



LEADER'S REFERENCE BOOK



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Eighteenth Edition, Revised 2015



recycled paper



LEADER'S REFERENCE BOOK

Leadership Training Program

Eighteenth Edition, Revised February 2015
Leadership Training Committee
Angeles Chapter, Sierra Club

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Preface

Welcome to the *Leader's Reference Book* (LRB), a guide for outings leaders and leadership candidates of the Angeles Chapter of the Sierra Club. As an integral part of the Leadership Training Program of the chapter's Leadership Training Committee, the LRB describes the program, including graduation requirements. In addition, this volume stands alongside a host of literature about outdoor recreation, mountaineering, natural science, conservation, first aid, and leadership. The LRB provides essential information about organizing and managing outings, Sierra Club policies and procedures, and applying various outdoor skills to Sierra Club activities. The LRB aims to help leaders conduct safe, enjoyable, and environmentally inspired outings—the foundation goals of Angeles Chapter outings.

Leaders bring a wealth of experience, education, and judgment to the outings they lead. As expertise grows, a leader's knowledge will far exceed the contents of this book. The LRB supplements, but does not replace, other literature that may be of value and interest to leaders.

Safety is always the first priority on any outing. As a result, the chapters on navigation, first aid, and snow and rock travel describe certain fundamental skills leaders must have in order to avoid problems and cope with emergencies. Time-tested techniques that require a minimum of equipment are emphasized to provide a margin of safety.

Whether already rated or provisional, leaders may find the material in chapters 4 and 6 especially useful in organizing and conducting an outing. Candidates for leadership ratings can use chapters 6, 7, and 8 and other relevant literature, along with information provided in the Leadership Training Program (LTP) seminar and practice gained at LTP outings, to prepare for checkout evaluations. Candidates must be proficient in the techniques appropriate for the outings they lead and must understand the strengths and limitations of any techniques used. While the checkout forms define the minimum skills required for various ratings, leaders and candidates alike are encouraged to advance their knowledge well beyond these requirements.

As ambassadors for the Sierra Club, leaders can enhance participants' enjoyment and appreciation of the outdoors. Technical proficiency, while essential, does not qualify the candidate for a leadership rating on its own. When evaluating candidates, examiners look for judgment, breadth and depth of knowledge, interpersonal skills, and practical expertise.

Thus, the *Leader's Reference Book* is a resource that helps leaders plan and manage safe, successful outings. Ongoing education about the natural environment, leadership skills, and wilderness travel is an essential component of leadership that will enhance safety and enjoyment for everyone.

Acknowledgements

The first edition of the LRB was compiled by Duane McRuer and Bill Houze in 1973. Contributors to succeeding editions include How Bailey, Wynne Benti, Bill Bradley, Maureen Cates, Bruce Collier, Don Creighton, Randall Danta, Diana Dee, Jim Erb, Joy Goebel, Bob Hicks, Ron Jones, Bob Kanne, Dennis Lantz, Gene Mauk, Duane McRuer, Byron Myhre M.D., Bill Oliver, Gene Olsen, Horace Ory, Dan Richter, Frank Riseley M.D., Bill T. Russell, Chuck Sal, Steve Schuster, Chuck Stein, Les Stockton, Larry Tidball, Barbee Tidball, and Chuck Youngberg.

The fifteenth edition, which differs significantly from the fourteenth, was inspired by the efforts of LTC Chair Dan Richter. The book has been partly reorganized, major additions have been made to the leadership and trip planning components of chapters 4 and 6, an appendix on UTM coordinates has been added, all drawings have been revised and many new ones created by Tom Bowman in Appendix B and elsewhere, many sidebars have been added, forms have been updated in Appendix C, changes have been made to every chapter, and the whole book has been reformatted by Tom Bowman. Tina Bowman edited and reorganized the text. The editors wish to thank the many who helped in revising this edition: Ron Campbell, Craig Connally, Don Creighton, Harry Freimanis, Donna Hryshchyn, Ann Kramer, Doug Mantle, Duane McRuer, Patrick McKusky, Bill Oliver, Dan Richter, Virgil Shields, Nile Sorenson, Steve Schuster, Larry Tidball, and Phil Wheeler.

The sixteenth edition has more material to aid candidates as they become new leaders with provisional lead pointers, new policies, and more information about the Provisional Lead Committee for M and E candidates in chapter 1 and an outing planning checklist in chapter 4. Information about the National Leader Standards, which became effective for the Angeles Chapter in 2006, and the effect of those standards on Angeles leaders has been added to chapter 2, and other updates have been made throughout the text. Brian (Wolf) Leverich, the LTC Administration Chair, reviewed chapter 1 to ensure that it is as clear and helpful to candidates as possible. Navigation Co-chairs Harry Freimanis and Phil Wheeler extensively revised chapter 6. Ron Hudson, the Rock Chair, made changes to chapter 7. Appendix C has the most recent version of forms, adding in several not included in the LRB before. Darrick Danta caught various slips in the fifteenth edition, which have been corrected. Tina Bowman edited the text; Tom Bowman revised the design and artwork.

The seventeenth edition includes general updates; information about the recently established M-rock and M-snow ratings; revisions to the rock and snow chapters by Ron Hudson and Nile Sorenson, the Rock and Snow Chairs respectively; and a revision of Chapter 6 by the outgoing Navigation Chair, Harry Freimanis, and the incoming Navigation Chair, Bob Myers. Ron Campbell and Jane Simpson are largely responsible for the M rating sidebar.

Since the seventeenth edition, the Angeles Chapter has dropped the normal printed *Schedule of Activities*; the Outdoor Activities Registration System (OARS), an on-line tool developed by the National Sierra Club, replaces it. Similarly, the *Southern Sierran* newspaper is now primarily an Angeles Chapter on-line publication. New E-rock and E-snow ratings have been added. The rock checkouts have been revised, and all chapters carefully reviewed and revised to be as current as possible. The technical chairs—Steve Schuster for first aid, Bob Myers for navigation, Patrick McKusky and Ron Hudson for rock, and Nile Sorenson for snow—have revised the technical chapters and associated bibliographic entries, sometimes extensively. Special thanks go to Phil Wheeler and Tina Bowman for looking over various chapters with their eagle eyes and extensive Sierra Club expertise. Edd Ruskowitz did the formatting for this edition.

Editions and editors:

First	1973	McRuer	Eleventh	1986	Danta
Second	1974	McRuer	Twelfth	1987	Danta
Third	1974-75	McRuer	Thirteenth	1991	Danta
Fourth	1975	McRuer	Fourteenth	1997	Danta
Fifth	1977	Youngberg	Fifteenth	2002	Bowman and Bowman
Sixth	1979	Youngberg	Sixteenth	2006	Bowman and Bowman
Seventh	1982	Russell	Seventeenth	2009	Bowman and Bowman
Eighth	1982	Russell	Eighteenth	2013	Bowman and Ruskowitz
Ninth	1983	Russell	Eighteenth, rev. ed.	2015	Bowman and Ruskowitz
Tenth	1984	Russell			

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Leadership Training Program

The Leadership Training Program (LTP) consists of an introductory one-day seminar and a series of practical studies, field exercises, and evaluations conducted under the jurisdiction of the Leadership Training Committee (LTC), which prepares candidates for leadership of Angeles Chapter outings. Successful candidates are certified by the Chapter Safety Committee at one of nine leadership levels designated as O-1, O-2, I, M-rock, M-snow, M, E-rock, E-snow, and E.

O-level outings are limited to Class 1 terrain (walking/hiking) and include nature walks, conditioning hikes, day hikes, and overnight backpacks on trails that require only minimal navigation skills. O-level outings comprise the majority of Angeles Chapter activities. Leaders rated at the O-1 level may lead day hikes and car camps. O-2 level leaders may lead backpacks.

I-level outings require navigation skills for significant off-trail travel, which may include Class 2 terrain (occasional use of the hands for balance).

M-level outings include skills for leading Class 3 rock climbs (frequent use of hands for upward progress) and moderate snow climbs, which may require the use of an ice axe, as well as navigation skills. M-rock leaders may not lead moderate snow climbs; M-snow leaders may not lead class 3 rock climbs.

E-level outings add skills for leading Class 4 rock (consistent use of the hands for upward progress and more exposure to falling) with a rope, anchors, protection, and belays; steep snow climbs that require the use of ice axe and crampons and may require roped travel and belays; and advanced navigation, which may require the use of an altimeter.

Note that a few Angeles Chapter entities offer outings rated T for technical. These outings require specialized skills, and leaders of these trips are approved by the entity to lead the technical aspect of the outing in addition to having an appropriate leader rating granted by the chapter. Examples include sailing and ski mountaineering.

PREREQUISITES

Prior to becoming provisional leaders, LTP candidates need to meet these requirements as well as those that are part of the LTP:

1. Current Sierra Club membership
2. Participation in five Sierra Club trips
3. Backpacking skill (for categories O-2, I, M, and E)
4. Mountaineering skill equivalent to that expected of a Sierra Peaks Section Mountaineers List member (for categories M and E).

Current Sierra Club Membership

Information on Sierra Club membership may be obtained by contacting

Sierra Club National Office
85 Second St., 2nd Floor
San Francisco, CA 94105-3441
(415) 977-5500
Internet: <http://sierraclub.org>

Angeles Chapter Headquarters
3435 Wilshire Blvd., Suite 660
Los Angeles, CA 90010-1904
(213) 387-4287
(213) 387-5383 (fax)
Internet: <http://angeles2.sierraclub.org>

Leadership candidates must maintain their Sierra Club membership. Although most of the Angeles Chapter's outings are open to all qualified participants from the general public, only club members may lead outings.

Participant Experience Trips

Prior to leading provisional outings, candidates must have participated on five Sierra Club outings at the O level or higher within the previous ten years. These experiences provide candidates the opportunity to observe the mechanics of outings leadership and to become familiar with Chapter outings and procedures.

Participation on trips with various leaders can help candidates to develop a sense of their own leadership skills and style, possibly cultivate a relationship with a leader mentor, and provide introductions to those who may serve as assistant leaders and evaluators of the provisional leaders. As a result, a maximum of two regularly occurring conditioning hikes or the like may be counted toward the experience trip requirement. Activities such as lectures, picnics, or workshops do not qualify, nor do LTC checkouts and similar training outings.

Either the Wilderness Travel Course (WTC) snow camp or Joshua Tree weekend qualifies (but not both and neither the conditioning hike nor the snow travel day). O-2 level candidates should have at least one Sierra Club overnight backpack experience trip.

For I candidates at least three of the five outings must be at or above the I level, and at least one of the outings must include wilderness travel with overnight backpacking. For the M and E levels at least three of the outings must include wilderness travel with overnight backpacking.

M and E candidates also must have participated on at

least five experience climbs that are solidly M or E rated; this experience does not have to be gained entirely on Angeles Chapter outings. At the discretion of the Provisional Lead Committee, more mountaineering experience may be required before M- and E-level candidates are granted provisional status.

The LTC Chair may grant equivalent credit for trips other than scheduled Angeles Chapter Sierra Club trips. Those asking for such credit should attach a statement to their LTP enrollment application explaining the situation.

ENROLLMENT

Application

An application for enrollment in the LTP can be obtained at http://angeles2.sierraclub.org/ltc_leadership_seminar or by mailing a request, together with a self-addressed stamped envelope (sase), to the LTC Registrar. At least two weeks prior to the seminar, the completed application must be mailed with the registration fee to the registrar.

Registration Fee

The registration fee for the LTP is \$25 in Spring of 2015, which includes a copy of the *Leader's Reference Book* (LRB). The fee also includes a leader recognition patch identifying the leadership level, which is issued to successful candidates by the Safety Committee with a leader's certificate. A discounted course fee is offered to applicants who do not wish to receive a paper copy of the LRB.

Paper copies of the LRB, however, will no longer be available in the future. Leaders, candidates and seminar participants can find the current version at http://angeles2.sierraclub.org/ltc_the_lrb.

Pre-Seminar Examination

After receiving the application and registration fee, the LTC Registrar will mail the applicant a copy of the LRB and pre-seminar examination, designed to assure that applicants have a minimum level of familiarity with information contained in the LRB. As a condition of admittance to the seminar, the applicant must present the completed examination to the registrar at the seminar.

Seminar

The LTC presents two one-day Leadership Training Seminars each year, one in April and the other in October.

Candidates begin the LTP by attending one of these seminars. The location and dates of these seminars may be found on the LTC home page at http://angeles2.sierraclub.org/get_outdoors/becoming_leader. The LTC home page is a valuable tool for leadership candidates. The LRB can also be found for download in pdf format at the LTC home page.

LTP Calendar of Events

The LTC maintains a Calendar of Events, listing dates for LTP practical studies and field exercises that candidates may use to schedule and complete their requirements for leader certification. At the seminar candidates will receive a current copy of this calendar, and they may see updates of the calendar on the LTC home page.

Leadership Levels

At the seminar registration, applicants will identify the leadership level that they are seeking: O-1, O-2, I, M-rock, M-snow, M, E-rock, E-snow, or E. The choice will depend on the level of outings one intends to lead. If qualified, one can begin the LTP as an E-level candidate; there is no requirement to obtain certification in succession. Candidates may, however, obtain progressive certifications without repeating similar requirements and without additional fees (but receiving only one patch); one simply completes those unique requirements of the next level. Once certified at a specific level, leaders may conduct outings at or below that level for a sponsoring group, section, or committee. Additional patches may be purchased from the Safety Committee for \$3 each.

Updates to the Leader's Reference Book

The *Leader's Reference Book* is available to rated leaders and previous LTP enrollees online at http://angeles2.sierraclub.org/ltc_the_lrb. Previous editions are archived at the LTC web site.

COMPLETION REQUIREMENTS

The LTC Administrative Chair maintains a progress file for each candidate with documentation of completed requirements. Upon the candidate's successful completion of all requirements, the Administrative Chair forwards the file to the Safety Committee with a recommendation for certification.

Requirements	O-1 & O-2	I	M-rock	M-snow	M	E-rock	E-snow	E
Seminars (Ch. 1)	One day	One day	One day	One day	One day	One day	One day	One day
First Aid (Ch. 5)								
CPR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard First Aid	Yes							
Wilderness First Aid		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Environmental Awareness (Ch. 1)		Two Days	Two Days	Two Days	Two Days	Two Days	Two Days	Two Days
Technical Checkouts								
Navigation (Ch. 6)		I/M Nav.	I/M Nav.	I/M Nav.	I/M Nav.	E Nav.	E Nav.	E Nav.
Rock (Ch. 7)			M-rock		M-rock	E-rock		E-rock
Snow (Ch. 8)				M-snow	M-snow		E-snow	E-snow
Final Exam			Yes	Yes	Yes	Yes	Yes	Yes
Approval by Provisional Lead Committee			Yes	Yes	Yes	Yes	Yes	Yes
Leader Provisional Trips	One ¹	Two	Two	Two ^{2,3}	Two ^{2,3}	Two ^{2,3}	Two ^{2,3}	Three ^{2,3}

¹ For the O-1 level, the provisional outing is a day hike or car camp. For the O-2, an overnight backpack.

² All E outings and any M outings using rope and/or ice axe must be approved by the national club's Mountaineering Oversight Committee. See page 9 for more information.

³ See M-Rock and M-Snow requirements for Provisional Outings on page 9, the M Rating sidebar on page 6, and the E Rating sidebar on page 7 for more information.

Figure 1-1. Summary of LTP graduation requirements

Summary of Graduation Requirements

Graduation from the LTP requires that the enrollee complete the steps identified in Figure 1-1 below. Detailed requirements for each step are given in the LRB chapter indicated. The LTC may change these completion requirements, including the specifics of the technical checkouts, at any time and may require candidates to comply with the new changes.

First Aid

All candidates must have a current certification for an American Heart Association, American Red Cross, or equivalent one-person adult (or higher) cardiopulmonary resuscitation (CPR) course. O-level candidates need current certification from a four-hour minimum American Red Cross or equivalent standard first aid course. Candidates at the I, M, and E levels need to complete a certified twenty-four hour (minimum) wilderness first aid course. For Sierra Club and LTP purposes first aid, wilderness first aid, and CPR are considered current for four years, whatever the card issued says (most cards will indicate a one-, two- or three-year duration). If a candidate's certification for CPR, standard first aid, or wilderness first aid expires before completion of the LTP, including provisional leads, the candidate will need to repeat the requirement to be current with certification. If an I or M leader chooses to become an M or E, he or she must have current certification in wilderness first aid (twenty-four hour minimum course) and CPR or will need to repeat these requirements.

Environmental Awareness

Angeles Chapter leaders may conduct outings in such diverse ecological areas as the Sierra Nevada, the Mojave Desert, the Angeles National Forest, Griffith Park, or Malibu beach. The environmental awareness training requirement for I, M, and E candidates is intended to enrich the leader's knowledge and appreciation of the natural environment. As models for their trip participants, leaders should have a general awareness of the natural environment in which they travel and practice "leave no trace" environmental ethics.

Candidates should choose environmental field study programs that are specific to the area in which they intend to lead outings. The Angeles Chapter's Natural Science Section conducts a Nature Knowledge Workshop each year in late spring and several Field Ecology Workshops throughout the year. These workshops are listed on the Natural Science Section's home page at <http://sierraclub.org/angeles/natural-science>. In addition, college, university, or university extension natural science field study courses are excellent

sources for specific education about our diverse California ecology. For example, community colleges often offer two-day field study courses, such as Geology and Natural History of the Eastern Sierra and A Field Study of Desert Birds, which provide appropriate environmental awareness training. "Leave No Trace" training may be used to fulfill part of the environmental awareness requirement. The LTC Chair and the LTC Administrative Chair are authorized to approve the method of satisfying this requirement. Candidates must provide the Administrative Chair with documentation identifying a minimum of fourteen hours of environmental awareness training.

Technical Checkouts

The LTC chair appoints a Technical Chair for each of the three disciplines of navigation, rock climbing, and snow climbing. The Technical Chairs are members of the LTC and are responsible for the technical requirements and checkouts for each leadership level in their discipline. The Technical Chairs schedule and conduct practice and checkout outings, which are listed in the online LTC Calendar of Events. These checkout requirements are detailed in the relevant chapters of this book.

The LTC Chair and the respective Technical Chairs appoint examiners who are authorized to checkout candidates for the applicable technical requirements for each leadership level. All of the examiners are authorized for the M level with a more restricted set usually for the E level. With prior approval of the Technical Chair, examiners have the authority to perform a checkout at times or places that they deem proper, and they may also grant a checkout based upon direct personal knowledge of the enrollee's skill. The preferred method of obtaining checkout, however, is for enrollees to attend a scheduled checkout sponsored by the LTC or some other group, section, or committee. The Technical Chair has the final approval of an LTC checkout.

Although candidates may apply for and attend as many practice outings as they wish before attempting a checkout, they may not practice and attempt a checkout on the same day. Candidates who fail a checkout will be assigned to a different examiner if at all possible at the next checkout they attend. Candidates who fail a technical checkout two times in one year must wait one year or have permission from the Technical Chair before attempting the same checkout again so that they have time to learn and practice the appropriate skills. This two-time in one year limitation does not apply to navigation checkouts.

Technical checkouts are designed to do more than just test skills. In each of the checkout exercises, examiners will also be assessing the candidate's knowledge of the material, preparation and execution, ability, judgment, and

leadership qualities. Candidates must not only perform the exercises at an appropriate skill level, but also must demonstrate an understanding of how they work and why they are important, as well as an ability to communicate those concepts to others.

Upon successful completion of a technical checkout, the examiner will notify the Technical Chair. The Technical Chair will notify the Administrative Chair that the candidate has completed the requirement at a specified leadership level. The examiner is also charged with giving an enrollee notice in writing or by e-mail of satisfactory completion, which should be kept as insurance against some breakdown in internal LTC communications.

Final Examination

Candidates for the M and E levels must complete a final written examination before applying to the Provisional Lead Committee to lead provisional outings. The exam, which is available at the LTC web site, is completed at home and submitted to a designated LTC member for evaluation. If the exam is satisfactory, the evaluator will return the exam with comments to the candidate and notify the Administrative Chair that the candidate has successfully completed the exam.

Provisional Lead Committee

When M- and E-level candidates have completed the requirements to become provisional leaders, including the final exam, they must send the LTC Chair their snow- and rock-climbing resume, preferably attached to an e-mail. The resume should detail M and E climbs (Angeles Chapter outings or their equivalent) of the last three years, as well as list Sierra Club number, contact information, and dates for passing the technical checkouts or completing other requirements such as wilderness first aid. For the climbs, give dates, leaders, technical difficulty level, and route information if known. The Provisional Lead Committee—the LTC Chair, Vice-chair, Rock Chair, Snow Chair, Navigation Chair, and Administrative Chair—will approve or disapprove the potential leader to lead provisional trips based on what it considers sufficient experience in the kinds of trips that Angeles Chapter M and

E leaders typically lead. A candidate may be asked to gain more experience before proceeding to the provisional stage. Completion of checkouts, provisional leads, and tests and the taking of required courses are not an indication of automatic submission for certification to the Safety Committee. Because becoming an Angeles Chapter leader is a privilege, not a right, the LTC reserves the right not to approve a potential leader if it deems that the candidate lacks sufficient leadership qualities such as judgment, character, and the ability to work with people.

The Provisional Lead Committee also reviews M- and E-level provisional outings and evaluates assistant leaders.

Provisional Outings

Once a candidate has satisfactorily completed all of the requirements aside from provisional outings, the Administrative Chair will notify the Safety Committee, which will recognize the candidate as a provisional leader. The candidate may then submit proposals for provisional outings.

Conducted in accord with the chapter's Rules of Conduct and Safety Policy, Angeles Chapter outings are sponsored by specific groups, sections, and committees (GSC). Having completed their five prerequisite outings if not more, provisional leaders will be somewhat familiar with at least one of the GSCs, and some candidates may have already enjoyed long membership in one or more of them. At any rate, provisional leaders need to identify with

ABBREVIATIONS

A number of abbreviations are used in the *Leader's Reference Book*, many of them familiar and some probably not so familiar to prospective leaders.

ExCom	Executive Committee of the Angeles Chapter
GPS	Global Positioning System
GSC	Group, Section, or Committee of the Angeles Chapter
ICO	Inner City Outings
LOSC	Local Outings Support Committee (National Sierra Club)
LRB	<i>Leader's Reference Book</i>
LTC	Leadership Training Committee
LTP	Leadership Training Program
MOC	Mountaineering Oversight Committee (National Sierra Club)
OARS	Outdoor Activity Registration System (on-line outings and activities list)
OLT 101	Outings Leader Training 101
OLT 201	Outings Leader Training 201
OMC	Outings Management Committee
USGS	United States Geological Survey
UTM	Universal Transverse Mercator (mapping coordinate system)
WTC	Wilderness Travel Course or Wilderness Training Committee

or become members of a GSC that sponsors the type of outings at the leadership level that they intend to lead. The outings chair of a GSC, moreover, can help provisional leaders choose appropriate trips, seasons in which to conduct them, and assistant leaders.

I- and M-level provisional outings should be planned so that they are representative of the higher end of a leadership level. Because outings that barely meet the minimum standard do not provide leaders with adequate opportunities to test their leadership potential nor allow for a thorough assessment of the provisional leaders by their evaluators, such outings will not be accepted. If provisional leaders have any doubts about their proposed outings' meeting the criteria for their level of leadership, the LTC Chair and Angeles Chapter Safety Committee Chair can review and approve the outings. I trips (and M and E trips for provisional leaders who are not already rated I or M) must include a significant amount of off-trail wilderness

travel and require significant navigation skill. Hiking a trail to within a few hundred feet of a visible peak and then walking to the summit do not meet the test of navigating and route finding.

Once provisional leaders have planned their outings and obtained an assistant leader to evaluate them, they submit their outing proposal, identified as provisional, to the outings chair of the sponsoring GSC. Upon approval of the trips, the outings chair then submits the outings for publication in OARS (Outdoor Activity Registration System), the *Southern Sierran*, newsletter of the GSC, and/or GSC web site or list server. The LTC Provisional Lead Committee gives final approval for M- and E-level provisional leads and evaluating assistant leaders. Many M- and all E-level outings also require approval by the Mountaineering Oversight Committee (see page 9 under Restricted Mountaineering Outings).

Provisional leaders must conduct their outings with

THE M RATINGS

The Angeles Chapter now allows leaders at the M level to be certified in both rock and snow, rock only, or snow only:

- M rating: Qualified to lead all M-level outings—rock, snow, or rock and snow combined
- M-rock rating: Qualified to lead all M-rated outings where M-level rock travel (but no M-level snow travel) is required
- M-snow rating: Qualified to lead all M-rated outings where M-level snow travel (but no M-level rock travel) is required.

Training and certification for the new M-rock [snow] rating are based on current standards for the M-rating, including

- Be an I-rated leader (or see below for new leader candidates and O-rated leaders)
- Pass an M rock or snow technical checkout
- Be current in wilderness first aid and CPR
- Complete an M-level written exam
- Provide evidence in a climbing resume of experience on an appropriate number of rock [snow] experience trips at Class 3 or higher to reach provisional status, as assessed by the Provisional Lead Committee of LTC
- For M-rock: lead a provisional outing including at least 100 feet of 3rd class rock climbing
- For M-snow: lead a provisional outing consisting of at least 400 feet of elevation gain on a snow slope between 25 and 35 degrees and requiring the use of an ice axe.

If a leader candidate for M-rock or M-snow is not a rated leader or is an O-rated leader, these are the additional requirements:

- Complete two days of environmental awareness training
- Pass the I/M-level navigation check-off
- Lead a second provisional outing at the I- or M-level that demonstrates navigation, and one for M-rock or M-snow (see above); both provisional outings should include a significant amount of off-trail wilderness travel that requires I/M level navigation (one provisional lead must be a backpack).

The requirements for the full M (both rock and snow) remain the same, requiring two M-level provisional outings, one on rock and one on snow. For more information, see the M Rating FAQ (frequently asked questions) document at the LTC web site: http://angeles2.sierraclub.org/ltc_become_a_leader.

THE E RATINGS

E rating: Qualified to lead all currently-defined E-level outings—rock, snow, or rock and snow combined

E-rock rating: Qualified to lead all currently-defined E-rated outings where E-level rock travel (but no E-level snow travel) is required

E-snow rating: Qualified to lead all currently-defined E-rated outings where E-level snow travel (but no E-level rock travel) is required

The requirements for the full E (both rock and snow) remain the same. Training and certification for the E-rock or E-snow rating¹ are based on the following standards:

- Be a full M-rated leader if seeking an E-rock or E-snow rating (M rating not required for full E rating)
- Pass the applicable E-technical checkout (rock for E-rock or snow for E-snow) and the E-level navigation checkout
- Provide evidence in a climbing resume of experience on an appropriate number of rock/snow experience trips at Class 4 or higher to reach provisional status, as assessed by the Provisional Lead Committee of LTC
- For E-rock: lead two provisional outings including at least 200 feet of 4th class rock climbing that requires the use of ropes and belays¹
- For E-snow: lead two provisional outings consisting of at least 800 feet of elevation gain on a snow slope greater than 35 degrees requiring the use of an ice axe and crampons¹
- All provisional E outings must be approved by the LTC's Provisional Lead Committee and the national Mountaineering Oversight Committee
- Complete an E-level written exam.

If a candidate first obtains an E-rock or E-snow rating, the candidate needs to complete one additional provisional outing on the applicable terrain for the full E-rating.

¹All provisional E outings must be approved by the LTC's Provisional Lead Committee and the national Mountaineering Oversight Committee.

an assistant or evaluating leader who is currently an active chapter leader and has been certified at or above the level of the outing for a minimum of two years or has a commensurate level of experience and has been approved by the LTC Chair. Assistant leaders should not be so familiar with provisional leaders that an impartial evaluation might be compromised. In addition, the evaluating leader must be fully capable of conducting the outing and have the authority and responsibility to assume leadership of the outing at any time if the evaluating leader believes that the safety or well being of the group is being jeopardized by actions of the provisional leader. The assistant leader will observe and evaluate the provisional leader and provide him or her with a written performance assessment. I-, M-, and E-level provisional leaders should have different evaluators for each outing or obtain a waiver from the LTC Chair to use the same evaluator. Different evaluators will give a wider, more varied response. After completing the outing,

the provisional leader submits this Assistant Leader's Report and the Provisional Leader's Self-evaluation Report to the Administrative Chair. Because provisional leaders are not expected to exhibit the same level of leadership maturity, poise, and group management skills as that of a seasoned leader, the comments offered by the evaluating leader are an important part of the provisional trip experience.

Provisional leaders must select, plan, and lead their provisional outings, including preparing proper write-ups for publication. Provisional leaders need to research and plan their own trips and should not copy standard trips to over-used places. In preparing and leading outings, provisional leaders need to do such things as

- research and select a destination
- select a date and acquire a wilderness permit if necessary
- obtain the map(s) and plan the route
- graph a trail profile and compute a time and

- distance table
- obtain an assistant leader to evaluate the provisional leader
- write and submit the trip write-up for publication
- interview, screen, and select participants
- write and send outing information to participants
- introduce themselves and identify the outing requirements and objectives to the participants
- lead the way and set the pace
- navigate off-trail with map and compass (for I, M, and E trips)
- find a route on difficult terrain
- choose campsites and manage the group
- make decisions with respect to objective and subjective hazards, changing conditions, accidents, injuries, and other emergencies
- know their own ability and that of the group and stay within the realm of capability.

These and other leadership skills are detailed in subsequent chapters. The provisional leader will follow the outings rules for the GSC sponsoring the outing. All outings require that leaders and participants sign the standardized nationwide sign-in/waiver sheets, one used for O-, I-, and non-restricted M-level trips and the other

for restricted M- and E-level outings. Trips, furthermore, need to have participants to count as a trip: the provisional leader, a close friend, and the assistant leader do not make an acceptable provisional trip. An outing with leaders but no participants is not considered a Sierra Club outing. Provisional outings at the O-1 and O-2 levels should have at least six participants, not counting the two leaders, in order to demonstrate group management skills adequately. Provisional leaders at the I and M levels should aim to have at least six participants on one, preferably both, of their provisionals; this is particularly important for those candidates who have no history of leading groups as an Angeles Chapter leader (e.g., as O-1/O-2 for I candidates, or as O-1/O-2/I for M candidates). Provisional leaders may be asked to lead another provisional if the LTC and/or Safety Committee considers the number of participants on a provisional outing to be too low for the demonstration of group management skills. In some circumstances the LTC Chair and the Safety Committee Chair may jointly waive this requirement of a minimum number of participants.

Provisional leaders should send a copy of online publication of an outing together with the evaluations of the provisional outing to the LTC Administrative Chair. This may be done electronically or by hard copy. It is a good

PROGRESS CHECKLIST

The checklist below is a summary of completion requirements and may help candidates keep track of their progress. It is a good idea to keep a copy of all certifications, publications of provisional outings, and evaluations.

Sierra Club membership renewal date: _____

CPR date: _____ Agency: _____

LTP seminar date: _____

Standard First Aid (O) date: _____

Angeles Chapter participant experience trips:

Wilderness First Aid (I, M, E) date: _____

	Date	GSC	Level	Destination
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____

Agency: _____

Environmental Awareness (I, M, E) date: _____

Environmental Awareness (I, M, E) date: _____

Final Exam (M, E) date: _____

Provisional Outings:

Technical checkouts:

	Date	GSC	Level	Destination	Evaluator
1.	_____	_____	_____	_____	_____
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____

Notes: _____

	Date	Level	Location	Examiner
Navigation:	_____	_____	_____	_____
Rock:	_____	_____	_____	_____
Snow:	_____	_____	_____	_____

Provisional Lead Committee Approval (M&E) date: _____

idea to keep a copy of the published write-up as well as of the evaluations.

Publication is required for all outings, provisional or not. All outings must be listed in an official Angeles Chapter publication, whether in print or online, such as in OARS (*Outdoor Activity Registration System*)¹, the *Southern Sierran*, a periodic newsletter of a GSC, or on a GSC web site or list server. OARS listings are automatically archived. Because other listings may not be automatically archived, provisional leaders should make a copy of the provisional outing listing for their own records and in case the LTC Administrative Chair later requests a copy. The outing write-up must include the name of the provisional leader and the assistant.

The O-level requirement is to lead one outing that is rated O, either a day hike or car camp outing for the O-1 level or overnight backpack for the O-2. The trip must be a unique trip planned and conducted by the leader candidate, not a regularly occurring event such as a conditioning hike to the usual destination. The trip must be listed in OARS, in a periodic newsletter of an Angeles Chapter GSC, or on a GSC web site or list server (and archived). The trip write-up must include the names of the provisional leader and the assistant leader.

The I-level requirement is to lead two trips that are rated I. Both must include a significant amount of off-trail wilderness travel and be of a nature that requires significant I/M-level navigation. (Travel over snow is considered off trail.) One trip must be an overnight backpack; the other may be a full day trip or a trip of two successive days with overnight car camping.

The M-level requirement is to lead two trips that are rated M. If the provisional M leader has significant backpacking experience, one of the trips may be a day hike; otherwise, both must be backpacks. If the leader isn't already an I-rated leader, both outings must entail significant off-trail wilderness travel of a nature that demands I/M-level navigation. One outing must include a snow climb of at least 400 feet of elevation gain on a slope between 25 and 35 degrees that requires the use of an ice axe. One trip must include at least 100 feet of Class 3 rock climbing.

The M-rock level requirement is to lead two outings, one rated M that demonstrates navigation ability and includes at least 100 feet of Class 3 rock climbing. The other may be an I-rated trip that demonstrates navigation ability or may be another M-rated rock outing that also demonstrates navigation. If the M-rock provisional leader is already an I-rated leader, the second outing is waived as is the navigation component of the rock provisional.

The M-snow level requirement is to lead two outings,

one rated M that demonstrates navigation ability and includes at least 400 feet of elevation gain on a slope between 25 and 35 degrees that requires the use of an ice axe. The other may be an I-rated trip that demonstrates navigation ability or may be another M-rated snow outing that also demonstrates navigation. If the M-snow provisional leader is already an I-rated leader, the second outing is waived as is the navigation component of the snow provisional.

The E-level requirement is to lead three scheduled outings at the E level. Two of the outings must have significant off-trail wilderness travel demanding I/M-level navigation unless the provisional leader is already an I- or M-rated leader. At least two outings must be overnight backpacks; the other may be a full day outing or two successive days with overnight car camping. One outing must include a snow climb of at least 800 feet of elevation gain on a slope greater than 35 degrees on hard snow, requiring the use of ice axe and crampons. One must include at least 200 feet of Class 4 rock climbing that requires the use of ropes and belays.

The E-rock level requirement is to lead two outings including at least 200 feet of 4th class rock climbing that requires the use of ropes and belays.

The E-snow requirement is to lead two outings consisting of at least 800 feet of elevation gain on a snow slope greater than 35 degrees and requiring the use of ice axe and crampons.

Note that only full M-rated leaders are eligible to apply for E-rock and E-snow provisional leader status.

