing down-slope.
- Encourage trainees to practice their route selection skills in moguls by trying to keep the toboggan out of the troughs and just up on the mogul face. This comes in handy when they can't keep the toboggan in the trough due to terrain conditions (e.g., extremely large moguls).
- Give trainees ample time to practice the falling-leaf sideslip in moguls; this will help them learn to control their speed without the aid of a chain brake.
- As a mogul progression of the falling leaf, encourage trainees to adjust their body height while doing the falling leaf to simulate the changing height of the toboggan handles during runs through moguls. Have them experiment with standing tall to squatting down or bending low and then back to standing tall to see how this affects their control.
- As trainees practice with unloaded as well as loaded toboggans in crusted snow conditions, encourage them to use a stance that allows independent leg action.
- As trainees descend off of the fall line in wet snow, have them practice using the toboggan shell as a major control surface to help with tracking.
- Introduce the **twist progression** on firm snow. As trainees traverse with a toboggan during a descent, tell them to twist the handles to increase tracking, that is, lift the uphill handle while applying pressure to the downhill handle to create a twisting effect while keeping the toboggan flat on the snow for maximum control. Then, they merely reverse the application at the beginning of a moving direction change.

continued >

TRAINING EXERCISES, continued

- Have trainees experiment with how their body position fore and aft will affect their control of the toboggan when traversing. When they shift their weight *back*, they tend to diminish control, increase speed, and move the toboggan out of the fall-line traverse. When they *center* their weight, this tends to reduce speed but may inhibit the ability to maintain an ideal traverse line because they are putting less pressure on the ski/snowboard edges. When they put their weight slightly *forward*, with a relaxed stance, this helps control both the speed and direction of travel, keeping the traverse in the best possible line to meet the objective.
- Practice long traverses on varied terrain. Make sure trainees spend sufficient time on their edges so they can gain the feel of the proper traverse position.
- Show trainees how to "ride the walls." Walls and steep inclines are found on many cat tracks, and these are great places to practice traverse stance and toboggan tracking. Have the trainees ski with toboggans up on these inclines and work to maintain a stable line.
- Choose uneven terrain or icy conditions for practicing balance and edge control during traverse maneuvers with an unloaded toboggan.
- Have trainees descend a slope using a traverse, kick turn, traverse, wedge turn, traverse, wedge turn, then traverse kick turn. They should repeat this to the bottom of the hill. Have them perform these maneuvers without a toboggan first, then with a toboggan. Encourage them to try to minimize the motion of the toboggan.
- Have trainees practice kick turns in a variety of conditions and terrain with and without a toboggan and with and without poles. (Some situations may warrant a kick turn in the tail rope position, so practice is advisable.)
- Demonstrate power stops, first without a toboggan and then with one, and have trainees do the same maneuvers.
- Have trainees practice doing power stops while moving at a reasonable speed with a toboggan. Encourage them to perform the stop in as short a distance as possible while keeping the toboggan uphill and in the fall line. The tail of the toboggan should not move sideways during this maneuver.
- Encourage trainees to wedge or sideslip to a power stop with a toboggan to become accustomed to these movements. Set up a narrow corridor and have them perform edge-to-edge turns to a short swing.
- Demonstrate a belay technique over a terrain drop and have trainees do the same. Encourage them to anticipate the decrease in load and then the sudden increase in load as the toboggan crests the terrain drop.

Notes:

Incident Scene Management

A quick assessment of the scene and the surroundings will provide you with essential information about the safety and stability of the situation and the probable mechanism of the patient's injury or nature of illness, among other factors.

This chapter addresses the manner in which you enter the incident site with the toboggan, manage the scene, initiate patient care, and secure the person and any equipment in the toboggan for the departure. These are critical steps in the overall emergency transportation effort.

SLIDING EQUIPMENT ICONS

- Alpine skiing (fixed heel)
- Telemark skiing (free heel, nordic downhill)
- Snowboarding
- Cross-country skiing (track and skate)

GENERAL PRINCIPLES

- Anticipate the best final approach to the incident scene.
- Perform an initial scene size-up as you approach, for scene safety, possible mechanism of injury or nature of illness, and input (if appropriate) from a first responder on scene.
- Determine the final position of the toboggan after considering factors such as the patient's position, any existing hazards, the terrain, the snow conditions, the skier/snowboarder traffic, and your anticipated route of egress.
- Be alert to obstacles and hill traffic.
- Adhere to the following scene management procedures:
  - Have one patroller in charge.
  - Make quick, correct decisions and actions.
  - Ask the first responder about the advanced preparations such as whether a toboggan anchoring platform has been prepared.
  - Use clear and concise communications.
  - Establish a safe, unobstructed incident site.
  - Use proper lifting techniques for rescuer safety as described in *Outdoor Emergency Care* (most current edition).
- Position and secure the toboggan and all of the other equipment in preparation for lifting the patient into the toboggan.
- Secure the patient and/or equipment in the toboggan.
- Visually and physically check the toboggan and its components before departure to ensure everything is positioned correctly and secured in place.

TRANSPORTATION MANEUVERS

How you bring equipment to the incident scene will vary slightly depending on your mode of transportation (i.e., alpine or telemark skis, a snowboard, or cross-country skis). That said, table 5.1 outlines the general steps of managing the incident scene that are applicable to all rescuers.

TABLE 5.1 INCIDENT SCENE MANAGEMENT

Alpine and Telemark Skiing	Snowboarding	Cross-country Skiing
▮ Approach	▮ Approach	▮ Approach (can be uphill or downhill)
▮ Securing the toboggan using an anchoring device	▮ Securing the toboggan using an anchoring device	▮ Securing the toboggan using an anchoring device
▮ Marking the scene	▮ Marking the scene	▮ Marking the scene
▮ Anchoring the skis	▮ Anchoring the snowboard	▮ Anchoring the skis
▮ Loading the patient	▮ Loading the patient	▮ Loading the patient
		▮ Preparing to build an improvised shelter to protect the patient in severe weather or a prolonged rescue (refer to *Mountain Travel and Rescue* [NSP 1995])

Table 5.2 lists the front operator's maneuvers to align and secure the toboggan in place at the incident scene. Several of these steps are parallel from one snowsports discipline to another, but there are certain distinctions, as indicated.

TABLE 5.2 FRONT OPERATOR MANEUVERS

Alpine and Telemark Skiing

- Align the toboggan perpendicular to the fall line.
- Set the braking device.
- Remove your uphill ski and place the tail in the uphill carry handle on the front of the toboggan, perpendicular to the fall line.
- Slide out of the handles and move along the downhill side of the toboggan to the rear (maintain contact with the toboggan).
- Remove the downhill ski and place it in the uphill loop at the back of the toboggan perpendicular to the fall line, when at the rear of the toboggan.
- Lock the toboggan handles in preparation for running the loaded toboggan.
- Undo the patient tie downs and open the rescue pack.
- Mark the incident site to alert the public, if necessary.

Snowboarding

- Align the toboggan perpendicular to the fall line.
- Set the braking device.
- Take your rear foot out of the binding.
- When you need to back a toboggan into position, place the tail of the toboggan level with the desired location, pushing it like a wheelbarrow.
- Slide out of the handles, align the toboggan perpendicular to the fall line, and move along the downhill side of the toboggan (maintain contact with the toboggan).
- Jam the toboggan handles into the snow.
- Remove the snowboard completely.
- If possible, wedge the snowboard along the downhill side of the toboggan.
- Use the patient's equipment to anchor the toboggan: if skis, put them through the loops; if a snowboard, jam the board between the front of the toboggan and its crossbar.
- Lock the toboggan handles in preparation for running the loaded toboggan.
- Undo the patient tie-downs and open the rescue pack.
- Mark the incident site to alert the public, if necessary.

Cross-country Skiing

- Align the toboggan perpendicular to the fall line.
- Set the braking device.
- Remove your uphill ski and place the tail in the uphill carry handle on the front of the toboggan, perpendicular to the fall line.
- Slide out of the handles and move along the downhill side of the toboggan to the rear (maintain contact with the toboggan).
- Remove the downhill ski and place it in the uphill loop at the back of the toboggan perpendicular to the fall line.
- Lock the toboggan handles in preparation for running the loaded toboggan.
- Undo the patient tie-downs and open the rescue pack.
- Mark the incident site to alert the public, if necessary.

APPROACHING THE INCIDENT SCENE AND SECURING THE TOBOGGAN

On your initial approach to the scene of an incident with the toboggan, you must move forward with caution so you can make a quick overall evaluation of the situation. You will need to note the patient's location relative to any terrain features or hazards that may be present and also determine where you will finally secure the toboggan so that it is close to the patient but does not obstruct emergency care procedures or block the path of oncoming skier/snowboarder traffic. In addition, you must consider the likely route of egress before securing the toboggan in place. All of this strategy occurs within mere seconds, but it can save precious minutes overall.

Objectives

The toboggan handler will

- explain and demonstrate how to safely approach an incident scene with an unloaded toboggan and secure the toboggan properly in preparation of loading a patient,
- demonstrate effective scene management through efficient resource management including equipment, personnel, and communications tools, and
- demonstrate how to use various anchors to secure a toboggan at an incident site.

Major Learning Points

- During the final approach to the incident scene, decide where to position the toboggan based on the patient's position, the terrain, any existing hazards, the snow conditions, available room for maneuvering, and the likely route of egress (photo 5.1).
- Slow or stop before and to one side of the incident site to allow for maneuvering the toboggan during the final approach. Be aware of changing circumstances and locations, and adjust your approach accordingly.
- Mark the incident site to alert the public.
- When possible, position the long axis of the toboggan across the fall line for best edge control and stability.
- Secure and stabilize the toboggan by one or more of the following techniques:

PHOTO 5.1 Arriving at the incident scene

PHOTO 5.2 Using skis to anchor the toboggan

PHOTO 5.3 Using a snowboard to secure the toboggan in place

PHOTO 5.4 Providing a long, wide, stable platform for the toboggan

  - Place anchoring devices (skis, snowboard, and other devices) through the ropes at each end of the toboggan and into the snow (photos 5.2, 5.3).
  - Place anchoring devices along the down-slope side of the toboggan.
  - Place anchoring devices between the front (and rear) handles.
  - Tie the toboggan to a stationary object.
  - Have another rescuer(s) hold the toboggan in position.
  - If necessary, stomp out a long, wide, stable platform using skis, snowboards, or boots to compact and excavate the snow (photo 5.4).
  - Jam the toboggan handles into the snow. Use this technique in combination with another technique, not alone.
  - Engage the chain brake.
- Secure the handles and prepare the tail rope for loaded operation; if using a four-handle toboggan, install the rear handles.
- Undo the patient tie-downs and open the rescue pack.
- S Use your toeside edge whenever possible for the final approach to the incident scene. (*Note:* Trainers should provide demonstrations on entering the scene from both heelside and toeside.)

Helpful Hints

- Mark off or close terrain park features surrounding an incident scene.
- Place the rescue pack over the rear fins to help stabilize the toboggan in place, depending on the snow conditions.
- A T S Drop the chain in your final approach. It will be engaged under the toboggan and ready to act as an anchor.
- Consider packing cut-off ski poles or other stake-type devices in the toboggan pack. (Skis with turned up tails and snowboards are ineffective anchors.)
- When using a snowboard to mark a scene, place the board on its edge with the base uphill to "barricade" the incident scene. Be sure to anchor the snowboard securely.

- Carry alternative anchoring devices such as poles or pickets.
- If possible, enter the site on your toe-side to facilitate the final approach.
- Find a nearly level spot to construct an improvised toboggan, then move it to the patient if the patient is in on sloped terrain.
- Be especially aware of marking an incident scene on a race course or past blind or descending corners.

POSITIONING THE PATIENT IN THE TOBOGGAN AND PREPARING FOR TRANSPORT

(Refer to the current edition of Outdoor Emergency Care *or local protocol for additional information.)*

As recommended in *Outdoor Emergency Care* (fourth edition), after splinting and providing other emergency care, you and/or the other rescuers on the scene will need to lift the patient into the toboggan, being careful not to aggravate any existing injuries or illnesses.

When positioning a patient in a toboggan, follow the general rules for managing the injury or illness and the patient's comfort. Placing the patient directly on a canvas litter or tarp will make removal from the toboggan easier. Wrap the patient in a blanket or sleeping bag covered with a tarp or other snowproof and windproof cover, and strap him or her in securely without putting pressure on the site of injury or in such a manner that might impede emergency care during transport.

Objectives

The toboggan operator will

- describe the principles of patient positioning in the toboggan based on the nature and extent of the injury or illness, the number of people able to assist, the terrain, any existing hazards, the snow conditions, the available room for maneuvering, the type of toboggan, and the likely route of egress, and
- demonstrate proper patient positioning and loading into the toboggan, and securing for transport.

Major Learning Points

Determining the Patient's Position in the Toboggan

- Position the patient with the *head uphill* in the following situations:
  - Injury to the head, eye, face, neck, or upper extremity
  - Shortness of breath
  - Unresponsive or diminished level of responsiveness
  - Suspected cardiac emergency
  - Very steep terrain
- Position the patient with the *head downhill* in the following situations:
  - Cardiac arrest
  - Shock
  - Hypothermia
  - Lower-extremity or pelvic injury
  - Abdominal injury (unless the patient is short of breath)
- Place the patient in a *position of comfort* (usually head uphill) if he or she has a chest injury.
- Place the patient in the *recovery position* (photo 5.5) if he or she is experiencing nausea and vomiting or is unresponsive for nontraumatic reasons.

PHOTO 5.5 The recovery position

- Place the patient in a *sitting position* if he or she is having difficulty breathing or has an upper extremity injury. Consider using a backpacking chair or another rescuer to serve as a backrest for the patient.
- Try to keep the patient's head away from the track of a towing snow machine if the injury allows. This will keep unwanted snow from blowing onto the patient's head.
- In rolling backcountry terrain, place the patient in the *position of comfort*, as the head position will change as the terrain features change (photo 5.6).