TWO OUTINGS NOTES

WTC Experience Trips

Wilderness Travel Course (WTC) students are not trained for trips at the M or E level, and thus M- and E-level provisional trips should not be led as WTC experience trips. (Students need to complete several outings in order to be graduated from WTC.)

Restricted Mountaineering Outings

All E-level and most M-level outings fall into the category of Sierra Club restricted outings. Any outing requiring the use of ice axe, crampons, or a rope is by definition a restricted mountaineering outing. In contrast, an example of an unrestricted M-level outing is one with easy class 3 rock without exposure; the leader would reasonably expect that no one screened for the outing would request a belay. Although permissible to use a rope for safety in unanticipated conditions on an unrestricted M-level outing, it may be

¹The OARS nomenclature is in flux as of this writing. It may be called OARS at some web pages, the "Activity Calendar" at others, and perhaps even the "Schedule of Activities," which until recently referred to a print publication. If you have any doubts or questions, please contact the LTC Administrative Chair, LTC Chair, or your entity's outings chair.

used only to retreat, not to continue toward a summit. For example, rain may make rock slick and dangerous, barring safe upward progress and causing concerns about safety for a descent; a leader may belay climbers down in such a situation. Open to Sierra Club members only, restricted outings have special approval requirements controlled by the national club and its insurance carrier and subject to change. Applications for restricted mountaineering outings may be found in Appendix C and at the LTC web site, <http://angeles.sierraclub.org/ltc/forms.html>

LEADER CERTIFICATION

Upon a candidate's successful completion of the LTP requirements listed above, the LTC may recommend the candidate for certification to the chapter Safety Committee. Successful completion of the LTP, however, does not guarantee certification. Only the Safety Committee can certify candidates to lead outings for the Angeles Chapter. The LTC Chair or the Safety Committee may require candidates to gain more experience, develop higher technical and/or leadership skills, or lead additional provisional outings before being certified at a specific leadership level.

PROGRESS

Leadership candidates set their own timetable for

completion of the LTP. If no progress has been made in twenty-four months, however, their files will be made inactive. Reinstatement to active status is at the discretion of the LTC. Candidates may be asked to repeat some or all of the requirements. Questions concerning LTP progress and requirements should be directed to the LTC Administrative Chair. Enrollees also should keep the Administrative Chair informed of their mailing address, e-mail address, day and night telephone numbers, and name changes. Those who wish to progress from one leader category to another should make sure that their intention is understood by the Administrative Chair and that their provisional leads satisfy the applicable requirements. If candidates have questions about first aid, navigation, rock climbing, or snow climbing, they should address them to the respective Technical Chairs. Questions or suggestions of any nature pertaining to the LTP or the LTC may be addressed to the LTC Chair. Questions pertaining to Angeles Chapter safety policy, to the definition of trip categories, and to certification of leaders other than by LTP graduation should be addressed to the Angeles Chapter Safety Committee Chair.

MENTORS

All leader candidates are encouraged to have a mentor, an experienced leader who can help guide the candidate through the LTP process.

MAINTAINING A LEADER RATING

Aside from maintaining their Sierra Club membership, under the National Leader Standards (NLS) leaders are to maintain currency every four years in first aid, by refreshing OLT 101 training, and by having led an outing at a given level within the past four years.

First aid training is considered current for four years, and a four-hour basic first aid course is sufficient to maintain currency, no matter what level a leader is under the Angeles rating system (O-1, O-2, I, M-Rock, M-Snow, M, E-Rock, E-Snow, E). Leaders of restricted mountaineering trips (many M and all E trips) should note that one of the two leaders of restricted mountaineering outings must be current in wilderness first aid. CPR is not required under the NLS and does not count toward first aid currency. All leaders are encouraged to take wilderness first aid if they plan to lead outings more than several hours from emergency help.

OLT 101 and OLT 201: The LTP seminar is considered the equivalent of the higher-level course, OLT 201. To "refresh" OLT 101 training, a leader will be able to take the course online or review it in a printed format. The Angeles Chapter's Outings Management Committee will be aiding leaders with maintaining currency in OLT 101.

Provisional leads: The Angeles Chapter already requires one or more provisional leads of leader candidates, the mentor being the assistant leader who evaluates the provisional leader. Leaders who have not led an outing in over four years may, with the approval of the outings chair, lead one as a provisional lead, the assistant leader becoming the Mentor Leader of the National Leader Standards.

PROVISIONAL LEAD POINTERS

I. General Reminders

- A. The evaluating assistant leader shall not be someone with a close relationship with the provisional leader, i. e., a spouse, partner, or close relative.
- B. The evaluating leader shall have been a leader at the level of the outing for two or more years or have significant experience leading at that level and have been granted a waiver by the LTC Chair.
- C. For I-, M-, and E-level provisional outings, the outing should be solidly within that level, not at the lower end of it.

II. Scheduling Provisional Leads

In anticipation of fulfilling all requirements to advance to provisional leader status, candidates may schedule their provisional outing(s) prior to completing all the requirements. The sponsoring outings chair, nevertheless, must know that a candidate has a reasonable plan to complete the prerequisites prior to the outing date. The outings chair should actively monitor the candidate's progress prior to the trip.

A problem arises, however, when a candidate has not been able to meet all the requirements by the date of the provisional lead. In this case, a candidate has several options:

- A. The outing may be postponed until after the requirements are met; the candidate should have a firm date in mind to communicate to would-be participants of the originally scheduled outing;
- B. Another appropriately-rated leader may take over for the candidate, and the candidate may schedule another outing; the leader candidate may not participate in any leader capacity on the original outing now to be led by current leaders of the appropriate rating;
- C. The outing may be canceled.

III. Meeting Navigation Requirements for I-, M-, and E-level Provisional Outings

If M- and E-level provisional leaders are already I-rated or M-rated, their provisional outings need not be planned with a view to demonstrating navigational skill. These provisional leaders will be expected to navigate well and show good route-finding skills, of course, but the outings do not have to be planned with significant navigation as one of the factors. M- or E-level provisional leaders who are not already I- or M-rated need to demonstrate navigational skill on two of their provisionals as would be expected of an I-level provisional leader. Passing the E-level navigation checkout is a sufficient demonstration of that skill level.

- A. I-level provisional outings (and M- and E-level for provisional leaders who are not already I- or M-rated) need to allow the provisional leader to demonstrate navigation and not only route-finding skills. The following are some clarifications and amplifications.
 - 1. The route must involve cross-country travel, i.e., routes that are not on roads, maintained trails, or use trails and ducked routes that are known to be reliable. Occasional encounters with use trails or ducked routes will not prevent a route from being considered cross-country.
 - 2. The objective and/or significant portions of the route to it should not be visible from the point of departure from the trail, i.e., simply leaving the trail to take an obvious route to a nearby visible objective does not demonstrate navigation skill. A summit visible from the trail would be acceptable only if the route involved a navigational challenge (i.e., the summit is visible from the trail but not for most of the route).

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3. Cross-country routes should be significantly different from available trails. Simply staying off a trail while walking essentially the same route does not demonstrate navigation skill.
 4. The route will require the leader to make important decisions that require navigation skill and correct judgment such as traveling on a bearing in a forest or desert; choosing the appropriate gully, drainage, ridge, etc. to follow or cross while ascending and/or descending; etc. The following are unacceptable for demonstrating navigational skill:
 - a. Going up or down a long ridge that has no forks or where there is no choice between ridges
 - b. Going up or down a long gully that does not have major tributaries and changes in direction or where there is no choice between one or more gullies
 - c. Gentle, open, featureless, or low-relief terrain on the topo and to the eye that is simple and easy to follow
 - d. Destinations in the Sierra Nevada or elsewhere where normal routes clearly do not involve sufficient navigation for a provisional lead, such as Mt. Agassiz, Cirque Peak, Mt. Goode, Mt. Lamarck, Mt. Tom, Vogelsang Peak.Generally acceptable demonstrations of navigational skill include
 - e. cross-country in broken terrain with visibility limited to nearby features because of the terrain (may include finding passes or gullies in the mountains and key up or down turnoffs to achieve a planned route)
 - f. cross-country navigation in a heavy forest with broken terrain
 - g. cross-country navigation in broken terrain on snow where there are no trail markers or pre-existing trail
 - h. cross-country to normally easy objectives using alternate routes of much greater navigation difficulty. Be sure it is a feasible, likely route, however, and not one contorted to demonstrate navigation.
 5. Off-trail navigation is “significant” when it provides a meaningful demonstration that the candidate can make practical use in a real trip situation of the types of skills that are tested in the exercises of the I/M navigation checkout. Neither the navigational problems nor the travel needs to be more difficult than the checkout. This is not a test of climbing skill or the ability to conduct arduous travel over rough terrain.
 6. The only navigation aids permitted for provisional leaders are map, compass, and altimeter. If the altimeter used is integral to a GPS receiver, the leader may not use the GPS “pages” on the instrument. A GPS may not be used to navigate or to mark waypoints to be followed later. The provisional leader may also not rely on the navigational advice or directions from others in the group.
 7. Here are some suggestions:
 - a. Lead an outing to one of the many desert peaks that are not visible from the trail (if any) or cars;
 - b. Lead an outing to an HPS peak by a different route in which the peak is not visible from the point of departure from the trail; this should be a route without a known, clear use trail and with some sort of navigational challenge
 - c. Lead an outing that requires navigation through forest;
 - d. Lead an outing other than a peak climb that involves cross-country navigation, such as a cross-country trip through western Sierra forest to visit a lake or some other feature not visible from or easily deduced from the take-off point from the trail; there is no requirement that an I-level provisional outing include a peak climb, and candidates would be well-advised to consider interesting non-peak objectives that require significant off-trail navigation.

- B. The LTP checkout process previously certified the provisional leader’s basic navigation competence, whether I/M or E. The provisional leader simply needs to demonstrate appropriate use of the navigation skills during a real-life group-led situation, not on any contorted provisional navigation route.
 - C. The LTP has always encouraged scouting the provisional trip (and other outings), which is a good strategy for experience and safety reasons. In scouting the provisional trip route, however, the provisional leader has then already navigated the route. This is entirely acceptable. In analogous provisional rock and snow situations (M and
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E), the provisional leader, having scouted, would simply perform all the technical moves correctly again. Same for navigation. The candidate is required to demonstrate the navigation skills and decision-making steps to the checkout leader regardless of having scouted the outing.

- D. The provisional leader is encouraged to consult with the assistant/evaluating leader, his or her leader mentor, and/or the outings chair of the sponsoring group, section, or committee in planning the provisional outing. The provisional leader may also wish to consult the LTC Navigation Chair and/or the LTC Chair about the acceptability of the proposed outing as a provisional lead.
- E. Finally, the assistant leader is responsible to determine the adequacy of the provisional leader's performance, not only for navigation but all other aspects of the outing. The assistant leader may ask questions or take actions similar to those of a navigation examiner during an LTP checkout and may pose challenges or problems for the provisional leader to solve along the way.

IV. Meeting Route-finding Requirements for I, M, and E Provisional Outings

- A. Route finding is a different skill than navigation, but demonstrations of both are required for cross-country travel.
- B. Route finding involves the small-scale decisions of the leader in determining the route through terrain that is not obvious. This is a learned skill developed by experience on various types of terrain.
- C. On many peak climbs the "listed" routes follow a relatively easy route up the peak with more difficult ground on either side. The listed route may be second class or I rated, but to either side it may be third class or full of dense brush. How well the leader does in discerning the route will keep the group on the easiest ground and within the rating classification of the outing.
- D. The assistant leader should evaluate the leader candidate on route-finding decisions and the leader's awareness and handling of the group dynamics and abilities on the different types of terrain.
- E. A provisional leader may need to consider such route-finding options as
 1. Making a side-hill traverse vs. a descent and regain of altitude
 2. Ascending or descending scree and/or talus
 3. Traveling across large talus or small talus blocks
 4. Going around a difficult patch of terrain or across it
 5. Selecting stream-crossing points where no bridge is available
 6. Choosing between travel on snow or on adjacent rocks
 7. Going through the brush or over other terrain
 8. Deciding to go around fallen logs or over them.
- F. Route finding may also require management of the group whenever there is a possibility of rock fall or loose terrain.
- G. Such route-finding decisions not only indicate skills in reading terrain but also in estimating overall time required for a group, considering energy requirements for various options, and relating the time and energy aspects to the trip participants and the trip plan.
- H. Screening of participants comes into play as well as the adequacy of the trip plan for the time required to negotiate the terrain.

THE NATIONAL LEADER STANDARDS AND ANGELES CHAPTER LEADERS

The Sierra Club's National Leader Standards (NLS) became effective January 1, 2006, for the Angeles Chapter. The NLS divide outings into two basic types: Level 1 outings, such as day hikes and car camps, and Level 2 outings, such as backpacks or other trips with an overnight stay away from cars. The Angeles Chapter will continue to use its O, I, M, E, and T leader ratings without conflict with the NLS.

Under the NLS Sierra Club leaders must

- be a Sierra Club member
- be at least eighteen years old
- have first aid certification equivalent to or higher than American Red Cross Basic
- complete the Outings Leader Training—Basic (OLT-101) or comparable training
- have outing participant skills appropriate for the activities of the trip towards the advanced end of the scale
- provisionally lead at least one outing and receive a positive evaluation by the Mentor Leader
- receive approval to lead outings from the Outings Chair or delegated authority of the entity sponsoring the outing.

Leaders of Level 2 outings must also

- successfully complete the Outings Leader Training—Core Workshop (OLT-201) or comparable training
- provisionally lead at least one outing that includes an overnight stay away from cars and receive a positive evaluation from the Mentor Leader.

Leaders trained under the Angeles Chapter's Leadership Training Program meet all of these standards.

2

Sierra Club Organization, Conservation, and Outings Programs

The Sierra Club differs from all other conservation organizations in several important ways. No other organization chooses the members of both its local and national policy-making bodies through contested elections in which all members are encouraged to participate. No other organization has a network of volunteers that is as extensive as that of the Sierra Club or leads as many outings as the Sierra Club does. When David Brower was hired as the Sierra Club's first conservation staff member in 1952, the Sierra Club already had a tradition of volunteer leadership that was sixty years old. That tradition of activism and volunteer control of policy has continued to grow as the issues have become more complex and the size of the Sierra Club has multiplied. The result has been an increasingly complicated organizational structure, which still embodies the democratic principles of the Sierra Club's earlier days.

Statistics Summary (2014)

Members and Supporters: 2,400,000
Chapters: 64
Angeles Chapter: 40,000 members;
largest chapter in country has 16 regional groups, 32 recreational sections and committees, and
a constantly changing number of conservation subcommittees.

SIERRA CLUB STRUCTURE

The **Board of Directors (BOD)** is the fifteen-member governing body of the Sierra Club, which meets about six times a year, usually in San Francisco. The masthead of *Sierra Magazine* lists the current BOD members. These people are all volunteers.

The **President**, the highest officer of the Sierra Club, is elected by the board; this is a volunteer position.

Staff members working for the national Sierra Club are hired by the Executive Director and the Controller, who are hired by the BOD. Local chapter executive committees may also hire chapter staff. The Sierra Club has about 500 employees in the San Francisco headquarters, field offices, and chapters. The Angeles Chapter has six positions (Senior Chapter Director, Chapter Coordinator, two Conservation Coordinators, Outreach and Advertising Coordinator, and the *Southern Sierran* editor) as well as a treasurer's assistant, librarian, person to handle database and membership problems, and many office volunteers.

A **chapter** is a geographically defined area of Sierra Club membership, organized according to standards set in the Sierra Club bylaws. The Angeles Chapter consists of Los Angeles and Orange Counties. Chapters are officially sanctioned by the board to operate Sierra Club programs and are partially funded by an allocation from the national Sierra Club. The Angeles Chapter office or the national web site (<http://sierraclub.org>) can supply the address and phone number of any other Sierra Club chapter.

Regional Groups are subdivisions of a chapter, first begun in 1956. The Angeles Chapter is divided into sixteen regional groups based on zip code.

The **Chapter Executive Committee (ExCom)** is the governing body of a chapter, elected by its membership. In alternate years the Angeles Chapter elects four or five people to serve two-year terms as at-large members. Each regional group is entitled to a representative on the ExCom, which meets once a month on a Sunday.

The **Chapter Conservation Committee** discusses, organizes, and carries out conservation campaigns, as well as advises the ExCom on chapter conservation policy. Voting members are the representatives of each group and section as well as the issue committee chairs. The committee meets on the third Wednesday of each month at the chapter office. A separate Orange County Conservation Committee focuses on issues related to Orange County only.

Chapter Committees may be administrative, outings-oriented (and may become activity sections if they grow in membership and develop bylaws), or category defying. Their chairs are appointed by the chapter chair and approved by the ExCom.

Activity Sections are formed by members who wish to

pursue a special activity such as river touring or Sierra peak climbing. Each has its own organization with bylaws and elected officers. In the Angeles Chapter sections have about the same number of active members as regional groups.

All Sierra Club meetings are open to Sierra Club members and to the general public, except for rare executive sessions when sensitive issues (such as personnel or lawsuits) are discussed.

INFORMATION SOURCES

Angeles Chapter Office
3435 Wilshire Blvd., Suite 660
Los Angeles, CA 90010-1904
Phone: (213) 387-4287
Fax: (213) 387-5383
Internet: <http://angeles2.sierraclub.org>

http://angeles2.sierraclub.org/ltc_become_a_leader
(Leadership Training Committee)

http://angeles2.sierraclub.org/leadership_and_outings_resources_management
(Outings Management Committee and the Safety Committee)

Sierra Club National Office
85 Second St., 2nd floor
San Francisco, CA 94105-3441
Phone: (415) 977-5500
Internet: <http://sierraclub.org>
Extranet: <http://clubhouse.sierraclub.org>
(resource for leaders)

The National Sierra Club publishes *Sierra Magazine* six times a year.

The Angeles Chapter publishes *Southern Sierran* on-line monthly.

The National Sierra Club offers several web features to assist environmental activists: Grassroots at <http://sierraclub.org/grassroots> and the Insider at <http://www.action.sierraclub.org/site/PageServer?pagename=ArchiveInsider>.

Minutes and agendas of the BOD and Chapter ExCom meetings are available in the chapter office. Make arrangements with the Chapter Director to see these documents.

For entities still using print publications, the current issues of group, section, committee, and task force newsletters are available in the chapter library.

The Chapter Leadership Training Academy is a one-day workshop held in late winter, designed to help new group and section officers learn how to handle their responsibilities

CONSERVATION

Sierra Club Conservation Policy

The Board of Directors adopts policy statements on broad national issues (e.g. energy, climate change, transportation). The board also sets long-range (“decadal”) and two-year national campaign priorities for the period of a Congress.

All units of the Sierra Club structure are bound by board-adopted policy, and each level of the structure is bound by the policies adopted by the levels above it. The relevant level handles policy about specific local issues.

Policy Formation

The BOD formulates broad policy on environmental issues and decadal and two-year priorities, prepares resolutions for public consumption on hot national issues, and makes statements of commendation or condemnation aimed at federal agencies and politicians.

Chapters develop policy applicable to the area they cover and governmental entities contained therein.

Groups coordinate policy stances involving issues in their own areas with chapter policy.

Conservation Policy Guides

Sierra Club policy is posted on the Sierra Club’s extranet site (<http://clubhouse.sierraclub.org>).

Conservation and Outings Leadership

Outings fit quite naturally with Sierra Club environmental priorities. Perhaps the best approach for a leader is to tie a local issue directly to the area in which the outing is being conducted. This local issue may be used as a jumping off point for giving visibility to national priorities since people easily understand the connections between their local issues and those that resonate on a national level. This is a fundamental truth of our outings programs. Many outing leaders, however, are reluctant to “lecture about issues” in the context of a recreational experience. Armed with a basic knowledge of the community and national issues, a leader often can support and direct the conversations that trip participants usually have about the area into information about real action in ways that do not have the character of a lecture. This skill takes some development, but it is not out of range for most leaders. Those leaders who are interested in using outings to build advocacy may use other, stronger approaches by leading Activist outings or service trips.

Leaders also can promote conservation in a variety of ways, such as by reporting incidents of unnecessary resource damage (timber cutting, road building, ORV damage, or illegal activities) to chapter leaders or staff; setting a good example by bringing a trash bag for litter and using low-impact techniques; and telling participants about some of the local natural history to increase nature appreciation. To educate participants about a controversy, one may lead trips to areas where management decisions are soon to be made and talk about the issues during the outing. Leaders, furthermore, may conduct trips that raise funds for conservation activities or for the chapter and carry membership applications for recruiting new members.

Sierra Club Conservation Priorities

The Sierra Club is involved with hundreds of conservation issues, ranging from the protection of specific areas to policy questions of global scope. The Sierra Club’s various campaigns are conducted locally, regionally, nationally, and internationally. To be effective, though, the Sierra Club must focus its efforts. Accordingly, the Board of Directors periodically adopts national conservation issues for top-priority campaigns. Major current campaigns include

- Beyond Coal
- Beyond Oil
- Beyond Natural Gas
- Protecting America’s Waters
- Resilient Habitats

The club’s conservation policies can be found at <http://sierraclub.org/policy/conservation>.

OUTINGS

Club outings fall under three broad categories: National, Inner City, and Local.

National Outings Program

The national outings program was started when the Sierra Club was less than ten years old. William E. Colby, then secretary of the Sierra Club, led the first wilderness outing in 1901: a high trip into the Sierra Nevada. Sometimes lasting two months and including as many as two hundred participants, this outing became an annual occurrence. John Muir, Colby, and other early leaders of the Sierra Club were motivated to establish and expand this program by their love of the wilderness. By taking people into remote and beautiful mountain areas and by giving them a taste of this

wild freedom, they hoped to establish an involved group of people who would care about these places and who would fight for the preservation of all natural scenic resources and important wildlife habitats. Today, this is still a primary goal of the outings program. Although a much smaller version of the high trip still exists, the program now encompasses over three hundred other outings to every region of the United States and to over fifteen foreign countries. The program includes backpack, burro, base camp, raft, ski-touring, canoe, service, bicycle, family, and service trips, all generally lasting from one to two weeks.

The outings program is a volunteer program. The outings department staff assists the volunteer trip leaders with reservations, publicity, trip budgeting, and finances. Volunteers and staff work closely together to produce a yearly outings catalog, trip supplements (informational sheets on specific trips), and trip budgets.

The outings program is continually seeking new leaders and welcomes chapter outing leaders to participate in the program. Chapter outing leaders or others who are interested may become involved by attending subcommittee meetings or by participating in the various leader training programs which are run by the national outings program. One may contact the outings department at the National Sierra Club for additional information or see the extranet site (<http://clubhouse.sierraclub.org/outings>).

Inner City Outings

Sierra Club Inner City Outings is a community outreach program that provides opportunities for urban youth and adults to explore, enjoy, and protect the natural world. The program goals are to promote appreciation and protection of the natural environment through wilderness adventures and environmental education and to create opportunities for personal growth and development by linking participants from different cultures, foster respect of self and others, and provide participants with outdoor skills training and leadership opportunities. The Angeles Chapter has two local ICO groups in Los Angeles and Orange Counties.

Local Outings

Local Outings are those outings sponsored by the various chapters of the Sierra Club and account for the majority of outings offered by the club. Angeles Chapter outings fall under Local Outings. With a range of outings as diverse as the interests of the volunteer leaders, most local outings are open to members and non-members alike.

Angeles Chapter Outings Program

Over four thousand outings each year are conducted under the auspices of the Angeles Chapter, far more than those of any other Sierra Club chapter. This program is the result of the work of hundreds of volunteers under a chapter organizational structure, which is specially designed to encourage enjoyable, efficient, and safe outings at all levels.

Chapter outings are conceived, planned, and executed by outing leaders associated with the regional groups, special activity sections, activity committees, and training committees. The management committees of the sponsoring groups, sections, and committees (GSC) are responsible for all aspects of their trips (e.g., planning, leaders' qualifications, and outing procedures). Each GSC may have its own outings policies and procedures, which must comply with the chapter Safety Policy and be approved by the chapter Safety Committee.

To support the Angeles Chapter outings program, the Wilderness Travel Course (WTC) is offered every year, beginning in January. The ten-week course consists of weekly evening meetings and four weekend outings. Subjects include physical conditioning, equipment, land navigation, mountaineering medicine and safety, backpacking, snow travel, and winter camping. Graduation from the course requires completion of two additional off-trail peak climbs with overnight backpacks.

The LTC, WTC, and Safety Committee fall under the Angeles Chapter Outings Management Committee (OMC), which includes the chairs of the LTC, WTC, and Safety Committee. The OMC has overall responsibility for and oversight of all training and outings-related activities in the Angeles Chapter.

3

Outings Oversight and Policies

SAFETY COMMITTEE

The Angeles Chapter Safety Policy is included at the end of this chapter.

Background and History

In 1970 a voluntary leadership training program was established. At that time, outings were not classified as to their technical nature, nor were the leaders certified. In 1974 the Angeles Chapter decided that an outings safety policy should be established. The policy created a Safety Committee and a system of outings classifications and leader certifications. To provide opportunities for new leaders to obtain training and leader certification, the Leadership Training Program (LTP) also was established. The Safety Committee and the Leadership Training Committee (LTC) work together to ensure that outings are led by qualified leaders. The LTP can prepare potential leaders in various technical aspects related to the outings. Because the most important aspect of leading outings is leadership, provisional outings give new leaders an opportunity to exhibit leadership. Final recommendation by the Safety Committee is required to complete the LTP and become a certified outings leader.

Safety Committee Responsibilities

Approves procedures for Groups, Sections, and Committees (GSCs). A few of the GSCs sponsoring outings higher than O have a safety policy that expands on and supports the chapter policy. Those GSC policies contain specific training and procedural requirements for leaders of outings sponsored by that group. New leaders should obtain a copy of these procedures from GSCs for which they plan to lead and become familiar with the specific requirements of those entities.

Certifies leaders. Completion of LTP requirements is the usual method of obtaining certification. Special requests based on LTP requirement equivalency may be considered. Certification is at the minimum level, and leaders are encouraged to advance their experience and training actively. After successful completion of the committee review, a certification card and leader patch are mailed to the leader.

Publishes a yearly safety report. A copy of the report is e-mailed to the chair and outings chair of all GSCs. The report contains a copy of the chapter safety policy and accident reporting forms. GSC outings chairs are responsible for assuring that leaders are qualified to lead outings sponsored by that GSC.

Investigates accidents and complaints. To reduce the frequency of accidents, actions are taken as appropriate. The committee receives and reviews written complaints concerning leader conduct and takes appropriate action, which can include a permanent revocation of leader certification.

Monitors publications. The Safety Committee monitors listings in OARS and in GSC newsletters and on their web sites that contain scheduled outings. The Safety Chair and Outings Checker both receive copies of newsletters and submit appropriate comments to the sponsoring groups. The Safety Committee evaluates the trips for these aspects:

- Reasonableness of the trip
- Proper classification of the trip
- Listing of two appropriately rated leaders.

Trip Classifications

The Safety Policy, included at the end of this chapter, provides a brief description of the classifications of outing difficulty. These classifications help to ensure that participants and leaders have a common understanding of the difficulties involved in the outing. By working with an experienced outings chair, a leader can be sure to classify outings properly. Some additional comments to elaborate on the descriptions in the Safety Policy are included below.

The **O** category covers a variety of outings (e.g., beach walks, bike rides, climb of Mt. Lowe). Trips at this level can include easy cross-country if they do not require the use of navigation skills and are still class 1 (walking, not class 2, which is going over rougher terrain where hands may be occasionally used for balance). For example, a hike on a trail comes within a short distance of the summit of a peak. The peak can be seen from the trail, and no navigation or scrambling is necessary to hike from the trail to the summit and return. O-level overnight backpacks may be led by O-2 rated leaders. O-1 leaders may lead day outings.

I trips involve cross-country travel. Snow conditions requiring use of an ice axe for safe travel (e.g., hiking poles and snowshoes may not be enough to prevent or arrest a fall) and rock travel that requires the use of hands for climbing would be at least M level. Hands can be used for balance on an I trip, but if they must be used for climbing, the trip must be rated higher than I. The term Class 2 would apply to I-level trips. Because of the navigation usually required,

snowshoe or cross-country ski trips normally require two I-rated leaders; the Safety Committee may grant a waiver for some exceptions. Leaders must recognize that snow conditions change and that a snowshoe trip that starts out on soft snow might be dangerous without an ice axe on the return. It is the leader's responsibility to keep the outing safe and within the rating of the trip; when in doubt, turn around.

M If safety dictates the use of ice axes, the trip can no longer be classed as I. Rock climbing at the M level will involve the use of hands, and some participants may want a belay for safety. The term Class 3 would apply to M-level trips.

E If safety dictates the use of crampons as well as ice axe, the trip can no longer be classed as M. Rock climbing at the E level will involve the use of a rope. The term Class 4 would apply to E-level trips.

Circumstances can change the classification. Spring trips may involve travel where trails are obscured by snow. Although streams do not have a classification, crossings in April and May could justify an E trip rating, while in summer the crossing could be made in ankle deep water. Rain and snow—even a small amount—can change rock travel from easy to hazardous. Fog or darkness can quickly present a severe navigation challenge to an O-rated leader. Being prepared as a leader means having skills that normally would exceed the demands expected for the planned outing.

Because the point at which an outing is classified as “M” or “E” is not always easy to distinguish, the following elaboration on the factors leading to a trip rating and related issues is offered.

M-rated trips: An M-rated trip involving snow climbing would typically take place on slopes that in late summer would be class 1 or 2 sand, scree, or talus slopes. The snow on these slopes would be less than the angle of repose of scree, that is, less than 34 degrees. An occasional short section of soft snow up to 45 degrees may be encountered. Ice axe skills for snow climbing, self-belay, and self-arrest are mandatory for these snow climbs. On M-rated climbs, the snow should have a consistency that allows for step kicking. Crampons may be used on a M-rated snow climb to facilitate an early morning start or more rapid movement on consolidated snow. Crampons, however, should not be necessary for climbing (step kicking is possible, but slower due to surface hardness), but may be equipment required by the trip leader. An occasional top rope belay may be used to get the group past a short exposed or icy spot.

An M-rated rock outing would involve class 3 scrambling or climbing over rock. Class 3 climbing is defined as that in which hands are used frequently for upward progress. A top rope belay may be used on M rock routes. Exposure for M-rated snow or rock routes would be classified as moderate.

E-rated Trips: An E-rated snow climb extends conditions to steeper slopes and harder snow where crampons are mandatory. Roped snow travel, belays, and glacier travel with crevasse hazard may occur. Skills for these conditions including crevasse rescue techniques may be required, depending on the trip. An E-rated trip may also involve rock travel on belayed class 4 pitches. Climbing proficiency, belaying, knots, and rappel skills may be necessary. Exposure for E-rated routes is likely to be significant, and belay, anchoring, and/or self-belay skills must be adequate to provide a margin of safety for all participants. Class 5 rock climbs and vertical ice climbing are beyond the scope of the E rating, although a 5th class summit block is within the scope of the E. This difficulty of outing is classified as T (technical). Mountaineering outings at this level are not currently sponsored by the Angeles Chapter.

Many M and all E outings are designated as MR and ER in the trip listing. The *R* indicates that the outing is restricted to Sierra Club members only, a requirement of the Club's insurance. Any trip on which an ice axe or a rope may be used is a restricted mountaineering outing. A version of the sign-in/waiver form that has a space for the member number is to be used for these outings.

T-rated Trips: A few outings are designated by the T rating, which indicates that special technical skills, such as sailing or ski mountaineering, are required.

Leader judgment is necessary in assessing current conditions of any route based on the weather and other factors. Many routes require excellent route-finding to stay on terrain of the guidebook-listed difficulty. Straying "off-route" can suddenly put the group on significantly more difficult ground than that anticipated. Any route can also quickly become much more difficult with a change in conditions. Knowing the skills of the group as well as those of the leaders is essential in judging whether a route is safely within the described limits of the outing as well as within the skill limits of the participants. Leaders must not exceed the listed outing rating and always maintain a safety margin.

USE OF FORMS

The forms for Incident Reports and combination sign-in/waiver sheets are supplied in this book. Mountaineering outings and watercraft outings falling under the "restricted outings" category require special forms. All of these forms are issued by the Club from San Francisco. One may contact the outings chair of the sponsoring GSC for the latest correct forms because they change from time to time. Or one may obtain the forms from the national Sierra Club extranet site (<http://clubhouse.sierraclub.org/outings/Handbook/>

[Forms/index.asp](http://clubhouse.sierraclub.org/outings/Handbook/Forms/index.asp)) or from the LTC web site (www.angeles2.sierraclub.org/ltc_become_a_leader).

Incident Report

An Incident Report must be filed whenever an accident or incident occurs on a Sierra Club sponsored activity. In all cases, use the Incident Report form from the LTC web site or this book. The Angeles Chapter uses a customized Incident Report form that is different from the standardized form on the national Sierra Club extranet site, adding the Angeles Chapter office and Angeles Chapter Safety Chair as recipients of the form. The Angeles Chapter form may be found in Appendix C or on the Angeles Chapter LTC web site.

The report is to be made as soon as possible after the event even if it is unlikely that the Sierra Club may have a liability for the incident. Leaders should carry a copy of the form on the hike. Memories fade rapidly, particularly under stressful conditions. Note that it is preferable to submit reports for seemingly minor events than not to report them at all. What seems to be a simple illness or a sprain could turn out to be a stroke or a fracture when the person visits a doctor after the outing. In the event of a serious injury or fatality, the national Sierra Club office must be informed immediately. The toll-free emergency number for such reports is 1-888-OUTINGS (1-888-688-4647).

Emergency Response-Patient Report

In the event of an emergency situation that requires outside help, the Emergency Response-Patient Report Form should be used. Each of the two leaders should carry a copy on the outing, with one copy being retained at the emergency site. The copies should contain identical information so that there is no need to question what information the messenger took to the rescue party.

Liability Release

The national outings and risk management office of the Sierra Club has issued a combined sign-in/waiver form for use by all Sierra Club leaders on all Sierra Club trips, including the conditioning hikes.

RULES OF CONDUCT

The Rules of Conduct give the outings leaders the authority to conduct the outings and manage the group. The rules that govern all Angeles Chapter outings are reprinted in the sidebar. Many activity GSCs have special modified

versions incorporated into their outings procedures. Outing leaders should check with the outings chair of the sponsoring GSC to obtain a copy of these procedures and rules that apply to that entity's outings.

Although cell phones and other devices may be used to summon help in some circumstances, leaders should note that reception is not possible in many outings locations. Although carrying a cell phone is advised, the cell phone is not a substitute for the safe conduct of the outing, nor for the leader's ability to manage an emergency situation.

HARASSMENT

The policy of the Angeles Chapter Sierra Club is that there is no place in Sierra Club events or outings for harassment, sexual or otherwise, of leaders or participants. Such action by any Sierra Club leader or participant will not be tolerated, and violation of the policy will result in disciplinary action, including loss of leadership status and loss of privilege of participating in Sierra Club events or outings.