Lifting into the Toboggan

- Before you lift the patient into the toboggan, be sure to assess the following factors:
  - Position of the patient in the toboggan
  - Nature and extent of the patient's injury or illness
  - Patient responsive or unresponsive
  - Patient mobility—ability to assist
  - Number of people able to assist
  - Terrain (steep, flat, or moguled)
  - Conditions (hardpack; poor footing; soft, deep powder)
  - Type of toboggan (with/without basket—height of edges)
  - Other considerations for transferring into a toboggan:
    - Assess the patient's mobility and his or her ability to assist.
    - Determine if there is a need to improvise equipment based on the special needs of the adaptive patient (consult the most current edition of *Outdoor Emergency Care* for information on special populations). Use the patient and that person's guide, if one is present, as a resource for how best to handle the patient.
- If you are the patroller in charge of the lifting maneuver, make sure the other rescuers know which transfer technique you will be using given the terrain and the nature of the patient's injury or illness, and check to see that the patient is in the appropriate position for you to execute the maneuver.
- Perform the move smoothly without compromising the injury or illness. (Consult the most current edition of *Outdoor Emergency Care* for information on rescue lifting techniques.)
- Ensure that the patient clears the side of the toboggan.
- Position and secure the patient in the toboggan (photo 5.7).
- Secure the patient's equipment on his or her uninjured side, or ask another patroller to transport the equipment.

PHOTO 5.6 Placing the patient in the position of comfort in backcountry terrain

PHOTO 5.7 Securing a toboggan in place on an anchoring platform with the handles locked

- Monitor the patient before moving the toboggan.
- Check the equipment and the incident site before leaving the scene. Have other patrollers clean up the site and eradicate any holes or other terrain irregularities that might make the site unsafe.

Before Leaving the Scene

- Clear the incident site.
- Fill in all holes.
- Remove or mark hazards per local protocol.
- Transport the patient's equipment and any unused patrol equipment.
- Collect and dispose of any biohazardous materials per area requirements.
- Verify that the toboggan handles are locked (if appropriate).
- Check the rig pins or bolts.
- Position the chain brake for use as needed.
- Select and communicate the appropriate route to the tail rope or rear operator and to any other assisting patrollers at the scene, on route, or at the base station.

Helpful Hints

- Use safe lifting procedures whenever lifting the patient or heavy equipment, as described in the most current edition of *Outdoor Emergency Care*.
- Encourage the patient to assist as much as possible without adding to the injury or exacerbating the illness.
- Be prepared to adjust your toboggan-handling techniques when the patient is sitting up; this changes the toboggan's center of gravity.
- Many improvised toboggans tend to plow into the snow and gather and push snow in front. By placing the patient several inches rearward and adjusting a tarp several inches forward, the toboggan will ride higher on the snow and plow less.
- If additional patrollers are available, ask them to pack down the snow in front of the toboggan, which will provide the patient a smoother ride in deep snow.

SUMMARY

The scene size-up entails identifying real or potential hazards and preparing your final approach accordingly. You should not approach the patient until you have dealt with these hazards in a way that eliminates or minimizes risk to both the rescuers and the patient.

Always use proper lifting and moving techniques, and maintain coordination and communication with the others who are assisting. Your safety, the safety of the other rescuers, and the safety of the patient all depend on proper lifting techniques and on the team's ability to maintain a proper hold while lifting and carrying.

Also, be sure to conduct a safe egress from the scene using appropriate toboggan-handling techniques and maintaining good communication with the tail rope/rear operator, other patrollers, and the base. Take the toboggan to its destination using the safest, smoothest, and shortest route, and try to avoid jostling and bumping the patient. Strap the patient's equipment on the side of the toboggan opposite the injury with any tips pointing toward the patient's feet, or have another rescuer carry them. Never leave a loaded toboggan unattended.

TRAINING EXERCISES

Set up various scenarios with different contributing factors (steep terrain, a mock hazard, a patient with a life-threatening injury, etc.) and have trainees practice approaching the scene with a toboggan based on these considerations.

- Have trainees practice backing a toboggan into the scene and using the wheelbarrow approach to park the toboggan.
- Incorporate Outdoor Emergency Care training objectives for incident scene management into the toboggan approach, securing, and departure exercises.
- Have trainees practice techniques for marking incident sites.
- Have the group practice making a long, wide, stable platform to secure the toboggan, using various methods such as stomping down the snow with skis or boots, or tamping it down with your ski poles.
- Have the trainees learn and practice the local area's equipment inspection procedure to use before departing the incident scene.
- Have trainees practice lifting maneuvers for various injuries and illnesses. Have them experiment with lifting/positioning the patient head up, head down, sitting, and when the patient is able to assist. Also have the group practice removing adaptive skiing or snowboarding equipment from a patient so they can place the individual into a toboggan.
- Have the trainees review all the local policies on transport positions for various injuries.
- Discuss different types of special equipment concerns for various injuries (e.g., equipment for a shoulder dislocation that would allow the patient to sit in a toboggan).
- Discuss the pros and cons of different patient positioning in a toboggan.
- Have the group practice securing a patient's equipment in the toboggan.

Notes:

Operating a Loaded Toboggan

Now that you've delivered the toboggan to the scene, provided the necessary emergency care, and secured the patient in the toboggan, it's time for the final phase of outdoor emergency transportation: exiting the scene and transporting the patient to your destination without further incident.

Depending on your area's policies, you may be called upon to serve as the sole operator of a loaded toboggan. While you should be able to transport a loaded toboggan on your own, you should also be prepared to serve as either the front or tail rope operator in a two-person toboggan-handling operation. Likewise, your area may have four-handle toboggans that require the team

SLIDING EQUIPMENT ICONS

- A Alpine skiing (fixed heel)
- T Telemark skiing (free heel, nordic downhill)
- S Snowboarding
- C Cross-country skiing (track and skate)

effort of a front and rear operator, and you may need to train and practice your skills accordingly. Overall, the more you know about the functions involved in transporting a loaded toboggan, the better the chances of a safe, expedient experience for the patient, for you, and for the other rescuers.

Note: Whereas the following general principles and transportation maneuvers apply to all kinds of toboggans, the remainder of the chapter content is divided into two sections—two-handle toboggans and four-handle toboggans.

GENERAL PRINCIPLES

Front Operator

- Operate the toboggan at a safe, consistent, and controlled speed within personal limitations.
- Anticipate changes in the terrain and snow conditions, and be sure to communicate these variations to the tail rope/rear operator.
- Maintain a stance and position relative to the handles that allows maximum maneuverability and control over the toboggan (photo 6.1).
- Remain in the fall line as much as possible for maximum control while braking.
- Utilize your ski/snowboard edges, the toboggan chain brake, and the toboggan body configuration to maintain a safe, consistent, and controlled speed (photo 6.2).
- Be prepared to perform a power stop in a reasonable distance.
- Select an appropriate route to provide for a smooth, continuous, and obstacle-free run in order to maximize the patient's comfort and safety.
- Look around periodically for potential hazards and skier/snowboarder traffic.

Tail Rope/Rear Operator

- Comply with the local policies regarding the use of a tail rope/rear operator; whether or not the patrol uses a tail rope/rear operator is at the discretion of area management.
- Maintain a stance and position relative to the rope that allows maximum maneuverability and control over the toboggan.
- Look around periodically for potential hazards and skier/snowboarder traffic.
- Be aware that the level of training for a tail rope/rear operator should be comparable with the level of training for a front operator.

PHOTO 6.1 Changing hand positions on the handles to maneuver the toboggan

PHOTO 6.2 The front operator using a variety of maneuvers to control the toboggan

- Hold the rope in both hands; never tie the rope to your body.
- Hold the rope in front of your body most of the time for adequate control. Occasionally, as when encountering a steep pitch, you may need to use a belay position (particularly if you are on a snowboard).
- Hold the rope at mid-thigh level for maximum control (photo 6.3); avoid holding the rope too low, because this will displace your center of gravity and may cause you to lose your balance.
- Keep the rope loosely coiled and move it back and forth from one hand to the other in order to take up slack and avoid entanglement.
- Keep the toboggan in its appropriate orientation to the front operator and the path of travel (photo 6.4).
- Maintain tension and control of the tail rope as required for safe operation.
- Maintain the speed that is set by the front operator.
- Support the front operator by supplying a braking and/or steering component for the toboggan, if appropriate.
- Stay in the fall line to keep the back of the toboggan from sliding or swinging

PHOTO 6.3 The tail rope operator demonstrating a good position up the fall line

PHOTO 6.4 Helping the front operator maintain control on steep terrain

away from the front operator's direction of descent.

- Realize that your primary role as tail rope/rear operator is to assist the front operator and provide a safe descent when terrain and conditions warrant.
- Be prepared to shift positions to assist the front operator as the terrain warrants (i.e., move to the front to help the front operator pull the toboggan uphill, then back to the rear at the crest of the hill).

Teamwork

- Travel at a speed that is commensurate with your skills, the skills of the other operator, the terrain, snow conditions, weather, and the patient's condition while maintaining verbal communication with the other operator and/or any other patrollers who may be skiing/snowboarding alongside the toboggan to help monitor the patient.
- Demonstrate teamwork at all times. Regardless of sliding equipment, cooperation is essential in operating a toboggan.
- Maintain verbal and visual communication with each other while moving the toboggan to its destination.
- Use additional operators if needed to facilitate moving direction changes.

TRANSPORTATION MANEUVERS

Anyone who operates a toboggan must possess an aptitude for route selection, a willingness to maintain communication with the other operator, and a commitment to teamwork. In addition, whether patrolling on skis or a snowboard, operators must demonstrate a variety of movements and turns or transitions to control the speed and path of a toboggan. Tables 6.1 and 6.2 list the skiing/snowboarding maneuvers commonly used to transport a loaded toboggan.

TABLE 6.1 FRONT OPERATOR, LOADED TOBOGGAN

Alpine and Telemark Skiing

- Traverse
- Descent and ascent
- Transitions (Turns)
  - Wedge
  - Step
  - Parallel
  - Telemark
  - Pivot slip
- Sideslip
- Falling leaf
- Static direction change
- Power stop

Snowboarding

- Traverse
- Descent and ascent
- Switch
- Sideslip
- Transitions (Turns)
- Pivot slip
- Sideslip
- Falling leaf
- Power stop

Cross-country Skiing

- Traverse
- Descent and ascent
- Moving belay (wide, narrow trail, and sidehill)
- Static belay (raising and lowering)
- Transitions (Turns)
  - Wedge
  - Step
  - Parallel
  - Telemark
- Sideslip
- Falling leaf (may be difficult or impossible on waxless cross-country skis)
- Static direction change
- Power stop

TABLE 6.2 TAIL ROPE/REAR OPERATOR, LOADED TOBOGGAN

Alpine and Telemark Skiing	Snowboarding	Cross-country Skiing
▮ Traverse	▮ Traverse	▮ Traverse
▮ Descent	▮ Descent	▮ Descent and ascent
▮ Moving direction change	▮ Moving direction change	▮ Moving direction change
▮ Sideslip to wedge turn	▮ Sideslip to skidded turn	▮ Sideslip to wedge turn
▮ Falling leaf to diagonal falling leaf	▮ Falling leaf to diagonal falling leaf	▮ Falling leaf to diagonal falling leaf
▮ Static belay	▮ Static belay	▮ Static belay

TWO-HANDLE TOBOGGANS

Whether you are transporting a patient in a two-handle toboggan by yourself or with another patroller, you will need to use appropriate techniques for descending and ascending the fall line, making a moving direction change, traversing, making a static direction change, executing a power stop (if necessary), and parking the toboggan. The following sections contain detailed information on how to conduct these maneuvers safely.

DESCENDING AND ASCENDING THE FALL LINE

Two-Handle Toboggan

Descending and ascending the fall line with a loaded toboggan presents a different set of considerations than when traveling with an unloaded toboggan. Now you have the added concern of the patient's safety and comfort, requiring you to simultaneously monitor the individual and the surroundings (i.e., terrain, snow conditions, skier/snowboarder traffic, etc.). You must also adapt your toboggan-handling techniques to compensate for the additional weight as well as maintain communication with the other operator (if present) to ensure a safe, efficient outcome.

Objectives

The toboggan handler will

- descend with a loaded toboggan in varied terrain and snow conditions as a front operator and as a tail rope operator with stability and control,
- use an effective combination of operator skills and toboggan maneuvers to provide the patient a safe and smooth ride, and
- execute the terrain-drop maneuver as needed.

Major Learning Points

Front Operator

- Use the front operator's edges as the *primary* braking device and the chain brake as the *backup* braking device when operating a loaded toboggan.
- Lift and twist the handles to obtain maximum leverage and control over the loaded toboggan.
- In moguled terrain, try to keep the loaded toboggan in the troughs or on the uphill sides of the moguls to avoid jostling the patient.
- When using a chain brake, keep it in contact with the snow.
- When the cresting over moguls or other terrain features, lift the toboggan handles to lessen the pressure on the chain brake and avoid stalling the toboggan.
- Because speed and momentum will increase as the loaded toboggan passes over each mogul crest, prepare to edge harder on your skis/snowboard and apply more pressure to the handles to keep the chain brake in contact with the snow.
- Do not allow the loaded toboggan to turn when you transition from a wedge to a sideslip and vice versa.

- A T Use a herringbone or sidestep to ascend with a loaded toboggan.
- A T C Use a combination of skiing techniques—including sideslip, wedge, telemark and parallel turns—to control a loaded toboggan as dictated by the terrain, snow conditions, and your ability level (photo 6.5).
- A T C Use a wedge or sideslip-to-wedge transition to help control your descent with a loaded toboggan.
- S Use a stairstep technique to ascend with a loaded toboggan.
- S Use a combination of riding techniques including falling leaf (forward to switch and switch to forward), sideslipping, and linked turns to control a loaded toboggan as dictated by the terrain, snow conditions, and your ability level (photo sequence 6.6).

PHOTO 6.5 Using various skiing techniques to ensure a controlled, safe descent

PHOTO 6.6 Toe-to-heel sequence

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- If you are descending or ascending the fall line with a loaded toboggan that does not have fixed handles, you may need to use rope or webbing to belay the toboggan in the desired direction (photos 6.7, 6.8).
- Use a diagonal stride, sideslip, climbing skins, or a herringbone to facilitate uphill movement of the toboggan.
- Use a chest harness and/or backpacking type of waist belt attached to the toboggan to free up your hands so you can use your ski poles to obtain better propulsion.

PHOTO 6.7 Descending with an improvised toboggan

Tail Rope Operator

- As the loaded toboggan pivots through the fall line, move laterally across the hill, staying uphill of the toboggan.
- Follow the front operator's line of travel, and adjust your stance and position to help that person control the loaded toboggan. Try to anticipate the actions of the front operator, and communicate throughout the process.
- Keep your upper body facing down the fall line as much as possible.
- Maintain an appropriate uphill position relative to the loaded toboggan so you can help the front operator control it and maintain stability.
- Use your downhill hand to control the tail rope. If you use your uphill hand and need to perform a power stop, your upper body will rotate into the fall line.
- Increase or decrease tension on the tail rope for braking as needed or requested by the front operator. Avoid jerking on the rope.

PHOTO 6.8 Ascending with an improvised toboggan

PHOTO 6.9 Maintaining tension on the tail rope and holding it at mid-thigh level

- Maintain tension on the tail rope to help control speed, provide lateral stability, and prevent the toboggan from slipping sideways (photo 6.9). Maintaining tension in the tail rope is not to be confused with *steering* the toboggan, which is the front operator's responsibility.
- Increase tension on the tail rope if the front operator needs or requests your assistance.
- Be prepared to adjust your position due to variations in the fall line.
- Call out if you begin to lose your position so that both you and the front operator can take appropriate action.
- Maintain a flexed and stable stance to avoid being pulled off balance. Anticipate the time and distance you would need to react to sudden changes in terrain or regain control.
- Maintain an appropriate distance from the toboggan to avoid contact with it.
- A T Hold the rope loosely so you can discard it as needed; do not tie it off to anything (e.g., your waist, clothing).
- S When making a fall-line descent in a regular stance (left foot forward) on the heelside edge, use your left hand to grasp the rope with your palm up and your arm flexed so you can compensate for the changing rope tension. Use your right hand to belay the rope around and behind your right hip. Reverse hand positions for a goofy stance (right foot forward).
- S When making a fall-line descent on the heelside edge, follow the front operator's direction, either traversing forward or switch.
- Hold the rope loosely when descending, keeping tension as needed to provide control. In steep terrain with an improvised toboggan, expect the front operator to shift to the rear (uphill) position to assist you.

Teamwork

- If you are the front operator, constantly scan the route for obstacles, changing terrain, and variations in the snow conditions. Communicate that information to the tail rope operator and adjust the route accordingly.

- If you are the front operator, anticipate the tail rope operator's route and adjust your route as necessary.

Helpful Hints

Front Operator

- Realize that the operation of a loaded toboggan occurs with the front operator inside (between) the toboggan handles. Some areas have adopted an outside-the-handles method of operating the toboggan; this is used primarily in moguled terrain. The use of this technique is at the discretion of area management.
- Slightly lift the handles to help the toboggan fins remain in contact with the snow. This will also add weight to your ski/snowboard edges as well as increase the toboggan's ability to track in a stable manner on either a high-angle or low-angle traverse.
- Try to keep the toboggan as level as possible to provide a comfortable ride for the patient.
- Anticipate the moment the chain may lose contact with the snow surface so you can increase the pressure on your ski/snowboard edges.
- When possible, make quick visual checks of the toboggan's position, the tail rope operator's location, and the patient.

PHOTO 6.10 Placing one hand on the crossbar for more control

- If you cannot comfortably reach the toboggan handles in steep or otherwise challenging terrain, place one hand on the crossbar for more control (photo 6.10).
- Keep your skis/snowboard on the sides of the moguls to place the toboggan in the correct position and to increase the effectiveness of your ski/snowboard edges.
- Try not to let the toboggan rotate when the middle is in contact with the snow but the fins and brake chain are not.
- If you are forced to turn on a mogul, once you are over the crest, get back into position quickly so you can control the speed of the toboggan.
- Wedge your hips against the crossbar to enhance control in steep terrain. Persons of smaller stature may find this helpful in many situations.
- Try to keep your shoulders and hips perpendicular to the fall line for maximum control.
- Avoid over-pressuring the handles; this can lower the bow of the toboggan enough to disengage the fins and cause the toboggan to slip.
- Determine if a belly chain should be added for resistance. A toboggan with a belly chain must be run on or near the fall line; it does not traverse effectively on firm snow.
- A T S Look uphill for oncoming skier/snowboarder traffic.
- Be aware that your emergency care belt could interfere with your operation of the toboggan. Consider stowing it in the toboggan along with the patient, if there is room.
- A If you are on alpine skis with a turned up tail, be aware that they can send a lot of snow spray into the front of the toboggan. You can avoid this by skiing with the tails closer to the nose of the toboggan. You can also bundle up the patient or have a protective barrier (snow/spray guard) shield him or her, as long as this doesn't obstruct your view of the person.

- Start heelside and try to maintain that position whenever possible for maximum stability.
- If you are skiing uphill, keep your poles behind your feet to prevent your skis from slipping back.
- Always have at least two points of contact with the snow (e.g., one pole and one ski) when climbing.
- When pulling a heavy load, take shorter ski steps to make climbing uphill easier and save your leg strength. If you call one ski stride a "step" you can count "step, step, pull."

Tail Rope Operator

- Avoid allowing excess slack in the tail rope; having to manage extra rope will increase your reaction time and overall effectiveness.
- Consider placing knots in the tail rope at intervals of 6, 9, 12, and 15 feet from the rear of the toboggan. These will serve as hand-holds to help you maintain tension on the rope (photo 6.11).
- Your downhill hand should be closest to the toboggan to maintain a stable skiing/riding position.
- Keep the rope parallel to the fall line behind the toboggan. This will help you stay in the fall line too.
- Look uphill for oncoming skier/snowboard traffic.

PHOTO 6.11 Using knots in the tail rope as hand-holds on steep terrain

- Make constant adjustments in the length of the rope in moguled terrain.
- Be aware that terrain conditions can affect your braking power.
- If you are the tail rope operator you should ride switch when possible in order to maintain the optimum tail rope position.

Teamwork

- The more pressure on your equipment edges, the more effective your braking action if you are correctly angled to the hill—but only to a point. Excessive pressure can lead to "chattering" or washing out.
- On flat terrain, if you are the tail rope operator you should move forward and pull with the rope to help the front operator maintain the toboggan's forward momentum.

MOVING DIRECTION CHANGE

Two-Handle Toboggan

In transporting the patient to the aid room, awaiting ambulance, or other destination, you may find it necessary to change the direction in which the toboggan is moving to avoid an obstacle, access a better route, etc. Again, this maneuver is complicated by the need to monitor the patient's safety and comfort while remaining aware of the surroundings (i.e., terrain, snow conditions, skier/snowboarder traffic, etc.). Also, you will need to adapt your toboggan-handling techniques to compensate for the additional weight as well as maintain communication with the other operator (if present). Here are the general guidelines for executing a moving direction change with confidence and efficiency.

Objectives

The toboggan handler will

- select the best location to initiate and complete a transition (turn) relative to the route, terrain, and snow conditions, and

- use skiing/snowboarding maneuvers that are appropriate to the terrain, snow conditions, and personal ability level.

Major Learning Points

Front Operator

- Consider the route, terrain, snow conditions, and skier/snowboarder traffic when deciding whether to change the direction of the toboggan.
- Recognize the specific performance characteristics of the transportation equipment being used and the aspect, or position, of the toboggan relative to the terrain.
- Be prepared to initiate a moving direction change during a traverse or while descending the fall line.
- Execute any direction changes at a consistent and controlled speed. Use a combination of transitions and braking techniques in a variety of terrain and snow conditions.
- When maneuvering the toboggan with a tail rope operator, maintain awareness of that person's position (photo 6.12). Select and communicate the intended line of descent and maneuvers to the tail rope operator.

Tail Rope Operator

- Avoid making a simultaneous transition with the front operator so that one person is in a position of stability at all times.
- Follow the front operator's line of travel and adjust your handling techniques to maintain speed and control.
- Maintain control of the toboggan and your position above and behind the toboggan before, during, and after a descending direction change.
- Adjust the rope length for adequate braking tension and to help control the toboggan during the transition.
- In the backcountry, shift to the front or uphill side to assist the front operator when ascending.

PHOTO 6.12 Maintaining an awareness of the tail rope operator's position at all times

Teamwork

- After initiating the direction change, the front operator should stay in or near the fall line until the tail rope operator completes the direction change and resumes his/her regular position behind the toboggan.
- The tail rope operator should increase the rope tension to help the front operator with turning as needed.

Helpful Hints

- Never go into a moving direction change or transition faster than you want to come out of it.
- Consider the use of a tail rope on steep, narrow terrain.
- Unweight the chain brake slightly before a moving direction change to maintain consistent speed while turning.
- Direct another patroller or bystander to pack a route for you by sidestepping or sideslipping ahead of you, if possible, so that you may descend safely.

TRAVERSING

Two-Handle Toboggan

When transporting a loaded toboggan, you will need to traverse the slope or trail at some point to control speed, avoid obstacles, or access the best route. Again, this maneuver is complicated by the need to monitor the patient's safety and comfort

PHOTO 6.13 Helping the front operator pull the toboggan on flat terrain

while remaining aware of the surroundings (i.e., terrain, snow conditions, skier/snowboarder traffic, etc.). Also, you will need to adapt your toboggan-handling techniques to compensate for the additional weight as well as maintain communication with the other operator (if present). Here are guidelines for moving the toboggan perpendicular to the fall line in a safe, efficient manner while maintaining forward momentum.

Objective

The toboggan handler will cross the slope or trail as a front operator and as a tail rope operator while maintaining stability and control of the loaded toboggan.

Major Learning Points

Front Operator

- Utilize your ski/snowboard edges and the toboggan fins to prevent slipping.
- Use the chain brake as necessary to control speed.
- Move at a consistent, appropriate speed to maintain the forward momentum and control of the toboggan.
- Transfer the weight of the toboggan to the upslope hip or thigh.
- Keep the toboggan at a stable angle to maximize the patient's comfort.
- Coordinate actions appropriately with the tail rope operator, if present (photo 6.13).
- A T C As the slope becomes steeper and the angle of descent moves somewhat closer to the fall line, move your downslope hand forward on the handles. This will increase the pressure on your downhill ski to help you control the traverse.
- S When traversing, use the toeside edge of your snowboard whenever possible to maintain better control.

Tail Rope Operator

- If necessary, use an effective belay technique appropriate for the terrain.
- Maintain control and position above and slightly behind the toboggan during a traverse (photo 6.14).

PHOTO 6.14 Demonstrating a good traverse position at the tail rope

- When traversing, maintain a balanced and stable skiing/snowboarding stance, keeping the tail rope taut to prevent the toboggan from slipping sideways.
- When traversing, use the heelside edge of your snowboard whenever possible for optimum control.

Teamwork

- When on a high-angle traverse, a tail rope handler on a snowboard may be forced onto the toeside edge in order to follow the toboggan's path. The operator may not be able to exert sufficient energy to be an effective brake in the event assistance is required, as being on the toeside edge means the upper body is twisted down-slope and the lower body is oriented upslope. Therefore, communication is essential before switching operator positions or to discuss an alternate route selection.
- In a backcountry downhill traverse, additional patrollers will need to move to the rear to assist with speed control and to keep the rear of the toboggan from slipping down the fall line.
- In a backcountry uphill traverse, additional patrollers will need to move to the front and uphill side of the toboggan to assist with uphill travel and to help keep the rear of the toboggan from slipping down the fall line.

Helpful Hints

- Vary the pressure on the handles in order to find the optimal position of stability.
- If you are the front operator, ski/snowboard with the handles at a slight angle to the fall line so the toboggan will plow through the crust and the chain will dig into the snow to control speed.
- Avoid over-pressuring the handles, which can lower the bow of the toboggan enough to disengage the fins, causing the toboggan to slip.
- You will be more effective traversing when you are able to ride switch on either the toeside or heelside.
- Move your downhill ski slightly forward and move slightly forward in the handles during a traverse.
- Consider using climbing skins during an uphill traverse.

STATIC DIRECTION CHANGE

Two-Handle Toboggan

You may find it necessary to execute a static direction change in certain situations, such as when moving a loaded toboggan over a drop-off or other terrain irregularity. To conduct a static direction change, you must stop the toboggan and make either a stepping wedge turn, kick turn, or switch (if you are on a snowboard), then resume your position in the handles and pivot the toboggan in the new direction to continue the descent. Again, this maneuver is complicated by the need to monitor the patient's safety and comfort while remaining aware of the surroundings (i.e., terrain, snow conditions, skier/snowboarder traffic, etc.). Also, you will need to adapt your toboggan-handling techniques to compensate for the additional weight as well as maintain communication with the other operator (if present). Here are guidelines for executing a static direction change with a loaded toboggan in a safe, efficient manner.

Note: If there are two toboggan handlers, both should not perform the static direction change at the same time. (As one operator performs the maneuver, the other stabilizes the toboggan.)

Objective

The toboggan handler will execute a controlled static direction change while maintaining contact with the toboggan handles.

Major Learning Points

- Stop the toboggan in a safe and secure location.
- Move toward the end of the handles.

- Execute a controlled static direction change while holding onto the handles of the toboggan using either a stepping wedge turn or a kick turn.
- Make sure your skis or snowboard do not make contact with the toboggan or a terrain feature.
- Resume a running position in the handles facing a new direction.
- If there are two operators, do not attempt to perform the static direction change at the same time.
- Pivot the toboggan in the new direction as you resume the descent.
- You can ride switch and accomplish a static direction change without having to turn the snowboard around. This means you can ride from right to left or left to right without having to change your edge (heelside or toeside). If you wish to change the edge, you can perform an on-snow transition soon after getting underway.

Helpful Hints

- Stomp out a secure, flat platform before making a static direction change.
- With a step or wedge turn, use as wide a stance as possible.
- Look in the direction in which you are turning when making a kick turn.