Harassment may take many forms, including

1. Verbal conduct—such as swearing; epithets; derogatory comments; or racial, ethnic, or gender-based slurs—or unwanted sexual advances, invitations, or comments
2. Physical conduct such as assault, pushing, or blocking normal movement
3. Retaliation for having reported harassment.

Specific forms of sexual harassment include

1. Pressure for sexual favors
2. Demands or requests for sexual favors accompanied by threats concerning acquisition of volunteer leadership roles or overt promises of preferential treatment
3. Repeated requests for dates or “get-togethers” when a person has said “no”
4. Unwanted physical contact such as touching, pinching, or brushing against
5. Persistent unwanted attention to physical appearance or manner of dress
6. Inappropriate sexually-oriented questions about a person's personal life
7. Intimidation, hostility, or condescension based on gender
8. Obscene remarks, jokes, insults, or tricks
9. The use of stereotypes based on gender in attempts at humor.

Although harassment is not common, it happens, unfortunately, that people on outings sometime feel “preyed

upon,” “targeted,” or seen as “fair game” by others. This is more likely the case for single, unaccompanied people. Leaders should be alert for such inappropriate conduct and sensitive to the need to make everyone feel welcome and comfortable. For leaders themselves to be guilty of unwanted sexual advances is particularly unacceptable.

A number of avenues are available to a person who feels that he or she is a victim of harassment, sexual or otherwise. They include contacting the chair or the outings chair of the GSC sponsoring the event or outing, the chair of the Outings Management Committee, the Sexual Harassment Committee, the chair of the chapter Executive Committee, or the Local Outings Manager at Sierra Club Headquarters in San Francisco. All complaints will be thoroughly investigated.

COMPLAINTS

Leader candidates, rated leaders, and outings participants may choose to voice questions, concerns, or complaints pertaining to outings and outings leaders. In such circumstances, several alternatives exist.

If the complaint arises as a result of a technical checkout (navigation, rock, or snow), the complaint should be made to the appropriate technical chair or chair of the LTC. If the complaint arises on non-training outings, it should be addressed to the chair of the Angeles Chapter Safety Committee if it is an issue related to the safe conduct of outings. If safety is not the primary issue, then the complaint should be addressed to the ombudsperson/member advocate of the Angeles Chapter Outings Management Committee. All of these people are listed in the Angeles Chapter's Directory.

SIERRA CLUB INSURANCE (2012)

Sierra Club insurance is renewed annually, and significant changes can and do occur. National Sierra Club staff prepare a guide to the insurance coverage in an effort to help leaders and outings chairs understand the insurance coverage. The guide is called “Risk Management and Insurance Manual.” Information included here has been taken from the national Sierra Club extranet site and may be reviewed or downloaded from <http://clubhouse.sierraclub.org/administration/finance/risk/default.aspx>.

Unfortunately, the insurance policy tends to change faster than the guide can be amended. In case of a conflict, the insurance policy, not the guide, controls. Questions about insurance coverage should be addressed to local.

The Angeles Chapter will be updating the Rules of Conduct. Check http://angeles2.sierraclub.org/ltc_rules_of_conduct for the most current rules.

RULES OF CONDUCT

The following rules apply to all persons participating in outings activities of the Angeles Chapter of the Sierra Club. Violation of these rules may result in removal of a participant from a particular outing and/or revocation of the privilege to participate in future outings.

Authority of the Leader: The authority of an outing leader is nearly absolute. The outing leader is the sole judge of the qualifications of participants. Participants must comply with the orders and instructions of the outing leader.

Eligibility to Participate: Most Angeles Chapter outings are open to both Sierra Club members and non-members. Eligibility restrictions, if any, should be stated in the trip write-up. Sponsoring entity themes should be regarded as a clue to the ambiance to be expected rather than a restriction on participation. For example, you don't have to live in the San Fernando Valley to go on an outing sponsored by the San Fernando Valley Group, and you don't have to be single to go on an outing sponsored by the Sierra Singles Section.

Qualification to Participate: Trip announcements typically give information about the physical challenge involved (distance and elevation gain) and the skills, equipment, and experience required for successful participation. Some trips require prospective participants to provide information about their conditioning and experience to the leader for screening in advance of the trip. Other trips may simply ask participants to screen themselves before showing up at the trailhead. In either case, you should be honest with the leader or yourself. If you participate in a trip for which you are really not qualified, you won't enjoy the experience, and you may make the experience less enjoyable for other participants. Leaders should give good faith consideration to accommodations requested by potential participants who are disabled.

Minors: Participants under 18 years of age must be accompanied by a parent or guardian or have written permission from same giving phone number and authorization for continuing treatment by a physician in case of necessity. An Authorization and Consent form is printed in Appendix C and is available at http://angeles.sierraclub.org/ltc/transfers/Minor_Waiver.pdf or http://www.sierraclub.org/outings/national/participantforms/forms/individual_waiver.pdf Note that there is also a medical release form for minors, available in Appendix C and at <http://clubhouse.sierraclub.org/outings/forms/programs/insurance/minorrelease.PDF>

Liability Waiver: All participants are required to sign a liability waiver. This is an important legal document which limits your right to sue the Club or its leaders in the event of injury on an outing. Your participation in an outing is a voluntary recreational activity. If you are not willing to sign a waiver, you need to find some other recreational activity.

Travel Procedures: Participants are to remain with the group unless the leader gives permission to leave, adhere to routes designated by the leader, refrain from "short cutting" switchbacks on trails, and remain behind the leader and ahead of the trail sweep.

Leave No Trace: The Sierra Club supports leave no trace principles, including minimizing the environmental impact of travel and camping, disposing of waste properly or packing it out, leaving natural objects as you find them, using stoves for cooking, limiting campfires to a single small campfire where permitted, respecting wildlife, storing food and garbage securely, and being courteous to other visitors.

Compliance with Laws and Regulations: Sierra Club outings are conducted in compliance with applicable laws and regulations, including requirements for entry permits, campfire restrictions, campsite location restrictions, waste handling rules, parking restrictions, etc. Rangers and other law enforcement personnel are to be treated with respect.

Sexual Harassment: Sexual harassment of Club members, volunteers, or others who participate in Club-sponsored activities is prohibited. Sexual harassment includes unwelcome sexual suggestions, physical contact, offensive sexual language or images, or use of club contact information to make unwelcome sexual suggestions outside of Club activities.

Animals: Animals (other than guide dogs) are prohibited unless a specific announcement that animals are allowed is included in the trip write-up. The leader may permit a disabled participant to bring a guide dog as long as the group safety isn't jeopardized or local land agency rules or regulations are not violated.

Firearms: Always prohibited.

Cell Phones: Both leaders and participants are encouraged (but not required) to carry cell phones because they may be a useful resource in an emergency. Inappropriate or excessive use of cell phones for non-emergency communications can be annoying to participants. Outing leaders therefore have the authority to restrict or regulate the use of cell phones.

Hand-held Transceivers: May be carried but used only if permitted by the leader and subject to further leader restrictions.

Radios and Sound Listening Devices: May always be used at camp if equipped with earphones for private listening. On the trail or when climbing, use may be restricted or prohibited by the leader in the interest of safety.

GPS Receivers: Generally permitted, with the sole exception of navigation checkouts, where evaluators may prohibit use or possession in order to test a candidate's skill at non-electronic navigation techniques.

Hiking Poles: Permitted unless the trip announcement indicates that hiking poles are not permitted. Even when permitted, leaders have the authority to require safe practices in use of hiking poles and restrict their use when appropriate for safety reasons.

Bike Helmets: Participants and leaders must wear appropriate safety helmets while riding on a bicycle outing.

Technical Climbing Gear: In general, gear such as ropes, ice axes, or crampons is appropriate only on approved Restricted Mountaineering Trips. There is no prohibition against outings participants bringing along whatever mountaineering or safety equipment they may choose to bring on an outing for their own personal safety. However, the use of technical climbing gear should be restricted to avoiding unanticipated hazards only, not to be used for mountaineering that is not part of the structured outing.

outings@sierraclub.org. The Local Outings Manager at the national Sierra Club office can also help local chapter entities with insurance questions.

The basic purpose of the Sierra Club's insurance is to provide that Sierra Club activities and property are adequately covered by insurance to protect the Sierra Club against significant risk or loss.

Comprehensive General Liability Coverage—Domestic

The domestic liability policy provides coverage for the Sierra Club and the Sierra Club Foundation, its employees,

and members authorized to act on its behalf against claims for bodily injury, death, damage to property of others, or infringement on others' personal and property rights. The policy extends to activities of the Sierra Club in the United States and Canada (except for Sierra Club Canada, including the Canadian Chapters/Groups, which is incorporated under Canadian law).

The General Liability policy is not a medical or accident policy to insure covered parties against medical expense or income loss[es] from injuries. It insures the Club, its employees, and volunteers against liability to third parties for unintentional negligence and provides a defense against such claims. For insurance coverage to apply, the following

conditions must be met.

1. The person must be an employee, authorized agent, or volunteer of the Club and be acting within the scope of his/her authorized duties. Volunteers must be acting on behalf of the Club in a responsible manner and in a defined role (e.g., outings leader, chairperson, newsletter editor, coordinator for a fundraising event, etc.) and are covered only while performing his/her authorized function. This is limited by the restrictions on coverage while operating a vehicle as set forth in Auto Liability Coverage. Individual members participating on an outing, or attending a Club meeting, fundraising event, or other activity, are generally not insured by our various policies, since they are not officially acting on behalf of the Club.

2. The “event” or “activity” must be a Club function that has been officially authorized or sponsored by the Club or one of its entities. Typical functions include outings, fundraising activities, volunteer meetings, retreats, etc. Such functions, after being authorized, should be announced in a Club, Chapter or Group publication. Authorization must come from some governing body within the Club, such as a **Chapter or Group ExCom, Outings Chair or a Club committee**. Individual trips, events or activities, even though participated in entirely or partially by Club members, are not covered if they are privately organized by individuals and not officially authorized by the Club as described above. If an event cannot be announced in Sierra Club publications (i.e., event or outing is planned after a newsletter goes to print), other documentation, such as trip reports, master outing calendar entries, or meeting minutes, must be used to substantiate the activity as an authorized Club event. Chapter, Group, or Outings Chairs must keep the documentation on file for at least as long as the statute of limitation for negligence lawsuits in their state, which can be up to six years from the date of injury (depends on state law).

Restrictions in the Domestic General Liability Policy

Most activities will normally be covered by this policy. Specific exclusions, however, have limited the types of activities the Sierra Club can be involved in, and some activities have exclusions or limitations or require special approval prior to the outing or event. The current restrictions for 2012 are described below, but are subject to change annually. Besides the restrictions on watercraft and mountaineering activities, Challenge Courses, also called Ropes Courses, have restrictions but are not offered by the Angeles Chapter.

Watercraft Activities–United States and Canada

Current watercraft policies and answers to frequently asked questions can be found at <http://clubhouse.sierraclub.org/outings/policy/watercraft/> and <http://clubhouse.sierraclub.org/outings/faq/watercraft.asp> respectively. For insurance limitations, please see the Risk Management and Insurance Manual: <http://clubhouse.sierraclub.org/administration/finance/risk/default.aspx>.

All watercraft activities must meet the following criteria:

1. The watercraft cannot be owned by the Sierra Club or any of its entities. (If the watercraft is less than fifty feet in length, it is permissible for the watercraft of an outing to be owned by the leader and to be used by participants, provided that no fee is charged for the use of the watercraft).

2. Watercraft fifty feet or greater in length must be operated by a licensed professional concessionaire.

3. The outings leader must have all participants sign an *Acknowledgment of Participant Responsibility, Express Assumption of Risk, and Release of Liability* waiver form before the trip begins and must send these waivers to the outings chair. Outings chairs must keep these on file for at least as long as the statute of limitation for negligence lawsuits in their state, which is generally six years. *All participants must be informed in advance of the outing of the requirement to sign an assumption of risk and liability waiver.*

4. The outings leaders must follow all state and federal regulations for operating watercraft used for carrying passengers. Sierra Club entities conducting watercraft activities must check with their state on any regulations for leading the type of watercraft activity they wish to be approved.

Due to insurance restrictions, some watercraft activities that use a concessionaire are considered “restricted” and approval must be obtained from the national Sierra Club prior to making any commitments or advertising the event. If the concessionaire is hired for the renting of equipment only (e.g., renting kayaks/canoes from an operator, but not using their guide services) or is a regularly scheduled charter/cruise (e.g., a public ferry), the trip is not considered restricted, and an application does not need to be submitted.

If a concessionaire is hired (either with or without payment) for the operation/chartering of a watercraft, guiding services (e.g., a rafting operator, a kayak/canoe guide), or even just to accompany the trip, the trip is considered restricted and an application must be submitted to the Outings Department.

For restricted watercraft activities, in addition to the criteria listed above that all watercraft activities must meet, it

is necessary for the concessionaire to sign the Concessionaire Agreement and issue a Certificate of Insurance to the Sierra Club, naming the Sierra Club as an “additional insured.” The application, Concessionaire Agreement, Certificate of Insurance, and proof of current first aid training for each Sierra Club leader must be sent to the Outings Department at least 30 days prior to making any arrangements or commitments or advertising the activity. In the event that a concessionaire refuses to name the Sierra Club as an additional insured, contact the Outings Department immediately.

On restricted watercraft activities, the Acknowledgment waivers must be sent to the Local Outings Manager in the Outings Department.

Mountaineering Activities

Any Club event that is expected to use ropes, runners, ice axes, crampons, or other mountaineering equipment is considered “mountaineering” and must be approved by the Mountaineering Oversight Committee (MOC), a group of volunteers with expertise in mountaineering.

This applies only to outings on which mountaineering equipment is expected to be used. In no event should this policy be treated as restricting leaders from taking along such mountaineering or other safety equipment as may be prudent to deal with unanticipated hazards. Leaders must not attempt to avoid the extra requirements for approval of a mountaineering outing if the leaders know or reasonably believe that mountaineering hardware will be required in order to negotiate the planned itinerary or any optional routes on the outing safely.

For any mountaineering outing, an application must be submitted to the MOC Chair, who will forward approved applications to the Local Outings Manager. The leader cannot make any arrangements or commitments or advertise the outing until the activity has been approved by the MOC.

Due to insurance restrictions, if a professional concessionaire is hired to guide the outing, the following criteria must be met: the concessionaire must have proof of up-to-date American Mountain Guide Certification and the concessionaire must carry liability insurance of at least \$1,000,000 and provide the Sierra Club with a certificate of insurance naming the Sierra Club as additional insured. In the event that a concessionaire refuses to name the Sierra Club as an additional insured, contact the Local Outings Manager immediately.

On all Sierra Club mountaineering outings, the outings leader must have all participants sign an *Acknowledgment of Participant Responsibility, Express Assumption of Risk, and Release of Liability* waiver form before the trip begins and must send these waivers to the Local Outings Manager in

the Outings Department.

IMPORTANT: Trips to climbing gyms are strictly prohibited.

To view the Sierra Club Mountaineering Policy go to <http://clubhouse.sierraclub.org/outings/policy/Mountaineering.asp>

Ice axes and other personal safety equipment may be brought by participants on non-restricted trips. This must not be interpreted, however, to mean that trips may be scheduled on which it is “understood” but “not required” that everyone bring an ice axe, or that belays will be given, but “not required” to avoid the Restricted Outing approval process. Leaders need to live by both the spirit and letter of these regulations. The trip leader needs to judge well in advance whether ice axes or ropes are prudently required for the trip to be led safely. If the leader is not really sure that the trip can be led safely without ice axes or ropes, the leader should make the outing a restricted one and obtain the necessary approvals. If a trip is not scheduled as a restricted outing and the leader determines during the trip that a rope or ice axes must be used to continue, the trip objective should be aborted and another goal which can be met safely without using this equipment substituted. If, for example, conditions make it appear that a peak climb may require a rope for some participants to descend safely (even if they could climb up without one), the leaders must abort the climb so that there is no need to use the rope for the descent in a situation that could have been avoided. **TRIP LEADERS WHO VIOLATE THIS RULE AND ALLOW THE USE OF ROPES OR ICE AXES WHEN NOT APPROVED RISK LOSING THEIR LEADERSHIP PRIVILEGES AS WELL AS BEING HELD PERSONALLY LIABLE.** This policy is not to be interpreted to rule out the use of any safety equipment in an emergency.

Mountaineering Outings are allowed by the Club when they are approved in advance by the national Mountaineering Oversight Committee. Approval of the trip must be obtained prior to publication of the trip in OARS or activity calendar of the GSC. These outings are restricted to Sierra Club members only. At this time the Desert Peaks Section, Leadership Training Committee, Sierra Peaks Section, Ski Mountaineers Section, and Wilderness Training Committee have received approval to lead these “restricted” outings. The outings chairs for these sections will have the latest applications for trip certification, special sign-in/waiver sheets, and liability release forms. The forms are also located on the Chapter’s LTC web site and the national extranet site, as well as in Appendix C. Leaders planning on leading a mountaineering outing should contact the appropriate outings chair for the latest information. Only those trips reviewed and approved by the national Sierra Club’s Mountaineering Oversight Committee will be

covered by the Club's liability insurance.

Mountaineering and rock climbing outings as well as mountaineering training outings have the following requirements in common:

1. The leader must obtain approval for the outing prior to publication in OARS or a GSC activities calendar. Obtain the application forms from the outings chair, LTC web site, Appendix C, or <http://clubhouse.sierraclub.org/outings/local/forms>. Upon approval by the sponsoring GSC, the outings chair will forward the application to the chair of the Mountaineering Oversight Committee (MOC), who will forward the application to San Francisco for final approval, which may take up to four weeks to obtain.

2. All participants and leaders must be current Sierra Club members and must be screened for appropriate skills suitable for the mountaineering activities planned or those that could reasonably be expected.

3. When the leader sends back trip information to the participants, they should be warned that there is no medical coverage for this type of event and that a liability release form (waiver) must be signed. The leader may enclose a copy of the waiver form for their prior review.

4. All participants and leaders must sign the Mountaineering Sign-In Sheet Liability Waiver form, which has a space for each person's Sierra Club number.

5. All leaders and participants must provide a completed Participant Medical Form, usually two copies, available on the extranet site at <http://clubhouse.sierraclub.org/outings/local/forms>. Leaders may use these for further screening of participants as well as in an emergency.

6. After the trip, the sign-in/waiver and one copy of the medical form must be sent to the outings chair, who sends them on to the Local Outings Manager in San Francisco.

Mountaineering outings may have as a part of the on-trip climb preparation a skills refresher to make sure that all participants are, for example, current on ice axe arrests. Critique and comments can be made, but this is not to be a training course, and all participants should have been screened to make sure that they had the prerequisite skills prior to the outing.

Mountaineering Training Outings

Mountaineering Training Trips (including leader certification training) may be led, but training of "rank beginners" is not permitted. This is the only restriction, however, in the material that may be taught. These trips will have as their primary goal training. Trips with limited skills refreshers as a part of a climbing trip (as described above) will not be considered training trips. As with all restricted outings, leaders and participants must be club members, and the trip must be approved in advance (see above). The

application for training trips should be used.

Certificate of Insurance

When arranging an outing or an event, a leader may be asked to provide a "Certificate of Insurance" by a property owner. If this is the case, contact the Local Outings Manager in San Francisco to obtain the proper help.

What to Do in the Event of a Lawsuit

If one is advised of any form of legal action against the Sierra Club or any of its affiliated entities, this information must be communicated to the Risk Management Manager immediately (415-977-5569). Leaders should report threats of litigation as well as actual notice of suit. Chapters and subentities should not engage their own counsel. The foregoing applies to complaints in the areas of libel and slander, copyright, employment, breach of contract, accidents, negligence, and any and all forms of liability.

The Sierra Club headquarters, with assistance of the legal committee, will retain outside legal counsel, which includes paying for the legal fees, and will ask outside counsel to work with the appropriate persons to resolve the legal matter.

Once one has received notice of litigation or potential litigation, one should not discuss the matter with the press or newspapers until or unless directed by counsel to do so. Other discussions with Sierra Club employees or members should be done only if necessary and only with appropriate parties. The goal is to minimize inaccuracies, adverse publicity, and weakening of the Sierra Club's case.

Bus Insurance

Outings chairpersons must ensure that sponsored bus trips comply with Sierra Club rules. The rules applying to bus trips are outlined in the Insurance Guide. Bus trip rules require the sponsoring leader to determine that the bus company being chartered has a valid certificate of insurance which names the Sierra Club as additional insured. This certificate must be on file in the chapter office. In order to give leaders more freedom in the selection of bus companies, there is no official list. The leader is responsible for checking with the chapter office to see if the chosen bus company has a current certificate on file, and, if not, the leader is to secure a renewal or new certificate from the bus company and to send it to the chapter office before the trip. Forms for this purpose are available in the chapter office or on the national extranet site. In the case of lapsed certificates or refusal to add the Sierra Club as additional insured, the bus company must not be used.

Carpooling

Because the policy is that trips start at the trailhead, leaders must not take an active role in making arrangements for participants' transportation. Carpooling and transportation arrangements are not to be directed by the leader. Instead, the leader is responsible to see that all participants know the directions and, in the case of moving between roadheads and/or campsites, that no participants are

left behind. The leader should not imply that transportation arrangements are anything but voluntary and participant-initiated because some lawyers may try to make the Sierra Club liable for traffic accidents. For further information, one may contact the Safety Chair. The sign-in sheet/waiver should be signed at the initial trip meeting place, which may be the carpool point. It is a good idea for a leader to tell participants about the plan of the trip at a rideshare point before carpooling in case a participant decides not to go on the outing.

ANGELES CHAPTER SAFETY POLICY

Angeles Chapter Safety Policy (ACSP):

Approved by Angeles Chapter Executive Committee June 23, 2013

1.0 Purpose

This policy applies to the Angeles Chapter outings program and provides specific requirements for groups, sections, committees, and task forces (GSCs) to assure that outings consistently meet participant safety expectations and Sierra Club risk-management goals.

2.0 Scope and Precedence

This Angeles Chapter Safety Policy (ACSP) supplements national Sierra Club outings policies and the Angeles Chapter Outings Governance Policy and is applicable to all personnel involved in the Angeles Chapter outings program. This policy provides requirements for the Safety Committee to conduct its business and oversee chapter- and GSC-sponsored outings. This policy also provides detailed guidance for certain GSCs to prepare GSC Safety Policies and manage their outings program consistent with chapter and national requirements.

In any case where this policy is less stringent than national Sierra Club outings policies and the Angeles Chapter Outings Governance Policy, those policies have precedence. In cases where this policy is more stringent (e.g., the requirement for two leaders on outings), this policy shall apply.

3.0 Angeles Chapter Outings Ratings

A system of classifying outings has been established in the Angeles Chapter according to 6 levels of difficulty (C, O, I, M, E, T). Five of these levels correspond to leader certification levels (O, I, M, E, T) as described below

Level C (Conducted): Certain outings are conducted almost entirely under external control, such as by a concessionaire or ranger. During a conducted outing, the Sierra Club leader has little responsibility beyond administrative matters. Organizers of conducted outings require only minimal leader qualifications and, therefore, conducted outings are not included in the leader certification system.

Level O (Ordinary): O-Level outings are trips on trails or off trail with no navigation or terrain difficulty (class 1) and require basic technical skills of outings leaders and participants. New leaders who have not led a backpack as a provisional leader are identified as O Level 1 (O-1) leaders who may lead day hikes and car camps but not backpacks. Such O-1 leaders may subsequently upgrade to O Level 2 (O-2) status by completing a provisional lead of a backpack.

Level I (Intermediate): I-Level outings include cross-country travel and possibly class 2 terrain. Leader qualifications shall include demonstrated navigation, cross-country travel, and backpacking skills in addition to the O-level requirements.

Level M (Moderate): Outings that involve class 3 rock or snow travel requiring the use of an ice axe shall be classed as M. Technical training in rock climbing and snow travel is required in addition to lower-level requirements. Leaders may be rated full M (both rock and snow), M-Rock, or M-Snow.

Level E (Exposed): Outings that involve class 4 rock or snow travel that requires the use of crampons in addition to ice axe for safety shall be classed E. Leaders are required to demonstrate more advanced skills involving rock climbing and snow travel than are required for level M. Leaders may be rated full E (both rock and snow), E-Rock, or E-Snow.

Level T (Technical): T-Level outings involve specialized technical skills (for example, sailing, kayaking, or ski mountaineering). These outings impose highly specialized leadership requirements, and certification of leadership qualifications shall be in accordance with the requirements defined by the entities that sponsor such outings.

4.0 Related Committees

In addition to the Angeles Chapter Executive Committee (ExCom) and the GSCs, the Safety Committee relates to several other committees, notably the Outings Management Committee (OMC) and Leadership Training Committee (LTC).

4.1 Outings Management Committee (OMC)

The Outings Management Committee is the Angeles Chapter committee responsible for managing all aspects of the outdoor activities program of the chapter, including training and risk management. The OMC promotes outdoor leadership and provides support for entity outings chairs.

4.2 Leadership Training Committee (LTC)

The LTC provides training of potential outings leaders in technical and non-technical subjects. LTC recommends qualified candidates to the Safety Committee for certification as Angeles Chapter outings leaders.

5.0 Angeles Chapter Safety Committee

The Safety Committee manages all safety and risk management aspects of the outdoor activities program of the chapter, including safety policies, publication review, Quick-Turnaround (Q-T) approval, accident investigation, policy monitoring, leader certification, and leader database maintenance.

The Safety Committee is led by the Safety Chair, appointed by the Chapter ExCom Chair and confirmed by the Chapter ExCom. Other Safety Committee members include the OMC Chair, the LTC Chair, the Wilderness Training Committee (WTC) Safety Coordinator and any other members specified by the current Angeles Chapter Outings Governance Policy and other Chapter Outings Standing Rules. The Safety Chair shall appoint additional committee members as needed to enhance judgment, expertise, and liaison functions of the committee.

SAFETY COMMITTEE RESPONSIBILITIES

5.1 The Safety Committee shall review the ACSP at least annually to reflect changes due to new situations or to capture chapter experience in operating under it. The Safety Chair shall propose ACSP revisions to the OMC. If the proposed revision is adopted by a vote of the OMC, it will become effective upon its confirmation by a vote of Chapter ExCom.

5.2 The Safety Committee shall review and approve safety policies established by the GSCs. Policies judged inadequate by the Safety Committee shall be returned to the appropriate GSC for revisions.

5.3 The Safety Committee shall monitor published outings that appear in all chapter media, including the Online Activity Registration System (OARS) and its successors, websites, listservs, newsletters and the *Southern Sierran*. It shall also set standards for publicizing chapter outings on social media. It shall ensure that qualifications of leaders are appropriate for the outing and that mileage, elevation gain, and other trip characteristics are properly identified

for participants. The Safety Committee shall communicate with the sponsoring GSC and request modifications of outings that exceed the qualifications of the leaders or participants. If the above is not successful, the Safety Committee shall direct the sponsoring GSC to cancel the outing.

5.4 Outings write-ups approved by a GSC outings chair shall be provided to the Safety Committee for information as soon as possible (e.g., by email to safecomm@angeles.sierraclub.org if they are submitted for publication in OARS or another chapter website or listserv). The outings chair of the sponsoring entity shall make suitable provision for seven-year archiving of the trip write-up if it is not published on OARS; no archiving shall be required for outings published on OARS.

5.5 Upon request by a GSC outings chair, the chapter Safety Chair may grant authority for an entity to employ the nationally-defined "Enduring" Waiver procedure for their regularly scheduled conditioning hikes. This authority must be confirmed by the national Outdoor Activity Program Team (OAPT) to take effect, and be implemented with full adherence to the "Enduring" Liability Waivers then current at the outings extranet of Clubhouse.

5.6 The Safety Committee shall investigate outing incidents and complaints involving outings leaders. Depending on circumstances and steps taken by the sponsoring GSC, additional action may be taken by the Safety Committee. The Safety Committee shall assure that incident reports are processed and that copies are retained.

5.7 The Safety Committee shall monitor national outings policies and forms for changes and notify the GSCs.

5.8 Upon leader candidates' satisfactory completion of the LTC training program, the Safety Committee shall grant leader certification. The Safety Chair may also directly certify leaders based on previous experience, proven capabilities, certification with other club chapters, etc. The Safety Committee shall notify sponsors of provisional outings of newly certified leaders and update the leader database to reflect new certifications.

5.9 The Safety Committee maintains a database of currently approved leaders, providing the leader's name, membership number and expiration date, leader certification level, first aid certification (date of course completion and type of course—standard or wilderness first aid), and date of policy knowledge renewal.

6.0 GSCs

Angeles Chapter outings are sponsored by regional groups, activity sections, committees, and task forces (GSCs).

6.1 GSC Organization

Each GSC is recognized by the Safety Committee to lead outings up to a particular certification level. Each GSC shall establish an appropriate organizational structure, select officers, recruit leaders, and provide resources as needed to conduct safe and successful outings at the indicated level.

GSCs that offer T-rated outings, provide training or conduct proficiency exams at the I-level or higher, or permit leaders to lead routes that are rated higher than their leader rating shall prepare a GSC Safety Policy (GSCSP) to supplement this Angeles Chapter Safety Policy (see section 7). Each such GSC shall review its GSCSP at least annually or if any major changes occur in the level and nature of outings conducted. A copy of the GSCSP shall be submitted to the Safety Committee for review and approval and subsequent archiving. Other GSCs that operate their outings entirely within the provisions of this ASCP have blanket authorization to operate their outings program and do not need to file a GSCSP.

The outings chairs of the GSCs play a crucial role in planning, selection, and scheduling of outings. More than any other individuals, the outings chairs can influence outing safety. Therefore, it is important that they be selected with great care. They should be well-qualified outings leaders familiar with the types and locations of outings frequently conducted by the GSC. Each GSC shall select an outings chair according to established criteria following documented procedures.

GSCs shall notify the OMC Chair, the Safety Chair, and the Schedule editor of new outings chair appointments before the new outings chair functions to approve outings for the entity.

Outings chairs shall use the Chapter Outings Chairs listserv (ANGELES-OUTINGSCHAIRS@LISTS.SIERRACLUB.ORG) as needed to keep informed on matters of safety and on changes to club and chapter outings policies. Outings chairs without e-mail are to provide the OMC and Safety Chairs with an e-mail address of someone who will forward listserv messages to the outings chair.

6.2 GSC Outing Requirements

With the exception of “conducted” events and certain outings as noted below, the GSC shall identify two appropriately rated leaders for each outing. If the GSC conducts outings that require additional leaders, the outings chair shall assure that additional leaders are provided.

The Safety Committee may sanction a GSC to lead specific outings (e.g., conditioning hikes with one leader per subgroup). If the GSC is so sanctioned, the GSC shall establish appropriate procedures for ensuring group control and safety.

If circumstances arise that impose greater difficulty (e.g., outings held in early spring), then the outings chair shall recognize these circumstances as the need arises and assign the outing a commensurately higher rating (e.g., an I-level outing with spring snow may become an M-level outing), and it shall be led only by persons qualified for the newly assigned higher level.

All snowshoe and cross-country ski outings must be led by two leaders certified at the I-level or higher unless a one-trip waiver is granted by the Chair of the Angeles Chapter Safety Committee for one or both leaders to be O-rated. Waivers will be based on such factors as the planned route and the experience of the leaders (e.g., have they led such trips and this particular route before?). Such waivers are required for any such trip published to be led by either two O-rated leaders or one I-rated leader and one O-rated leader. Any trip published to be led based on such a waiver must be canceled if there is heavy snowfall forecast on the day of the outing.

If the GSC conducts outings that involve special difficulty or that require special skills or equipment, the GSCs shall document additional procedures for the selection of the outings chair, leaders, and participants in their Safety Policy. Mountaineering outings requiring the use of technical equipment (ropes, ice axes, or crampons) shall receive prior approval by the national Mountaineering Oversight Committee (MOC).

Some GSCs conduct technical T-level outings (e.g., ski mountaineers, river touring) that encompass a broad span of specialized skills and difficulties. Outings chairs involved with T-level outings shall document criteria for leader selection and participant screening for safe outings under normal and possibly adverse conditions.

Some GSCs conduct training outings (e.g., navigation, rock climbing, and snow climbing). GSCs offering training outings at the I-level or higher shall document policies to screen participants properly and to conduct training outings in a manner commensurate with the risk to ensure the safety of participants.

Some GSCs conduct proficiency demonstrations (e.g., Leadership Training Committee and Ski Mountaineers) and shall document their policies to screen participants properly and conduct proficiency demonstration outings in a manner to ensure the safety of participants.

A GSC that is allowed to offer certain outings rated higher than the rating of the leader shall document this arrangement and its implementation in a GSC Safety Policy. The document shall indicate the ways in which safety and risk management are maintained.

6.3 Announcement Processing

Each Sierra Club outing shall be sponsored by a GSC and shall be published in an appropriate form in order for the outing to be sanctioned as an official Sierra Club trip. By sponsoring an outing, the GSC is giving its approval to the outing plan and the outing's leadership.

The GSC outings chairs shall be responsible for collecting announcements from leaders and seeing that they are published. Announcements submitted by anyone other than the outings chair shall be approved by the outings chair prior to publication. Restricted mountaineering outings shall be approved by the national Mountaineering Oversight Committee (MOC).

Outings chairs shall verify that each announcement lists a leader and at least one properly qualified assistant, contains an indication of the trip rating (O, I, M, E), describes the difficulty of an outing (such as elevation gain, distance, pace, etc.), addresses the general demands on participants and any special skills required, and provides contact information for the leaders.

On reserved outings, for which participants apply in advance for a spot, the trip announcement generally will not include the meeting time and place. On non-reserved outings, for which participants show up without a reservation, the meeting time and place must be included in the announcement.

Outings with multiple sponsors listed shall be approved in advance by each sponsoring entity and must comply with the outings procedures of each entity. The primary sponsor must be listed first in the header wherever the write-up is published. The primary sponsor is the one that would take the lead, in conjunction with the Safety Committee, to investigate any incidents that occurred on the outing.

Publication may be accomplished by GSC outings chairs submitting announcements to the Online Activity Registration System (OARS) or a successor website. Publishing in a GSC newsletter, website, or listserv also qualifies, provided a copy of the announcement is forwarded to the Safety Committee publications monitor. A complimentary copy of all GSC-sponsored publications shall be sent to reviewers designated by the Safety Chair and the Angeles Chapter office.

Any schedule announcements not published in OARS shall be archived for seven years after completion of the outing. In the event an announcement is published only electronically (at a website or any other non-print medium other than OARS), a hard-copy of the announcement shall be archived for the seven-year period.

After publication in OARS or a GSC newsletter, website or listserv, outings may be publicized through social media (such as Facebook, Twitter, Meetup or Craigslist) at the discretion of the sponsoring GSC. All such publicity shall mention "Sierra Club" or "Angeles Chapter" or the name of the sponsoring group, section or committee in the social media post or be prominently displayed in the account name for the posting. All such publicity shall also contain a hyperlink to the original publication in OARS or a chapter website; this link may be a "short link," such as those provided through bitly.com and tinyurl.com.