POWER STOP

Two-Handle Toboggan

Because safety is the primary concern when operating a loaded toboggan, you may find it necessary to make an immediate, unexpected stop at any time and in such a manner as to avoid an obstacle or unforeseen hazard while maintaining complete control of the toboggan. The maneuver used to stop the toboggan immediately is called a "power stop," in which you pivot both feet across the fall line while applying increasing pressure and edge angle to stop the toboggan. A loaded toboggan further complicates this maneuver because of the added weight of the patient and the increased momentum of the toboggan. In addition, it is important to warn the other operator (assuming one is present and you have time to do so) that you are about to conduct the maneuver. Here are guidelines for executing a power stop safely and efficiently with a loaded toboggan.

Objective

The toboggan handler will demonstrate a power stop with a loaded toboggan within a reasonable distance in all conditions.

Major Learning Points

- If you are the front operator, maintain the loaded toboggan in the fall line during a power stop.
- Let the tail rope operator know in advance that you will be making a power stop.
- From a neutral stance, simultaneously flex your ankles, knees, and hips while pivoting both feet across the fall line as you apply increasing pressure and edge angle to stop the toboggan.
- Maintain balance over the center of the skis or the middle of the board.
- It's important for either the front operator or the tail rope operator to maintain the toboggan in the fall line during the emergency stop to retain control.
- Apply appropriate downward pressure on the handles to enhance the effectiveness of the chain brake.

Helpful Hints

- Keep the edges sharp on your personal equipment.
- Keep your upper body facing downhill.

PARKING

Two-Handle Toboggan

At times you may need to bring a loaded toboggan to a controlled stop in order to attend to the patient, adjust equipment, or because you and/or the operator are overly fatigued. To park the toboggan, notify the

other operator (if present), and be sure to locate a place that's safe for the patient and you. Make sure the toboggan is oriented perpendicular to the fall line—preferably to the side of the slope or trail—and does not obstruct oncoming skier/snowboarder traffic. Here are guidelines for parking a loaded toboggan and securing it in place.

Objective

The toboggan handler will ski/snowboard and pivot across the fall line, using the control surfaces of the loaded toboggan to park it.

Major Learning Points

- Park/position the toboggan perpendicular to the fall line in a stable place such as a mogul trough or other terrain feature in the snow so that the toboggan is secure and safe. Stomp out a platform if needed.
- After parking the toboggan, determine whether you need to ask another rescuer to approach from below and assist the patient, adjust equipment, or make other necessary adjustments.

Helpful Hints

- If either operator is too fatigued to continue, be sure to park safely and regain strength before continuing.
- If either operator is too fatigued to continue and another patroller is skiing/snowboarding alongside, have that individual take the other operator's place, assuming there is time to do this and it is an appropriate option given the nature of the patient's injury or illness.

FOUR-HANDLE TOBOGGANS

A four-handle toboggan is a good equipment choice when terrain and snow conditions are such that maneuvering a two-handle toboggan in the setting would be inefficient or particularly difficult, as when the incident scene is off trail, when there are considerable stretches of flat terrain on the route to or from the incident, and when there is heavy, wet snow. A benefit of this type of toboggan is that both operators have fixed handles, enabling them to maneuver the equipment as a team. As with any scenario in which two operators are transporting a loaded toboggan, communication and coordination are essential. It is also important to maintain good visual and verbal communication with the patient. The following section examines these and other nuances of four-handle toboggan handling.

DESCENDING THE FALL LINE

Four-Handle Toboggan

One of the ways in which a four-handle toboggan is different from a two-handle toboggan is that the front operator's movements are "amplified" for the rear operator. In other words, because both operators have a direct connection to the toboggan, the rear operator feels the front operator's movements immediately (and vice versa). This is important when descending the fall line, because any direction change will greatly influence the dynamics of the toboggan. In addition, both operators must be aware of the increased momentum caused by the extended rear handles as well as the added weight of the patient.

Objectives

The toboggan handler will

- demonstrate front and rear operations of a loaded four-handle toboggan, and
- descend the fall line with a loaded four-handle toboggan, showing stability and control in a variety of maneuvers conducted in a variety of snow conditions.

Major Learning Points

Front Operator

- Use a variety of techniques—including falling leaf and fall-line parallel transitions—to control the toboggan as the terrain and snow conditions dictate.
- Transport the toboggan at a speed commensurate with the rear operator's skills,

the terrain, weather, snow conditions, and the nature of the patient's illness or injury.

- Travel at a safe, consistent, and controlled speed by using edge and pressure control and the chain brake (photo 6.15).
- In moguls, maintain the toboggan on the face of the mogul just above the troughs. Work the descending pattern of mogul faces usually found from 5 to 10 degrees off the fall line.
- Use the chain brake or slightly lift the toboggan to control speed.
- Lift, twist, and maneuver the handles to maintain maximum leverage and control.
- Keep the toboggan flat on the snow or rolled slightly to the downslope side to promote tracking and edge control.

Rear Operator

- Follow the front operator's line of travel and help him or her maintain control of the toboggan.
- Keep the toboggan flat on the snow or rolled slightly to the downslope side to promote tracking and edge control.
- Lift the tail of the toboggan to maintain weight on the chain when more braking power is needed.
- Support the weight of the toboggan when the front operator does a moving direction change.
- Maintain communication with the front operator.

Teamwork

- Adjust your skiing/snowboarding stance and your position in the handles to maintain control of the toboggan. Typically, toboggan operators position themselves closer to the end of the handles with a four-handle toboggan (photo 6.16).
- Communicate verbally and nonverbally with each other. Call out your turns.

Helpful Hints

- If you are the stronger of two handlers, you should be in the rear.
- If you are the front operator, do not push down too hard on the front handles because this will cause the fins to lose edge control.
- In difficult terrain, run 5 to 10 degrees off of the fall line to allow the chain to function at its maximum capacity and the fins or sidewall to carry part of the weight.
- Consider placing any equipment in the toboggan over the rear fins for added weight and stability.
- Realize that pulling back on the handles will cause the toboggan bow to lift off of its chain and the front operator to lose pressure on his or her ski edges.
- If you the rear operator, hold the handles in front of your body.
- If you are the rear operator, do not push down too hard on the rear handles

PHOTO 6.15 Descending the fall line

PHOTO 6.16 Positioning at end of handles

because this will cause the chain to lose its braking power.

MOVING DIRECTION CHANGE

Four-Handle Toboggan

In transporting the patient to the aid room, awaiting ambulance, or other destination, you may find it necessary to change the direction in which the toboggan is moving to avoid an obstacle or unforeseen hazard, access a better route, etc. Again, this maneuver is complicated by the need to monitor the patient's safety and comfort while remaining aware of the surroundings (i.e., terrain, snow conditions, skier/snowboarder traffic, etc.).

Also, you will need to adapt your toboggan-handling techniques to compensate for the additional weight as well as maintain communication with the other operator (if one is present). The front operator must always consider the effects of his/her actions on the rear operator because the effects are amplified when operating a four-handle toboggan. Here are guidelines for executing an efficient, safe moving direction change with a loaded four-handle toboggan.

Objective

The toboggan handler will

- select the best location to initiate and complete a direction change relative to the route, terrain, snow conditions, and the position of the rear operator, and
- use skiing/snowboarding maneuvers that are appropriate to the terrain, snow conditions, and personal ability level.

Major Learning Points

Front Operator

- Select and communicate the intended line of descent and maneuvers with the rear operator.
- Use maneuvers appropriate to the terrain, snow conditions, and the rear operator's ability level.

Rear Operator

- Follow the front operator's line of travel and adjust your movements and handling techniques to maintain the speed and path of the toboggan.
- Keep the toboggan flat on the snow or rolled slightly to the downslope side as appropriate for the terrain and snow conditions and to maintain tracking.

Teamwork

- Operate as a team when conducting movements; whatever you do will directly affect the other operator.
- Maintain a proper skiing/snowboarding stance and an appropriate position in the handles depending on the terrain and snow conditions.

Helpful Hints

- Before executing a maneuver, slow to the desired speed for both of you to complete the maneuver and anticipate the needs at the end of the maneuver. Don't expect the toboggan to slow during the maneuver.
- If you are the front operator, when changing direction stay on or near the fall line until the rear operator completes the direction change and locks into position.
- If you are the rear operator, be prepared to anticipate the actions of the front operator.
- The front operator should anticipate the rear operator's situation before making a moving direction change.

TRAVERSING

Four-Handle Toboggan

When transporting a loaded four-handle toboggan, you will need to traverse the slope or trail at some point to control speed, avoid obstacles, or access the best route. Again, this maneuver is complicated by the need to monitor the patient's safety and comfort while remaining aware of the surroundings (i.e., terrain, snow conditions, skier/snowboarder traffic, etc.). Also, you will need to

adapt your toboggan-handling techniques to compensate for the additional weight as well as maintain communication with the other operator (if one is present). Here are the guidelines for moving the loaded four-handle toboggan perpendicular to the fall line in a safe, efficient manner while maintaining forward momentum.

Objective

The toboggan handler will traverse a loaded four-handle toboggan in a stable and controlled manner with minimal lateral slippage in a variety of terrain and snow conditions.

Major Learning Points

Front Operator

- Adjust your position in the handles as the terrain and snow conditions dictate.
- Pressure the edges of your skis/snowboard, the toboggan fins, and the toboggan edges as needed to prevent slippage (photo 6.17).
- Lift the toboggan slightly or use the chain brake as needed to control speed.

Rear Operator

- Keep the toboggan flat to the slope and tracking.
- Help to propel the front operator hard enough to maintain speed on shallow traverses.

PHOTO 6.17 Traversing with a loaded four-handle toboggan

- Maintain communication with the front operator.

Teamwork

- Maintain a proper skiing/snowboarding stance and an appropriate position in the handles depending on the terrain and snow conditions.
- Coordinate actions appropriately.

Helpful Hints

- If you are the rear operator, keep the rear of the toboggan from sliding away from the direction in which the front operator is moving.
- If you are the rear operator, you may want to keep your upper body centered behind or slightly below the toboggan's downhill handle.

ADAPTING TO TERRAIN AND SNOW CONDITIONS

Four-Handle Toboggan

Depending on the policy of area management or the public lands administrator, four-handle toboggans are often used in adverse conditions where both operators need maximum control. The rear operator is more directly influenced by the maneuvers of the front operator and the toboggan itself, making for a stronger, more direct connection between both handlers and the equipment. For this reason, communication and teamwork are essential. Here are general guidelines for adapting to terrain and snow conditions when maneuvering a loaded four-handle toboggan.

Objectives

The toboggan handler will

- perform all the maneuvers of transitions, sideslips, moving direction changes, parking, and terrain drops in a variety of terrain and snow conditions,
- "make light" on flat terrain and on a variety of slopes in wet, heavy snow on an appropriate slope, and

- execute the terrain-drop maneuver with a loaded four-handle toboggan over an appropriate drop.

Major Learning Points

Front Operator

- Select the best route and the best point(s) of transition.
- As the toboggan tips down over a lip, momentarily check the speed of the toboggan while maintaining the line of travel until the rear operator is over the lip and back in position.

Rear Operator

- Be prepared to control the direction and speed of the toboggan when the terrain and snow conditions dictate.
- Push the toboggan to start moving.

Teamwork

- Adapt to the terrain and snow conditions.
- Communicate exactly what will be done (i.e., the speed over the lip, the stopping point, the maneuver to be done, and the snow conditions ahead).
- Pass the weight (control) back and forth from one handler to the other depending on which handler has the best leverage due to the snow conditions.
- Keep the toboggan positioned at the proper angle.
- Conduct the maneuvers in a smooth, continuous movement.
- Be knowledgeable and experienced in toboggan maneuvering skills before attempting them in more challenging terrain and snow conditions.

Helpful Hints

- Adjust your stance and position in the handles to control the toboggan as the terrain and snow conditions warrant.
- Let the toboggan do some of the work. Operate it; don't fight it. Use finesse rather than brute strength.
- The tougher and tighter the moguls, the slower the speed.

SUMMARY

Maneuvering a loaded toboggan, whether its configuration is two-handles or four-handles, requires solid skiing/snowboarding skills, strong teamwork, and concise communication skills. At the same time, the care and safety of the patient is of primary concern as the loaded toboggan is maneuvered across the slopes or trails. The general principles and specific skill sets identified in this chapter bring into consideration all of these elements. The following training exercises provide valuable learning tools and practice opportunities for new trainees as well as seasoned patrollers.

TRAINING EXERCISES

Transportation Maneuvers

Fundamental Skills

Have trainees focus on demonstrating the solid fundamental skills of skiing/snowboarding and turning while operating a toboggan in challenging situations (steeps, moguls, and irregular snow). Have them practice these skills progressively, that is, first without a toboggan, then with an unloaded toboggan, and finally with a loaded toboggan. Also have the group practice good route selection on steep, moguled terrain, using the fall line and moguls to control speed and provide a smooth, safe toboggan ride. Consider starting each team with the active assistance of the tail rope operator, and then have them try the same without the active assistance of the tail rope operator.

Refer to PSIA-AASI manuals and recruit PSIA-AASI instructors to help emphasize the baseline fundamental sliding and turning skills.

continued >

TRAINING EXERCISES, continued

- Have alpine, telemark, or cross-country skiers practice their sideslipping transitions (i.e., sideslipping while facing left to sideslipping while facing right).
- Have alpine, telemark, or cross-country skiers practice making left and right wedge turns to control the direction of the loaded toboggan.
- Have alpine, telemark, or cross-country skiers make left and right step turns to control the direction of the loaded toboggan. Have the trainees focus on making smooth and controlled turns and transitions.
- Have trainees practice falling leaf transitions from left to right to control the direction of the toboggan. Then have them practice the falling leaf sideslip, again focusing on the transitions from one direction to another.
- Have trainees practice a diagonal fall-line descent, using the falling leaf to control direction.

Chopsticks

This simulated toboggan exercise is designed to improve front operator skills and develop teamwork when maneuvering a loaded toboggan. Two patrollers ski while holding two poles taped together on either side to simulate a toboggan (photo 6.18). Rather than act as a tail rope operator, the person in back uses his/her weight to push the front operator, creating the effect of a loaded toboggan. The front operator is responsible for direction and speed.