6.4 Verification of Leader Qualifications

Outings leaders are trained and rated through a chapter-approved leadership training program conducted by LTC and structured to be compatible with the leader requirements for rating levels O through E. Experience and training other than that obtained through a leadership training course may be recognized as a partial basis for leadership certification. Leadership certification is done by the Safety Committee following a leader candidate's completion of all appropriate training, demonstrations, and provisional leads.

Outings chairs shall verify that leaders meet the following criteria at the time of the outing:

- a. Current Sierra Club membership,

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- b. Certification as a rated leader at or above the level of the outing,
 - c. First aid certification within the last four years before conduct of an outing,
 - d. Leadership “soft” skills competence demonstration (e.g., OLT 101 completion and having read the Chapter Supplement to OLT 101—or the equivalent of these two as identified by LTC) within the last four years.

Any waivers to these requirements for specific individuals must be approved by the Safety Chair.

Outings chairs shall verify that leaders possess adequate knowledge, skills, experience, and mental aptitude commensurate to the outing and are capable of effective control of the group during the outing.

Outings chairs shall verify that leaders know the basic procedures for conduct of the outing and know Sierra Club emergency procedures. Sponsoring GSCs may elaborate upon the Chapter’s Rules of Conduct in their safety policies to match their outings characteristics.

Outings chairs shall verify that leaders of proposed outings be in sufficient physical condition to complete the outing and handle emergency situations, be familiar with the areas to be entered, and have a good idea of the conditions to be encountered during the outing.

Outings chairs shall verify that leaders of technical outings (especially T-rated outings) have appropriate training and certification(s).

6.5 Leader Responsibilities

Once adequate information is gathered for an outing, the leader prepares an announcement and submits it to the outings chair. Following publication, interested participants evaluate their interest and suitability for a particular outing and may contact the leader for further clarification. The leader answers inquiries so that participants understand the demands of the outing and can make more reasoned judgments on whether they should attend.

On reserved outings, the leader shall perform screening in advance of the trip. Once screening is completed and the participant list takes shape, the leader normally sends out a trip sheet to participants, detailing where and when to meet, what to bring, how to prepare, and what to expect. The trip sheet normally includes participant contact information to allow participants to make individual carpool arrangements to arrive at the meeting point on time, fed, rested, and ready to go.

If two appropriately rated leaders are not available at the start of the outing, the outing must be replanned at a level consistent with available leaders or canceled. Trips canceled for this reason may not be led as “private” outings, unless all participants are notified before leaving home.

The carpool to the trailhead is never part of the Sierra Club outing, and leaders should not suggest or imply that the outing begins with the carpool. Leaders shall avoid accepting responsibility for travel to, during, or from outings, leaving that to private, voluntary arrangements. If there is a carpool from the meeting point to the trailhead, the waiver should be signed before the carpool.

A waiver is required for participation in any Sierra Club outing. Leaders are responsible for collecting waivers from all participants. At the start of the outing, leaders shall provide a sign-in/waiver sheet to obtain information on each participant, including name, car license, and emergency contact. Participants should sign the liability waiver at the initial trip meeting place, thus providing participants an opportunity to back out of the outing if they decide not to sign the waiver.

Leaders should ensure that participants are prepared to follow the Rules of Conduct established by the Sierra Club and Angeles Chapter. During introductions, leaders shall inform participants of the rules that govern conduct on an outing.

The leaders shall check that all participants are properly equipped and qualified for the outing, either through pre-screening or at the trailhead or both. On non-reserved outings, the meeting point is the first opportunity to screen participants.

During the outing, the outing leaders shall exercise control of the group and are responsible for the outing's safe conduct. This includes compliance with the requirements and procedures established for safe outing conduct. Leaders shall keep the group together and under control at all times. The leaders shall modify the outing plan as necessary to avoid exceeding the capability of the group. The leaders shall abort the outing objective if circumstances prevent its completion in safety. During the conduct of an extended outing, if two rated leaders are not available for any part of the planned outing, a fully-rated leader may appoint an experienced participant to assist in conduct of that part of the outing. Such a participant must be a Sierra Club member. Before doing so, the leader must make the determination that the outing plan may be safely completed with the remaining group. Following any outing during which a fully-rated leader appoints a participant to assist in conduct of part of the outing, the leader shall report the circumstances to the outings chair and to the Safety Committee Chair.

Any participant leaving the outing before its completion shall be signed out, consistent with national policy ("Early Sign-Outs"). Sign-out of all participants at the end of an outing is at the leader's discretion but is particularly prudent in the case of more remote outings to ensure no one is left behind.

Following an outing, sign-in/waiver sheets shall be archived by the GSC outings chair for a period of seven years.

For a normal outing without accident or incident, no further follow-up is required.

6.6 Accident/Incident Procedures

If an accident occurs during an outing, the leader is expected to limit the situation to avoid any further injuries, appoint someone to document the events, then render assistance to the injured. Often an incident necessitates holding the group together for a prolonged period and may involve the entire group missing work the next day or until the situation is remedied. It is important that the vitals of the patient(s) be recorded at regular intervals and that injuries and treatments be recorded. In medical and legal parlance, if it isn't written down, it didn't happen. Also, a written record may prove vital to defend the leader's actions months or years later during an investigation.

Following an accident/incident, the leader shall file a report with the Safety Committee and National. Subsequent to filing the incident report the GSC shall investigate all accidents and complaints, take action as appropriate, and file their analysis with the Safety Committee. The GSC shall support the Safety Committee investigator as needed.

7.0 GSC Safety Policies

The following guidance is for GSCs that need to maintain a GSC Safety Policy. While adherence to the structure suggested below for a GSC safety policy is not a requirement, GSC safety policies shall be audited for content in each of the following areas. Therefore, policies that are structured with the following points in mind will be much easier to evaluate and approve.

GSC Organization

- A1 Indicate the GSC name and highest level of outings the GSC is authorized to conduct;
- A2 Indicate the title of the person(s) responsible to write and approve the GSCSP;
- A3 Indicate the outings chair selection criteria;
- A4 If applicable, if the outings chair does not use the listserv, indicate the person responsible for forwarding listserv messages to the outings chair;
- A5 If applicable, indicate whether the GSC has any special approvals on file for one-leader outings;
- A6 If applicable, indicate whether the GSC has any special approvals on file for outings that involve special

difficulties or special skills and equipment;
A7 If applicable, indicate whether the GSC has quick-turnaround outings approval.

GSC Outings

B1 Describe the types of outings conducted by the GSC;
B2 If applicable, describe how waivers and sign-in sheets are handled before, during, and after the outing;
B3 If applicable, describe any large group events that require more than two leaders;
B4 If applicable, describe any one-leader outings;
B5 If applicable, describe any outings that involve special difficulties, skills, or equipment;
B6 If applicable, describe procedures used for any restricted trips, including MOC coordination;
B7 If applicable, describe any criteria for upgrading the level of an outing due to adverse conditions;
B8 If applicable, detail any T-rated outings including leader selection, participant screening, and any special grading systems used;
B9 If applicable, describe any outdoor training conducted by the GSC, including qualifications of leaders, instructors, and participants and how risks to students are controlled;
B10 If applicable, describe any outdoor proficiency demonstrations conducted by the GSC, including qualifications of leaders, examiners, and participants;
B11 If applicable, describe any arrangements whereby a leader of a particular rating may lead a route at a higher level.

Announcement Processing

C1 Describe the method(s) used by the GSC to satisfy the publishing and archiving requirements, especially if electronic publications are used;
C2 If applicable, describe any procedures for quick-turnaround approval of outings;
C3 If applicable, detail any special rating systems, other than mileage and altitude gain, used in the publication of outings to indicate strenuousness or technical demands;
C4 If applicable, describe procedures for any jointly-sponsored outings;
C5 If applicable, list any outings-related books, manuals, or newsletters published by the GSC, and frequency of publication.

Leader Qualifications

D1 Describe the GSC criteria for approving a leader (especially one with previous accidents, complaints, or disciplinary action) to conduct a particular outing;
D2 If applicable, describe any GSC-specific directives that elaborate upon the chapter's Rules of Conduct and how leaders become aware of any such GSC specific directives;
D3 If applicable, explain how any T-rated leaders receive technical training and certification.

Leader Responsibilities

E1 Describe or provide representative example(s) of trip sheets provided to participants before the outing to help them assemble their equipment and prepare for the outing;
E2 Indicate how trip participants are screened to assure that they have the skills required for the trip and to identify those with medical conditions or a previous history of complaints or disciplinary action;
E3 If applicable, describe any special procedures used to assure the technical skills of participants (e.g., the mountaineers list).

Accident/Incident Procedures

F1 Describe how the entity is set up to handle emergencies, reports, and follow up activities and how these procedures are coordinated with leaders before an outing;
F2 If applicable, explain any special emergency procedures employed by the GSC for the scope of its outings.

4

Outings Leadership and Emergency Procedures

The leader is responsible for achieving the published goals of the trip to the extent they can be accomplished while ensuring the safety of the party. Sierra Club trips are planned to be enjoyable and environmentally sound, but to reduce whatever hazards may exist and to increase the enjoyment of all, certain rules should be followed and various precautions taken. This can be accomplished in large part by planning and good judgment with a minimum of orders and regimentation.

Experience in the Sierra Club and other outdoor activity groups has shown that good leadership is more important to successful outings than technical skills. Leadership has many dimensions and can be viewed and assessed in multiple ways: behavior of the leader, internal motivation of the leader and group members, performance of individual outing participants, the interpersonal dynamics of the group, or objective performance of the group as a whole. Besides the mechanics of leading a trip for the Angeles Chapter, this chapter delves into the components of leadership as an aid to prospective leaders and offers perspective on leadership with the goal of enhancing the performance of leaders and the groups they lead.

The best leaders are aware of their limitations and personal motivations for being a leader, and they are aware of the style of leadership they are expressing. They become good judges of when it is prudent to shift styles in reaction to changing conditions. Just as leaders will be conscious of their own style and performance, they know they will be closely watched by members of their party looking for models of successful or dysfunctional leadership.

OUTINGS LEADERSHIP

Psychology of Leadership

Successful leaders reflect a variety of personal profiles or personalities. There is no perfect leader profile, but the outings leader should possess certain qualities, common to many successful leaders, in reasonable degree. The qualities include physical fitness, technical knowledge, planning and problem-solving skills, confidence, and decisiveness. Leaders should be as gentle as possible on the feelings of others and aware that they are in a position of visibility. Good leaders act in a manner that reflects well upon themselves, the Sierra Club, and the outings community. The two (or more) leaders of an Angeles Chapter outing, furthermore, need to work well together.

The psychological factor involved in outings is often difficult to detect in the field until too late and sometimes surprisingly hard to describe and understand after the occurrence. But its influence, for good or evil, cannot be overestimated in the outings environment. An effective

LEADERSHIP QUALITIES

Good leaders

- Accept responsibility;
- Always are learners, seeking to improve their leadership skills;
- Know appropriate outdoor skills and practices;
- Organize and delegate;
- Plan safe, enjoyable, and environmentally appreciative trips;
- Are enthusiastic, energetic self-starters, who follow through;
- Remain poised and confident under pressure;
- Exercise a sense of humor;
- Are congenial and considerate;
- Are tactful and understanding, yet firm and diligent;
- Have patience with the inexperienced;
- Restrain the overenthusiastic;
- Are effective communicators and good listeners;
- Encourage others;
- Are flexible;
- Willingly impart knowledge and skills to others;
- Recognize their own limitations, capabilities, and shortcomings;
- Identify potential leaders.

Sierra Club Group and Outings Committee,
Outing Leader Handbook "The Redbook,"
San Francisco: Sierra Club, 1998, pp. 5-6.

leader is a confident leader. A vacillating leader, or one obviously not in control of oneself, can do irreparable harm to the psychological set of a group and its members. Alert for the early signs of psychological deterioration in specific members of the group, the leader will check with the assistant to determine the presence of those attitudes and actions which may be symptomatic of an undesirable psychological state, and thus, of future trouble (running ahead, lagging behind, bravado, excessive competition, groundless fears, inexplicable exhaustion, unusual irritability, or incessant complaining). Beyond checking for symptoms in a particular person or persons, the leader must also consider the possibility of impending group psychological deterioration. This can stem from one or two disturbed persons gradually "infecting" others, or it can happen suddenly to the group as a whole. This latter situation can be the result of monotony or physical and nervous exhaustion. Often, it will stem from the group's disappointment (and perhaps disagreement) with the leader's decision to turn back, skip lunch, impose regulations, bivouac early, or leave camp before dawn.

A negative psychological set, once established in the group, has high potential for future trouble. One "leader error" or one "unexpected" natural event (e.g., a white out) may precipitate panic or rebellion. The successful leader THINKS AHEAD and by words and actions precludes or greatly minimizes the possibility of group deterioration. Of course, there is no pat answer, no one right course of action, for the leader confronted with an adverse psychological situation. In general, however, the leader should remain calm, display objective interest in the person and the situation, listen and observe more than talk, and discreetly discuss the situation with the assistant (and perhaps another knowledgeable person). In the end, the leader must exercise judgment and make a decision based on experience, training, and problem-solving ability. Once made, the decision should be explained to the person (and the group, as appropriate) and then implemented, politely, but firmly and rapidly. Judgment is what leadership is all about. One useful resource is John Graham's *Outdoor Leadership: Technique, Common Sense & Self-Confidence* (Seattle: Mountaineers, 1997).

Styles of Leadership and Roles of the Leader

The leader serves as the balancer of the many polar elements of group activity: structure versus flexibility, adventure versus safety, cohesion versus individuality, personal security versus growth, goal versus process, and others. Although a particular style of leadership may be most effective in a given situation, in most cases the difference in results is small, and leaders can express their individuality. In pursuing a proper balance, an effective leader will adjust

STATE OF MIND: A KEY TO SAFETY

It's impossible to know how many hikers have been injured by haste or overconfidence, but many survivors will tell you that they somehow lost their good judgment long enough to get hurt.

At least three states of mind frequently contribute to accidents: ignorance, casualness, and distraction.

Ignorance: There's Always More to Learn

- Look in the mirror: Are you the stubborn type? Do you resist suggestions? Could you be a bit overconfident? (Ask your friends.)
- Read: The climbing magazines are full of good recommendations and case histories that can show you how subtle factors may combine to catch you unaware.
- Practice: Reading may make you aware but not competent. In fact, you can be dangerously misled by what you read. Book-learning alone can give a complacency that could prove fatal.

Casualness: "I just didn't take it seriously"

- Habit Reinforcement: The more often you get away with taking risks, the more entrenched risky habits become. For example, you may casually drop items from your safety checklist.
- Listening to Others: Your attitudes and habits can be reinforced by the experiences (and states of mind) of others—sometimes good, often not.
- Memory Decay: "I'm not going up again without raingear—I thought I would die!" A week later this climber had forgotten how scared he had been in that thunderstorm and took no raingear on the next outing.

Distraction: Whatever Takes Your Mind off the Task at Hand (Like the Hike)

Experienced hikers are often hurt after making "beginner errors" (their words) to get somewhere quickly. There was no emergency or panic, but their minds were elsewhere—on a cold beer, a good pizza, or a warm bed. For example, darkness had caught two day-hikers far from their car. Unprepared, upset, and off-route, they rushed to get down, arguing with each other about what to do. After several errors, which they knew how to avoid, one was seriously injured by a long fall.

Conclusion—Or a Beginning

An adequate state of mind is like good physical conditioning: it doesn't happen overnight, and it takes constant practice, but the payoff in both safety and confidence is well worth it.

Stay aware of your mental state:

- Are you uneasy before this hike or climb? Learn to recognize that, ask yourself why, and deal with it.
- Are you taking shortcuts and risks? Could it be you're distracted? Stop, get your act together, then go.
- As a leader you are responsible for your trip participants: your mental preparation will affect their safety.

This material is adapted by Phil Wheeler from the paper "Staying Alive" by John Dill, National Park Service Search and Rescue

style to the situation. Leadership style is an interplay among the amount of task-oriented direction the leader gives, the amount of emotional support the leader provides, and the maturity or competence that group members exhibit in specific circumstances.

The definitions of leadership are many. Without settling on a single version, survey results from hundreds of outings show that participants expect leaders to be good at organizing and planning; be self-confident; be technically competent in skills such as first aid, route finding, and reading the weather; care for other people; make good decisions; be trustworthy; communicate well; inspire others to do their best; build and maintain morale; be good teachers and coaches; be able to deal with difficult people and handle conflicts; be able to build and maintain teams; anticipate problems and deal with them proactively. This is certainly a heavy obligation. Leaders approach such responsibilities and expectations in their own manner and style. Here are some generalized examples of styles.

In many circumstances, particularly private trips, the participants are nominally equals and have comparable levels of skills; each relates as a companion. They mutually agree on objectives and style (aggressive or casual) and the degree of commitment expected of everyone. Responsibility for safety of the party is shared, if unspoken, and no structured leadership is required as long as things go well.

Another style of leadership is that of teacher or coach. Most outings are not specifically training events, nor are leaders intended to be instructors, but outings participants often comment that they want to learn things as well as do things. Skills and knowledge gained from more experienced outing members are big reasons for participation and a primary means of increasing the skills and confidence of Sierra Club members, even though all participants are nominally expected to be similarly competent. The designated outing leaders need not be the most knowledgeable persons; instead, they can provide great value by verbalizing context in a teachable moment when skills transfer takes place: "OK, we're going to set up a belay here. Notice how Bob is . . ." Some leaders may think such comments are too contrived, but participants universally report appreciation when their uncertainties are resolved or new skills are conveyed by a few simple pointers offered by the leader.

One final leadership role should be mentioned by way of contrast, that of *guide*. A guide is paid to accept all responsibility for the party and for every member achieving the stated objective, sometimes even when doing so sacrifices other rewards of the outing. The members of the party are likely to be substantially unskilled, compared to the guide. An autocratic guide may not even inform the party of upcoming events. The authority of a guide is absolute, but

so is the responsibility. The guide may even be responsible for providing equipment and preparing meals. Sierra Club outing leaders are not guides, even though their decision-making authority during an outing is akin to that of a guide.

Sierra Club Leadership

Leadership on Sierra Club outings can be a dynamic combination of the various styles discussed previously, but our outings have certain basic and perhaps unique aspects. One is a process intended to ensure that participants are selected to have uniformly appropriate competence, with the selection process becoming more rigorous for more demanding outings. The leader first describes the outing for a published listing in a way that allows participants to self-select based on their own abilities. The leader may return more detailed trip descriptions to applicants, providing another opportunity for self-selection. The leader has the option of requesting background information to assess the applicant's ability and capability for self-assessment; this is a purpose of the SPS Mountaineers List or a personal activity résumé. For restricted mountaineering outings (those using a rope or ice axes), leaders must have two copies of the Participant Medical Form for each person on the trip. The form can be used as part of the screening process, and one copy should be carried on the outing in case of an emergency. See page 48 for more information and Appendix C for a copy of the form. The leader can ask others who have been out with the applicant whether they feel the applicant is appropriate for the outing. Inappropriate does not always mean that abilities are below the requirements; a hard charger on a modest outing can be as disruptive as a laggard. Even at the trailhead, the leader can describe the outing again, perhaps adding data on weather and route conditions, and allow applicants to opt out. The leader has the responsibility at that time to ensure that every participant has adequate personal equipment and supplies, providing another assessment of competence. Finally, even after the outing commences, the leader can make the uncomfortable decision to require a participant to sign out if it becomes obvious that his or her abilities will impair the group and if it is safe to do so. Social pressure should not compel an outing leader to include participants who are unsuitable for the planned activities; doing so can be unsafe for the individual, unwelcome for the group, and damaging to the leader's regard.

The most important responsibility an outing leader accepts is the physical and emotional safety of every group member. In modern leadership parlance this is called risk management; every outing is in some way a balance of adventure and safety. Risk management is first proactive and then, in an emergency, reactive. If one reviews compilations

LEAVE NO TRACE PRINCIPLES OF OUTDOOR ETHICS

Plan Ahead and Prepare

- Know the regulations and special concerns for the area you'll visit.
- Prepare for extreme weather, hazards, and emergencies.
- Schedule your trip to avoid times of high use.
- Visit in small groups. Split larger parties into groups of 4-6.
- Repackage food to minimize waste.
- Use a map and compass to eliminate the use of marking paint, rock cairns, or flagging.

Travel and Camp on Durable Surfaces

- Durable surfaces include established trails and campsites, rock, gravel, dry grasses, or snow.
- Protect riparian areas by camping at least 200 feet from lakes and streams.
- Good campsites are found, not made. Altering a site is not necessary.
- In popular areas:
 - Concentrate use on existing trails and campsites.
 - Walk single file in the middle of the trail, even when wet or muddy.
 - Keep campsites small. Focus activity in areas where vegetation is absent.
- In pristine areas:
 - Disperse use to prevent the creation of campsites and trails.
 - Avoid places where impacts are just beginning.

Dispose of Waste Properly

- Pack it in, pack it out. Inspect your campsite and rest areas for trash or spilled foods. Pack out all trash, leftover food, and litter.
- Deposit solid human waste in catholes dug 6 to 8 inches deep at least 200 feet from water, camp, and trails. Cover and disguise the cathole when finished.
- Pack out toilet paper and hygiene products.
- To wash yourself or your dishes, carry water 200 feet away from streams or lakes and use small amounts of biodegradable soap. Scatter strained dishwater.

Leave What You Find

- Preserve the past: examine, but do not touch, cultural or historic structures and artifacts.
- Leave rocks, plants, and other natural objects as you find them.
- Avoid introducing or transporting non-native species.
- Do not build structures or furniture or dig trenches.

Minimize Campfire Impacts

- Campfires can cause lasting impacts to the backcountry. Use a lightweight stove for cooking and enjoy a candle lantern for light.
- Where fires are permitted, use established fire rings, fire pans, or mound fires.
- Keep fires small. Only use sticks from the ground that can be broken by hand.
- Burn all wood and coals to ash, put out campfires completely, then scatter cool ashes.

Respect Wildlife

- Observe wildlife from a distance. Do not follow or approach them.
- Never feed animals. Feeding wildlife damages their health, alters natural behaviors, and exposes them to predators and other dangers.
- Protect wildlife and your food by storing rations and trash securely.
- Control pets at all times, or leave them at home.
- Avoid wildlife during sensitive times: mating, nesting, raising young, or winter.

Be Considerate of Other Visitors

- Respect other visitors and protect the quality of their experience.
- Be courteous. Yield to other users on the trail.
- Step to the downhill side of the trail when encountering pack stock.
- Take breaks and camp away from trails and other visitors.
- Let nature's sounds prevail. Avoid loud voices and noises

From <http://www.Int.org/programs/Int7/index.html>

of outdoor accidents, the inevitable conclusion is that nearly all could have been prevented by more effective risk management, and very few are actually due to unforeseeable hazards or circumstances beyond the leader's influence. Foresight is never as acute as hindsight, however, and when unplanned incidents do occur, leaders must step forward to direct the best resolution.

When all is going well, seemingly little leadership is needed. That things are going well indicates effective leadership has already taken place. When problems arise, it is most often due to previous lapses in leadership. Sierra Club leadership training and outings protocols emphasize the small actions leaders must take to head off big problems later on.

Objectives of Successful Leadership

Risk Management

The leader's primary responsibility is to balance risk and adventure with individual and group safety. This task is non-trivial because a good part of personal growth and the enjoyment of outdoor adventure comes from surmounting risk; risk is a component of adventure. Incidents, which is perhaps a better term than "accidents" as it does not imply unpredictability, occur at the unfortunate confluence of environmental hazards (such as weather, terrain, rockfall, or equipment faults) and human factors (such as gaps or weaknesses in planning, skill, leadership, communication, or physical conditioning). The skills that a leader employs to strike the optimum balance between adventure and incident come from self-knowledge, training, modeling other leaders, and thoughtful experience. All these point to a basic strategy: apply a keen awareness of environmental hazards and anticipate their impacts to avoid or minimize adverse consequences, optimize the human factors, and have a plan to deal with incidents should environmental hazards unavoidably overwhelm human factors.

As an example, the most common emergency incident is probably the unaccountable separation of individuals from the party. This can occur for many physical reasons: brushy or indistinct trails, intersecting trails, gastrointestinal exigency, exhaustion, and so forth. Deterrence is achieved by preemptive human intervention: advising the party regarding known problem points, keeping all of the group in visual contact and regrouping frequently at trail junctures, and having a plan to minimize the consequences should this incident arise. The consequences range from a time-wasting inconvenience for a group hike on a local trail to life threatening—for the separated individual or for the balance of the party that must conduct a search in impending darkness, such as on a ski mountaineering tour.

Group safety is not solely the leader's task, but it is

among the leader's responsibilities to involve other members of the party actively in the overall risk management strategy. Communication is key. The leader can brief the group on objective hazards ("We'll each need two liters of water today"), promote collaboration ("Let's all keep an eye on the weather"), and monitor impairments ("Let me know if that ankle gets worse").

The Angeles Chapter requires the demonstration of higher levels of leader competence to reflect the increased demands on risk management as environmental hazards and the adverse potential of incidents become more serious, reflected in the O, I, M, and E trip and leader ratings. All leaders are expected to conduct every outing with the safety of participants as the foremost objective.

Positive Group Experience

A positive group experience is central to a successful outing; it begins with the sense of belonging to a group. The military has long known that soldiers will perform far beyond their personal norms if they feel their performance is important to and recognized by their group; performance falls far below norm with impaired group cohesion. How do skilled leaders create a sense of group identity? Most importantly by a constant, consistent, and obvious policy of inclusion. This can begin with brief introductions in sign-up confirmations, but it really gets going with introductions at the trail head. Although this is a time when the natural tendency is to minimize the chatter and get on with the hiking, a wise leader will take the time to draw out participants just enough to send the message that a group is being formed and that this component of the outing is important. Investing a few minutes can produce considerable benefit later on. The leader can see that the group starts its hike smiling and chatting with one another, rather than everyone silently hunkering down for the forthcoming trudge. And that is only the beginning.

The next component of a positive group experience is the sense of personally contributing to the success of the group. The leader can encourage this by distributing responsibilities and chores among group members rather than taking on every task personally. He or she can underscore the importance of individual contributions with praise in front of others. The official leader is not required to direct every task and may choose to let group dynamics guide the selection of a situational leader, so long as other criteria, particularly risk management, are met. Any time leaders give more autonomy to the group, they must consider whether doing so might be unsafe or reckless or could jeopardize objectives. Doing so, however, may allow the group to build its sense of unity and lay the groundwork for individual members to grow personally.

As it is not necessary for leaders always to act as if they are the most competent group members in every respect, neither is it necessary for leaders always to be at the front in every activity. A competent and confident leader may move another person to the front in order to take the opportunity for other components of leadership, such as getting to know participants, coaching, assessing competencies that may be called upon later, or surveying the physical and psychological condition of the party. The official leader may suggest, "Alice, you seem strong, will you lead us up this next section?" Such an action is not an abrogation of leadership responsibility, but is a mature acknowledgement that outings may have complex objectives and that meeting more of them will result in a better experience overall. The leader can demonstrate expert group management by allowing someone else to demonstrate technical skill or grow in confidence.

Sometimes risk management requires the leader not be first, as might be the case when a party rappels and the assistant should go first to allow the leader to check, belay, and possibly coach each person. Knowing when to be first and when not to be is part of the situational judgment that good leaders develop.

Delegating responsibility for tasks is not the same as abrogating responsibility for making decisions. An outing group is not a democracy. A leader must carefully consider whether asking for a vote to reach a decision will have a positive effect, as participants may then view the leader as indecisive. In the backs of their minds, participants want to know they can rely on the leader to make critical decisions should the need arise, particularly when safety or other important objectives might be at risk.

A dictatorial leader will be shunned and a lackadaisical leader may cause concern for safety, even though both lead outings that achieve their stated objectives without incident. For nearly all participants, achievement of nominal objectives is not the foremost reward of an outing, though it is certainly high on the list.

Achievement of Stated Objectives

The leader begins the process of achieving the outing's objectives by stating them clearly, first in the published write up, later at the trailhead and throughout the outing. Articulating a vision of the outing's success serves to clarify the goals and get buy-in from participants. Of course, the total list of objectives may be complex; leaders need to acknowledge objectives other than the nominal, prioritize them, and let the group know the priorities and the bounds of flexibility with which objectives and milestones might be changed. Wise leaders know that participants have unspoken personal objectives that they associate with the nominal objectives of the outing; this provides individual

motivation and a sense of personal accomplishment. Even when buying in to the nominal objectives of the outing ("climb Mt. Hazelton"), individuals may have a variety of secondary personal objectives (bag a certain peak, complete any challenging climb, view nature, learn camping skills). A leader must focus on group accomplishment and recognize success in terms of the group's performance, while all the time realizing that a fundamental element for success is the harmony of personal objectives among an outing's leaders and participants. To promote that harmony, the leader will praise the group when milestones are reached ("Good work, folks, we made it to the lake right on schedule!"), but will also realize that each person is striving to reach personal milestones that should also be recognized and celebrated. The leader faces a challenge of balancing task-oriented direction (achieving group objectives) and providing emotional support (achieving individual objectives) but can meet that challenge by sensing how individual participants and the group as a whole are doing both physically and emotionally and using this assessment to choose appropriate leadership strategies.

When direction is required, a leader provides it by clearly stating messages using "I" language ("Dave, I need you to . . ."), by making messages complete and specific with congruent verbal and nonverbal delivery, and by emphasizing importance with redundancy. To ensure the directions are understood, a leader uses body language that communicates attentiveness to the person being addressed and asks for feedback about how the messages are being received.

Individual Motivation and Personal Growth

The first party members whose motivations must be addressed are the leaders. Leaders' strength comes from knowing why they want to be leaders and why they want to lead the kinds of trips they choose. When leaders accept that role, a certain amount of self-sacrifice is required, as the best interests of the party come before the personal needs of the leaders. To accept this successfully, leaders need to have a good deal of self-knowledge and self-confidence—leading outings is not a means of proving oneself. Usually, in fact, leaders must confront their limitations more forthrightly than any other party member while expressing a genuine interest in every participant that transcends their own emotional needs. The self-exploration and personal growth demanded of good leaders can require more courage than facing the most daunting environmental hazards or technical difficulties.

Self-knowledge, as well as compatible styles and coincident motivation, also applies to the leader's selection of an assistant or co-leader. Conflict between the leader and the assistant results in a mediocre outing, even if nominal

ELECTRONIC RESOURCES FOR OUTINGS LEADERS AND OUTINGS CHAIRS

On the Web

1. **The Outings Extranet.** The national Sierra Club maintains an Outings Extranet web site, called Clubhouse, with information that is useful to Sierra Club outings leaders. To get to the Outings Extranet, go to: <http://clubhouse.sierraclub.org/outings>. The extranet cannot be located with search engines, and it is not linked to the Club's "main" internet web site. It contains national outings policies, national forms, and other helpful information.
 - The Local Outings page is particularly helpful to group and section outings chairs and leaders. It includes national outings policies applicable to group and chapter outings.
 - Please note that the Incident Report Form for use in the Angeles Chapter is slightly different from the form on the national extranet site.
 - Be sure to use the Angeles Chapter Incident Report form for reports about Angeles Chapter trips.
2. **The Chapter LTC Web Site.** The Chapter's Leadership Training Committee maintains a web site at http://angeles2.sierraclub.org/ltc_become_a_leader. This web site has all of the national Sierra Club forms that you are likely to need, as well as the Angeles Chapter-specific Accident/Incident Report Form.

E-mail Resources

1. **The Lists of Climber.Org.** SPS member Steve Eckert maintains e-mail discussion lists that may be of interest to outings participants or leaders. There are separate lists for particular areas, such as the Sierra Nevada, the desert, the Bay Area, the Cascades, Colorado, the Los Angeles area. He also has lists for particular topics, such as high altitude and gear (equipment). For information on how to subscribe, check out <http://climber.org> or contact Steve at eckert@climber.org.

24 hour Help Line

Serious injuries and fatalities must be reported immediately. The 24-hour emergency telephone number for this purpose is 1-888-OUTINGS (1-888-688-4647).

objectives are met.

When a participant remarks, "Yeah, we got the peak, and the scenery was great, but I really didn't get much out of it," this translates to emotional needs not being met. Leaders can get a grip on this problem by realizing that needs are a hierarchy: physiological needs (warmth, food, water, etc); safety and security; affection, friendship, and belonging; esteem; and self-actualization. Somewhere in that hierarchy that person's needs were not met or were threatened. All individuals—leaders and participants alike—have emotional needs that are uniquely associated with tangible accomplishments that may or may not be among the identified objectives of the outing. By understanding this, leaders can more effectively ensure that all participants achieve the personal rewards and growth they are seeking, even though becoming personally acquainted with everyone on the outing may not be possible.

Take-Away Value, New Skills

Each of us has benefited when a more experienced person gave us a little tidbit of knowledge: a take-away skill that we remember long after the outing. This chapter has already pointed out that leaders are usually not intended

to be instructors and that party members are nominally of comparable ability. Nevertheless, leaders and assistants have a tremendous collection of skills that are eagerly soaked up by outing members—who report that this is a major reason for participating. For most leaders, transferring skills is one of the rewards of leadership once they get the hang of it. They quickly realize that knowledge transfer best takes place when the learner is in a receptive mode, and they develop a sense of when skills transfer is appropriate and when it is futile. Therefore leaders must be sure their skills are kept up to date to avoid perpetuating wisdom that is no longer wise. It should also be mentioned that experience is not the same as knowledge, skill, or wisdom—experience can mean making the same mistakes over and over, until sufficiently stressful circumstances finally reveal the deficiency.

Environmental Activism

For well over one hundred years the continuing purpose of Sierra Club outings has been to promote environmental activism. People are more likely to fight for and preserve areas they have explored. A leader can contribute to this by describing plants, animals, and geography of the natural environment—or threats to it—encountered during the

outing. Historical tidbits and the names of pioneers are readily absorbed by every participant, who appreciate a leader's taking the time to do the research and tell the tales. Some outings are more specifically focused on environmentalism and activism. Leaders should always model environmentally conscientious behavior, such as Leave No Trace practices. It is said that a group is a collection of people with common objectives, and that a team is a group with common values. On Sierra Club outings one shared value is a desire to preserve and protect the natural environment, and every leader has the responsibility to build upon this value.

Resolving Conflicts

Conflict in a group arises when individual goals are impossible to reconcile with the group's goals. A leader should be sensitive to this possibility and head it off at the first sign. Such conflicts occur so infrequently and dealing with them is so unwelcome that a leader may at first deny the conflict and then be surprised when dealing with it becomes inescapable. Maladaptive behavior almost always gets worse; denial is an ineffective response. After formulating an approach with the assistant, the leader's first recourse is a private consultation with the individual and the assistant leader. Sometimes it is only necessary to let the individual know that his or her voice has been heard and allow that person to confirm or clarify the leaders' interpretations. If a person's behavior needs to be changed, the leader will describe the behavior without evaluating or interpreting it and will place the behavior in the context of the group's objectives and values. The leader will accept the person while making it clear that the behavior is not acceptable. The leaders may offer general comments on successful alternate behaviors, reiterate common and agreed upon goals, and even call upon peer pressure. Much depends on the personal trust the leader has built and on the sense of group belonging that has been created during the outing. The dissenting individual should never be corrected publicly, and the interaction should never be allowed to become one of personal differences with the leaders. Ultimately, the leaders may have to isolate the individual from the group; this may mean signing the individual out, with all the attendant difficulties that may cause.