For this drill you will need two 8- to 10-foot-long poles sturdy enough to support the weight of the tail rope/rear operator. You can use either a pair of 2 x 2s or two to three stout bamboo poles taped together in several places for additional support. You may want to connect a sling-type device between the ends of the poles so the tail rope operator will have something to lean on (although this is not depicted in photo 6.18).

continued >

PHOTO 6.18 Chopsticks drill

TRAINING EXERCISES, continued

To begin, the front operator places a pole under each arm and cups his or her hands over the pole ends. When the team begins skiing, the tail rope/rear operator leans onto the sling. The patroller's weight is distributed from the sling to the poles, creating the effect of a loaded toboggan.

The front operator performs various toboggan maneuvers using proper balance and stance. This person should use exaggerated movements to emphasize non-verbal communication and teamwork and to allow both operators to get the feel of what they are doing. For this particular drill, the tail rope/rear operator should be an experienced toboggan handler who can respond to the front operator's moves as would a loaded toboggan. Maneuvers easily simulated in the training exercise are fall-line descents, traverses, moving direction changes, and emergency stops.

Have the trainees practice this drill first on a groomed slope, progressing to more challenging terrain as their skills improve. One word of caution: This is an effective training exercise, but only when practiced in a serious manner. Horseplay such as dropping the sticks or driving hard into the front person can be dangerous. The goal is to build teamwork and trust.

Safety considerations:

1. Use sturdy poles that will support the weight of the tail rope/rear operator and won't break when put under pressure.
2. Practice on slopes that have a level of difficulty commensurate with the operators' expertise at this exercise.
3. Encourage the tail rope/rear operator to pay close attention to the front operator's moves, respond appropriately, and back off completely if necessary.

Adaptation:

Have trainees practice "mirror" skiing/snowboarding (i.e., as if skiing/sliding with a four-handled toboggan) on non-challenging terrain. Tell them to use the wedge, sideslip, transition maneuvers, parallel turns, braking, and kick turns.

Power Edge Drill

This simulated toboggan exercise focuses on developing agility, mobility, and a feel for the balance point required to maintain edge hold when controlling a loaded toboggan.

Have trainees practice traversing on relatively flat terrain while putting their upslope hand on their downslope knee. They should try different foot positions, such as feet together, feet apart, and scissored (with the upslope foot forward) to see how far they can extend their feet with each movement. Encourage them to experiment to find the most stable foot position and platform. Then, they should practice traversing with their upslope hand touching their downslope boot. The goal is to control forward movement as well as maintain the required stance for maximum edge hold. Tell trainees to be aware of the position of their head, shoulders, hips, and feet as they maintain edge control.

Once all the trainees have this down, move the group to a steeper slope. Again, have them put their upslope hand on their downslope boot and hold it there while doing a controlled traverse. They should practice doing this with their feet together, apart, scissored, and with their weight centered back on their heel and then forward on the ball of their foot. If they are on the correct balance point and are in the correct stance to maintain their edge, this should be easy!

Try to conduct these exercises on steep terrain where trainees can traverse for long distances with no exposure to other skiers/snowboarders (e.g., a cat track upper wall). The trick is to stay on the wall and control speed.

continued >

TRAINING EXERCISES, continued

This part of the exercise enables the trainees to maintain edge control with independent leg action—skills used in toboggan handling on advanced or expert terrain. The sidewall is not always smooth, and the trainees not only have to be on their edges correctly, but also they must control their speed and have the agility to negotiate bumps. If they are not over their edges correctly they will lose their edge and slip off. If they cannot operate their skis independently (ride one and check with the other) they will gain too much speed. To increase the challenge, have the group play follow-the-leader. Again, the goal is to achieve control, not speed.

Safety considerations:

1. Have trainees practice this exercise on terrain that is commensurate with their ability levels.
2. Encourage trainees to focus on controlling their direction and speed, using maximum edge control at all times.
3. Conduct practice away from the skiing/snowboarding public or have someone watch for oncoming traffic.

Wedge/Sideslip Transition Drill

This exercise focuses on transitioning from a wedge to a sideslip and vice versa to control a loaded toboggan. It also develops leg strength.

On a moderate pitch, with the toboggan chain up, the trainees should perform a sideslip and transition to a wedge. They should hold the wedge for a bit, then transition to the opposite sideslip, hold that, transition back to the wedge, and so on.

If the transitions are properly executed, the toboggan tracks will remain parallel and go right down the fall line. If the toboggan comes out of the fall line slightly with each transition, this indicates that the operator's weight is either too far forward or backward on the downhill ski during the transition.

If there is a jog in the tracks at the point where the operator moved from a wedge into a sideslip, he or she may not have unweighted the ski tails sufficiently at the beginning of the transition, resulting in edge hold at the tail of the downhill ski and causing the ski to carve through the last part of the transition. Encourage the operator to focus on unweighting the skis completely and to visualize the effect of a hop turn and how it would work were it not for the toboggan. Suggest that the operator maintain only the slightest contact with the snow and pivot on the front half of the ski to maintain edge contact.

Braking Control

Have trainees practice braking a loaded toboggan. Encourage them to use a combination of tactics: edging their skis/snowboard, engaging the chain brake, and utilizing the other control surfaces of the toboggan (i.e., the fins, the skid plates, or the cambered base of the shell if applicable).

Handle Control

Have trainees experiment with pushing down and pulling up on the handles of the toboggan to see how this movement increases and decreases pressure on their ski/snowboard edges (photo 6.19). An adaptation of this drill is to have trainees push down and pull up on the handles to engage and disengage the chain brake so they can experience its braking capability.

Also have the group experiment with sliding fore and aft in the handles to vary the leverage required to control the toboggan. This allows trainees to find the most efficient position for use of lower body versus upper body exertion.

continued >

PHOTO 6.19 Handle control

TRAINING EXERCISES, continued

Stork Drill

This exercise develops maneuvering skills and independent leg strength. It is a good prelude for learning to control a loaded toboggan in moguls, although the drill itself can be practiced on most types of non-moguled terrain. Start on a fairly gentle pitch so the trainees do not have to use chain brakes. If possible, choose firmly packed trails until everyone is ready to try the exercise on more challenging terrain.

Have the trainees start down the hill holding a sideslip. Once under way, they should lift their uphill ski about 6 inches off the snow and hold it there for 5 to 10 seconds. If they start to gain speed, they should resist the temptation to put down the uphill foot. Encourage them to try picking up on the handles to direct more weight to the ski edge. Remind them to maintain flex in their lower leg, and control speed by picking up rather than pushing down on the handles.

Then have the trainees do the exercise with the other leg holding a sideslip. Their tracks should go straight down the fall line; if not, their sideslip is not centered, and their weight is either too far forward or backward on the active ski.

Most people have more trouble staying centered on the uphill ski than on the downhill one. Have the group try to do entire runs facing one direction, then go back up and do another one facing the other direction. After they master this drill they can learn to work the ski in and out of the fall line slightly while engaged in the stork drill. By alternately pointing their tip and tail slightly downhill, they prevent a wave of snow from building up in front of their ski. Encourage them to keep their weight centered on the ski and to stay "loose" in the handles, that is, their body motion relative to the handles should not affect the direction of the toboggan. If this exercise is done properly, they'll be dancing gracefully in the handles while the toboggan maintains a controlled beeline down the hill.

Controlling Improvised Toboggans

Have the front operator and tail rope operator load a person into an improvised toboggan and transport it uphill for 50 yards, then traverse for 50 yards, and then ski back downhill for 50 yards. Have the patrollers switch positions so they can become familiar with all aspects of transporting an improvised toboggan.

continued >

TRAINING EXERCISES, continued

Tail Rope Operations

Front Operator Maneuvers

Have tail rope/rear operator trainees focus on responding to the front operator's movement in an effort to minimize the effects varied terrain, moguls, and dips.

Rope-A-Goat

This simulated toboggan drill focuses on tail roping skills, but the front operator—who is the "goat"—will also obtain a sense of the dynamics of tail rope operations. (*Note:* Be sure to obtain area management's approval before practicing this exercise on the slopes.)

The goal is to develop skills in tail roping and edge control appropriate for the terrain and turns. This drill also should help tail rope operators develop an understanding of their limitations in controlling the toboggan. During the exercise, ask the trainees questions such as, "How much weight can you control?" "What is the best position for you in relation to the track of the 'goat' in front of you?" "How much steering can you do with a tail rope?" "How good are you at using your edges for control?"

You will need a 15- to 30-foot length of small-diameter rope, a sturdy belt or rope sling, and a locking carabiner. Put some kind of flagging on the rope to ensure that it is visible to others. Then, tie three double-overhand knots on the rope, beginning at the end and spacing each knot 3 feet apart. This will help the tail rope operator keep his or her hand from sliding on the rope as the pull increases. At the other end, loop the lead end of the rope through the carabiner and tie it off. Attach the belt or sling to the front operator (don't use a slip-knot). Then, snap the carabiner holding the lead rope onto the front operator's sling in back.

The front operator moves to the fall line in a gliding wedge with unset edges in order to imitate a toboggan. The tail rope operator controls and guides the simulated toboggan down and across the hill, using edge control and skiing/snowboarding techniques appropriate to the terrain and snow conditions. The tail rope operator moves from side to side, controlling direction and moving forward and backward on the rope to adjust to the terrain.

As the trainees increase their proficiency with this exercise, encourage them to explore their limits. They can increase the weight on the rope and move to more difficult terrain, for example. For more weight on the rope, have patrollers carefully ski in and pull on the rope. This is one time the tail rope operator can see just how much he/she can hold and for how long. Be sure to have the tail rope operator tell the pullers when he/she has had enough. Further, it can be dangerous if the pullers let go of the rope without warning, so make sure they know to communicate their intentions to the tail rope operator.

Safety considerations:

1. Do not use a slip-knot on the front operator.
2. Make sure the patrollers who ski/snowboard in to put extra weight on the rope know to exercise extreme caution when approaching the tail rope operator and to avoid overpowering the person.
3. Emphasize communication among all participants. When enough is enough, the tail person should tell the pullers so they can ski away. Likewise, when the pullers are ready to release the rope they should notify the tail rope operator.

continued >

TRAINING EXERCISES, continued

Adaptations:

- Review the different types of belay positions for tail roping and practice where appropriate. Discuss the pros and cons of each method.
- Have the tail rope operator belay the rope across the front of his/her body and over the uphill thigh.
- Have the tail rope operator practice lengthening and shortening the tail rope depending on speed, terrain, and snow conditions.
- Have the tail rope operator and front operator practice left and right moving direction changes with a loaded toboggan in varying terrain and conditions.

Moving Direction Changes (Front, Tail Rope and/or Rear Operators)

Changing Directions on Varied Terrain

- With a front operator and tail rope/rear operator, practice transitions with a loaded toboggan on unchallenging terrain. Practice using a wedge or switch to control your speed during moving direction changes. Use a sideslip to control speed.
- With a front operator and tail rope/rear operator, practice descent and traverse maneuvers with a loaded toboggan on varying terrain (starting with unchallenging terrain and progressing to more challenging terrain, smooth and moguled, etc.). Practice under different snow conditions.
- Have the tail rope/rear operator hold the loaded toboggan on belay while the front operator performs the following tasks: anchoring the toboggan, changing direction in difficult terrain, and dropping the chain.

Mogul Conditions

Have the trainees practice techniques to descend smoothly through moguls with a loaded toboggan. Focus on route selection and how to utilize the fins, the chain brake, and the handles to maintain speed and control.

Powder Conditions

Have trainees focus on weighting both skis more or less equally (perhaps with a little more weight on the outside ski). Explain that too much weight on one ski may cause it to dive deeper while the unweighted ski floats to the surface. Emphasize the importance of weighting the middle of the skis and not sitting back.

Rear Turning

Have the group practice coordinating left and right turns on both smooth and moguled slopes.

Traversing

Toboggan Traverses on Varied Terrain (Front Operator)

Have trainees work on traversing with and without active assistance from the tail rope operator on progressively challenging terrain. Work on smooth and moguled terrain and in packed powder, powder, crud, and icy conditions.

continued >

TRAINING EXERCISES, continued

Traverse Transition Drill (Front Operator)

Set up a situation in which trainees are traversing on a moderate pitch. At the end of the traverse, rather than have them go into a wedge to come out of the traverse, tell them to steer their skis so that their tails point slightly down the fall line. This will cause them to back into a sideslip, bringing the toboggan toward the fall line. If they do this properly, the tracks will indicate an abrupt change in the toboggan's direction. They should hold the sideslip for a few seconds, then do a transition into a wedge. They will then go into the opposite sideslip and hold it. Check for straight tracks.

Next, have them start a traverse by pointing their tips slightly downhill and picking up slightly on the handles to load the fins. Their skis or snowboard should shoot across the terrain and the toboggan will follow. The tracks should show a fairly square corner. Have them repeat this until they run out of trail. Follow up with a discussion on the merits of short-radius maneuvers in and out of traverses. Emphasize that these movements can keep you out of trouble when operating a loaded toboggan.

Static Direction Changes

- S Have trainees go switch, using balance and edge placement to maintain an upright stance. They should practice this maneuver without a toboggan at first, then with a toboggan.
- A T C Have trainees descend a slope using a traverse, kick turn, traverse, wedge turn, traverse, wedge turn, and traverse kick turn—repeating these maneuvers until they reach the bottom of the hill. They should practice this maneuver without a toboggan at first, then with a toboggan.

Power Stops

- Have trainees wedge or sideslip to a stop to get the feel of a power stop. Set up a narrow corridor, and have them perform edge-to-edge turns to short swing turns.
- Have trainees demonstrate power stops, first without a toboggan, then with an unloaded toboggan, and finally with a loaded toboggan.
- Have trainees ski/snowboard at a reasonable speed and then perform a power stop in as short a distance as possible while keeping the toboggan uphill and in the fall line. The tail of the toboggan should not move sideways during this maneuver.

Parking

Curbside Parking

Have trainees practice moving and pivoting the loaded toboggan into a stable position to get a feel for how to park the toboggan.