Handling Emergencies

In the event of an emergency, the style of leadership is no longer discretionary. The leader and assistant must step forward and orchestrate the individual and group actions necessary to resolve the emergency. Organization and reassurance are critical; hasty or panicked actions must

be avoided. The emergency may arise because of injury to a party member, encountering a person in distress from another party, an unexpected change of weather or other objective conditions, or the realization that the party is lost or in imminent danger. The most common emergency incident is probably the realization that a member of the party is missing or that the party has become split up with no plan of how to reunite.

If the official leader is not present or is injured, the group may be momentarily paralyzed. The assistant or previously designated alternate leader must immediately take over. If neither is present, it is imperative that an acting leader be selected. This can be done by someone volunteering to assume the role of leader, verbalizing the need for a single leader and perhaps nominating someone, or simply by assuming the role and taking action.

In an emergency situation the objective of the leader is not to perform all the necessary tasks personally, but rather to identify the tasks and ensure that they are carried out. The skill required is management, not technical expertise. For example, instead of suggesting "Bob, you have a lot of first aid experience, why don't you take over" a better suggestion might be "Alice, you seem to have a handle on things, why don't you take over so that Bob can concentrate on first aid treatment."

The most important concern for the leader in an emergency situation is the safety of the party; providing aid to an individual is secondary. The role of party members in an emergency is to support the leader, carry out assigned tasks, and report relevant information to the leader to keep him or her apprised of all aspects of the situation.

Contribution Expected of Group Members as Effective Followers

This chapter discusses leadership, but in a sense, each person is his or her own leader. Every outing leader hopes that each member of the party will exhibit effective personal leadership by setting high but achievable personal goals, taking responsibility for personal and group objectives, showing willingness to go beyond personal comfort zones and be exposed to growth, interacting effectively with others in the group, and accepting assignments and carrying them out cooperatively and effectively should an emergency arise. Participants need to remember—and perhaps be reminded—that they are signed up for the duration of the trip; in the event of an emergency, such as the injury of another member, participants may not sign-out for their personal convenience but are expected to help as directed by the leader.

Leadership Methods for Specific Situations

Leaders benefit from considering what they would do in various situations when the harmony of the group has been disrupted or the trip goes awry. Some advice is given in this chapter about what to do when a party member is lost, but what if the whole group is off route? Chapter 6 gives practical advice, but leaders should consider how best to handle the situation for the group dynamics. What if a participant challenges a leader's authority or ignores it? How can a leader best handle a sudden deterioration of group morale? How can a leader help the group endure a bivouac?

THE HOW-TO'S OF LEADING A TRIP

Conditioning

A primary obligation of a leader is to be physically capable of fulfilling the requirements of the trip. Thus leaders must be fit enough to lead the trip, to enjoy the experience, and to have an adequate margin left over to cope with emergencies. The need for a margin may arise only rarely, but when it does, the leader must be able to deliver a clear-headed, physically active response.

For most Sierra Club outings, the principal physical requirement is endurance. The buildup of fitness requires well-ordered and regular work. One should start one's fitness buildup campaign very cautiously with a modest level of exertion and gradually expand to establish a training baseline that is adequate to support the workload level required on trips. The key to fitness and endurance is aerobic exercise maintained for extended periods of time at elevated heart rates. A nominal training heart rate to shoot for is resting heart rate plus 75% of the difference between resting and maximum heart rate. The maximum heart rate is about 220 minus one's age. Any activity that permits the development of such rates for extended intervals will improve one's fitness, be it fast walking, jogging, bicycling, or swimming. Some activities may have more direct relevance to your Sierra Club activities than others, but all will help. The best practice is a regular and routine exercise that contains as many of the physical components of the trips to be led as possible. Thus, for climbs in the Sierra a preparation based on local hill climbing is ideal.

Plan the Trip

Gather information

The most important preparation for a successful trip occurs with the pre-trip planning phase that is extensively

covered in chapter 6. With a trip location and objective(s) in mind, the leader may get information from guidebooks, newsletter write-ups, maps, and other leaders. The goal is to plan a safe trip that will be attractive to participants. The best information can come from scouting the trip since weather and people can drastically change conditions. Ideally then, the trip should be scouted (in full if possible) as near the scheduled outing as possible.

Chapter 6 shows how to develop a detailed plan and route card. Aside from the hiking or other activity portion of the day, one should consider the campsites for overnight backpacks and car camps. In some areas such as Sequoia and Kings Canyon National Parks backcountry and developed campgrounds, bear boxes are available at certain commonly used campsites. Will there be enough space for the number of participants the leader is planning on accepting for the trip? If the group will use a campground, are group sites available, what is the fee, and does the campground have water? Big picture maps help with information about trailheads and the overall area. If a trailhead has limited parking, which the group size may exceed, the leader should have a plan for alternative parking arrangements.

Leaders may also wish to form alternative plans should the group turn out to be faster or slower than expected, such as nearby areas to explore if camp is reached early or a closer campsite if the group is not as fast as predicted. Finally, leaders should err on the side of being conservative, keeping in mind that most people are tired after eight to ten hours of hiking. One may use the energetics formula at the end of Appendix D and the Naismith Rules in chapter 6 to determine the strenuousness and reasonableness of the trip.

Apply for a Wilderness Permit

Most wilderness areas require permits, applications for which may be obtained from the US Forest Service or national park in which the trip will occur. Rules change from year to year, but head count limits are imposed in most areas. Because some areas limit group sizes severely, a leader needs to plan ahead and not wait too long to apply. If permits are required, lack of one makes trip cancellation mandatory. Some areas require only fire permits. If the group will use a campground, the leader should probably make reservations.

Submit a Write-up and Publicize the Outing

The leader needs to submit a write-up to the sponsoring entity's outings chair for publication in OARS, GSC newsletter or web site, or *Southern Sierran*. Although brief, the write-up should indicate how strenuous the trip will be and request that those responding include enough information so that the leader can screen the applicants. The sidebars give guidelines and format for the write-up.

A BRIEF OUTING PLANNING CHECKLIST

- Provide a write-up for OARS, GSC calendar of activities, or *Southern Sierran* to the sponsoring GSC's outings chair. If this is a provisional lead, tell the outings chair so.
- Provide the outings chair with an Application for Mountaineering Outing Approval and current leader resumes for restricted M- and all E-level outings, i.e., those using a rope or ice axe.
- Apply for a Wilderness Permit if needed.
- Screen applicants. For restricted mountaineering trips, get two copies of the medical form for each person on the trip, one copy to be held by the leader during the outing.
- Scout the trip or otherwise get information about the most current conditions.
- Distribute an information sheet to participants and those on a waiting list for outings for which people apply in advance.
- Gather needed forms: sign-in sheet/waiver, Angeles Chapter Incident Report form, Emergency Response-Patient Report, Refusal of First Aid form.

A BRIEF POST-OUTING CHECKLIST

- Send the original of the sign-in sheet/waiver (and one copy of the medical form for each person for restricted mountaineering outings) to the outings chair of the sponsoring GSC. Keep a copy of the sign-in sheet/waiver for yourself.
- Submit a trip report to the sponsoring GSC's newsletter
- If it was a provisional lead, send the assistant leader's evaluation and your own self-evaluation to the LTC Administration Chair (keep copies for yourself).
- If there was an incident or accident, submit an Incident Report form.

“Provisional” leaders or those planning to be one by the time the trip takes place should also notify the outings chair of that fact. I-, M-, and E-level provisional leaders should also remember to have the trip approved by the LTC Chair or Administration Chair to be sure that the trip meets the minimum requirements for the candidate's level of leadership.

Restricted outings, M- and E-level trips that will use ropes and/or ice axes, must be approved by the outings chair and the national Mountaineering Oversight Committee. An application for such a trip is included in Appendix C and may be downloaded from the Angeles Chapter or national Sierra Club web sites or obtained from the outings chair of the sponsoring GSC. The write-up for a restricted outing should include the fact that only Sierra Club members may participate, unlike most other Sierra Club outings.

Screen Applicants and Select Participants

The trip write-up and applicant screening should aim to assure that participants have the appropriate level of physical abilities, technical skills, and equipment. Participant screening can be extremely important, and leaders should be reasonably certain that the trip is right for the participant and vice versa. If someone is approved for the trip without having the proper qualifications, others on

the trip, including the leaders, will not be well served. Trip schedules are compromised, chances for problems increase, and safety margins are jeopardized. Screening criteria should not be relaxed for friends and family members of leaders or participants. Although inappropriate participants may be rejected at the trailhead or signed out after the trip commences, screening should be accomplished primarily in the reservation process. A questionnaire may be used to assess the suitability of the participants for a particular outing.

Restricted mountaineering outings also require that participants and leaders provide two copies of the Medical Form, which may be used in screening participants. If a leader has questions about a person's ability to participate on a mountaineering outing because of a medical condition, the leader may discuss it with the participant or ask the participant to get written approval to participate from his or her physician. A copy of the form is available at the LTC web site and <http://www.clubhouse.sierraclub.org/outings/local/forms/> as well as in Appendix C. One copy of the form should go with the leader on the trip (or one copy with each leader if three copies are requested); if there is an accident or illness, the form may help first aiders and medical personnel. The medical forms are sent with the sign-in sheet/waiver to the outings chair, who will forward them to national. All

WRITE-UP FORMAT EXAMPLE

Some entities use the format below for their web sites or newsletters. Other entities use the newer OARS/*Schedule of Activities* format, such as that found at the Angeles Chapter's web site. For OARS format help see http://clubhouse.sierraclub.org/communications/web/support/activities/activity_entry.aspx

The write-up should include all the information prospective participants will need to know in order to sign up without telephoning the leaders. If that would make the write-up overly long, then the leader can give basic information and request that prospective participants "Send sase or e-mail for detailed information" or "Telephone leader for more info."

Leaders send all write-ups to the outings chair of the sponsoring entity.

Apr 18¹ Sat² Sponsoring Entity³, Co-Sponsoring Entity(s)

I:⁴ Black Mtn #6 (5244'), Red Mtn (5261')⁵: Two volcanoes in Kern County. Moderately paced 12 mi rt, 3000' gain over rocky xc routes in historic mining area. Dirt road driving with high clearance recommended⁶. Meet 6:30 am Sylmar Rideshare pt.⁷ Bring 4 qts water, lunch, lugsoles⁸. Rain cancels⁹. Ldr¹⁰: Great Leader¹¹. Asst: Great Assistant.

- When in doubt, compare with a similar situation in a current newsletter or on a web site. Use the abbreviations listed here but no others.
- Write-ups should be in the following order for consistency.

Headers (Boldface)

1. Dates: Abbreviated to 3 letters, no periods: Apr, Sep, etc. If event is longer than one day, use first and last dates only. Separate by hyphen.
2. Days: Abbreviated to 3 letters, no periods: Sat, Sat-Mon
3. Organization: Use as found in the newsletter or web site. Separate co-sponsor(s) with a comma. Primary sponsor should be listed first. Send a copy of the write-up to the co-sponsor(s).

Title (Boldface)

4. Rating: O, I, M, M-R, E-R, T, C. All leaders must have this rating of the outing or higher. Follow with colon. M-R and E-R indicate restricted mountaineering outings open to Sierra Club members only with appropriate experience.
5. Title: Give short description of the event. Initial caps. End with a colon. Peak elevations in parentheses (9952'). If over 9999, use a comma (10,649').

Text

6. Description. (Order may vary for readability or emphasis.)
 - Difficulty: Terrain, steepness, pace, etc. Note unusual situations. Cross-country (XC) should be noted.
 - Miles: Usually roundtrip (12 mi rt). Do not use periods with abbreviations.
 - Gain: (3000' gain) Do not give loss unless different than gain. Give gain on return if significant.
 - Other: Any other information important to describe the event. Include any unusual conditions. Be brief, but give enough information so that prospective participants can determine if the event will suit their plans and abilities. Include all necessary information, restrictions, and requirements (not for beginners, Sierra Club members only [for restricted trips]).
-

-
7. Meeting place and time or contact info:
 - Rideshare or meeting point: If participants are to meet at a carpool point or trailhead for trips not requiring prior sign-up, give meeting time and detailed location and directions if not a standard meeting point. (Use E, W, N, S, R, L)
 - Time: On the hour is 8 am. Other is 8:15 am or 7:30 pm.
 - E-sase or sase: Activities requiring reservations should include any space limitations, deadlines, requirements for experience, contact info, fees, or other requirements. "Sase" stands for self-addressed stamped envelope. Most people now apply by e-mail (e-sase).
 8. Things to bring: Include any items required for the outing.
 9. Rain cancels or postpones (give a specific alternate date if possible).

Leader Information

10. Leader Title: Ldr, Ldrs, Co-Ldr, Co-Ldrs, Reserv, Asst, Assts, followed by a colon.
 11. Names: Leader names should be approved to lead the rating of the activity. Leaders must be current Sierra Club members. If a leader is not in the current Directory, include contact information. Use the directory form in Appendix C.
-

information on the form should be kept confidential.

Reservations should not be granted nor promised prior to publication of the trip description, and all prompt applicants should receive bona fide consideration. A leader legitimately may inform friends about trips in a forthcoming publication and urge them to apply promptly after publication to maximize their chance of acceptance.

The location and nature of the trip will influence the size of the group along with factors such as party size limitations in various wilderness areas, parking at a trailhead, climbing safety, and time margins.

Scout the Trip

A leader should scout the trip whenever warranted by conditions or uncertainties. Private property restrictions, washed-out roads, and real estate developments may have changed the feasibility of a trip. Leaders of recent outings to the area may be helpful in supplementing the information gathered in the planning phase. And the www.angeleschapter.org web site is an excellent source of current information on many HPS, DPS, and SPS peaks.

Distribute an Information Sheet

The information sheet should leave no doubt concerning distances to be traveled on trails and cross country, elevation gain/loss, steepness, anticipated hiking or climbing conditions, maps of the area, and equipment and special clothing requirements for each day of the trip. To facilitate carpooling, a list of participants with addresses and phone numbers should be included, but under the Sierra Club insurance policy the leader must not arrange the carpooling for participants. The trip sheet should

include directions to the meeting place and indicate when participants are expected to be ready to begin the trip. The leader should send out the information sheet at least a week before the trip and may request that participants confirm by a specified date or it will be assumed that they have canceled. "No shows" are a continuing problem. If spaces open up, the leader may fill them with participants on the waiting list.

Make an Emergency Management Plan

An emergency management plan is a safety management tool that lists the local resources a leader may need to call upon in the event of an emergency. The plan would indicate the nearest hospital and whom to contact in event of emergency, whether it be the sheriff, National Park Service, Forest Service, or Bureau of Land Management. The plan would include addresses and phone numbers as appropriate. A Safety Management/Emergency Response Plan form is available at <http://clubhouse.sierraclub.org/outings/local/forms/#Safety> This national Sierra Club form indicates that a copy should be left with the outings chair. The Angeles Chapter does not require that a leader do this, though leaving the completed form with someone who will notice that the group has not returned is a good idea.

At the Meeting Place

Two Leaders

Although some trips have more than two leaders, all trips require two appropriately rated leaders. If one of the designated leaders is not available, a rated participant may be appointed as an assistant leader. All assistants must meet

the rating requirements that the trip difficulty specifies. If this cannot be done, then the route or objective must be modified to match the leader/assistant rating level. Should two appropriately rated leaders not be available, the trip must be canceled. When a trip is canceled for any reason, it may be rescheduled as an official Sierra Club trip even though a notice may not appear in a chapter publication. The planned trip canceled at the trailhead cannot be led as a “private trip” since it would still be recognized as a Sierra Club sponsored outing. Outings canceled before participants leave home may become private outings.

Introductions

The leaders should identify themselves and have the participants introduce themselves. Explaining the expectations for the trip and that day and reviewing the rules of conduct, the leader should also point out any special permit restrictions and/or group restrictions. Reminding participants to stay between the leaders, to keep the group together, and to “leave no trace” (including human waste), the leader may also wish to let participants know how much water to carry before the first reliable water will be reached and to discuss water purification. The leader should ask that participants with specialized medical training or with medical considerations contact one of the leaders in private.

Sign-In

Participants must sign in on the national Sierra Club form that combines a sign-in sheet with a release of liability. Leaders should mention that by signing in, participants are agreeing to obey the “Rules of Conduct” and have signed a liability waiver. “Camp followers” (persons who want to tag along without being officially signed into the trip) should be discouraged by every lawful means, including signing

out any participant who appears to have encouraged their presence. After the trip, the leader must send the sign-in sheet to the outings chair. The form is available in Appendix C of the LRB and from the Angeles Chapter LTC web site.

Check for the Essentials and Trip-Specific Gear and Clothing

The “10 Essentials Plus” are important. Time is well spent at the trailhead to check that suitable footwear and clothing are being worn and that necessary items such as food, water, and camping gear are being carried. Participants in outdoor activities must be able to stay dry in order to keep warm, and backpackers must have additional equipment to stay dry in camp. Does everyone have the specified special equipment ready for use? For example, are crampons sized to the boots? Or do participants have appropriate footwear for a segment of a trip that has repeated stream crossings to avoid time lost in changing in and out of boots with every crossing? What first aid supplies does the group have besides the leaders’ first aid kits?

A leader’s essentials represent a number considerably in excess of the usual ten. As a leader one may often supplement items forgotten by others. The “Equipment and Other Items” sidebar offers items to be chosen according to the terrain, weather, and duration of trip. Certain items may be specified by the leader as mandatory for each group member to accommodate some special requirement of a trip.

Trip Conduct

Start on Time

Having made a plan, the leader should try to stay with it. Starting early may provide a buffer of daylight for a long day’s outing. Roadhead introductions, signing-in, and equipment checks take time.

THE TEN ESSENTIALS

TO CARRY:	IN THE CAR:
To Find Your Way	1. Water, Pack, Boots
1. Navigation (map and compass)	2. Spare Motor Oil, Tools
2. Illumination (flashlight/headlamp)	3. Spare Clothes, Personal Items
For Your Protection	4. Extra Car Keys
3. Sun Protection (suntan/sunglasses/hat)	5. Electrical Jumper Cables
4. Nutrition (extra food)	6. Car Jack, Spare Tire
5. Hydration (extra water)	7. Tow Cable, Shovel
6. Insulation (extra clothing)	8. Maps
For an Emergency	9. Alarm Clock
7. Fire (waterproof matches and fire starter)	10. Blanket, Tarp to Cover Vehicle Items
8. Emergency Shelter	
9. Repair Kit and Tools (knife, duct tape, etc.)	
10. First-aid kit	

Car Caravans

If the trip starts with a drive to the roadhead from some meeting spot, the caravan procedure, in which each car is responsible for visual contact with the car behind, should be used. If the car behind stops or is out of sight, the car in front stops. With a proper caravan a car will not be left behind, and problems can be taken care of more readily. Carpooling may be advised. A count of the cars should be kept until they are all parked.

Who Leads?

A leader who knows the route and is competent in navigation (if required) should precede the group. The other leader should be the “sweep,” moving with the end of the group. If the group starts to separate into a slow group following a fast group, the sweep leader may precede the slow group while at the same time retaining visual contact with them. This technique is especially helpful if there is some question as to the specific route to take. Because an “easy” pace in front may be much too fast for those in the rear, rotating the lead so that all leaders are sensitive to the physical condition of group members is a good idea.

Pace

Setting a proper pace of travel will keep the group together. If the difference in arrival time between leader and sweep at a rest break exceeds fifteen minutes, it may be necessary to place additional restraints on faster participants, give additional encouragement to the slower participants, or both.

Once the group is underway, several key points should be followed to assure that everyone has the best chance of keeping up with the group and does not become “burned out” in the process. Starting off slowly for half a mile to

a mile allows everyone’s respiratory and cardiovascular systems a chance to warm up to a comfortable steady state. By maintaining a steady pace at a rate the party can sustain, the group will probably fare best.

How the party is likely to feel about a particular speed is indicated in the chart in Fig 4-1. The data on which this graph is based were obtained with hikers walking on the level. The graph shows that the exertion felt subjectively does not change very much until the pace exceeds about 2.5 mph. Above this speed the perceived exertion rises very rapidly as the pace is increased, so complaints (or stoic overexertion) can be expected.

After unusual obstacles (e.g., stream crossings or short sections of class 3) that tend to slow down each one in line, the leader should shorten steps until everyone has caught up.

Rest Periods

Well-timed breaks can make the difference between agony and enjoyment. Most people will appreciate a clothing break after a few minutes of hiking. Well-timed “split” breaks and stops for water and/or rest will contribute to an enjoyable trip. During a rest stop, a leader may take time to discuss the elements of route finding and navigation or local environmental issues. A break is a good time for the

EQUIPMENT AND OTHER ITEMS

USUALLY CARRIED BY EACH BACKPACK PARTICIPANT	OFTEN CARRIED AS INDIVIDUAL OR COMMUNITY GEAR	LEADER NEEDS AND TECHNICAL EQUIPMENT
1. Backpack	21. Tent or Bivouac Sack	42. Wilderness Permit
2. Water Bottles	22. Mosquito Netting, Insect Repellent	43. Sign-in Sheet/Waivers
3. Ten Essentials	23. Day Pack	44. Incident/Patient Report Forms
4. Boots (waterproofed)	24. Bandana	45. Medical Forms
5. Socks (wool or synthetic)	25. Car Keys, Wallet	46. Climber Guide
6. Sun Hat, Sunglasses	26. Personal Items, Sunscreen	47. Nylon Cord
7. Shirt (wool or synthetic)	27. Needle, Thread	48. Bags for Hanging Food
8. Pants (wool or synthetic)	28. Whistle	49. Altimeter
9. Wind Parka	29. Watch	50. Rope(s)
10. Sweater (wool or synthetic)	30. Thermometer	51. Carabiners, Pulleys
11. Rain Jacket and Hood, Rain Pants	31. Monocular or Binoculars	52. Chocks, Friends
12. Down or Pile Jacket, Hood, Vest, Mittens, Booties	32. Notebook, Pen, Pencil	53. Slings, Prusiks, Sit Harness
13. Balaclava or Wool/Synthetic Cap	33. Glasses	54. Helmet
14. Sleeping Bag	34. Photography Items	55. Gaiters
15. Insulating Foam Pad	35. Rain Cover for Pack	56. Ice Axe, Protectors
16. Waterproof Ground Cloth	36. Spare Flashlights	57. Snow Pickets
17. Food and Drink Items	37. Stuff Sacks	58. Crampons, Protectors
18. Stove, Fuel, Pot, Cup, Spoon	38. Plastic Bags for Trash	59. Snow Goggles or Equivalent
19. First Aid Kit	39. Folding Water Bottle	60. First Aid Kit
20. Toilet Tissue	40. Water Filter, Iodine, Purification Pills	
	41. Bear Canister	

First Aid kit may contain sterile compresses, adhesive tape, adhesive bandages, triangular bandages, air splint, moleskin, roll bandage, elastic bandage, scissors, aspirin, thermometer, soap, sunburn protection, windburn protection, tweezers, magnifying glass, insect repellent, First Aid book.

leader to get to know participants better and monitor the group's attitude and physical condition.

With an appropriate steady pace the primary reasons for periodic rests (other than equipment changes or split breaks) are to decrease the level of lactic acid and other waste products in the blood, to take on fuel, and to re-hydrate. These can be accomplished with five to ten minutes of rest every hour. If a longer rest is requested, the leader should slow the pace instead. Stragglers who are too slow should be halted or turned back, if feasible.

Longer rest periods are not particularly advantageous because the fall-off in concentration of waste products decreases with time (recovery in twenty minutes is only about twice that in the first five minutes). Also, the movement equilibrium built up by the group is lost with longer rests. The slow breaking-in period must then be repeated

After lunch, some time (about thirty minutes) should be allowed for digestion to get well along, because this process competes with exercise for the blood supply. If time is short, the lunch size should be reduced.

Keeping the Group Together

Together does not mean in lock-step. It means in contact or being able to make contact in a short time. The main goal is to avoid losing people or more likely, having them lose the group, and to maintain communication ties verbally or visually. When the route being followed develops options, contact becomes particularly important. Counting heads after breaks or when gaps in the group have developed is a very sound practice. When in doubt, count!

Large diverse groups, trails with many junctions, routes with lots of stream crossings, and routes in heavy forest or brush can give the leaders some real challenges in keeping the group together or even maintaining a good appreciation of the group status. Groups tend to be easier to keep together going up (the front leader can wait) in contrast to going down. In fact, there is a peculiar tendency for large groups to spread out over the landscape during the last stages of trips proceeding cross-country across relatively flat terrain. For instance, once off the high ground and onto the wash-dissected undulating terrain on the return to a desert road head, participants making relatively small individual heading errors can build into a widely dispersed group front. Cars at the road head and other members of the far-flung party are often out of visual contact in spite of being fairly close together. Although it is always good strategy to keep the group together, it is not always a simple process, especially as all are stumbling towards the end, believing they know what they are doing. So this easiest of ground has been known to lead to a great mess, long delays at the end of trips, and a major headache for those leaders who do not

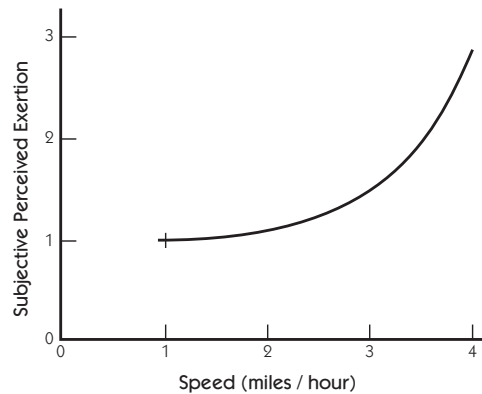


Figure 4-1. Perceived exertion at various speeds

insist on keeping the group together until the cars are in plain sight of all. An aiming-off strategy is often helpful here. Even more useful is a good GPS fix taken at the cars at the start of the hike.

One very important aspect to keeping the group together is being aware of the group's physical condition. Are participants starting to lag? Do they need to eat or have a water break? Leaders should monitor

- Minor first aid issues such as blisters and sunburn
- Energy levels
- Dehydration
- Cold problems: hypothermia and frostbite
- Heat problems: dehydration, heat exhaustion, heat stroke
- Altitude problems: acute mountain sickness, cerebral edema, pulmonary edema
- Tick attachment and other insect problems

In Camp

When the group reaches camp, the leader often designates a kitchen site and eating area as well as bathroom, bathing, and swimming areas. The leader may wish to offer assistance as appropriate as participants set up their camps and fuss with stoves. During or after dinner, the leader should take time to talk about the next day's plan and objectives and discuss the day just completed. All food, trash, and scented items must be stored properly to avoid problems with animals before the group goes to bed.

Signing Out Problem Participants

Signing out a participant before the conclusion of an outing may be appropriate for the safety, comfort, or convenience of that participant or to deal with inappropriate behavior. (The national Sierra Club's leader extranet site has advice about conflict resolution, which is useful for a leader to review before the trip.) Most often signing

out occurs when someone is significantly slower than the rest of the group. Signing out a participant is a judgment decision, which should not be made lightly, and alternative solutions (modifying trip objectives or turning the entire group around) should always be weighed in the light of the following considerations:

- The group objectives
- The length and difficulty of the return route
- Prevailing weather conditions and any other special hazards
- The physical and mental condition of the person to be signed out
- The experience, ability, and equipment of the person to be signed out
- The availability of sufficient personnel to provide an escort if needed
- The level of confidence that the person to be signed out expresses in his or her ability to

return safely to the trailhead.

Weighing all the factors, the leader bases the final decision on safety considerations above all else. People leaving the group must sign out.

Trip Modifications

Conditions change, and the trip plan may have to change also. A good leader adjusts the objectives and route as needed due to weather, participant limitations, and other factors. This judgment decision, often with many options and tradeoffs, is even tougher because of the conflicting desires of participants. Trying to be reasonable, the leader must make safety the overriding consideration. Hiking in daylight is much safer than in the dark. If a safe alternative to the trip cannot be planned, the trip should be aborted.

Hazards

Leaders must be constantly alert to potential hazards

RECOGNIZING HYPOTHERMIA AND HEAT PROBLEMS

Mild Hypothermia

1. Victim feels cold
2. Victim shivers uncontrollably
3. Victim loses fine motor (hand) coordination
4. Victim is lethargic/tired/apathetic/forgetful
5. Victim feels weak
6. Victim moves at a slow pace
7. Victim stumbles

Profound Hypothermia

1. Slow thinking process (decision making is difficult, often erroneous)
2. Retrograde amnesia (memory of specific facts, dates, and names deteriorates)
3. Strong desire to escape the cold by sleeping
4. Apathetic (especially towards survival)
5. Periodically lapses into coma
6. Speech is incoherent (this is a late sign)
7. Loses vision (another late sign)
8. Has acetone-like, fruity breath (poor fat metabolism from inadequate blood supply)
9. Shivering is decreased or absent
10. Expresses a willingness to cooperate but does not do so
11. Skin is cold, pale to blue in color
12. Pulse is weak, slow, irregular
13. Respirations are slow, shallow, irregular
14. Urinary incontinence
15. Denial that anything is wrong

Heat Cramps

1. Severe muscle cramps
2. Weakness, exhaustion, clammy skin, fast pulse, profuse sweating, anxiety, nausea, restlessness
3. Normal or slightly elevated body temperature

Heat Exhaustion

1. Thirst, weakness, nausea, confusion, cool and clammy skin, fast pulse (above 90/min), rapid and shallow breathing, profuse sweating, anxiety, restlessness (seems like shock)
2. Person may faint
3. Normal or slightly elevated body temperature, below 105°F
4. Decreased urine output

Heat Stroke

1. Skin is hot and flushed
2. Altered level of consciousness
3. The person may still be sweating, or sweating may have stopped
4. Pulse is rapid and strong, becoming weak later on
5. The person may be confused, weak, or dizzy and be complaining of headache and being very hot
6. Temperature is usually above 105°F
7. Nausea, vomiting, diarrhea, agitation, delirium, coma, seizures

during the outing. Steep banks, loose rocks, stream crossings, poison oak, and icy patches are some. How will these conditions affect the group's return? Will the conditions change from morning to afternoon? Good leaders stay aware of their surroundings and any situations that may affect the outing.

Accidents and Emergencies

Because accidents and emergencies come in all shapes and sizes, careful risk management can help avert problems. The following section on outing hazards provides a survey of what can happen and what can be done about these problems.

The leader should

- Limit the emergency

- Render first aid as necessary
- Get outside help if one cannot handle the situation properly
- Complete the recovery.

Report the accident/incident. In all cases use the Angeles Chapter Incident Report Form available in Appendix C and on the Angeles Chapter web site.

End of the Trip

The trip is not over until all members are accounted for. At the end of the outing, most leaders simply check that everyone is back; some leaders have participants sign out.. The leaders should verify that all cars will start before they leave. After the trip, the leader sends the sign-in sheet/

SIGNING OUT?

The Rules of Conduct and the Chapter Safety Policy require that the group be kept together at all times. Generally, no one is to get ahead of the leader or behind the sweep. Participants are not to leave the group unless signed out by the leaders when, in the leaders' judgment, it is a safe and prudent thing to allow this. These rules allow for some leader flexibility and require sound leadership decision making to apply them to the circumstances of the outing. However, uncontrolled joining and leaving a group should not be allowed.

1. The first premise of our outings policy is that all of the participants and leaders will start the outing together, stay together throughout the outing, and return to the end together. If a participant is not willing or able to participate on the terms of the outing proposed in the write-up, he or she should not be a participant on that outing. Participants who wish to hike faster than the planned pace should seek another outing. If a participant wishes to split off from the group to climb a peak not part of the trip objectives, he or she should not sign up to participate on the group outing.
2. While some situations may require the leader to allow a participant to sign out of the group, this should be the exception and should be done only when it is safe. If the group is at the cars or a short distance away where a safe return is assured, checking out someone is fine. Other options are returning the entire group to the cars to ensure a sick or tired participant gets out safely or sending back several qualified people with the person checking out.
3. On rare occasions a participant may be creating a problem for the group or other participants. Signing out the problem person may be done only when safe, but it may be necessary to ensure the enjoyment of the entire group. The leader may have to cancel an outing by returning the group to the cars to deal with a problem person if it is not safe to sign him or her out on the spot.
4. Splitting the group creates two outings, each of which must have two leaders qualified at the level of the outing.
5. Signing out a participant to go home or to split off to another objective can have two very negative results. First, it weakens the remaining group in the event of an emergency through its decrease in numbers. Second, the person signing out may lead others to come along, who are trusting the person splitting off to be a safe and competent "leader" (and in fact the first one leaving may not be qualified to be a leader either formally or not). If an accident occurs, this kind of situation could have very disastrous results if an accident occurs for both the entrusted one and the Club.
6. If leaders are having problems with participants who wish to check out and do their own thing, those participants should not be allowed to participate on future outings unless they agree to abide by the outing plan and leaders' directions. Signing out is not "fine" and should be discouraged.
7. Some outings have clear break points such as a multi-day car camp trip. With the leader's permission, it is possible for participants to arrive a day late or leave early. This is different from signing out someone in the middle of a hike.
8. A good practice is to include date and time of sign out.

waiver to the outings chair of the sponsoring GSC. If an incident has occurred requiring reporting, the leader should follow the directions on the report form. The leader should carry a copy of the form as part of emergency preparedness. Chapter 3 has more information on the forms and their use.

OUTING HAZARDS

Anticipate Possible Problems

A number of factors have the potential of creating an emergency situation, but for the most part, things can be done to prevent this occurrence. The leader's job is to predict possible emergency situations and take action to minimize the effect of "unavoidable" events. Some preparations may be useful, such as carrying pencil and paper, having a list of names and telephone numbers of rescue organizations in the outing area, and noting the location of phones and ranger stations. The club's extranet site has a useful Safety Management/Emergency Response Plan at <http://www.clubhouse.sierraclub.org/outings/local/forms/#Safety>

Use of Helmets

Leaders and participants must wear climbing helmets on restricted mountaineering outings for ascending and descending third class or higher rock when ropes are used and for snow travel when ice axes are necessary as well as in any area known or suspected to be dangerous because of rockfall.

Equipment Failures

A thorough check of equipment before leaving the roadhead is certainly desirable, but a leader should be prepared for repairs. An emergency repair kit might contain a knife (Swiss Army type is versatile), wire, duct tape, safety pins, needle and thread, and extra hardware items such as crampon adjustment screws/nuts.

Rock Fall

A significant number of chapter accidents result from a rock fall inadvertently started by another climber. Rock fall is a very common hazard, but one which is often controllable through group discipline. On high angle slopes, the leader can switchback so that climbers are never above one another. Where chutes are unavoidable, the leader can send one, two, or three climbers at a time in closely bunched groups. The leader can keep the area below a rappel clear of other climbers. Helmets are mandatory on climbs and hikes

where rock fall potential exists. Again, the key to effective risk management is active leadership.