Amazing Disappearing Toboggan Trick

Discuss with trainees the fact that centering and balancing are no less important in toboggan handling than they are in free skiing or riding. Many patrollers are off-center and compensate by leaning on the handles. Have the patrollers run a loaded toboggan. During the run, either call "Stop!" or blow a whistle. They must stop the toboggan and then tell you whether they would have fallen over at the moment the whistle was blown if the toboggan were to suddenly, amazingly disappear into thin air. This exercise helps patrollers become aware of their body position and the need to stay centered on their skis/snowboard and not over-angulate or lean. It also helps them learn to stop the toboggan quickly.

continued >

TRAINING EXERCISES, continued

Four-Handle Toboggan Exercises

(Note: Many of the training exercises listed previously can be adapted for four-handle toboggan training.)

Have trainees practice "mirror" (copycat) skiing/snowboarding on non-challenging terrain. Tell them to use the wedge, sideslip, transition maneuvers, parallel turns, braking, and kick turns.

Applying General Toboggan Maneuvers

Have trainees practice general toboggan-operating principles with an unloaded and then a loaded four-handle toboggan in deep snow, on flat terrain, and on steep terrain with moguls and crud conditions.

Moguls

For running the four-handle toboggan in moguls, have trainees practice using the falling leaf sideslip to control speed.

Variable Conditions

For running the four-handle toboggan in variable conditions, have trainees practice empty-toboggan skills and then loaded-toboggan skills using a stance that allows independent leg action.

Firmer Snow

For running a four-handle toboggan in firmer snow, have trainees twist the handles to pressure the fins, which will set an edge for tracking.

Wet Snow

For running a four-handle toboggan in wet snow, have trainees practice descending off the fall line and into a traverse, using the shell of the toboggan as a major control surface for tracking.

Traversing

- Have trainees practice traversing with an unloaded four-handle toboggan with only the front operator and then only the rear operator. Have the group do long traverses in a variety of terrain and snow conditions. They should focus on developing a feel for toboggan tracking as well as fin and ski/snowboard edge control.
- Have the group practice traversing with a loaded four-handle toboggan on unchallenging and then more challenging groomed terrain to get the feel of traversing. When the team is comfortable, continue training in all terrain and snow conditions.

Direction Changes

- Using a four-handle toboggan, have the group practice direction changes with the front operator moving through the fall line and the rear operator having control of the toboggan. When the front operator is in position, the rear operator should follow through with his/her transition.
- Have the group do kick-turn ski drills, either using the chopsticks drill or an empty four-handle toboggan. For single-operator kick turns, have the trainees practice in more challenging terrain. Do the same with a loaded four-handle toboggan.

continued >

TRAINING EXERCISES, continued

Teamwork

- Have trainees take turns in both the front and rear positions of an unloaded and then a loaded four-handle toboggan so they can experience the effects of the other person's actions. Have the group focus on maneuvering the handles to see how their movements impact the toboggan and the other operator.
- Have the rear operator trainees focus on moving the handles of an unloaded/loaded four-handle toboggan left and right in order to pivot the toboggan in coordination with the front operator's movements into and out of the fall line.
- Have the rear operator trainees hold a four-handle toboggan on belay while the front operator completes the following tasks: anchoring the toboggan, changing directions on difficult terrain, and dropping the chain.

Handle Control

- Have the group experiment with rolling or twisting the handles of a loaded and an unloaded four-handle toboggan downslope to roll the toboggan edge for best leverage and set the fin for tracking. They will then need to roll or twist the handles upslope to release the fins and allow the toboggan to sideslip.
- Have the trainees practice pushing forward with pressure on the handles of an unloaded and then a loaded four-handle toboggan for speed control and stability.

Notes:

Belays

Whether you patrol alpine slopes or backcountry trails, the need may arise for you to belay a toboggan over terrain on which you could not otherwise transport the equipment. It is not only important to recognize when a belay is required, but also to be trained in the various aspects of conducting the maneuver, be it tying specialized knots in ropes and webbing, serving as an anchor, or helping lift and pull the rig over the terrain.

That said, this special application of toboggan handling should only be conducted at the behest of and under the auspices of the local area management or public lands administrator. In some instances, you must also comply with local, state, or other mandated guidelines.

Note: Consult *Mountain Travel and Rescue* (NSP 1995) for more information on belaying techniques and guidelines.

SLIDING EQUIPMENT ICONS

- A Alpine skiing (fixed heel)
- T Telemark skiing (free heel, nordic downhill)
- S Snowboarding
- C Cross-country skiing (track and skate)

GENERAL PRINCIPLES

- Do not attempt a belay unless all the patrollers involved have been properly trained and authorized by area management to conduct such a maneuver.
- Use a belay when it is not possible to safely transport a toboggan down or across certain terrain, for example, when the slope is steep and icy or when the incident scene is off trail.
- Consider the following factors to help you determine when a belay is necessary: steepness of slope, weather conditions, the nature of the patient's injury or illness, the availability of appropriate equipment, and the rescuers' physical capabilities.
- Always make sure that the belayers are sufficiently anchored.

STATIC BELAY

In a static belay, you lower or raise a person or toboggan using rope tied to an anchor or belay device that does not move. This skill is used to control the descent or ascent of the toboggan on a steep slope. Static belaying refers to the process of wrapping the rope around a friction device (a climber's body, a tree, or whatever is available and sufficiently sturdy). The belayer controls the rope to avoid slack between the belay and toboggan.

Objective

The toboggan handler will demonstrate a static belay from a tail rope position to control the descent or ascent of a loaded toboggan down a difficult section of slope (steep or narrow).

Major Learning Points

To conduct a static belay you must do the following:

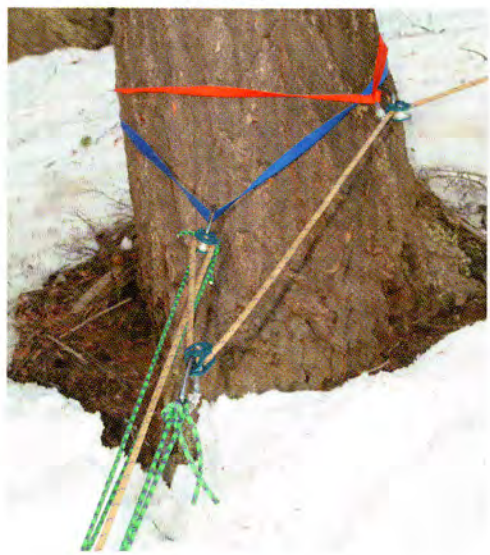
- If you are the primary belayer, stop and establish a strong stable position from which to initiate a static belay.
- If you are the primary belayer, assume a hip belay position with the rope around your body (not tied).
- If you are the primary belayer, grip the rope with one hand (the brake hand) close to the body and the other hand out in front to guide the rope (photo 7.1). (If your "braking" elbow is not in front of your hips, your brake hand can be pulled around.) The brake hand should never leave the rope.
- If you are the primary belayer, the back-up anchor person, or the wing(s), notify the front operator when you are in position.
- Maintain communication with the other patrollers at all times, using the universal belay commands as follows:

PHOTO 7.1 Static belay

PHOTO 7.2 Z-pulley ascending belay

  - "On belay?" (Do you have me on belay?)
  - "Belay on." (Yes, I am belaying you.)
  - "Off belay." (I am secure and no longer need your belay.)
  - "Belay off." (I am no longer belaying you.)
- If you are the primary belayer, control the descent of the toboggan with rope friction while on belay.
- If you are the primary belayer, wait for the front operator to assume control before releasing body tension.
- If you are the primary belayer, descend the fall line carefully or turn when the front operator establishes a controlled position.
- On steeper terrain, use other belay techniques approved by the local area management or public lands administrator.
- Use a 2:1 or a 3:1 (z-pulley) mechanical system (photos 7.2, 7.3) or direct lift with multiple personnel to raise a loaded or unloaded toboggan (*Mountain Travel and Rescue*, NSP 1995).
- Make sure you have access to appropriate materials, which include the following:
  - Ropes (static, i.e., designed to stretch minimally or not at all)
  - Webbing (tubular)
  - Locking carabiners
  - Friction devices
  - Ascenders
  - Snow flukes
  - Pickets
  - Skis and poles, snowshoes, or a snowboard
  - Ice axe
  - Pulleys
  - Prusik cords
- Be able to tie the knots commonly used in a static belay as follows (see *Mountain Travel and Rescue*, NSP 1995):

PHOTO 7.3 Close up of z-pulley



- Water knot
- Clove hitch
- Bowline
- Butterfly knot
- Figure-eight on a bight
- Prusik

Helpful Hints

- Make sure that everyone understands the details about the belay rope, the belay position, and the anchor as well as the use of terrain (e.g., moguls), trees, lift towers, pickets, or anchors.
- Coordinate all belay techniques with the front operator.
- Realize that the steeper the terrain, the more pulleys needed.

DYNAMIC BELAY

A dynamic belay is generally a moving belay used to pull a toboggan in the backcountry or on flat terrain where a snowmobile isn't available. In a dynamic belay, the belayers are positioned on different sides of the toboggan, spreading out in a fan-shape for the most efficient configuration, and shifting their position when needed to maintain momentum. Together they pull on ropes securely attached to the toboggan to move it in the intended direction (photo 7.4).

Objectives

The toboggan handler will

- demonstrate how to properly rig a toboggan for a dynamic belay, and
- demonstrate how to effectively position up to four patrollers for safe and efficient transport of a loaded toboggan on wide and narrow as well as wide trails and on sidehills.

Major Learning Points

To conduct a dynamic belay, make sure you do the following:

- Have three or four patrollers available to help: the toboggan handler (the front operator or "mule"), the "swing" (three-member team), and the "wings" (four-member team).
- Have the following materials available:
  - Ropes (static, i.e., designed to stretch minimally or not at all)
  - Webbing (tubular)
  - Locking carabiners
  - Skis and poles, snowshoes, or a snowboard
- When hauling a toboggan across open terrain, be sure to use the most efficient team configuration: spread out forward in a fan so that all members can help with the pulling.

PHOTO 7.4 Telemark gear, dynamic belay

- When hauling a toboggan on sidehill terrain, make sure that at least one patroller is above the rear of the toboggan to prevent it from slipping sideways down the hill. In order for that patroller to be effective, he or she must pull uphill on a rope that is attached to the downhill side of the toboggan.
- When hauling a toboggan on a narrow trail, change the configuration of the patrollers so that the team can ski/snowboard single file in front of and behind the toboggan.

Helpful Hints

- If you are the front operator, anticipate changes in terrain when positioning belayers in order to maintain momentum.
- If you are the front operator, realize that appropriate route selection is essential in using the patrollers efficiently. Make sure their movements aren't impeded by bumps, rocks, trees, etc.

SUMMARY

A belay is a somewhat strategic and precise procedure in which all rescuers must be trained thoroughly in the appropriate maneuvers. Patrollers should conduct this specialized application of toboggan handling only if it is essential to the safe, expedient transport of a patient—and if they have the authorization of the area management or public lands administration. In many situations, a belay is a necessary procedure for a successful outdoor emergency transportation outcome.

TRAINING EXERCISES

Static Belay

- Discuss when and how to statically belay a loaded toboggan down a difficult section of slope, then have trainees practice these maneuvers first on unchallenging terrain, progressing to more challenging terrain as their skills and confidence increase. Encourage trainees to develop the decision process for determining a situation that would require a static belay.
- Explain and demonstrate when and how to statically belay a loaded toboggan down a difficult section of slope. Develop the decision process for determining a difficult slope that would require a static belay.
- Have trainees practice lowering a toboggan gradually while in an anchored, secured position. Make sure they have the rope around their body (not tied) and that they grip the rope with both hands close to their body for braking friction. Remind them to keep both elbows in front of their hips.
  1. Have the belayers dig their skis or boots into the snow for anchors.
  2. Have the belayers anchored to a tree or lift tower with rope (and a carabiner, if possible).
  3. Have the trainees practice a 3:1 (z-pulley system) (*Mountain Travel and Rescue*, NSP 1995)

Hip Belay

Have trainees practice sitting-hip belays on a 20- to 25-degree pitch using one patroller as the "toboggan." Have the group focus on proper hand position (brake hand close to the body; other hand guiding the rope) and use anchoring devices such as skis or pickets. (Snowboarders will need to set a heelside edge.) As the trainees become more proficient, have them "leap-frog" down the hill, that is, as the belay rope is extended to its maximum length, have the next patroller descend and assume a position to belay.

continued >

TRAINING EXERCISES, continued

Dynamic Belay

Divide the patrollers into three- or four-person teams. Have them move a loaded toboggan over varied terrain and trails. Instruct the proper positioning of team members and the repositioning shifts that may be necessary to maintain the path and momentum of the toboggan.

Notes:

Equipment Suggestions for Cross-country Patrollers

BASIC PATROL PACK

Personal Gear (please refer to *Mountain Travel and Rescue* for more information)

- Basic equipment (skis, boots, poles, wax, climbing skins, ropes, wax kit, radio, notepad, pencil)
- Uniform
- Personal clothing (layering using combinations of wool and/or synthetic clothing topped with shell tops and bottoms)

Essentials

- Maps and compass (altimeter, inclinometer, hand lens)
- Matches, fire starter
- Flashlight or headlamp
- Sun protection (sunglasses, goggles, sunscreen, lip protection)
- Food
- Water (insulated water bottle)
- Clothing considerations (insulation layers, extra gloves, hats, and socks)
- Pocket knife (multi tool)
- Thermometer
- Emergency equipment
- Shovel
- Nylon cord
- Tarp or space blanket
- Whistle
- Mirror
- Avalanche transceivers
- Personal hygiene items

Camera, film

Extra set of car keys

GROUP EQUIPMENT (TOURS AND RESCUES)

- Current maps of area
- Radios
- Avalanche transceivers
- Avalanche cord
- Snow shovel
- Headlamp
- Sleeping bag
- Ensolite pad
- Tarp or tent
- Wood saw
- Waterproof/windproof matches
- Fire starter
- Survey flagging
- Stove with fuel, pot, hot drinks, hot cocoa, tea bags, instant soup
- Rescue plans
- Survival gear (extra food, extra clothing, extra bivouac protection)

TECHNICAL EQUIPMENT

- 150 feet static ½-inch rope
- Rescue 8
- Three carabiners (one locking)
- Three prusiks or ascenders
- Three 15-foot, 1-inch tubular webbing

Rescue Equipment

- 60 feet ¼-inch static rope
- 25 feet 1-inch tubular webbing
- 15 feet 4-mm perlon rope
- Figure-eight belay device (rescue type)
- Two small rescue pulleys
- Four to six locking carabiners

- Rescue mirror
- Rescue toboggan or materials to make one (waterproof tarp)
- Roll-up sled
- Avalanche transceivers
- Avalanche cord
- Snow shovel
- Headlamps (with extra batteries and a spare bulb)

EMERGENCY CACHE

- Rescue toboggan (with parts for snowmobile attachment, if necessary)
- Wool blankets and/or synthetic sleeping bag, poly pad, bivouac sack
- Quick splints
- Spine board
- KED
- Traction splinting device
- Oxygen equipment
- Master emergency care kit (see most current edition of *Outdoor Emergency Care* manual)

Avalanche Cache

- 12 to 14 probe poles
- Probe line cord
- Two large grain scoops
- Flags and/or wands
- Snow shovels
- Black marker pen
- Notebook and pencil
- Flagging
- Avalanche transceivers

AID STATIONS

Use most current edition of *Outdoor Emergency Care* manual as a guide. Additional items helpful to nordic patrollers (e.g., at race first aid stations):

- Cook stove, fuel, and pots
- Lots of water
- Hot drinks
- High-energy food sources

EMERGENCY EQUIPMENT

- Flashlight and candles
- Head lamp with extra batteries
- Tarp
- 50 to 75 feet utility cord
- Snow saw
- Three aerial flares
- Plastic whistle
- Two extra-large plastic garbage bags
- Notepad and pencil

NORDIC PATROL EMERGENCY CARE KIT

- Four or more cravats
- Three rolls non-adhering roller bandage, one each of three sizes
- One roll 2-inch adhesive tape
- Prepackaged bandage strips
- Betadine pledgets
- Vaseline gauze
- Four feet of plastic wrap (folded or rolled) or four large plastic storage bags
- One 3-inch rubberized bandage
- Two pairs disposable rubber gloves
- SAM splint, other splinting material
- Three oropharyngeal airways, one each of three sizes
- Pocket mask with one-way valve and oxygen intake nipple
- CPR mask (Microshield)
- One tube instant glucose
- Tweezers
- Bandage scissors or paramedic shears
- Sterile, non-adhesive gauze compresses, assorted sizes
- Four ABD pads or Surgipads, two large, two medium
- Single-edge razor blade or #15 scalpel blade in sterile packet
- Four safety pins: two large, two medium
- Spreader for ski pole splint
- Notebook, incident report forms, and pencil
- Flow sheet for vital signs

- Flashlight or headlamp
- Seam ripper
- Steel sewing needle
- Ankle hitch (EZ-TRAC) with 30 inches of nylon cord for pulley traction
- Hypothermia thermometer
- Matches (waterproof container)
- Firestarter

OPTIONAL

- Rewarming device for hypothermic patient (HEATPAC, chemical heating pads, hot air inhalation device)
- Pneumatic splints
- Kendrick traction device
- Urinal or pee bottle
- Blood glucose test strips
- Bottle of 10% povidone-iodine solution
- Sterile saline for irrigating
- 30-cc syringe and 18-gauge needle or catheter for irrigating
- Twelve 25-mg diphenhydramine (Benadryl) capsules
- Twenty aspirin or acetaminophen tablets, 325 mg
- Space blanket, sleeping bag
- Blister kit (moleskin)

REPAIR KIT

- #3 Phillips screwdriver (or tip used with vice grips)
- Small visegrips or leatherman's tool
- Pliers/screwdriver (slotted and Phillips)
- Knife (multi-tool type)
- Hacksaw blade
- 20 feet ⅛-inch nylon cord
- Wire, webbing, perlon rope
- 6-inch heavy steel wire
- Duct or fiber tape (20 feet nylon)
- First aid tape (in aid kit)
- Piece of soft aluminum (e.g., from a beverage can)
- 6-inch old aluminum ski pole with holes at each end (traction splint device)
- 6-inch ⅜-inch dowel (traction splint device)
- Two to four small hose clamps
- Drill bit
- Sewing awl, sewing kit
- Screws (ski bindings)
- Steel wool
- Super glue, epoxy putty
- Spare pole baskets
- Spare ski tip
- Extra bindings (75 mm preferably but also NNN or Profile parts)
- Pole repair kit (angle iron and ring clamps)

akja
A Scandinavian term for a boat-shaped toboggan made of aluminum or fiberglass, usually with two handles in front and two in back.

alpine
A term used to describe fixed-heel downhill skiing or snowboarding.

ascender
Often used as an alternative to the prusik sling, this device utilizes a spring-loaded cam with serrations or teeth that grip the rope when weight is placed on the device.

backpacking chair
A collapsible lightweight chair that nordic skiers often pack in to the backcountry.

backrest
Structural material that is placed in the toboggan so the patient can sit up and lean against it during transport.

balancing movements
One of the four basic skills in skiing and snowboarding, the act of maintaining equilibrium, or desired alignment, on the skis or snowboard. See also **edge control**; **pressure control**; **rotary movements**.

belay
To hold, stop, or control the rate of descent of a load being lowered by a rope.

belly chain
Also referred to as a "mid-chain," a secondary chain that is attached to the middle running surface of the toboggan for additional friction and braking on particularly icy or steep terrain.

bow
The front of the toboggan.

bow guard
A sturdy polyethylene covering that slips onto the bow of the toboggan and serves as a buffer between the shell and the chain brake, rocks, ice, etc.

carry handles
Hand straps or ropes attached to the front and rear of a toboggan, allowing it to be lifted and carried.

carved turn
A turn in which the skis/snowboard travel on an edge with minimal lateral slipping or skidding. A pure carved turn leaves a clean and round track in the snow. In skiing, the tails of the skis are on a forward path that follows the tips; in snowboarding, the entire edge of the snowboard passes through the same point in the snow.

chain brake
A chain that is attached to each side of the toboggan near the base of the front handles. When the toboggan is moving and the chain is down, it slides underneath the shell and creates friction against the snow surface for additional braking. When the chain is not being used the operator secures it to the crossbar.

chain guard
A sturdy piece of rubber that covers the chain brake to prevent the metal from rubbing against the surface of the toboggan.

chopsticks drill
A simulated toboggan exercise designed to improve front operator skills. Two patrollers

ski while holding two poles taped together on either side to simulate a toboggan. Rather than act as a tail rope operator, the person in back uses his/her weight to push the front operator, creating the effect of a loaded toboggan. The front operator is responsible for direction and speed.

commercial portable toboggan
A lightweight two-piece unit that is carried by the rescuers and assembled at the scene. This type of toboggan is typically used at nordic centers or in the backcountry, and is appropriate for use in all seasons because it can be set on a litter-wheel apparatus. The commercial portable toboggan is also appropriate for use in low-angle rescues because it is light and easy to transport.

control surfaces
The parts of a toboggan that are used for control, including the running surface, chain brake, and handles.

crossbar
A horizontal bar that connects the front handles on a two-handle toboggan. On a steep incline or terrain drop-off, some operators put one hand on the crossbar for better control.

cross-country skiing
A discipline of nordic skiing that is most suitable for flat or rolling terrain and that utilizes lightweight equipment. Prepared tracks are optional but not required. Categories include classic skiing, skate skiing, and light touring.

daily checklist
A complete list of procedures for checking the components and contents of a toboggan to ensure that transportation equipment and rescue packs are in good condition and are ready for service.

diagonal falling leaf
A maneuver in which the skier/snowboarder sideslips forward and backward but makes a slight overall direction change while moving down the fall line. The diagonal falling leaf is typically used in deep, heavy snow conditions. See also **falling leaf**.

diagonal stride
A cross-country skiing technique for negotiating flat terrain and hills, utilizing skis that are either waxed for grip or have waxless, patterned bases. The diagonal stride incorporates a cross-lateral movement pattern, that is, the opposing leg and arm move forward together. Striding is distinguished from walking by a dynamic weight transfer that generates forward momentum and glide.

diagonal V-skate
A cross-country skiing maneuver in which the skis are positioned in a distinct V-shaped position while the skier moves uphill and uses his/her poles. The opposing leg and arm move forward together.

double pole
A nordic maneuver in which the skier's arms are the sole source of propulsion. The skier brings both arms forward simultaneously to begin poling, with a distinct forward lean of the upper body over the poles. This results in forward movement of the body's core.

dynamic belay
A belay that is used to pull a toboggan in the backcountry or on flat terrain where a snowmobile isn't available. The belayers are positioned on different sides of the toboggan, spreading out in a fan shape for the most efficient configuration, and shifting their position when needed to maintain momentum. Together they pull on ropes that have been securely attached to the

toboggan to move it in the intended direction. See also **static belay**.

edge control
One of the four basic skills in skiing and snowboarding, the process of tilting the ski/snowboard relative to the surface of the snow and the hill to change direction or control speed. A ski/snowboard placed flat on the snow has zero degrees of edge angle. The skier/rider uses movements of the ankles, knees, and hips to adjust the edge angle. See also **balancing movements**; **pressure control**; **rotary movements**.

edge set
A purposeful edge engagement that provides a platform for the next turn. An edge set usually occurs at the end of the turn.

egress
Departing the incident scene with the loaded toboggan.

fakie
See **switch**.

falling leaf
A maneuver in which the skier/snowboarder sideslips forward and backward while traveling directly down the hill in an imaginary corridor. See also **diagonal falling leaf**.

fall line
An imaginary line that follows the steepest descent; the path a ball would take if it were released down the slope.

feathering
Pushing down or pulling up on the toboggan handles in a repetitive motion to maintain momentum and minimize drag when stopped or when running the toboggan through wet snow.

final approach
The phase just before the toboggan handler parks and secures the toboggan at the incident scene. During the final approach, the toboggan handler identifies the safest site for loading the patient as well as the best path for departing the scene. See also **initial approach**.

fins
Tracking devices attached to the bottom of the toboggan shell to help maintain the toboggan in the intended path. Also called "skegs" or "runners."

fin-set drill
An exercise designed to strengthen the operator's skills in engaging and releasing the toboggan fins. The operator pushes down on the end of the handles to apply pressure on the bow, thus releasing the fins from the snow surface and causing the back of the toboggan to come around toward the side. When the toboggan is about 90 degrees out of the fall line, the operator lifts up the handles to set the edges of the fins back into the snow. When the toboggan is back in line, the individual repeats the maneuver on the other side.

fixed-handle toboggan
See **four-handle toboggan**.

fixed-heel skiing
A term used to describe alpine skiing. The entire boot is attached to the binding of the ski. See also **free-heel skiing**.

forward
A snowboarder's direction of travel when his or her lead foot is in front, as opposed to "switch," in which the snowboarder's (traditional) rear foot is in front.

four-handle toboggan
A type of toboggan that usually consists of a bathtub-shaped shell (usually made of fiberglass or metal) and four separate metal pole-style handles that can be inserted and locked in a fixed position. When two operators are transporting a loaded four-handle toboggan, they both have a direct connection to the toboggan, which requires particularly coordinated teamwork. These toboggans are used most often in off-trail rescues and in steeper, more adverse conditions. Also called a "fixed-handle toboggan."

frame
The structural configuration of a toboggan, usually consisting of fiberglass or polyurethane and aluminum. The frame is the "skeleton" of the toboggan.

free-heel skiing
A term used to describe telemark (nordic downhill) or cross-country skiing. The heel is not fixed to a binding, thus allowing the skier to sink down, slide one foot forward, and the other foot back. See also **fixed-heel skiing**.

front handles
The control handles attached to the bow of a toboggan. The front operator changes hand positions and varies the pressure on the handles to help control the toboggan's direction and speed. Some toboggans feature a handle control for the chain brake, which enables the operator to deploy and retract the brake without stopping or reaching around.

front operator
The toboggan handler at the bow, or front, of the toboggan. This individual determines the direction and speed of the toboggan, and is responsible for communicating his or her intended actions to the tail rope/rear operator, if one is present.

garland turns
Turns involving the initiation and finishing phases, without the shaping or middle phases.

goofy
A snowboarder's natural riding stance in which the right foot is forward on the board, as opposed to "regular," in which the snowboarder's left foot is forward in a natural riding stance.

handle locks
Heavy-duty locking devices used to stabilize toboggan handles. The front handles may be placed in a hinged position for a flexible up-and-down movement during unloaded travel, or they may be secured with locking mechanisms, making them inflexible in a fixed position. This locked-handle position enables the operator to apply or reduce pressure to the body of the toboggan to enhance control.

heelside
A snowboarding stance in which the rider is on his or her heel edge. See also **toeside**.

herringbone
A diverging ski position useful for climbing hills. The skier faces uphill with ski tips pointing at an angle away from each other and walks up the hill on alternating feet while edging to avoid slipping backward.

improvised toboggan
A toboggan created from materials and equipment that the rescuers have on hand, such as skis, poles, and tarps. These are generally used when no commercial toboggans are available. They are portable, lightweight, and can be assembled and disassembled easily, which makes them ideal for longer evacuations as well as uphill and downhill transport. Improvised toboggans are typically used at nordic centers or in the backcountry.

initial approach
The toboggan handler's first size-up of the scene, beginning when he or she spots the incident or the on-scene patroller and determines the safest, most direct path to the scene. See also **final approach**.

javelin turn
A turn in which the skier lifts the inside ski and crosses its tip over the outside ski while keeping the inside ski suspended through the arc of the turn.

j turn
A maneuver in which a snowboarder turns in one direction until coming to a stop uphill.

kick turn
A maneuver to reverse or change direction in a tight or steep place. The skier lifts first one ski and turns it 180 degrees, then stands on it while doing the same with the other ski. Kick turns are useful for turning around while on the edge of a trail or to link traverses down a steep slope.

leader
In the context of a dynamic belay, the toboggan handler who is in charge of coordinating the speed and direction of the toboggan, whether it is traveling uphill or downhill. See also **mule**; **swing**; **wings**.

leaper turn
A slight hop into the air at the start of a turn followed by landing and finishing the turn on the ground. Also called a "hop turn."

litter wheel
A device used to transport a toboggan over all terrain surfaces. The toboggan is attached to a platform that is mounted on a single wheel. Also called a "rapid response wheel."

locking-handle toboggan
See **two-handle toboggan**.

long-radius turn
A turn with an arc length of more than 40 feet, and a cord (the length straight down the fall line) distance of more than 30 feet. Also may be thought of in terms of timing rather than distance. See also **medium-radius turn**; **short-radius turn**.

make light
A common expression for elevating a toboggan above the snow surface to reduce the drag or friction on the toboggan's sliding surfaces.

mechanism of injury
The way in which injuries occur; the forces that act on the body to cause damage.

medium-radius turn
A turn with an arc length of approximately 40 feet, depending on terrain, and a cord (the length straight down the fall line) distance of 30 feet. Also may be thought of in terms of timing rather than distance. See also **long-radius turns**; **short-radius turns**.

mid-chain
See **belly chain**.

moving direction change
A maneuver in which the operator changes the direction of the moving toboggan by initiating a turn to avoid an obstacle or access the best route. A moving direction change occurs when both the operator and the toboggan cross the fall line. See also **static direction change**; **transition**.

mule
In the context of a dynamic belay, an additional toboggan handler(s) who helps move the toboggan across terrain. See also **leader**; **swing**; **wings**.

nordic
Telemark (free-heel, alpine downhill) or cross-country (track and skate) skiing.

nordic downhill
Downhill skiing on free-heel equipment. The skier may perform any alpine skiing maneuver as well as telemark turns and most cross-country skiing maneuvers.

nordic track
Nordic skiing on prepared (groomed) tracks. The skier may use classic technique (traditional diagonal stride) or skating technique.

nose
The front end of the toboggan body. See also **bow**.