Snapping Branches

In areas with high brush or trees with low branches, hikers should watch out for branches snapping back into them. Eye injuries are a real danger. The leader may wish to remind participants to be considerate of others by not letting the branches swing back violently into those following and by not following too closely. It is illegal to trim branches and brush along trails without the consent of the agency responsible for the land being traveled.

Hiking Poles

Many hikers like to use hiking poles. The leaders should caution participants not to let poles point back at others as they go over rough terrain and to allow sufficient room between hikers to avoid injuries. When stowed on a pack, poles should not angle out but be snugged into the pack like a well-stowed ice axe.

Earthquakes

Earthquakes are not usually a problem to travelers unless they are near a rock slide or tall building. Unstable structures or loose hillsides may fall to the ground.

Stream Crossing

Plan trips to avoid stream crossing at high run-off times, whether by season or time of day. When snow is melting, streams are at their lowest in the morning. Turn back if a safe place to cross cannot be found.

Rain

Having the proper rain gear and a tent will minimize the effects of adverse weather. Provided the group is dressed adequately and packs are covered, it is still possible to enjoy a trip in rainy weather. Wet clothing and even a mild breeze, however, can have a very chilling effect. If an outing is conducted in rainy weather, the leader should be especially alert for signs of hypothermia. Rain may make travel on normally passable rock slabs treacherous. A continued rainfall lasting more than a few days can soak through all but the best tents, eventually leading to a wet sleeping bag. Unless means are devised to exclude moisture, it is time to retreat.

Snowfall

An unexpected snowfall can make the landscape beautiful, but as everything becomes cold and wet, travel becomes far more difficult. Rain gear, extra clothing, and overmitts can protect from the cold, but travel may be reduced to a crawl. Caught in the wilderness, travelers may spend extra days returning to safety. Weather reports for the outing area as close as possible to the beginning of the outing may help the leader to avoid unpleasant surprises; a storm prediction may be cause to postpone or cancel the trip.

Unexpected Snow Crossing and Ice

If a detour around an unexpected snow patch is not feasible, a stick or sharp rock may be held in the snow as a third point of contact to aid balance as one crosses. The leader must consider how likely and how dangerous a fall may be. If the risks are high, the leader should get out the rope for a belay—if available and if the trip has been approved to use a rope—or turn around.

Ice patches sometimes remain for months, even in the local mountains, after periods of warm weather. If ice must be crossed, extreme caution must be used. In the absence of a rope, it is probably time to abort the trip or a particular goal.

Flood

Flash floods are especially common in the desert. Even streams in local areas can change quickly from an easy step-across to a raging torrent. The group may have to make a detour to get out. The leader should be concerned when heavy weather conditions exist in hilly areas nearby.

Fire

Brush fires and forest fires are fairly common and move quickly, easily trapping a group by advancing flames. Determining the best escape route, the leader should avoid rash action and assure that the group sticks together. Doing nothing, at least for a while, may be the best plan.

Wind

Strong, gusty winds make some kinds of terrain very treacherous. In wet conditions, wind chill can lead to hypothermia. Even in dry conditions, strong winds can severely chill the group and make progress difficult and even dangerous. In forested areas breaking branches or an occasional falling tree are hazards.

Lightning

Especially when travel takes the group to high places, the leader must watch for sudden thunderstorms. Glowing metal objects, hair standing, and lightning striking close are exceptionally strong warnings that it is no time to be on a summit or ridge. For more information see <http://clubhouse.sierraclub.org/outings/medical/protocols/lightning.asp>

Bears

Although many mountain areas are free of bears, wilderness permit information will usually describe the bear risk if any, as well as how to protect food. Some bears know the “rip-off” business better than the hikers who try to outwit them, so hanging food usually is no longer a viable option. Bear canisters are the best solution and are required in many areas. Food loss and/or equipment destruction can be a serious matter for the victim and the bear, which may be killed for such behavior.

Insects

Mosquitoes are a nuisance and may carry West Nile Virus, but bees and wasps can be deadly for those allergic to their stings. Those who are allergic should carry an EpiPen and inform the leaders of their allergy and location of the pen. Ticks may be carriers of Lyme disease; frequent checks for ticks on members of the group when travelling in areas where ticks are present help prevent their attachment.

INJURY AND ILLNESS

Leaders should use first aid as appropriate (see chapter 5). If altitude sickness is the problem, do not wait before deciding to descend. Caring for the sick and injured is far more important than reaching the objective or getting home on time. Generally, it is better to keep the whole group together until everyone is back to the starting point and able to proceed home. Morale can deteriorate rapidly if the leader excuses some participants and not others.

Evacuation

Can the leaders and group handle the situation without outside help? Is evacuation the best solution? Options include carrying the victim and getting a horse or a helicopter. If the leader sends for help, the messengers should have adequate information—such as one of the two copies of the Emergency Response-Patient Report Form and one of the two copies of the Medical Form—concerning the

OUTINGS SAFETY

In order to “explore, enjoy, and protect,” we lead groups to wild places on outings that we want to be safe, enjoyable, and environmentally responsible. A task force looked at safety on mountaineering outings and developed a document, “Safety Management on Restricted Mountaineering Outings,” which may be reviewed at the Mountaineering Oversight Committee’s page of the Clubhouse extranet site at <http://clubhouse.sierraclub.org/outings/Mountaineering/SafetyManagement.PDF>. While the focus was on mountaineering outings, some parts of the document apply to almost any outing. The main point to emphasize is remaining aware of changing environmental conditions and the physical and mental condition of the group.

Mental Aspect of Safety Management

- Fatigue—physical fatigue can dull mental awareness of risk and diminish concentration on the task at hand, such as descending a relatively easy slope and taking a misstep or misjudging the size of a rock in the trail and tripping
- Distractions—similar to fatigue in removing concentration from one’s movement over the terrain, such as looking back to respond in a conversation and then tripping over a root
- Over-confidence—over estimating the ability and experience of the individual or group, for example, assuming a group will move as quickly at the end of a long day as at the beginning or assuming that a roped team on a snow slope can arrest the slip of one member
- Complacency—for example, what the group climbed up with confidence may present challenges on the way down because of fatigue or awkward moves. What has been done before may present challenges in the current circumstance. Talus slopes can change in their stability as the slope changes.

Awareness of these factors—the leaders’ knowing and applying safety protocol and good judgment—is key to accident prevention. For example, leaders should remind participants on the descent that the climb is only half over and that they must stay focused on the climb. Monitoring the physical, emotional, and mental condition of the group is an essential aspect of good leadership and safety management.

Examples of Keeping Safety Paramount

These examples apply to leaders and participants.

- Being in good condition to climb safely (cardio-vascular conditioning as well as muscle strength and endurance)
- Staying stable and completely in balance on and off the trail
- Monitoring changing environmental conditions
- Making sure all members of the group have appropriate and necessary clothing and gear
- Keeping ice axe self-arrest skills well practiced
- Staying firmly attached to the ice axe
- Keeping away from exposure by anchoring oneself or staying well back from a cliff while waiting on a climb
- Not touching rocks above unless one is sure that the rocks are completely stable
- Staying well hydrated and eating enough to keep up with the energy demands of the outing
- Carrying a first aid kit appropriate for the outing and level of first aid training. For suggestions see http://clubhouse.sierraclub.org/outings/medical/first_aid/kits.asp
- Reviewing first aid training prior to leading an outing
- Having a safety management plan for alerting rescue services if needed
- Periodically reviewing the lightning and altitude illness protocols available on Clubhouse: <http://clubhouse.sierraclub.org/outings/medical/library/altitude.asp>

These are just a few ideas of ways we consciously can make outings as safe as possible.

injured person and location. The appropriate authorities should be notified immediately. The messengers should maintain contact with the authorities (stay by the phone) to provide additional help if needed. The other members of the group may help assure the best treatment possible and achieve the best rescue position.

Personal Locator Beacons

Personal Locator Beacons, such as the SPOT, are good to have when a true emergency arises that requires outside help. These devices, however, should not be used simply for convenience when the group can extricate itself from trouble or evacuate an ill or injured member without outside help. Like cell or satellite phones, personal locator beacons should be used responsibly. Good leadership—trip planning savvy, technical skills, experience, judgment, group and environmental awareness—may prevent an emergency.

HELICOPTER OPERATIONS

Landing Spots

One of the prime considerations for a helicopter pickup is a site with clearance for a landing (or at least a partial touchdown). The ideal situation is a flat, one hundred foot square. Fifteen by thirty feet, however, should be adequate. An exposed ridge is desirable to maximize approach and departure.

Helicopters

Wind, elevation, and temperature affect the function of the helicopter. High elevations, temperatures, and winds reduce capabilities. Using dirt, snow, or light clothing to indicate wind direction will help the pilot.

Safety

Safety on the ground is a prime concern. Staying at least 100 feet from the pad and staying in sight of the pilot, everyone should secure or move away all loose items (hats included).

Evacuation Cost

Helicopter rescues can be expensive. Although some medical insurance policies will cover “emergency” expenses such as helicopter evacuation, the person being evacuated is generally responsible for payment. Service provided by the

Army, Navy, or Marines is normally no-charge. The expense of a helicopter evacuation is a consideration, but obviously safety and well being of the injured party are the foremost concerns.

Hoisting

If landing conditions are not suitable, a hoist operation may be required. If the rescue team cannot provide a person for ground support, the leader or other designated person must perform the required actions. A litter will be preceded by a tag line, which the leader will use to guide the litter down and up.

MISPLACED PERSONS

Form a Plan

Even if the leader does everything right, some member of the group may become misplaced. If the leader has counted heads periodically, he or she can establish when and where the missing person was last included in the count. Questioning members of the group may improve on that information. Trying to reconstruct events helps in guiding ensuing actions. As in effective navigation, all the clues should be used to develop a search plan.

Yell and Listen

If no immediate response to a yell comes, one should remember that many barriers block sound travel in mountainous terrain. Because good judgment will clear up most of these situations, the leader should keep the group controlled and patient.

Misplaced Leader

If one of the leaders has become misplaced, the group should stay together and function as in the case of a misplaced non-leader. Sharing the problem may result in some valuable assistance.

Retreat

Without a leader, the group may want to return to the starting point. It is hoped that people in the group walked with their eyes up and with some attention. Scouting may

help as may a vantage point from a tree or a hill. The group should take time for navigation breaks, not rush, and stay calm.

Tracking

Tracking can be used in cases of misplaced persons or in finding one's way, as retracing steps while returning from a peak climb. Avoiding obscuring the tracks that are available, one should try to follow step by step and use common sense as a guide to the route to follow. Broken branches and twigs and bent grass are other clues. One can practice tracking on any hike and then be ready to use it in a real situation.

BIVOUACS

Why and When

Staying with the hiking/climbing game long enough, one almost certainly will bivouac. Sometimes people choose to bivouac even when a return to camp is possible. Accidents are an obvious consideration, but hazardous travel due to

darkness or weather may also dictate a bivouac. A few hours of discomfort may be much preferred to a risky stream crossing or dangerous rock and/or snow travel.

Equipment

Some basic equipment considerations can take the danger and much of the discomfort out of a bivouac. The standard "10 essentials," extra clothing, food, and water are vital. Assuming that someone may have to stay out overnight (and it might be the leader) either injured or otherwise, the leader should carry a down jacket or equivalent even though daytime weather is expected to be mild. A small, lightweight emergency tube tent can conserve an enormous amount of body heat and will fit in a first aid kit. Combining the above items with the other essentials will dictate the proper summit pack size. Outside straps will help with bulky clothing.

Be Prepared

The obvious rule to follow is "be prepared."

LOST PERSONS

At the trailhead a leader should explain the Sierra Club procedure for lost people:

A search for lost participants will not begin after dark unless there is good cause for alarm, and searching will not begin (or resume) until eight o'clock the next morning. The Club's years of outing experience have led to the conclusion that such occurrences are rare and do not justify the danger to other outings participants caused by undertaking night searches.

In any event, the lost person should understand that there are usually several hours of daylight before 8:00 a.m. in which to attempt to rejoin the group before a search begins (Sierra Club Outings Department, *Outing Leader Handbook*, San Francisco: Sierra Club, 2007, 38).

The *Outing Leader Handbook* notes that this policy is not always followed:

With lost children, a leader's emotions, as well as the emotions of parents and outing participants, often force action. If conditions necessitate a night search, proceed methodically. A closely spaced line of searchers is best. Amateur rescuers, by covering tracks and frightening a lost child with loud yelling, can make it even more difficult for experts to locate that child the next day. (39)

WHEN A TRIP MEMBER IS INJURED: BEDSIDE MANNER AND THE OUTING LEADER

By John Edginton

As Chairman of the Sierra Club's insurance committee, I am often called upon to explain why the Sierra Club has enjoyed an excellent loss history with regard to accidents on both national and chapter outings. A number of factors contribute to our successful record: good safety practices on outings, the reluctance of loyal and/or sympathetic members to sue the club, a realization that the participant is often at fault for the injury, and fate.

But there is another factor at work here which prevents claims, one that I think is as important as any of the others: the good "bedside manner" of our outings leaders toward a trip member who is injured.

It goes without saying that we should operate our outings and activities as safely and cautiously as possible, consistent with the goals and nature of the activity. We need to reinforce good leader traits and skills with training and create opportunities for leaders to network and discuss their experiences, problems, and solutions. We should also encourage fellowship among our participants so that their loyalty and restrained litigiousness continues. But as we do all of that, we should also be sure that this other important skill is in our repertoire.

The expression "bedside manner" is commonly used in reference to a medical practitioner. A physician with excellent bedside manner conveys confidence and concern in caring for his/her patient, regardless of the stress involved. Likewise, an outing leader should exhibit confidence and concern toward an injured participant, not only as a common courtesy but also for the purpose of preventing claims.

Techniques like bedside manner are part of the "soft" side of leadership—namely people-to-people skills. All leaders have different personalities and will approach each situation differently. The following tips, however, should prove useful to everyone.

Do:

- Stay calm. When an accident occurs, a good leader will approach the situation as calmly and efficiently as possible. The expertise and training in first aid/mountain medicine skills will be apparent, which will be comforting to the injured participant. If the leader is calm and logical, the victim will have a feeling that the situation is in hand, and in good hands. The moral here is to have the appropriate amount of first aid/mountaineering skills necessary for the trip you are leading. This will allow a confident and quiet approach.
- Pay attention to the injured person. In addition to being calm, the leader must present an empathetic/sympathetic personality. The use of calming words and a concern for the injured person's comfort and mental well being are mandatory. Generally speaking, you should not leave the victim alone. Explain the details of what is being done and describe any evacuation procedures or other measures you are taking to summon help. Assure the patient that his/her gear will be taken care of if he/she is to be evacuated.
- Remember the relatives. It is also important to be considerate of any relatives or friends of the patient who may be present and to keep them informed about what is going on.
- Keep written records. Keep a written log regarding the injury and treatment so that this can accompany the patient if an evacuation is necessary. The doctors at the medical facility will be grateful for this information, and it also will be helpful when preparing the accident report. Also be sure to send along any information you have regarding allergies or other medical needs that you received from the trip participant prior to the outing. If you didn't get this information ahead of time, get as many details as you can from the injured person after the accident.

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- Send someone out with the injured person. Unless the victim is evacuated by professionals, be sure he or she is accompanied to the final destination for treatment by a member of the trip staff or responsible volunteer. As leader you have a responsibility toward the other participants to continue the trip, assuming the welfare of the injured person can be taken care of in some reasonable way.
 - Maintain communication after the trip. If the participant has been evacuated and is in a hospital, visit him/her at the end of the trip and offer assistance if possible. Be sure that diligent attempts have been made to contact the participant's relatives or friends who will assume responsibility after your departure. Upon returning home, remain in contact with the injured participant, so that he or she understands that you care about his/her welfare and recovery. These final steps are very important.

Don't:

- Don't volunteer opinions regarding the cause of the accident to the patient or anyone else. Complete the accident report and transmit it in accordance with its instructions. During World War II it was said that "loose lips sink ships," and the same is true with claims prevention. Do not make statements, which later could be deemed admissions against the Sierra Club's interest.
- Don't cancel the outing if it reasonably can be continued in light of the accident. You do have a responsibility to the other trip members to fulfill their expectations.
- Don't attempt medical procedures or treatment that is beyond your expertise. Some procedures should only be performed by a nurse or doctor. Do utilize any medical expertise or training which may be present among the trip members.
- Don't expose yourself to the risk of a claim of sexual harassment. When working on a member of the opposite sex, try to have a witness of the patient's sex to avoid claims of improper touching, etc. Respect the victim's privacy, but recognize that sometimes performing appropriate medical treatment will require removal of clothing, elimination of fluids and waste and other intimate actions. Try to obtain the victim's consent before dealing with such sensitive problems.
- Don't tell the victim that the accident was his or her fault. Don't make any deprecating remarks or imply that he/she was clumsy or otherwise inadequate. Do sympathize with his/her plight.

Perhaps the best way to approach the bedside manner question in your own mind is to put yourself in the place of an injured person and recall the kind of conduct that made you feel good as opposed to apprehensive, frightened, or possibly angry. It is very helpful to discuss the subject in a meeting with other leaders, preferably of both sexes. The more you are aware of the importance of your bedside manner, the easier it will be for you to put it to use in the stressful situation of dealing with an injury on one of your trips.

5

First Aid Considerations

Sierra Club leaders should be capable of responding appropriately to medical problems and injuries that may occur during outings that they lead. The leader's level of training should be appropriate to the environment and risks possibly encountered on a given trip. For example, leaders for outings that occur in or near an urban environment require a lesser level of training than those occurring in more remote settings where professional medical care is more than one hour away. Although O-level candidates need only a standard first aid course and adult cardiopulmonary resuscitation (CPR), all other candidates must complete a twenty-four hour or longer wilderness first aid course as well as adult CPR, as noted in chapter 1. Those O leaders, however, who plan to lead backpacks or other trips more than an hour distant from emergency medical services are strongly encouraged to study wilderness first aid also. If an I- or M-rated leader later completes the additional requirements to become an M or E, he or she must have current certification in wilderness first aid (twenty-four hour minimum) and CPR or will need to repeat these requirements so as to be current at the time the new leadership level is attained. First aid, wilderness first aid, and CPR are considered current for four years for LTP purposes. Please note that for restricted M- and all E-level outings, one of the two leaders must be current in wilderness first aid (sixteen hour minimum course); the other leader may be current in standard first aid. Thus, a certified, not provisional, M or E leader may take a sixteen-hour wilderness first aid course to stay current.

First aid in an urban setting is rendered under the assumption that the patient will enter the emergency medical system rapidly. In the wilderness—essentially any location more than an hour away from professional medical care—basic first aid is of limited use for a variety of reasons. For one, the care required may be beyond the scope of basic first aid. Because of a lack of specific medical equipment and trained medical personnel to care for the victim optimally, the standard of care may deviate in the wilderness from that of urban medical care, and rescuers may have to improvise equipment and technique or do without. Some illnesses and injuries are unique to an outdoor or wilderness environment, such as snakebite or acute mountain sickness. Due to remoteness, lack of communication, and lack of transportation, professional medical care is likely to be delayed for hours or days when injury or illness strikes in the wilderness. As a result, the rescuer's contact with the patient will be prolonged for hours or days and will be around the clock; the rescuer thus needs training in longer-term care. The outdoor environment itself can present a challenge to the victims and rescuers alike, who may be exposed to unfavorable temperatures, weather, altitude, and terrain and a lack of food, water, and shelter. To make appropriate evacuation decisions, a leader needs familiarity with rescue techniques and operations. Finally, outcomes of treatment in a wilderness setting may be less favorable than treatment obtained by rapid entry into the emergency medical system.

CHOOSING A FIRST AID COURSE

For people with real jobs, taking sixteen to twenty-four or more hours of wilderness first aid (WFA) instruction is generally inconvenient. Most commercial WFA courses are expensive, and twenty-four hours of first aid may be out of proportion with a leader's training in other equally important disciplines, e.g., map and compass. Because first aid is a safety skill rather than a primary skill like recognizing trees and flowers, a leader will not necessarily have a more fulfilling trip just because of first aid training. Nevertheless, a person cannot become adequately trained in wilderness first aid in three to four hours any more than one can learn to skydive or pilot a small plane in the same period of time. Leaders who want the peace of mind that comes with being adequately prepared to deal with medical emergencies in the wilderness will have to invest the time and money.

This is not really a discussion about wilderness vs urban first aid courses; it is a discussion about getting enough hours of quality instruction. To provide a specific example, the eighty- to one-hundred-hour Emergency Medical Technician course is urban first aid, but it is quality first aid instruction that will prepare a person to deal with 98% of the illnesses and injuries you will encounter in the wilderness. That is not meant as a recommendation that every wilderness leader get an EMT certificate. Red Cross Standard First Aid (RCSFA), the most popular three- to four-hour first aid course, spends most of its time cataloguing injuries and illnesses and listing their signs and symptoms. It is very weak on patient assessment. Taking it is roughly equivalent to passing the written driver's license exam without any time behind the wheel of a car and then expecting to be a competent driver.

Advanced electronics are no substitute for first aid skills. If a party of backpackers in the Sierra uses a SPOT emergency locator beacon or a satellite phone to request help for a life-threatening emergency, a typical response time (from call to helicopter arrival) is five to six hours if the call is made early in the day and ten to twelve hours if it is made late in the day. At best, RCSFA training will prepare a leader to deal competently with the first fifteen to thirty minutes of that period. The time between that first half hour for which a person has been trained and the arrival of professional medical assistance is going to seem like several lifetimes if the leader has a seriously ill or injured patient and no idea what to do for him or her.

Realistic simulations are the heart of any quality first aid course, wilderness or not. Before signing up for a first aid course longer than three or four hours, ask how much time is spent in simulations. Find out how long a single simulation runs (just doing a realistic assessment of a patient takes a beginning first aider fifteen minutes or more), how many

“rescuers” are assigned to one patient, and what fraction of his or her time the instructor(s) can devote to each group doing a simulation.

Instructor Qualifications

First aid is like most other disciplines—if a person has not done the real thing out “in the field,” he or she most likely does not understand it well enough to do a quality job of teaching it. Many short first aid courses offered by the Red Cross and similar providers are taught by paramedics, nurses, and other experienced health care professionals, but not all first aid instructors are that well qualified. Ask about the instructor's hands-on patient care experience before signing up for the course.

Recognition of Course Credentials

If a leader wishes to go beyond a three- to four-hour first aid course and/or wishes to take wilderness first aid, a number of regional and national organizations may offer appropriate first aid courses. All of them most likely provide a diploma or certificate of course completion. If a person is taking the course as part of leadership training for one or more organizations, he or she should find out in advance which first aid courses are recognized by the organizations one is training to lead for. National organizations such as Wilderness Medical Associates (WMA) are likely to be recognized by most or all organizations requiring first aid training for their leaders; regional organizations such as the Wilderness First Aid Course (WFAC) may not be recognized outside their geographic areas. The American Camping Association maintains a list of widely recognized Wilderness First Aid providers.

LEGAL CONSIDERATIONS

Obligation To Render Aid

No state in the United States has laws that require anyone to help a stranger in distress. An obligation does exist in such circumstances, but the obligation is ethical, not legal. A legal obligation to render first aid and assistance (“duty to the patient”) does exist when one has caused injury to another. This obligation exists for leaders of organized outings, and probably also for fellow members of a hike, backpacking trip, or technical climb.

If a citizen does go to another person's aid, the law obliges him or her to continue to care for the patient until the patient's care is transferred to another qualified person. Failure to do the latter is called abandonment and can result in consequences such as a lawsuit.

Documentation

Detailed documentation of the emergency care provided to each patient is very important: this documentation is required by most rescue organizations, which provide report forms to be filled out in each case. The rescuer should remember that, in the case of litigation, he or she may be required to testify in court many months or years after the occurrence in question. Having a complete and accurate report to refer to is much better than relying on memory alone.

Once a first aider has touched a patient and started to give care, he or she cannot just walk away, even if the patient momentarily changes his or her mind or starts imposing conditions that make it difficult to give appropriate first aid. The patient may decide to refuse further treatment or insist on being released to the care of someone less qualified or impose conditions (e.g., “I want your help, but you can’t remove my clothing”). In such a case, the rescuer should attempt to persuade the patient to accept the suggested care, making it clear

- 1) why this is in the patient’s best interest and
- 2) that the rescuer’s training requires him (her) to proceed in this manner.

If the patient still refuses to allow the rescuer to perform first aid in a manner that the first aider thinks appropriate, the rescuer should ask the patient to sign a Refusal of First Aid form, an example of which is found in Appendix C. The form provides a degree of legal protection for the rescuer if first aid is discontinued. Before asking the patient to sign this or any other form, one must make sure he is conscious, alert, and fully oriented and not under the influence of alcohol or drugs. If the patient refuses to sign the form, one should note all the information on the form anyway, note that the patient refused to sign, and have witnesses sign.

Informed/Implied Consent

In the eyes of the law, a person’s body is inviolate. Interfering with it or even touching it without permission may constitute battery, an illegal act in many states. Because any person usually has a right to refuse emergency care, when first approaching a patient, the rescuer should identify himself or herself as a trained rescuer and provider of emergency care and ask “Can I be of help?” The patient may either specifically give consent or may cooperate with your assessment and care in a way that can be taken as actual consent. When telling patients what they need to know about the treatment being offered, the first aider should make sure to do it in language the patient can understand. Not only will this satisfy the requirements of informed consent, but it

will also provide patients with greater confidence since they know what to expect.

If the patient is unconscious or irrational or is a minor and urgently needs care for a life-threatening or serious illness or injury, consent may be “implied.” This means that the law presumes that the patient, if able (or the patient’s parents or guardian, if present), would consent to the care.

In some cases, a patient who initially refuses care can be persuaded to accept help by a calm discussion of the risks of not obtaining care. If the patient persists in refusing, it is wise to have responsible witnesses present and have statements from them for the record specifying that care was offered and refused.

If an irrational or unreasonable patient refuses urgently needed care for a life-threatening or very serious condition, it is probably better at least to try to give the care despite the refusal. At this point, however, proper documentation is essential.

“Good Samaritan” Laws

Another deterrent against litigation is the so-called Good Samaritan laws, the purpose of which is to encourage people to help out voluntarily in emergencies. Although these laws do not prevent suits from being filed, they generally make it more difficult for the plaintiff to win because in theory they absolve from liability anyone covered by the statute who gives care gratuitously, in good faith, and in accordance with his or her training and expertise in a bona fide emergency—except in the case of gross or willful negligence.

California Health and Safety Code 1799.102 adds that no person who in good faith and not for compensation renders emergency care at the scene of an emergency shall be liable for any civil damages resulting from any act or omission. (Four other California good Samaritan laws add very little to this basic one.)

Federal Volunteer Protection Act (1997) protects volunteer members of non-profit organizations who are acting within the scope of their responsibilities. Unlike the California Good Samaritan laws, the Federal statute is not limited to medical situations. It protects a wide range of volunteer activities such as coaching Little League, being a Girl Scout leader, and leading a wilderness outing for the Sierra Club.

Despite any legal protection offered by the above state laws, the rescuer should realize that the best protection—and also an ethical obligation—is good, up-to-date training, conscientious maintenance of competency in knowledge and skills, and dedicated patient care. Nonetheless, training and quality care alone are not sufficient legally unless records are kept that document them, preferably on standardized

forms. Detailed notes should be made of dates, names of rescuers attending, and procedures performed. Although a legal basis for claims does exist, lawsuits arising from voluntary medical assistance are very rare. In wilderness circles they are essentially non-existent.

Note: This information is for general guidance only. An attorney should be consulted for definitive legal advice.

SUGGESTED READING

Carline, Jan D., Martha J. Lentz, and Steven C. McDonald. *Mountaineering First Aid: A Guide to Accident Response and First Aid Care*. Seattle: The Mountaineers, 2004.

A very friendly and accessible text but not as complete as the two following. The material on patient assessment is only fair. This is the only text listed here that might be small and light enough to be carried by a group as part of the communal gear.

National Safety Council and Wilderness Medical Society. *Wilderness First Aid: Emergency Care for Remote Locations*. 2nd ed. Sudbury, MA: Jones and Bartlett, 2005.

If you are going to buy one WFA textbook, this is the one. It is readable, it is reasonably complete, and it is sponsored by

the Wilderness Medical Society. It has a fairly good chapter on patient assessment.

Schimelpfenig, Tod and Joan Safford. *NOLS Wilderness Medicine*, 4th ed. Mechanicsburg, PA: Stackpole, 2008.

Good coverage of the fundamentals, clearly written. A good choice for a single WFA text, striking a good balance between readability and completeness. Nice line drawings.

National Ski Patrol. McNamara, Edward C., David H. Johe, and Deborah A. Endly, eds. *Outdoor Emergency Care*. 5th ed. Boston: Brady, 2012.

This is the ski patroller's bible for outdoor first aid. A coffee table size reference book, it is not cheap (about \$70). This text goes into great depth and is meant to be studied, not read casually. It assumes the availability of backboards, oxygen, and radio communication.

Wilkerson, James A. *Medicine for Mountaineering and Other Wilderness Activities*. 6th ed. Seattle: Mountaineers, 2012.

The title says "medicine," and they mean it. This is not a first aid text. This would be a useful handbook for medical professionals who want to learn more about outdoor medicine.

RESPONDING TO WILDERNESS ACCIDENTS AND ILLNESS

This material is designed for use as part of a course of instruction, including hands-on skills practice under the supervision of qualified instructors. It is provided here to promote a general understanding of wilderness first aid.

Scene Survey

Form a general impression of the nature of the accident and the victim's injuries.

Look around for objective danger—anything that can put you or your patient(s) at risk such as falling rock.

Put on medical gloves and get out your barrier for mouth-to-mouth breathing if you may need it.

Count the number of victims.

Primary Survey

Assuming that there is only one victim,

Assess **A**irway—is the patient able to respond verbally? Open airway with modified jaw thrust as needed.

Assess **B**reathing—can the patient use basic (complete) sentences? Give mouth-to-mouth breathing if needed.

Assess **C**irculation—does the patient have a pulse? If the patient meets A & B above, the answer is yes. Otherwise, check for the carotid pulse.

Assess **B**leeding—is there visible fresh blood on the patient's skin, clothing, or the ground nearby? If so, expose the source by removing clothing. If the bleeding is profuse, control the bleeding with direct pressure right over the source of the bleeding. If the bleeding is minor, place a piece of gauze over the wound and secure it if needed.

Immobilize the patient's head and neck. Use c-spine immobilization techniques if you are trained in them. Otherwise, ask the patient to look straight ahead, to keep his or her head and neck absolutely still, and not to look around.

Gather Patient Information

Introduce yourself and state your qualifications in first aid.

Ask the patient's name.

Estimate the patient's age. If the patient is in his teens or twenties, ask his or her age.

Assess patient Level of Consciousness (LOC) as Alert/Verbally Responsive/Responsive to Pain/ Unresponsive.

Get permission to treat.

If the patient is alert, further assess LOC. Can the patient correctly identify:

Person—who is he or she?

Place—where is he or she?

Time—what day of the week and what month is it?

Situation—what happened?

Address the Patient's Chief Complaint

Ask the patient “What hurts?” The answer to this question is referred to as the patient’s “chief complaint.” Expose the site where the complaint is located. Assuming that what you find is not life-threatening or potentially disabling, spend a minute or two addressing it. If it is a wound, put a dressing over it. If it is a possible fracture, have someone immobilize it. If it is a bruise, elevate it and apply ice or compression. Talk to the patient about it and express your concern, but move on as quickly as possible.

Get Vital Signs and Record Them

Pulse rate and quality, e.g., 88 per minute and weak

Breathing rate and quality, e.g., 16 per minute and shallow. Breathing rate can be difficult to assess through outdoor clothing. If breathing is not labored or noisy, you can record it as “normal.”

Skin vitals are color, temperature, and moisture, for example “pink, warm, and dry.”

Check Pupils—assuming the patient is outdoors in daylight, ask the patient to close his or her eyes and cover them with your hand. Count to ten. Have the patient open his or her eyes as you remove your hand. Do both pupils constrict (get smaller)? Are they equal in size?

Record vital signs including level of consciousness along with the time.

Vital signs should be repeated every fifteen minutes until the patient's condition is stable.

Medical History

Ask the patient about the following aspects of his or her medical history:

Allergies—does the patient have any allergies, if so, to what?

Medications—ask the patient to list his or her current medications. Since it is easy to record the drug names incorrectly, make sure to record the function, e.g., drug for hypertension.

Previous Medical or Surgical History—ask the patient whether he or she has had illnesses, operations, or chronic conditions that might be relevant to the current situation.

Last Meal—when did the patient eat last and what/how much? When did the patient drink last and what/how much?

Events Preceding—what happened just before the accident or the onset of the illness? For example, if the patient fell down and injured his wrist in the fall, did he fall because he wasn't watching his footing or because he felt dizzy? If the latter, the first aider must ask additional questions to determine whether an underlying medical condition caused the dizziness.

Head-to-Toe Exam

Begin at the head and work toward the feet but save the back for last.

Check the head for lumps, bruises and wounds. Check the nose, ears, cheekbones and mouth for blood or discharge.

Have the patient bite down; Ask “does this hurt?” Check the vertebra of the neck by pressing on each one and wiggling it gently:

Is it displaced compared to its neighbors?

Does it move?

Does pressing on it cause the patient pain?

Check both collarbones for pain and deformity. Ask the patient to inhale while you squeeze both sides of the ribcage. Does this hurt the patient? Find the belly button and draw imaginary vertical and horizontal lines through it, dividing the stomach and abdomen into four sectors. Press firmly on each sector using both hands with the fingers overlapped. Does this cause pain? Are the muscles rigid? Find the points of the pelvis and put one palm on each. Push down, compressing the pelvis against the ground. Does this hurt the patient?

Wrap your hands around each leg, one at a time. Run your hands down the leg, beginning just below the groin, squeezing while trying to touch as much surface area as possible. Are there deformities? Does this hurt the patient? Do you feel any fresh blood? On each leg, remove the shoe and sock. Do the following four checks on each foot:

Circulation—Pinch the big toe, observe that the nail bed has gone pale, release it and time how long it takes the nail bed to go pink again. The time should be two seconds or briefer

Sensation—With the foot in a location where the patient cannot see the toes, pinch the big or little toe and ask the patient which toe you are pinching.

Motion—ask the patient to wiggle his or her toes

Function—with your hands, push up (toward the patient's head) on both of the patient's feet and ask him or her to resist. Then pull down (away from the patient's head) on his or her feet and ask him or her to resist. Can the patient exert a normal amount of force with his or her feet, and is the force roughly equal on both feet?

Put the patient's socks and shoes back on and move up to his or her arms. Wrap your hands around each arm, beginning just below the armpit, one at a time. Run your hands down the arm, squeezing while trying to touch as much surface area as possible. Are there deformities? Does this hurt the patient? Do you feel any fresh blood? On each hand, remove gloves or mittens. Do the following four checks on each arm:

Circulation—Pinch the thumb, observe that the nailbed has gone pale, release it, and time how long it takes the nail bed to go pink again. The time should be two seconds or briefer. This is referred to as checking distal circulation or "distals."