180-degree jump turn
Jumping up and spinning the body and the skis/snowboard around 180 degrees to face the opposite direction.

parallel turn
A turn made on corresponding ski edges with simultaneous edge release and engagement. The skis remain parallel throughout the turn, as opposed to converging or diverging.

parking
Bringing the toboggan to a controlled stop, out of the way of oncoming traffic, in order to monitor the patient, check equipment, or due to fatigue.

patient straps
Cravats or webbing used to secure the patient or equipment in the toboggan. The straps are usually attached to the inside wall of the toboggan shell.

pin
A device used to secure toboggan handles to the frame. Types of pins include lynch pins, hinge pins, captive pins, and hitch pins.

pivot slip
A transition maneuver in which a skier sideslips, then spins his/her skis 180 degrees while on the snow, then sideslips again, all while maintaining a constant speed.

portable toboggan
See **commercial portable toboggan**.

power stop
A maneuver used to bring the toboggan to an immediate stop. From a neutral stance, the front operator simultaneously flexes the ankles, knees, and hips while pivoting both feet across the fall line as he or she applies increasing pressure and edge angle to stop the toboggan.

pressure control
One of four basic skills in skiing and snowboarding, the movements that moderate forces from foot to foot, along the length of the skis or snowboard, and between the skis/snowboard and the snow. The skier/rider controls the amount of pressure applied to the skis/snowboard by repositioning the center of mass or by changing the turn radius, speed, amount of bend in the joints, edge angle, or weight distribution. See also **balancing movements**; **edge control**; **rotary movements**.

prusik knot
A type of knot that allows a rope to be securely gripped with considerable friction by a smaller-diameter sling or rope, as long as the sling remains weighted. When the sling is unweighted, the prusik can be released quickly with the thumb and slid along the rope to the next desired location, where it automatically tightens when loaded.

pulley
A device consisting of a wheel with a grooved rim in which a rope or chain is pulled to change the direction of the pull and thereby lift a load. A pulley provides a mechanical advantage when raising or lowering a weight.

quick checklist
An abbreviated list of procedures for inspecting the toboggan's components to ensure that everything is in good working order.

railroad track turn
A maneuver in which the skier starts in the fall line in a fairly wide parallel stance and makes large sidecut turns in the fall line by tipping both legs at the same time. This engages the edges and allows the skis to turn.

rapid response wheel
See **litter wheel**.

rear handles
The control handles at the stern of a four-handle/fixed-handle toboggan. The rear operator changes hand positions and varies pressure on the handles to help the front operator control the toboggan's direction and speed. These may be hinged or fixed for desired application.

rear operator
A term used to refer to the individual who controls the rear handles on a four-handle/fixed-handle toboggan. Because the rear operator also grasps fixed handles, the two toboggan handlers can maneuver the equipment as a team. See also **tail rope operator**.

recovery position
The preferred body position for an unconscious patient with no suspected spine injury. The patient lies on one side with the opposite knee flexed and the head cushioned on the hand.

regular
A snowboarder's stance in which the left foot is forward on the board. A regular rider with the left foot forward is riding "forward"; a regular rider with the right foot forward is riding "switch" (or "fakie"). See also **goofy**.

rescue pack
A pack of emergency response items most commonly secured in a toboggan that is sent to an incident scene. Refer to *Outdoor Emergency Care* (most current edition) and local protocols for a list of suggested contents. Considerations for nordic patrollers are provided in the appendix of *Outdoor Emergency Transportation*.

rotary movements
One of the four basic skills in skiing and snowboarding, the movements that increase, limit, or decrease rotation of the skis. The rotational motion of a body about an axis (including the movement of the body's limbs about their axes). Slowing or stopping body rotation initiated in the direction of the intended turn results in a turning effort that is transferred to the skis or snowboard. Skiers/boarders commonly use shoulders and hips, either separately or together, to develop the turning effort. See also **balancing movements**; **edge control**; **pressure control**.

route selection
The process of determining which route to take when transporting a loaded or unloaded toboggan on downhill slopes or backcountry trails. Considerations include the terrain, weather, snow conditions, incident location, distance to the aid room or other destination, skier/snowboarder traffic, nature of the patient's injury or illness, and even the type of toboggan being used.

runners
See **fins**.

running surfaces
The parts of a toboggan that contact and slide on the snow surface.

scene size-up
A quick assessment of the scene and the surroundings made to provide information

about its safety and the mechanism of injury or the nature of the illness. The size-up is conducted before the patroller enters the scene and begins patient care.

shell
The main body of the toboggan; the hard "container" that holds and supports the patient. May be made of plastic, metal, or fiberglass material.

short-radius turn
A turn with an arc length of approximately 15 to 30 feet, depending on terrain, and a cord (the length straight down the fall line) distance of 15 feet. Also may be thought of in terms of timing rather than distance. See also **long-radius turn**; **medium-radius turn**.

sideslip
A method of moving down the hill with the skis or snowboard perpendicular (across) to the fall line.

sidestep
A method of moving up the hill in which the skier steps up the hill one ski at a time with the skis across the fall line.

skating
A method of propulsion in which the skier presses from foot to foot while keeping the skis in diverging position. The inside edge of the weighted ski is engaged as the skier moves forward. In a snowboarding context, the rider moves the board forward by pushing with the free foot.

skegs
See **fins**.

skidding
A combination of sliding and slipping as the skis/snowboard move forward through a turn. This occurs on a ski/snowboard that is not carving.

skid plates
Metal pieces bolted to the bottom of the toboggan shell to minimize drag on flat terrain and provide abrasion resistance to rocks, ice, etc.

skins
Strips of material affixed to the bottoms of skis for uphill purchase. Skins are made of everything from laminated mohair to nylon, plastic, or metal. Depending on the design, they may incorporate an adhesive surface or a strap-on device that attaches to the skis.

snow fluke
A simple metal plate used as an anchor ("deadman") in the snow.

snow guard
A device made of protective material that can be attached on the snowmobile tow bar and the front of the toboggan to help protect the patient and other contents from the snow spray of the snowmobile. Also called a "spray guard."

spiess turn
A tight, quick hop-turn, starting and finishing across the fall line (i.e., a 180-degree hop to an edge set).

static belay
Lowering or raising a person or toboggan on a steep slope using rope tied to an anchor or belay device that does not move (a climber's body, a tree, or whatever is available and sufficiently sturdy). The belayers control the rope to avoid slack between the belay and toboggan. See also **dynamic belay**.

static direction change
A maneuver in which the operator stops the toboggan and makes either a stepping wedge turn or a kick turn to change direction. The operator resumes a running position in the handles and pivots the toboggan

in the new direction to continue the descent. (If there are two operators, they do not perform the static direction change at the same time.) See also **moving direction change**; **transition**.

stem turn
Initiating a turn by stemming the ski. The skier creates a platform with the downhill ski, then steps, slides, or places the uphill ski into the new turn. After stemming, the skier transfers weight to that ski to start the turn and then brings the other ski to a parallel position.

stepping wedge turn
Performing a wedge turn while stepping rather than sliding the ski into the wedge.

step turn
A turn in which the skier maintains the downhill ski as a platform and steps the uphill ski into a converging, diverging, or parallel position.

stern
The rear of the toboggan.

swing
In the context of a dynamic belay, generally a team of three patrollers who are positioned at the rear or side of the toboggan and who change positions depending on whether the leader wishes to maintain a fall-line direction or a traverse. These individuals can also act as a "slingshot" to assist in uphill transportation. See also **leader**; **mule**; **wings**.

switch
A snowboarding stance in which the rider leads with the tail without turning the body to face the direction of travel. Also called "fakie."

tail rope
A length of rope that attaches to the rear of the toboggan, allowing for the tail rope operator to perform back-up braking and control slippage.

tail rope operator
The toboggan handler at the stern, or back, of a two-handle/locking-handle toboggan. This individual maneuvers the tail rope to support the front operator's efforts to control the direction and speed of the toboggan. The tail rope operator helps the front operator pull the toboggan through flats, wet snow conditions, and on uphill stretches as needed. Also called the "rear operator."

telemark turn
A turn on telemark skis in which the skier's feet are separated fore and aft, with the entire front foot and the ball of the rear foot pressuring the ski. The feet transition from one telemark position to the other. This is the quintessential nordic downhill maneuver.

terrain level of difficulty symbols
Graphic icons used to denote the degree of challenge of specific terrain at a given area:
● = green circle, easiest
■ = blue square, more difficult
◆ = black diamond, most difficult
◆◆ = double black diamond, expert
● = orange oval, terrain park

terrain-drop maneuver
A maneuver used to lower a toboggan over a dramatic, rapid change in the steepness of the terrain. This attempt generally requires the assistance of a tail rope or rear operator to help control speed through the rapid drop. An example might be descending over a small cornice, off a patient loading platform, or over the side of a cat track. Initially the front operator's handles may be well above his or her head until the toboggan falls in behind the individual in the fall line.

thousand-step turns
Making constant "baby steps" throughout a turn to strengthen balance and stance and to practice releasing and engaging edges.

toboggan
A large, sturdy sled designed to convey a person or equipment down mountain slopes and across backcountry trails. In the patrolling environment, a toboggan is the primary means of outdoor emergency transportation across icy, snow-covered surfaces. The four types of toboggans described in this manual are (1) two-handle (locking-handle) toboggans, (2) four-handle (fixed-handle) toboggans, (3) commercial portable toboggans, and (4) improvised toboggans.

tobogganeer
A colloquial term that may be used to describe a toboggan operator.

toeside
A snowboard stance in which the rider is on his or her toe edge. See also **heelside**.

transition
To end one turn and begin another. The toboggan operator may or may not turn the toboggan while performing a transition. See also **moving direction change**.

transportation
The process of moving a toboggan laden with an injured or ill person from the slopes or backcountry trails to the next level of care.

traverse
A directional maneuver in which the skier or snowboarder moves across the slope, that is, the skis/snowboard move perpendicular to the fall line. Generally a traverse is used to control speed.

two-handle toboggan
A toboggan consisting of a shell (usually made of fiberglass or Kevlar material); attached metal handles; and a tail rope. The front handles may be placed in a hinged position for a flexible up-and-down movement during unloaded travel, or they may be secured with locking mechanisms, making them inflexible in a fixed position. This locked-handle position enables the operator to apply or reduce pressure to the body of the toboggan to enhance control. The tail rope attached to the rear of the toboggan allows for the tail rope operator to perform back-up braking and control slippage. Also called a "locking-handle toboggan."

V-1
A nordic skating maneuver in which the skier double poles on one side of his or her body. The skier positions the poles asymmetrically, and times the pole push to coincide with a weight transfer to the skating ski. This is the most common skating maneuver for flats and hills.

V-2
A nordic skating maneuver in which the skier double poles with each skate. Unlike the V-1, in the V-2 the skier positions the poles symmetrically, as in double poling, and begins the pole push after transferring weight to the ski. This is a high-speed maneuver for flats, slight uphills, or sprints.

V-2 alternate
A nordic skating maneuver with the double-pole timing of the V-2 but with the skier poling on one side only. The rhythm is "skate, skate, pole...." The skier plants and pushes the poles for a double pole on one skate, and begins to recover the poles on the other skate. This is a high-speed maneuver for flats and downhills.

wedge
A position in which the skis are converging so that the tips are closer together than the tails, and the skis are on opposing edges.

wedge turn
A turn with the skis in a wedge (converging) position. Generally used to control speed.

wheelbarrow maneuver
An emergency recovery maneuver for an out-of-control toboggan. If the toboggan is sliding around in front of the front operator, he or she drives the toboggan into an across-hill position (as if operating a wheelbarrow), and drives the toboggan with the downhill fin until it is across the hill and in a safe position to stop. The operator then reestablishes the appropriate hand positions on the toboggan and continues downhill.

wings
In the context of a dynamic belay, generally a team of four patrollers who function as "mules," that is, they are located on either side of the toboggan or all on one side of the toboggan, depending on the terrain and the direction of travel. See also **leader**; **mule**; **swing**.

z-pulley
A 3:1 mechanical system used to raise a loaded or unloaded toboggan.

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