Sensation—With the hand in a location where the patient cannot see the fingers, pinch the thumb or little finger and ask the patient which finger you are pinching.

Motion—Ask the patient to wiggle his or her fingers.

Function—Offer the patient your index and middle finger on each hand and ask the patient to squeeze them hard. Can the patient exert a normal amount of force with his or her grip, and is the force roughly equal using both hands?

Check the back. Lift the patient's near shoulder and reach under him or her with the other hand until you can feel the spine. Starting with the prominent vertebra at the base of the neck (C7), place your fingertips on the bony protrusion of each vertebra, one at a time, and press gently. Is it aligned with its neighbors? Wiggle it a bit—does it move more than its neighbors? Watch the patient—does it look like he or she is experiencing pain when you move the vertebra?

Dress Wounds and Splint Possible Fractures

Wounds found during patient assessment that were bleeding heavily have had the bleeding controlled with direct pressure over several pieces of gauze. At this time (if it has not already been done), the dressing is checked to confirm that bleeding has stopped, a bandage is wrapped tightly to hold the dressing in place, and distal circulation on the affected limb is checked.

Wounds found during patient assessment that are not bleeding heavily have been temporarily dressed with a piece of gauze. At this time they are cleaned with soap and water, dried, and redressed, and a bandage is applied to secure the dressing.

Possible fractures found during patient assessment have been stabilized by a first aider holding the limb above and below the injury site. At this time the materials required for splinting are assembled. With the first aider continuing to support the fracture site, the splint is applied and secured. Distal circulation is then checked on the affected limb.

Reposition the Patient (this can be done at any time during the response)

Sometimes the patient needs to be moved a short distance to be relocated away from the trail or to be sheltered behind a boulder from wind or rockfall. In addition, patient body position sometimes needs to be adjusted to be more appropriate for the patient's medical issues. For example, a patient who has lost significant blood is likely to do better lying down than sitting up. The following is a list of body positions and the medical conditions with which they are usually helpful. Keep in mind that the patient's "position of comfort" trumps these general guidelines. If the patient says that breathing while lying down is difficult, then allow him or her to recline or sit up. Also consider what sort of injury or illness is likely to cause this symptom.

Shock or loss of blood—Lying down with head slightly downhill

Head injury—Lying down with head slightly uphill

Bleeding from the mouth or likely to vomit—On his or her side

Difficulty breathing—reclining

Chest or rib injury—sitting up with uninjured side higher

Summary of Urban First Aid, Wilderness First Aid, and CPR Courses

Course Name	Org./ Lead Instructor	Dates	Total Hours/Format	Est. Cost	Location	LTC Rating	Contact
First Aid and CPR/AED	Red Cross	Many	6 hours	\$110	Many in LA Basin	O	OC: http://oc-redcross.org LA: http://redcrossla.org Click "Take a Class"
Web sites – www.redcrossla.org (Los Angeles); oc-redcross.org (Orange County); redcrosslb.org (Long Beach)							
First Aid and CPR	SC Angeles Chapter/ Steve Goldstein	tba	6 hours for SFA + adult CPR	\$35 course fee +\$27 for card	Angeles Chap HQ or by arrangement	O	hatbsa@sbcglobal.net
Comments: Red Cross CPR card and First Aid card provided with some discussion of wilderness considerations							
Wilderness First Aid Course	WFAC/Steve Schuster	April or May and October	26 hours/Fri thru Sun	\$920	Harwood Lodge	O to E	WFAC PO Box 3414 Fullerton, CA 92834
Comments: LTC/WTC sponsored; fee includes lodging, meals for weekend, notes Prerequisite of CPR course within previous 4 years. Full fee and proof of CPR required for enrollment. Web site address is http://wildernessfirstaidcourse.org/ . Contact Steve Schuster at steve.n.wfac2@sbcglobal.net							
Wilderness Advanced First Aid	Wilderness Outings	Two to three per year	36 hours – Thursday thru Sunday	\$399	Idyllwild	O to E	www.wildernessoutings.com
Comments: Nationally recognized certification; includes text and adult CPR; lodging extra. Phone 877-494-5368							
HAT First Aid	Verdugo Hills BSA	Fall	60 hours/Saturdays	\$75	Glendale, CA	O to E	Marlene Lugg at 818-882-4526 or e-mail (below)
Comments: Fee includes book and mask; ARC Emergency Response, plus complies with WMS guidelines. Includes CPR, and new Wilderness and Remote First Aid course.							
Wilderness and Remote First Aid	Verdugo Hills BSA	Spring and fall	16 hours/Sat., Adult CPR prerequisite	\$40	Glendale, CA	O	Marlene Lugg at mmhlugg@alumni.pitt.edu
Comments: This is the new, enlarged ARC Course replacing Wilderness First Aid Basics. Complies with WMS and BSA guidelines. Can take CPR with High Adventure First Aid class for additional \$10.00 fee.							
REI	NOLS	tba	16 hours	\$200 mbr/ \$920 other	REI store	O	Your local REI store
The CPR Lady	AHA certification	2 – 3 per month on Mondays	4 hours	\$50 class + \$15 text	Many in LA, OC, Riverside counties	O to E	www.thecprlady.net 949-651-1020
Comments: Any CPR course is OK for any leadership rating. Ski patrol first aid instructors say that this is a good CPR provider.							
A Google search on "CPR Instruction Southern California" yielded about half a million hits—choose a course with a time and location that is convenient for you. It must be hands-on; web CPR training is not accepted.							
Key to Abbreviations: ARC—American Red Cross; WFA—Wilderness First Aid; HAT—High Adventure Training; NOLS—National Outdoor Leadership School; WMS—Wilderness Medical Society; BSA—Boy Scouts of America							
Financial support for first aid enrollment is available. Contact the LTC chair to discuss a scholarship. Contact Steve Schuster at steve.n.wfac2@sbcglobal.net about helping in the WFAC kitchen in exchange for reduced (or free) enrollment at a subsequent WFAC.							
Sierra Club National First Aid Information: http://clubhouse.sierraclub.org/ Username: clubhouse Password: explore Choose Outings (top bar); Choose Training (left bar) Choose First Aid Providers							

Reported Outings Injuries and Illness

This table, compiled by Steven Schuster, presents data for reported injuries (not incidents or persons) for an outings program in the western United States over a ten-year period.

“Technical” refers to high-angle rock climbing and snow climbing with an ice axe. In case of doubt, injuries are considered non-technical.

Major Category	Minor Category	Non-Technical	Technical	Combined
Evacuation	Helicopter	4	7	11
	Litter		2	2
	Sled	1		1
	Other & Unknown	3	5	8
Sprain/Strain	Knee	20	5	25
	Elbow	1		1
	Ankle	34	11	45
	Groin		1	1
	Wrist/Hand	6	2	8
	Back	1		1
	Leg	1	2	3
Fracture	Ankle/Foot	16	11	27
	Vertebra	0	2	2
	Lower Leg	8	4	12
	Hand/Wrist	14	7	21
	Rib	4	3	7
	Hip/Pelvis	6	1	7
	Elbow	2	2	4
	Femur		1	1
	Arm	5	1	6
	Clavicle/Shoulder	4	2	6
Nose	2		2	
Flesh Wound	Torso		2	2
	Extremities	29	16	45
	Head/Face	29	7	36
Dislocation	Shoulder	1	7	8
	Knee	2		2
	Elbow	1	1	2
Contusion	Torso	13	5	18
	Extremities	10	5	15
	Head/Face	6	1	7
Major Head Injury		4	3	7
Dog Bite		2		2
Heart Condition		6		6
Heat Condition		3		3
Diabetic Condition		2		2
Major Chest/Abdomen		1	1	2
Eye Injury		2		2
Marine Life		1		1
Dental Injury		1		1
Totals		230	102	332

6

Navigation, Route Finding, and Trip Planning

Angeles Chapter trips are quite diverse activities, ranging from hikes on well-marked and mapped trails with excellent descriptions in written guides to exploratory cross-country adventures through difficult mountain and desert terrain. The range of planning and navigational skills required to conduct these trips safely is equally extensive.

For many leaders who plan outings in well-known and well-marked territory, some of the material in this chapter will be unnecessarily complicated. Yet the moment a party steps off a trail in unfamiliar terrain, a leader with confidence in his or her navigational knowledge and practical experience using navigational skills may be essential to reach the objective and return safely; such confidence and experience often mean going beyond the “basics.” This chapter, therefore, goes beyond the specifics called out for navigation checkouts to include supplemental information to enlarge the scope of the leader candidate’s knowledge of navigation techniques and lore.

Advanced planning and route finding techniques are not difficult to learn in theory, but it takes practice to become proficient under the stress of real-world situations.

- Leaders must be able to plan trips that can be done in a reasonably efficient and safe manner within the time available. Planning entails selection of the route, estimation of the time required, selection of necessary equipment, screening of group members for the necessary skills and physical condition, plus contemplation of unexpected events that might require time-consuming corrective measures and fall-back plans. All of these considerations have a direct or indirect impact on the navigation aspects of the trip.
- In the field the leader must navigate and “find” the route. The leader must know where the group is and where it is going and be able to select an appropriate route to get there. Besides knowing their location on the map or being able quickly to determine their location and correlate features on the map with the terrain, leaders should also have the skill and experience to select a good route from the outset and be able to change the route if necessary as the terrain unfolds.

MAPS

Big Picture Maps

Some maps produced by the Automobile Club of Southern California are invaluable aids for the automobile part of the trip. They are updated frequently and show unimproved roads, campgrounds, locked gates on roads, many major trails and peaks, and various points of interest. The Auto Club's county map series includes coverage of Southern California mountain ranges from the Mexican border to the northern boundaries of San Luis Obispo and Tulare Counties. The Auto Club has also developed excellent maps that provide detailed coverage of Yosemite and the Eastern Sierra, as well as of Death Valley, Indian Country, and the Colorado River.

The United States Geological Survey (USGS) 1:250,000 scale maps cover an area of one degree latitude by two degrees longitude at a scale of about one inch on the map to four miles on the ground. They are topographical maps and have more terrain detail than the Auto Club maps but have less reliable road information. They are very useful in those regions beyond the coverage of the Auto Club maps.

USGS 1:100,000 scale maps (30 x 60 minute series) are now available for most of the contiguous 48 states. These topographic maps have a scale of about one inch on the map to 1.5 miles on the ground. Since USGS is no longer updating or printing the 1:62,500 scale maps (15 x 15 minute series), the 30 x 60 minute series maps provide a useful tie-in or overview for the 1:24,000 scale maps (7.5 x 7.5 minute series).

United States Forest Service (USFS) maps are helpful supplements to other maps because they show trail numbers, campgrounds, private property, fire closure areas, logging roads, and the names of some terrain features not found on topographic maps. They may be obtained by writing the particular National Forest headquarters or by visiting a ranger station in that National Forest. Many outdoors and sports stores also carry these maps.

Topographic Maps

The principal map used by the leader for detailed planning and in the field is the USGS topographic (topo) map in the 7.5' (minute) series, with a scale of 1:24,000 (one inch on the map represents 24,000 inches, or 2000 feet, in the field). The 7.5' map series was launched in 1945 and completed in 1992. All of the contiguous 48 states are covered by the 7.5' map series, which has replaced the older 15' series once maintained and sold by the USGS. Each map covers a region of 7.5' (1/8 degree) in latitude and longitude, called a quadrangle. (The area covered by

the quadrangles in California is roughly 7 1/2 x 8 miles.) Each quadrangle map has a unique name taken from some prominent feature in it. National Park and National Forest Visitor Centers, specialty map shops, and outdoors stores usually carry frequently-used topo maps of the local areas they serve. The USGS web site is <http://usgs.gov>, and internet orders for USGS maps can be made at <http://store.usgs.gov>. At the USGS store web site, a "Map Locator and Downloader" is available. This will allow you to search for and download .pdf images of all 7.5' topo maps.

USGS 7.5' topo maps are less available in local outdoor stores than they were in the past, particularly for areas of California more remote from Los Angeles (e.g., the Sierra). Most REI stores in Southern California carry a small selection of local topographic maps. The USGS has created a new map series called "US Topo" to replace the 7.5' map series. In 2012, the USGS released US Topo maps for every quadrangle in California. The new maps use the same names as the 7.5' minute map series and cover the same area with slight marginal differences caused by use of the North American Datum of 1983. (Most maps in the 7.5' map series use the North American Datum of 1927.) The new US Topo maps can be downloaded for free on the USGS web site. Printed versions are available from the USGS for \$15.00.

The US Topo map series is produced using automated and semi-automated processes and cost substantially less to produce than the handcrafted 7.5' map series. These new digital maps are considered the "next generation" of USGS map products. The 7.5' map series will no longer be updated.

The 2012 release of US Topo does not have the same detail of the 7.5' map series. Future releases may address some of these shortcomings, with the next release scheduled for 2015. Significant shortcomings include

- Many common topographic map symbols are not used;
- Elevations for peaks are missing;
- Township, Range, and Section information are not included;
- Trails, buildings, and other features are not shown;
- The contour lines are not as finely shown and many small, closed contours on the 7.5 minute maps are not shown on the digital maps.

The LTP navigation program will continue to use the 7.5' map series. These maps are superior to the new US Topo series and should continue to be available for purchase from a variety of vendors.

Caution: Some vendors sell 7.5' topos printed on plasticized material. These are not acceptable or usable for LTP navigation practice/checkout requirements because

one cannot write on them. Maps must be 7.5' USGS topographic maps printed on paper to correct USGS scale. For detailed trip planning and especially for navigation in the field, 7.5' topographic maps are generally used. These maps are mandatory for navigation practice and checkouts and the associated homework. For trip planning and more casual navigation, however, other topographic maps are available which can be very useful. These include

- The USGS 15' maps, while no longer updated and therefore potentially suspect with regard to accuracy of trail and road locations, are still available in books (e.g., *Hetch-Hetchy*, *Yosemite*, and *Mt. Whitney*) published by Wilderness Press and available in local outdoor stores. These maps, having a scale of 1:62,500, are less detailed in terms of terrain features than the 7.5' maps. Nevertheless, in California they do cover larger areas (typically 14x17 miles) and can be very useful in planning longer trips in the Sierra. Many of these 15' maps can be downloaded at the USGS online store.
- In addition to large-scale national forest maps, the USFS offers high quality topographic maps of several wilderness areas in Southern California (e.g., the Cucamonga and San Geronimo Wilderness Areas). Although not as detailed as the USGS 7.5' topographic maps, these maps are often more up-to-date and show trails not yet incorporated in the USGS maps.
- The commercially produced Tom Harrison Maps are readily available in local stores and cover both local areas and the Sierra. Typical titles (only a small sample) include *Trail Map of the Angeles Front Country*, *Trail Map of the Angeles High Country*, *Kings Canyon High Country Trail Map*, *Mono Divide High Country Trail Map*, and *Map of Yosemite Valley*. The scales of these maps vary but are generally not as fine as the 1:24,000 USGS topographic maps (those of the Santa Monica mountains are an exception, and offer very good detail). These maps are plasticized (good for rain resistance), include a UTM grid (see Appendix A), and, unlike most other topographic maps, include trail mileage information. The publisher appears to update these maps frequently.
- The commercially produced Trails Illustrated maps by National Geographic are also readily available in local stores and cover Joshua Tree National Park, the Santa Monica Mountains, Mojave National Preserve, and other areas in California. They provide valuable information,

including information about park rules and regulations.

Occasionally, when the area to be traversed or viewed is contained near the edges of two maps, then two maps are necessary. The maps may be carefully folded at the edges and seamlessly taped together with write-on tape (not glossy), on both sides. Write-on tape permits lines to be drawn on the tape when plotting near the taped edges of the maps. It is almost impossible to do terrain/map recognition, to plot bearings, or to estimate distances when the maps are separate.

It is best to fold the map to show the specific area of interest and then change the folding to show new areas as the trip progresses. A map which is quickly available and needs no unfolding, especially in the wind or rain, is most useful for route following. All map-folding methods will eventually cause the corners and edges of the map to wear away, resulting in loss of the printed area. These are then not available for navigating. Special map holders, available at outdoor stores, are designed to protect maps from abrasion, wind, or water while being viewed. Re-sealable plastic bags work too.

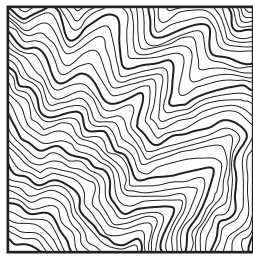
Electronic Topographic Maps

In recent years electronic topographic maps and the availability of inexpensive color printers have made "do-it-yourself" maps a viable option for the computer-literate hiker. Derived from USGS topographic maps, the electronic maps and the user-friendly software offer the leader great advantages: the ability to examine routes, calculate distances, make trail profiles, and conduct other comprehensive map studies at home. The USGS topographic map of interest and its surrounding quadrangles are seamlessly available at user-selected scales. Among the most useful features available are the capabilities to draw and assess the statistics of routes on the map, establish waypoints that can be transferred to GPS receivers, catalog bearings and distances to near and far peaks and other objects of interest, and determine their visibility from particular locations. These maps may include some of the marginal data (scales, magnetic declination, etc.) available on the printed topographic map, since they present data from many USGS maps. For the latest information on available software, contact the LTC Navigation Chair, your local outdoor store, or search for resources online.

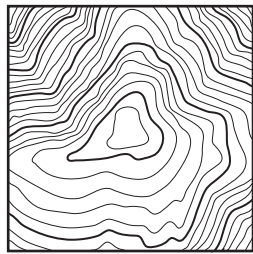
While electronic maps offer several advantages (selectable scales, spanning quadrangle boundaries, planning tools with the home computer packages), their end product is one or more printed maps. And in this hardcopy product there are limitations as compared to the standard USGS printed 7.5' maps:

- The quality and readability of the maps will

The keys to visualizing landforms on topo maps are the contour lines: their shape shows the shape of the land, and their spacing shows the steepness.



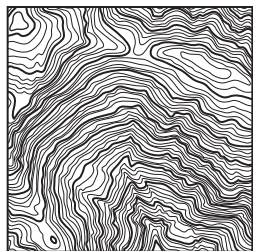
- ◀ **Gullies and Ridges** appear as V-shaped contours, with the V's pointing uphill in gullies and downhill on ridges. Ridges may be U-shaped.
 - Gullies tend to converge downhill and ridges diverge while the opposite is the case for uphill travel.
 - Ridges come together at the summit and gullies (going down) empty into bigger gullies.
 - Ridges border drainage patterns; gullies are the drainage patterns.



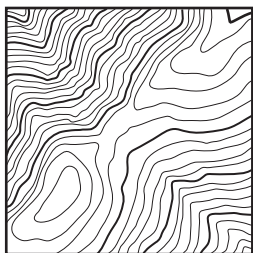
- ◀ **High Points (or Sink Holes)** appear as the smallest closed contours, usually within a concentric group of larger closed contours.
 - The precise location of peaks is often indicated by a benchmark, elevation, or a triangle or "x" symbol.
 - High points or sink holes may extend above or below the elevation of the smallest closed contour lines, up to 39 feet on 7.5 minute maps.



- ◀ **Benches and Cliffs** appear as variations in contour spacing.
 - Benches show a local increase in contour line spacing because terrain flattens out.
 - Contours are closely spaced for cliffs, where the terrain is very steep.



- ◀ **Bowls, Amphitheatres, and Cirques** appear as approximately circular contour line patterns with slight decreases in line spacing as altitude increases.



- ◀ **Saddles (and most passes)** are low points on ridges and appear as hourglass-shaped contours, with the higher ridge widening on both sides.

To help visualize the big terrain picture, one may trace certain contour lines, say every 1,000 feet, with colored pencils. Drawing lines along ridges reveals drainage patterns, and marking peaks with colored dots makes high points stand out.

Many terms are used to denote related landforms. Thus, we have not only gully, but couloir, chute, ravine, gulch, wash, draw, and at a larger scale, canyon, basin, and valley. Besides ridge we also have arête, rib, buttress, spur, and divide, while besides saddle there is col, notch, and pass. Each term has a different shade of meaning, but they all appear as patterns similar to their relatives differing primarily in sharpness and scale.

Figure 6-1. Topographic map terrain visualization

be limited by the capability of the printer and the paper used. Most consumer printers are limited in the size of paper that can be used; a common limit is legal size (8.5 x 14 inches). This means that a relatively small area will be printed or that a less detailed scale must be selected to allow printing of a larger area.

- Generally the marginal information printed will not be as detailed as that on a USGS map and will usually be limited to distance scales and magnetic declination information.

The electronic maps and their support software certainly add to the personal arsenal of the navigator, especially for trip planning. But the USGS 7.5' topo maps are still the map of choice for field navigation and are mandatory for LTC navigation events. Software printed 7.5' topos are currently not acceptable for LTP Navigation practice/checkout requirements. The maps must be USGS topos printed on paper with all margin information present.

Topographic Map Characteristics

The essential feature of a topographic map is the depiction of elevation by contour lines of constant elevation, which reveal the general shape of the terrain. One way to visualize a contour line is to consider a land area near the ocean. A contour at zero elevation corresponds to the coast line; should the sea rise by 40 feet, its level would then correspond to another 40 foot contour line on the map. On USGS 7.5' maps contour lines are printed in brown, typically at 40 foot intervals, with every fifth line made heavier for ease of reading, typically 200 feet. Elevations of the heavy contour lines are printed in brown figures at occasional places along the lines. By their nature, contour lines on a map never cross and eventually always close on themselves, frequently in a region beyond the borders of the map. A direction straight up or down a slope is perpendicular to contour lines; a traverse at constant elevation is parallel to contour lines. Because the contours essentially provide a three-dimensional representation of the terrain presented on a two-dimensional surface, the navigator's goal is to learn to "see" the terrain form in its three-dimensions.

The contour interval, noted on the bottom margin of the map, is the vertical distance between two adjacent contour lines. For almost all 7.5' maps the contour interval is 40 feet. Rarely, the contour interval can be 80 feet (San Jacinto is such an example in Southern California). The Malibu Beach topo has a contour interval of 25 feet and index contour lines are every four contour lines rather than the usual five. Some maps in the Sierra and the Southern California deserts are still in the "provisional" status and use metric contour intervals. Intervals are typically 20

meters (65.6 feet) in the Sierra and 10 meters (32.8 feet) or even 5 meters (16.4 feet) in the deserts. Occasionally, in gently sloping areas such as in flat desert or level towns, a supplementary contour line may be added, typically at midpoint elevation between two contour lines. The supplementary contour interval is noted at the bottom of the map. The interval can vary from map to map to map (e.g., 20 feet on the Mt. Wilson topo, 10 feet on the Stovepipe Wells topo) but will not exceed half the normal contour interval. These supplementary contour lines are thinner and lighter than a regular contour line and may also be dashed (e.g., Mt. Wilson quad).

USGS topographic maps contain a number of conventional symbols and colors to show both natural terrain features and human works. Water features are shown in blue, vegetation in green, surface features and contours in brown, man-made objects in black, and public land survey boundaries and major highways in red. Aerial photography updates of urban areas are shown in purple.

The margins of USGS topos show essential information with which the navigator should become familiar and use as needed. This information includes

- The name of the quadrangle covered by the map
- Identification of adjacent quadrangles
- Map scales
- Some basic map symbol data (e.g., regarding highways, roads, and trails)
- The contour interval (usually in feet, sometimes in meters)
- The degrees/minutes difference between UTM grid north (GN) and true north and the direction of magnetic north (MN) and its year and declination in degrees
- The date(s) the map was made and/or last revised
- The datum of the map (essential for map use with a GPS receiver, as discussed later).

Other paper topo maps will generally contain much or all of this essential data.

Coordinates and Reference Frames

Quadrangle maps have meridians of **longitude** and parallels of **latitude** as boundaries. Black tick marks 1/3 and 2/3 of the distance along each edge and four small crosses in the map interior mark intermediate meridians and parallels. These tick marks can be joined to give very accurate north-south and east-west reference lines for drawing north-south (N-S) reference lines. These N-S lines can be drawn as needed to cover the area navigated, typically about one inch apart. Because of meridians converging to the North Pole and because of the kind of projection used,

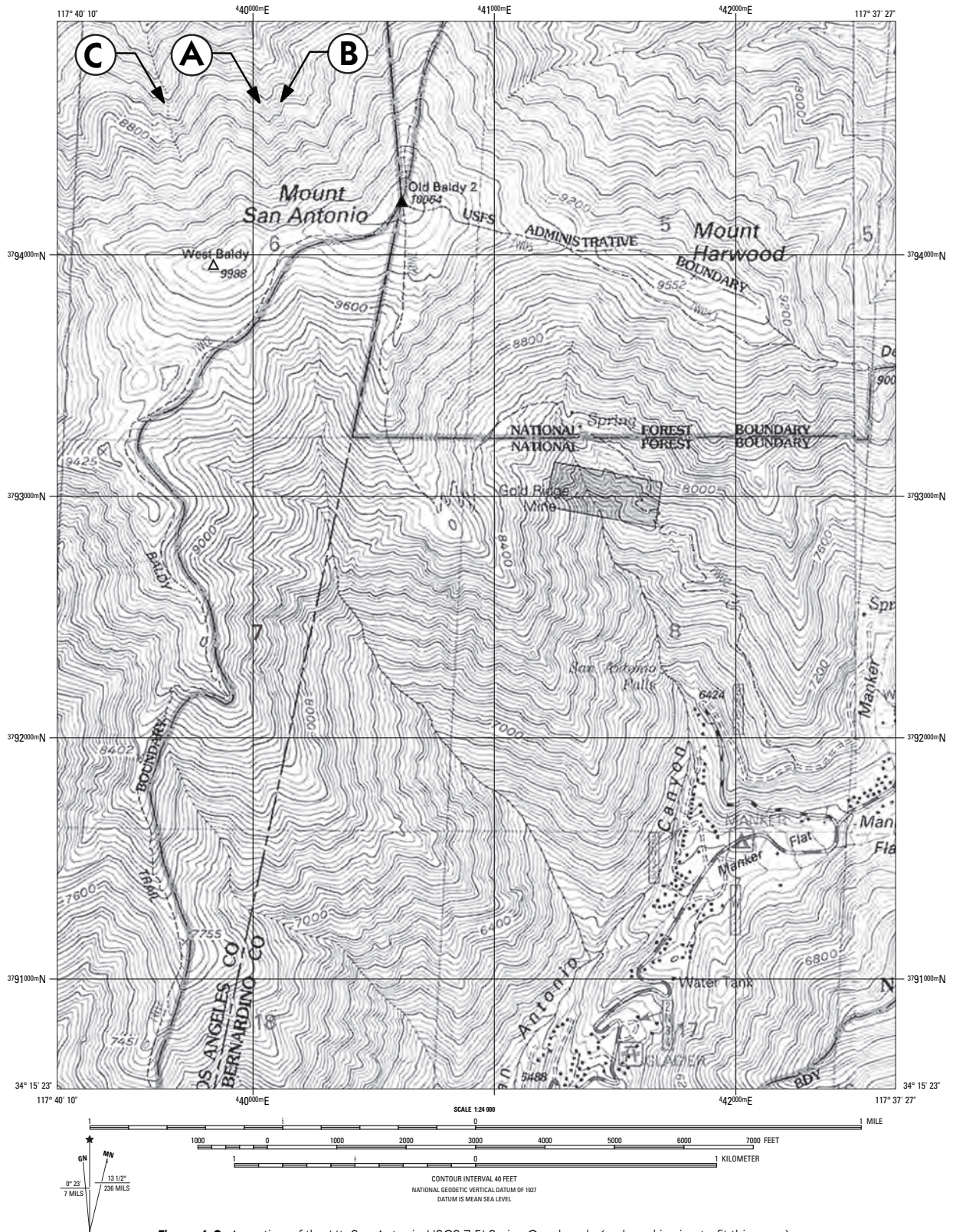


Figure 6-2. A portion of the Mt. San Antonio USGS 7.5' Series Quadrangle (reduced in size to fit this page)

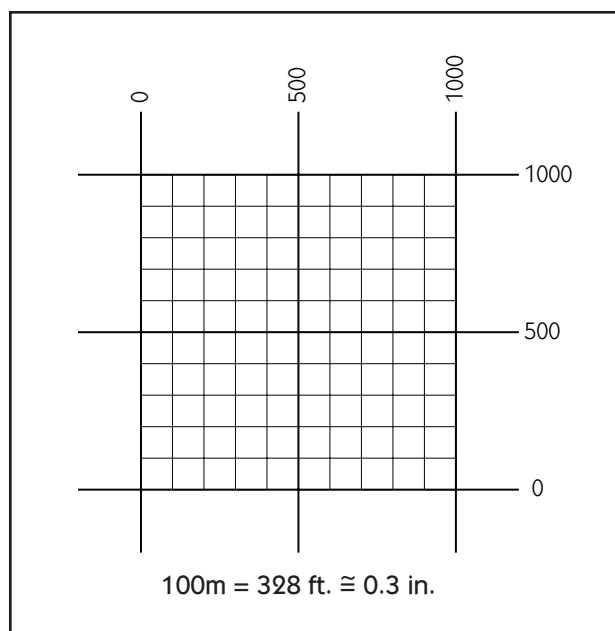


Figure 6-3. UTM template for 7.5 minute, 1:24,000 series topo

in Southern California the width of a quadrangle map at the top is slightly less than at the bottom (about 350 feet, or 2/10 inch). The two sides are not quite parallel, but both do point to true north.

Quadrangle maps show range, township, and section lines of the United States public lands survey in red. Many section lines are sufficiently close to true north to permit their use as bearing reference lines. Others are obviously skewed and unusable. For example, the north and south boundaries of Section 7 in Figure 6-2 are close to east-west, but the east and west boundaries are skewed and not usable as N-S lines. Except when skewed, sections are one square mile, so the section grid can be used as a ready scale for distance estimating. Accuracy should be checked before using any of these survey lines as N-S lines for navigation.

UTM Grid—Many quadrangle maps have the Universal Transverse Mercator (UTM) grid printed on them, providing a convenient reference system to use as a scale and for N-S lines (see Appendix A). If it is not printed on the map, the UTM grid can be constructed from the blue tick marks spaced at one kilometer intervals on the borders of the map, using a long straightedge and a fine pen. The UTM grid of one-kilometer squares (.62 mile, approximately 2/3 mile) provides an excellent framework for scaling map features relative to their on-the-ground terrain features. As a result, distances on the map are easy to visualize. For example, a distance equal to a tenth of the grid is one hundred meters (328 feet), about the length of a football field. The grids themselves provide an excellent local scale for quick assessments of distances and location. Precise distances are seldom necessary when navigating. The one-kilometer grid lines serve to calibrate the eye as attention

is transferred between the map and the terrain. When GPS receiver readouts are set to the UTM coordinate system, the UTM map grid allows easy transfer to a location on the map. Very accurate location can be plotted using UTM templates such as shown in Fig.6-3. On a metric map with metric contours, it is useful to remember that 300 meters is close to 1,000 (984) feet and 1,600 meters (5,249 feet) is close to a mile.

UTM Coordinates—Location in the UTM system is defined by the two coordinates of the point, giving the easting first and then the northing (see Appendix A). The convention of east (right) first, then north (up) second starting from the southwest corner can be remembered by the mnemonic “read right up.” A UTM coordinate can be expressed with several levels of precision: within one meter square area, ten meter square area, or 100 meter square area. In Figure 6-2 as an example, Mount San Antonio (Mt. Baldy) is 613 meters east of a line through the tick marks labeled 440 at the top and bottom of the map, and it is 241 meters north of the line through the tick marks corresponding to 3794 at the east and west boundaries of the map.

Since this topo is in UTM Zone 11 and Region S, the combined full UTM coordinate to the precision of one meter would be: 11S 440613E 3794241N. The digits printed in small type (superscript) denote the hundreds and thousands of meters, which are referenced to the equator (northings) and the zone meridian (eastings) and need not be listed when giving a reference on a single quadrangle. By convention, this same coordinate can also be streamlined and expressed as 40613 94241 to a precision of one meter. Expressing the coordinates to a precision of ten meters (33 feet) would be written 4061 9424; to the nearest one hundred meters (328 feet), it would be written 406 942.

The N-S UTM grid lines are aligned with true north only at the center of the UTM zone. In Southern California they may differ by as much as -2.5° at the west edge of the zone and $+2.5^\circ$ at the east edge of the zone; at the Equator the west and east edges of the zone are true north. The deviation between true north edges of the zone and UTM **grid north** (GN) at the center of the topo map is shown as one of three arrows in the diagram at the bottom of the map, along with the GN value in terms of degrees and minutes. The other two arrows are magnetic north, along with its declination value, and true north.

Judging Gradients of Trails and Slopes

The local steepness of the terrain is important in picking a route. It is also a safety factor in judging avalanche hazards on snow and loose rock slopes.

Slope—The slope can be expressed as the angle from the horizontal in degrees, or the ratio of elevation change to horizontal distance change as percentage. Use of slope

in percentages is not very useful in a practical sense since it is not linear. Slope in degrees (0° - 90°) is a linear measure, same as the azimuth and declination-clinometer scale on a compass, and is easy to understand. For the angle of repose, a 34° slope is easy to visualize and can be measured with the compass **clinometer**, but as a 67% slope it is hard to visualize, measure, or use in the field. For anyone desiring a percent slope number for trip planning purposes, it can easily be estimated by multiplying the degree slope by two. The resulting number, valid up to about 45° , is within 10% of the mathematical percent slope, which is adequate for any personal trip planning.

The spacing of contour lines is a measure of slope. For example, on a 1:24,000 scale map, 1/10 inch represents 200 horizontal feet. For an 11° slope, the vertical rise over this 200 feet is 40 feet, or one contour interval. Thus an 11° slope on this map scale has a spacing of 1/10 inch (2.5 mm). A 45° slope would rise 200 feet in 1/10 inch, or five contour intervals (one major, bold contour interval), which places the contour lines five times closer together. Fig.6-4 shows the spacing of contour lines for various degrees of slope. A scale (inch or cm) on the compass base plate provides the means to make linear measurements.

Topo maps do not provide or imply any terrain information between the contour lines. The terrain between two contour lines actually might be a slope or might be composed of a series of horizontal ledges or vertical terrain features of less than 40 feet. This effect is true of horizontal appearing narrow ridges in the high Sierra, which often are a series of jagged pinnacles and notches. It is also true in flat desert with many scattered large boulders (e.g. Indian Cove). This means that planning a trip in unknown terrain based on topo maps alone can be misleading or dangerous. Do consult leaders who have been there before, and it is always best to scout the trip in advance.

Most natural hillsides such as sand, loose dirt, scree and talus typically have slopes of up to about 34 degrees, which is called the **angle of repose**. It is a slope that is relatively

safe because a human body, like a loose rock, tends to stay put rather than to slide down. But it is difficult to climb in loose scree, leading to the “two steps up, one step back” phenomenon. Rock walls and the dirt sides of stream channels may occasionally have steeper slopes, because of supporting rock or vegetation. Highway slopes are usually less than 6° , sand dunes up to about 30° , scree slopes between 30° and 40° , avalanche-prone slopes between 25° and 50° , and house stairs about 35° . Steep constructed trails have slopes in the range of 6° to 12° .

Contour Line Spacing of Slopes—With rare exceptions, the USGS English system 7.5' topo maps show 40-foot contour lines with a heavy major line every 200 feet. For the English system, spacing of 40-foot and 200-foot contour lines at various degrees of slope is shown in Fig 6-4; spacing and values for the metric system are calibrated differently. Some topos in the Sierra have been converted to the metric system, typically with 20 meter contour intervals. Also, some metric system topos in the Sierra and the deserts of Southern California remain in the “provisional” status with hand-lettered data (vs. printed). On these topos intervals are typically 20 meters (66 feet) in the Sierra and 10 meters (33 feet) or even 5 meters (16 feet) in the deserts. Caution must be exercised when estimating slopes from the metric contour lines so as not to confuse them with the English system.

NAVIGATIONAL INSTRUMENTS

Compass

The Earth and Its Magnetic Field

The true geographic north-south pole direction (longitude lines) is defined by the axis of rotation of the earth, and its rotation is in the east direction (latitude lines) on maps. The earth also has magnetic poles which are in the general vicinity of the geographic poles. In 2012, the surface location of the magnetic north pole lay north of the Canadian arctic, at about 85.9° N latitude and 147.0° W longitude—about 280 miles from the geographic pole—and was moving north-by-northwest (NNW). In Southern California its movement resulted in the magnetic declination decreasing by one degree about every twenty years during the last quarter of the 20th century. That decrease has accelerated to about one degree every ten years as of 2012.

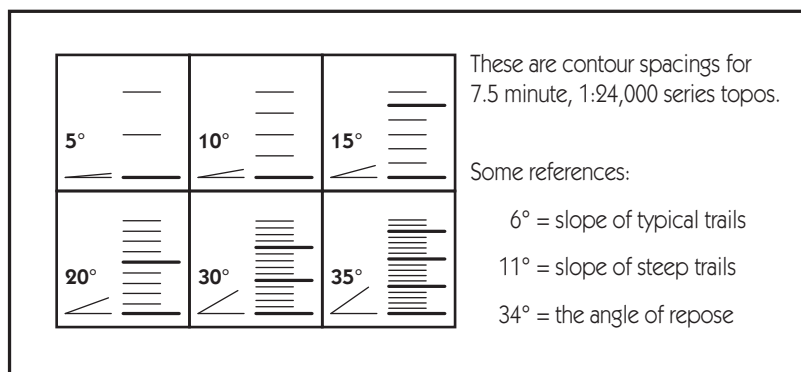


Figure 6-4. Contour line spacing of slopes

Magnetic Declination

The difference in bearing between the geographic pole and the direction the horizontal magnetic needle points to is called the magnetic declination. This varies significantly as a function of where a person is on the surface of the earth. In California the magnetic declination is to the east of true north and varies from 11.5° E of geographic true north in Blythe to 15° E in extreme northwest California. In the Los Angeles area, the declination is about 12° E, in the Southern Sierra it is about 13°, and in Yosemite it is about 13.5° E. In the eastern United States the declination is to the west of true north. A small diagram at the left bottom margin of each USGS topo map shows the magnetic declination direction, its date, and its bearing value.

Magnetic Inclination

The earth's magnetic field has another major effect on compasses, a vertical component caused by the three-dimensional center deep inside the earth's mantle. The needle attempts to follow the magnetic flux lines as they twistingly converge downward toward the area of the magnetic pole. Around the pole the magnetic flux lines and a simple magnetized needle would tend to point vertically. Far from the magnetic north pole in Southern California, the north end of a simple magnetic needle (typically red) of the compass will tend to point northward below the horizon at about 59°. This is called magnetic inclination and is caused by the same chaotic and asymmetric magma circulation that gives rise to the magnetic declination. However, we are not even aware of it when using a compass. The inclination dip of the needle is offset in compasses by counterbalancing the southern end of the needle (typically white) for the local magnetic region—so that the needle stays horizontal. On different parts of the earth, the apparent location of the magnetic pole, declination, and inclination changes in regions distant from geographic poles. Compass manufacturers have divided the earth into five magnetic regions and produce compasses with different amounts of counterbalance tailored to each region. Some manufacturers have designed a solution to this global anomaly, called global compasses. They contain an unmagnetized and bottom-weighted needle that pivots horizontally on a magnetized gimbal base (patented). The gimbal in turn rotates and pivots on a jewel base in the dial. Thus the needle is isolated from any varying vertical (inclination) magnetism effects of the different magnetic regions of the globe. A global compass can be used wherever one travels.

Local Magnetic Fields

Local magnetic fields, as well as any nearby source with iron content that may be magnetized, can affect the compass so as to distort the reading. Common local sources include a

mechanical pencil, clipboard, belt buckle, another compass, watches (rarely), cars (especially a row of cars), garbage bins, or rocks containing iron ore. Man-made features like power lines, pipes, rails, and buildings influence the local magnetism. A few peaks in California, like Iron Mountain, are known to contain iron ore and distort the compass readings. More rarely, magnetized lava flows, areas of large meteor impacts, areas around a lightning strike, major earthquake faults, or even sunspot activity can influence the local magnetic fields. If in doubt, take bearings from several spots in the general vicinity to verify that the bearings do not change significantly.

The Magnetic Compass

Typically, a magnetic compass functions because of a magnetized needle that will, in the absence of interference from nearby magnetic sources, align itself along the local horizontal lines of magnetic flux. These lines ultimately converge toward the observationally averaged magnetic pole. From California, the compass sees the far away magnetic pole as a strong point source. Approaching the area of the magnetic pole, the magnetic field becomes more vertical, and weak and erratic in the horizontal direction, so as to become unreliable or useless for a compass.

Compasses for Trail and Backcountry

Compasses suitable for basic navigation feature a magnetized compass needle, pivoting on a sharp point inside a fluid-filled capsule. Starting from this point, there are a number of different compass types, varying in increasing amount of features and accuracy in use.

Most Basic—Very experienced navigators, who are also expert in terrain recognition on maps, may need only a simple compass (e.g., attached via a strap to a finger, wristwatch band, or hiking stick). By keeping track of their location on the map, they may need a compass only for general cardinal points (N-NNE-NE-ENE-E, etc.) reference.

Rough Accuracy—The next compass level, capable of taking rough bearings, is a compass with a fluid-filled capsule inside a moveable dial that contains a degree bearing scale on the azimuth ring of the dial. It is mounted on a transparent plastic base plate that shows a direction-of-travel line or arrow. It probably has some meridian lines in the dial, making it possible to take and plot bearings on the map. Declination adjustment can only be accomplished by taping on a declination arrow at the bottom of the dial.

Good Accuracy—These significant-level compasses start to meet the demanding navigation needs for trail and backcountry. They have a longer base plate that carries various measurement scales to use on a topo. The dial is larger, and the degree bearing scale, capable of one-degree

resolution (not bearing accuracy) by the eye, is graduated in two-degree increments. The dial has five or more meridian lines for more accurate plotting of bearings. The dial contains an orienting arrow of parallel lines to align the needle within the arrow accurately.

It is strongly recommended that the dial also contain a mechanical means to adjust for declination, which increases accuracy. The dial then also contains the clinometer needle which uses the declination scale as also the clinometer scale. The declination adjustment feature uses a small screw at the top or bottom of the dial using the small key tool on the lanyard to turn the declination adjustment scale to the desired declination in degrees. Practically, the adjustment can be made to within one degree.

This is, however, still a flat, relatively short straightedge, base plate compass referred to as a “bellybutton” compass

since you must look down at the compass. Point it from your belly, then look up at the bearing object you are trying to point to. Then keep on looking down and up until you are ready to commit to a reading on the dial. In some ways this is analogous to “hip-shooting” with a handgun, instead of aiming it.

Best Accuracy—A full-featured compass (see Fig.6-5) contains a fold-out sighting mirror to achieve the best accuracy possible. Using the sighting mirror is analogous to aiming a gun vs. hip shooting. It has all the features of the “bellybutton” compass, and with the folding mirror extended, it has a straightedge to plot over two miles on a 7.5’ topo without resorting to a separate ruler. Most hikers and backpackers will carry a mirror for various purposes, including signaling and personal needs; if so, then why not add a compass to it?

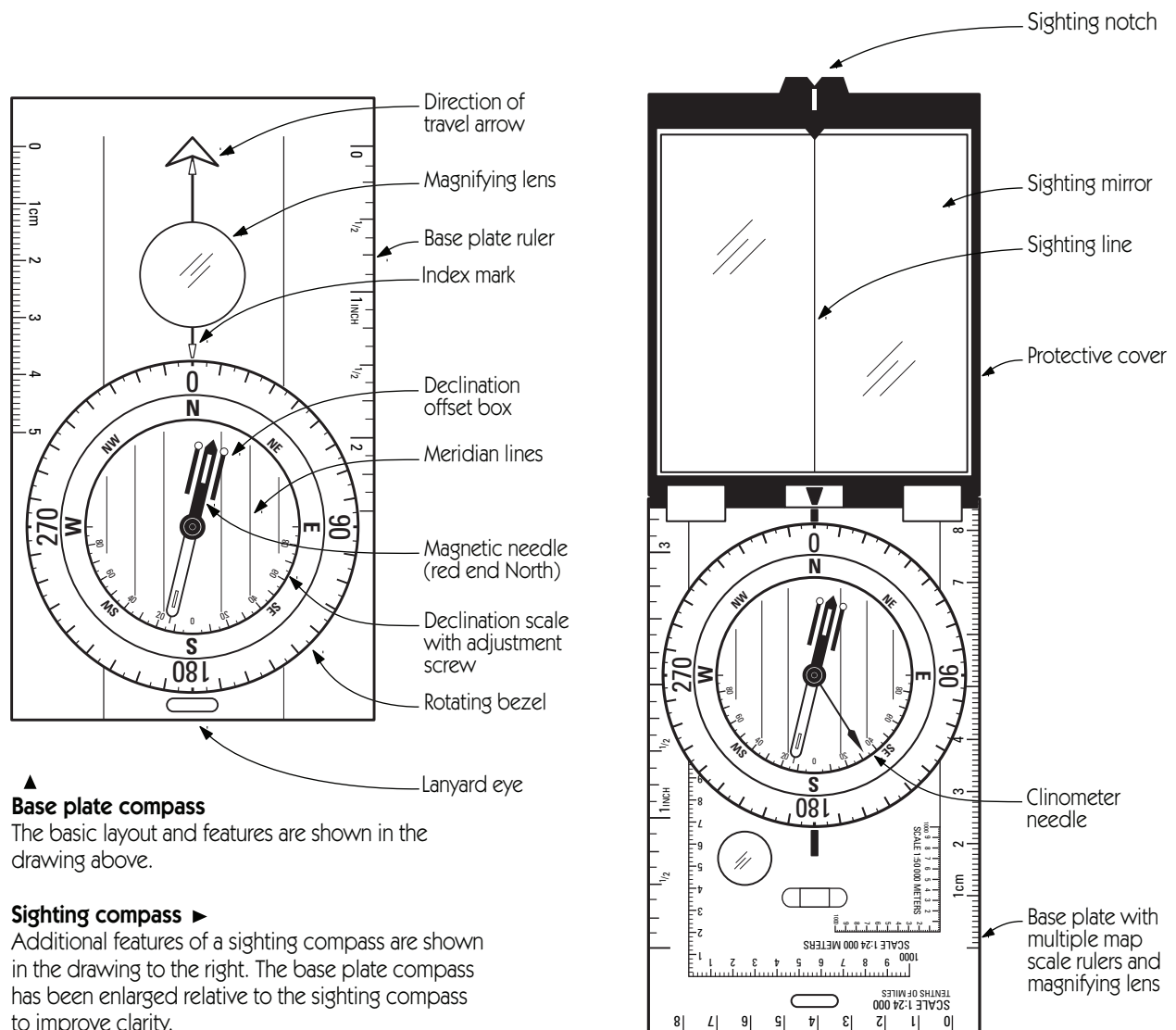


Figure 6-5. Base plate and sighting compass features

The mirror is best used with the compass held at arm's length with fingers of both hands and with the cover folded partway open (about 45°), using both thumbs to adjust the dial. Too many navigators still use and teach the carryover method from the old "bellybutton" compasses, which is to hold the compass in one hand while using the other hand to adjust the dial. This is more difficult and generally less accurate.

Slope Measurement

In the field, the compass can be used to estimate the terrain slope (washes, gullies, ridges, cliffs, mountain sides) using the clinometer needle of the compass. If the slope is ascending to your left, set the dial to 270° at the index mark, so that the meridian lines are horizontal when the base plate edge is horizontal. If the slope is ascending to your right, set the dial to 90° at the index mark. Then visually align the edge of the base plate to the slope of the terrain viewed, and read the slope angle on the declination-clinometer scale.

Without a clinometer, measuring slope is a similar but more difficult process. If the slope measured is ascending from your right to the left, set the compass dial at 360°. Align the edge of the base plate to the slope of the terrain viewed, then adjust the dial so the meridian lines of the dial are about horizontal to the eye, and read the slope angle at the index mark.

If the slope is ascending from your left to the right, align the edge of the base plate to the slope of the terrain viewed, then adjust the dial so the meridian lines of the dial are about horizontal to the eye, and read the degree number at the index mark. Subtract that degree reading from 360° to get the slope angle.

Bearings

The clockwise angle from the true north reference direction to the direction of a given line is called the bearing or azimuth. To measure a bearing in the field, point the base plate of the compass direction-of-travel arrow or sighting line toward the object of the bearing. Then rotate the dial so that the red end of the magnetic needle is directly in the middle (parallel to or "boxed in") the red end (north) of the orienting arrow or lines. For mirror compasses, accuracy is determined by having the mirror sighting line pass through the middle of the dial as seen in the mirror. The bearing is read on the dial at the index mark. While a person is learning, errors of 180 degrees in direction (i.e. dial with N-S direction reversed) can happen and can be easily corrected by adding 180° to the reversed bearing.

Bearings of Terrain Features—Any terrain feature on a topo or feature on the ground that continues in a direction for at least 200 to 400 feet (1/10 to 2/10" on topo) has a direction which is a measurable bearing; the longer the

feature, the more accurate the bearing. We typically think of taking bearings on large geographical features such as mountains, saddles and notches, big rocks, and man-made objects and features. Most terrain we travel through, however, is rich with all kinds of less distinct but very useful bearing information that we refer to as local bearings. The closer the object of a bearing is, the more accurate our location on the topo.

Local Bearings—If we know where we generally are, a local bearing can precisely identify our location on a topo when the compass is aligned from our location with a known nearby feature on the topo. A local bearing can identify a segment of the trail, road, or a direction in an intermittent stream, gully, ravine, wash, or ridge. To take a local bearing, align the compass with that terrain feature and take its bearing. Then move the compass around the general map area until that bearing aligns with a corresponding feature on the map. The compass edge now passes through our location.

Compass Accuracy—What is the practical (vs. theoretical) accuracy a navigator can expect taking bearings in the field? Experienced navigators will do better than inexperienced, and users of large mirror compasses will do better than those using small, short base plate compasses. Some observed rules of thumb are

- Inexperienced navigator with small compass—within 3° to 5° range
- Inexperienced navigator with mirror compass, and experienced with large baseplate non-mirror compass—2° to 3°
- Experienced with mirror compass—1° to 2°

Navigators will find that in taking a series of repeated bearings on the same object, their results will tend to vary in these ranges. Taking a series of repeated bearings on the same object is also the only way one can get a true sense of the accuracy of his or her personal bearings technique. Should a bearing accuracy be very important, for whatever reason, averaging several repeated bearings will almost always provide a more reliable result.

Bearing on a Map—When measuring a bearing on a map, the map need not be oriented with any compass direction, and the compass straight-edge is used as a protractor. The compass magnetic needle is ignored. An edge of the base plate is aligned from one object to the other, connecting two objects, such as the navigator's present location and the object. The dial is then rotated so that the meridian lines in the dial are parallel with the true N-S lines on the map. The dial angle at the index mark is the bearing.

Locating a Feature in the Field Using a Bearing from a Map—Hold the compass with both hands and point it in the direction at which the needle is exactly parallel within the orienting arrow or marks. Be sure that the sighting line

in the mirror goes through exactly the middle of the dial. The object terrain feature will be accurately identified.

Bearing in the Field, Plotted on a Map—Hold the compass with both hands and point it to the direction of the desired terrain feature in the field (either a known position or a candidate object). Adjust the dial so that the needle is exactly parallel within the orienting arrow or marks (“box” the needle). Be sure that the sighting line in the mirror goes through exactly the middle of the dial to preclude parallax. On the map align the edge of the base plate from the terrain feature in the field until the meridian lines in the dial are parallel to the N-S lines on the map. The edge of the base plate should pass close to your location; draw a line lightly on the map. This will seldom be as accurate as locating a feature in the field using a bearing taken from the map (above).

Topo N-S lines

Several kinds of north-south lines of sufficient accuracy (usually within one degree) found on various maps may be used for aligning the meridian lines of the compass dial. The left and right edges of the maps are true N-S. The north and south borders of the map have corresponding tick marks, which can be connected. All USGS topo maps have four precisely located crosses, each one third in from the edge of two map borders, which also can be connected. In many areas, UTM grids are close to N-S, and some section lines are very close to true N-S (the eye can easily identify any that are not so). In the deserts, roads often run N-S, and the eye can tell. Strong message: use your eyes as a primary navigational instrument! When accordion folded from east to west, the creases in the map can be used as accurate, but hard to see, N-S lines.

Add N-S lines—The most practical way to add N-S lines on a topo is with a ruler. Drawing accurate north-south lines on the map at about one inch intervals works best for taking and plotting accurate bearings, even with a short baseplate compass. There is no need to cover the whole map with these lines, just draw them in to cover the area you will be navigating in, and include all the terrain you will see along the way. In the area where you are navigating, measure and mark one inch intervals in line from the east or west edge of the map, then do so again about 10 inches higher or lower. Then connect the marks for accurate N-S lines.

Use of UTM Grid as N-S lines

Our local UTM Zone 11 and Region S covers an area from the Mexico border to just north of Reno and from Santa Barbara to Kingman, Arizona. In Southern California the UTM grid N-S lines vary off the true north between about -1.5° to the west and $+1.5^\circ$ to the east, depending on the location within a UTM region. In the northern part of the Region, the variation will be greater, up to 2° . Barstow,

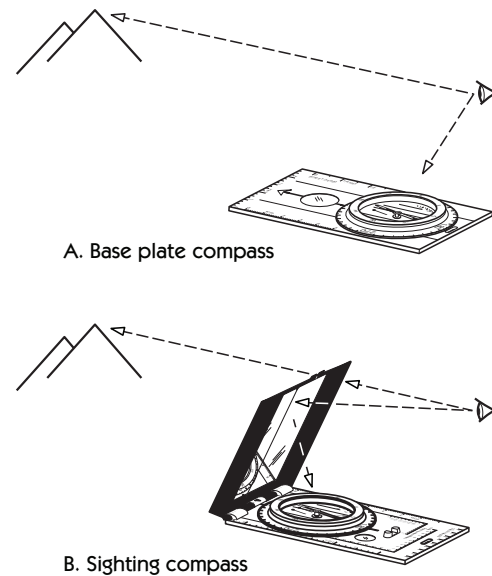


Figure 6-6. Measuring a bearing in the field

San Diego, and Death Valley are near the central meridian of Zone 11, where the grid north is equal to true north UTM. Grids may thus be very close to true N-S lines or with an appropriate GN correction can be used as accurate N-S references for plotting bearings.

Grid North (GN)—This UTM grid convergence in effect a UTM “declination,” off true north depending on the east-west location within its UTM rectangular grid. On the topo maps it is called Grid North (GN) and is identified in the lower left corner of the topo. When the UTM lines are off true north, the topo declination of the compass should be adjusted by the GN value “declination” to permit use of the UTM lines for plotting accurate bearings.

Declination Adjustment—When a UTM line is 1° (GN) off true north, the declination of the compass should be adjusted by 1° to be able to use the UTM lines accurately for taking and plotting bearings. Los Angeles is 1° west (add to topo declination) and the east end of Joshua Tree National Park is about 1° east (subtract from declination). One degree difference between top to bottom of a topo translates to a linear map difference of 4 tenths of an inch, about 800 feet on the ground. For maps with UTM grids, additional N-S lines are not necessary if you have a large mirror compass, since the UTM line spacing is adequate for large mirror compasses, as long as the declination is adjusted by the GN value. If you have a short base plate (no mirror) compass, a straightedge extension is usually necessary to take and plot accurate bearings of objects that are more than 1 mile away. Without the extension, to use a short base plate compass you need N-S lines drawn on the topo about one inch apart. A few sample locations and their declination corrections for GN are listed below.

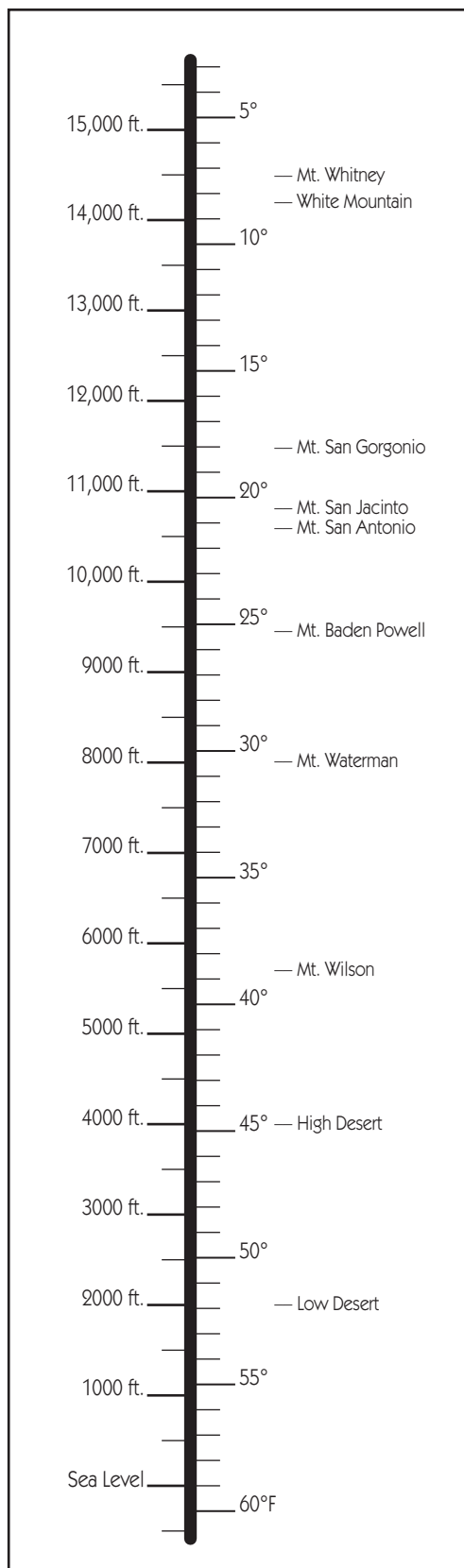


Figure 6-7. International standard temperature at various altitudes (at related features)

Some Region S Locations in California

Location	Adjust Declination
Lake Tahoe	Add 2°
Santa Barbara	Add 1.5°
Santa Monica, Kings Cyn, Mono Lk	Add 1°
San Diego, Big Bear, Barstow, Death Valley	No Change
Joshua Tree NP East, Providence Mtns (Mojave NP)	Subtract 1°
Needles, Blythe	Subtract 1.5°

Altimeter

A Portable Barometer

An altimeter is a portable barometer. A barometer at home on the wall measures the air pressure and indicates changing air pressure on a millibar scale. The standard air pressure at sea level is 29.92 in.hg or **1013.25** millibars, equal to zero feet altitude at sea level. Wherever it is located, a portable barometer measures the air pressure, which is translated into equivalent feet (or meters) of elevation for the altimeter. The altimeter provides a vertical dimension to assist navigation. The altimeter nowadays can be found as mechanical devices (Thommen is the “gold standard”), in wristwatches, and on electronic devices of various functional combinations. A GPS depends on satellite signals for elevation data and is not a barometer. A few GPS models, however, also have a traditional barometric altimeter added, which also can plot pressure (elevation) over time.

Pressure Sensors

The key element of an altimeter is the pressure sensor. Since there are many different pressure sensors of varying sensitivity and accuracy, the various altimeters will differ in their performance due to inherent pressure sensor range of error, both between similar and between different instruments. Thus, on a typical navigation day in the mountains, various altimeters, even the same make and model, will vary during the course of a day in a range of 50 to 100 feet. The primary contributors are sensor sensitivity, air column temperature, micro-weather variations, and the temperature of the altimeter.

Effect of Weather

An ideal altimeter would accurately identify the elevation of our location and therefore which contour line we are on or near. Along with accurate bearings, altitude measurements can help us plot closer to our exact location. But just as compass bearings carry a range of inaccuracy, many mechanical and environmental variables also contribute to the local air pressure and altimeter reading. These make accurate altitude determinations with an altimeter less reliable than desired or imagined. Using an altimeter effectively requires an understanding of how it functions, what affects its readings, and what its accuracy limitations are. Many environmental (weather) aspects affect air pressure, which along with mechanical sensor limitations combine to affect the altimeter readouts. All the barometer can do is provide the bottom line, a lump sum pressure converted to an elevation readout. That is where the navigator’s understanding of

the weather and altimeter comes in.

The fact that air pressure decreases with increasing altitude in a predictable way, according to the **International Standard Atmosphere (ISA)**, is the reference basis for an ideal altimeter. But altimeter accuracy seldom, and only under ideal conditions, approaches the contour accuracy of the map. USGS topo maps have a vertical accuracy requirement that 90% of the elevations be within one half of a contour interval, which is 20 feet on a 40 foot contour map. As weather pressure systems come and go, the pressure change over a few days can amount to 400-500 feet of apparent elevation change. Diurnal (day to night) changes typically account for 50 feet. On a sunny, windy winter morning in Joshua Tree the campsite elevation was observed to change 50 feet in 15 minutes! Short-term micro-weather pressure variations are caused by changes in airflow around the local terrain and offer no visible clues to the eye.

Temperature Compensation

Most quality altimeters (Thommen, wristwatch, etc.) are advertised as being “temperature compensated.” But the altimeter is not compensated for changes in the air temperature—an almost universal misperception. Rather, “temperature compensation” is a manufacturer’s attempt to design a mechanical or electronic compensation for errors resulting from temperature changes of the instrument itself. Ideally, this temperature compensation would allow the altimeter to have the same reading whether it is placed on a sunlit windowsill or nearby on an ice cube. Since the temperature compensation is only an approximation, the instrument’s temperature will always have some effect on the readout. A wristwatch altimeter is kept at a fairly steady temperature by body heat, but an altimeter hanging from the neck or in a parka pocket will drift more due to exposure to the external environment. The same two altimeters, one in a pocket and one on a wrist, will tend to differ due to the different temperature of the instruments.

International Standard Atmosphere (ISA)

ISA defines the standard temperature at various altitudes, against which the altimeters are calibrated. The worldwide ISA profile is more representative of the average year temperature profile of Northern California weather than that of Southern California. Fig. 6-7 shows the ISA standard temperature profile °F for altitudes up to 15,500 feet. Some geographic features are identified for reference at various altitudes.

ISA Standard Temperature

Temperature change with altitude is about 3.5°F per 1000 feet. Therefore, the temperature component is a major contributor to pressure change. On an extreme day

the temperature may be 30° to 40° above or below the ISA standard. On a hot day the air expands and is less dense, so there is less indicated altitude change than actually accomplished. The altimeter will read too low on ascent and too high on descent. On a cold day the air contracts and is denser, so more altitude change is indicated than actually accomplished. The altimeter will read too high on ascent and too low on descent. Starting near sea level in the LA basin on a hot summer day and arriving at 7,000 feet elevation in the San Bernardino Mountains, we typically find that the altimeter will read about 400 to 500 feet low. We have moved 7,000 feet higher in an air column much hotter and lighter than the ISA standard.

Air Temperature Variance

One can correct for temperature departures from ISA standard using the Correction Factor (CF) of $CF = 0.0022 \times \text{Temp Variance (TV) } ^\circ\text{F} \times \text{Altitude Variance (AV) feet}$.

Thus, for a typical Southern California climbing day in which the temperature is about 20 degrees warmer than the standard, the altimeter after climbing 1,000 feet will read 956 feet, i.e. $CF = 0.0022 \times 20^\circ\text{F} \times 1000 \text{ feet} = 44 \text{ feet}$. The altimeter as set at the beginning will then read 44 feet too low on a gain of 1000 feet. The table below shows altitude change effect caused by temperature differences from the ISA standard profile. For temperatures warmer than ISA, the altimeter will read too low on ascent and too high on descent; for temperatures colder than ISA, the altimeter will read too high on ascent and too low on descent.

TV °F	10°F	20°F	40°F
AV 200 ft.	*	*	22 ft.
AV 500 ft.	*	22 ft.	44 ft.
AV 1,000 ft.	22 ft.	44 ft.	88 ft.
AV 2,000 ft.	44 ft.	88 ft.	176 ft.
AV 5,000 ft.	110 ft.	220 ft.	440 ft.
AV 8,000 ft.	176 ft.	352 ft.	704 ft.

* Too small to be significant or measurable

The air temperature variance is just one of a number of weather-related and mechanical criteria that affect the altimeter readout, but it is the one that can be quantified.

Accuracy

In spite of many variables, including the above, good altimeter accuracy can be achieved and maintained by resetting the instrument whenever the user is at an identifiable location on the topo map. The more frequent the reset, the more accurate the altitude reading when necessary. Resetting negates any environmental and mechanical variables. As a practical matter, to make effective use of the

altimeter as a navigation instrument, the navigator should

- Reset the altimeter whenever reliable reference is available. This could include lakes, summits, trailheads, streams, forks in gullies and ridges, roads, buildings, railroad tracks, power lines, mine shafts, benchmarks, and wherever elevations actually appear on the map.
- Reset the altimeter when a good fix is available based on a combination of clues, such as good bearings.
- On days that are much warmer than the standard, expect the altimeter to indicate an altitude change to be significantly less than the real world, on ascent and descent (i.e., it will read lower than actual altitude on ascent and higher than actual altitude on descent).
- On days that are much colder than the standard, expect the altimeter to indicate an altitude change to be significantly more than the real world, on ascent and descent (i.e., it will read higher than actual altitude on ascent and lower than actual altitude on descent).

Use of the Altimeter

An altimeter can support the use of the compass and terrain recognition on the topo by adding information of the vertical dimension—elevation. Periodically resetting the altimeter at known points on the map is necessary to ensure accurate readings along the way. For example, you are hiking on a trail and come to a stream. You look at a map and see a stream that crosses the trail in two locations nearby. The stream crossing that is closest to your altimeter reading is probably your location. When crossing it, you reset the altimeter.

An altimeter can help you find your location in the absence of compass fixes. For example, your altimeter reads 7,240 feet, and looking at your topo, you see that the trail crosses this contour line in only one place. Your location is close to that point. If the trail goes up or down, crossing the 7,240 contour line in more than one place, you need to determine your location by identifying the terrain features around you.

An altimeter can also help locate your position when only one compass bearing is available. Your altimeter reading locates the closest corresponding contour line along the line of the compass bearing on the topo. This is close to your location.

An altimeter can also help you track where you are relative to your trip plan. Deep into the trip on a steep climb, it may give you the information you need to decide whether you can meet the trip objective or need to turn back.

In camp, your altimeter becomes a simple stationary barometer. It can alert you to significant changes in weather.

Global Positioning System Receivers

Consumer-oriented Global Positioning System (GPS) receivers (simply referred to as GPS) have become increasingly popular as size, weight, user-friendly properties, and costs have improved. A GPS that is designed for outdoor use can provide position fixes accurate to +/- three meters (+/- 10 feet). Because 20 feet corresponds to about 1/10 of 1/10 of an inch on a 1:24,000 scale USGS map, a GPS fix far exceeds the usable accuracy on the topo. Using data from satellite transmissions, the GPS can provide location in Universal Transverse Mercator (UTM) coordinates, which can be plotted readily on topos with UTM grid using a **UTM template**. The GPS may also be used to give a bearing and straight-line distance from one location to another. GPS fixes can help resolve ambiguities and uncertainties and increase the leader's confidence in the credibility of his position estimates derived from other techniques.

As the navigational challenges of a trip increase, the value of a GPS as an adjunct navigational instrument increases. It is especially useful in featureless terrain (such as some desert areas and snowfields); in conditions, such as whiteout or in a forest, where other terrain features become invisible; and in exploratory cross-country trips over terrain with nondescript features. Cross-country navigation across significant up and down terrain is a natural use of the GPS. By entering waypoints along a route, a leader may not only know the speed the group is traveling, but also have a reference for retracing the route. The receiver is used to record **waypoints** when at rest stops, trail junctions and important route changes. These waypoints can then provide guidance on the way back, regardless of weather or visibility conditions.

Waypoints can also be created and entered into the GPS from the trip plan which can then be used throughout the trip to provide direction and distance to the next waypoint. The **Go-To** function can then be used to lead from one waypoint to the next, creating a route to follow. The **Track** function allows a GPS to display and store the trail as one travels. The track can be used to show the return route, which can also be stored and used again at a later date.

Under some conditions the GPS does not work well. Satellite signals can be significantly reduced in steep terrain, in deep canyons, or under extensive tree cover, enough to affect normal GPS function. The GPS is a complex electronic instrument and is thus fragile, can run out of battery power, and has temperature limitations. By comparison, a compass is simple and always works as long as it is kept away from

iron. For these reasons a GPS can supplement, but never replace, other navigational instruments (i.e., map, compass, and altimeter). Exclusive reliance on the GPS as the sole source of navigational guidance is strongly discouraged.

Grid Systems and Datums (see Appendix A for further discussion)

A topographic map is typically used to plot GPS coordinates. High-end GPS units with adequate storage capacity can display and use various maps which are downloaded from a PC. The GPS location coordinates are selectable from a number of formats that can be plotted on a map scale. Most commonly used coordinates are latitude/longitude and the UTM.

Most GPS receivers are intended for worldwide use. The shape of the earth as defined by a mathematical model and the local mapping reference system for various parts of the world is defined by a **datum** to provide local mapping reference systems for various parts of the world. A GPS supports a large number of datums worldwide and can compute locations in any of these mapping systems and datum bases. The user, however, must set the same GPS datum on the paper or electronic USGS map being used. If the GPS datum selected and the USGS map datum are not the same, significant errors in the field will result.

Note that the USGS 7.5 minute topo maps provide map datum information in the legend at the lower left corner of the map. While most existing 7.5' topos were created using the NAD27 datum, it is gradually being replaced by the NAD83 datum in newer topos.

Handheld GPS Receivers

Small, lightweight GPS units with road and off-road maps can be a boon to navigators. Specific locations such as trail junctions, roadheads, caches, summits, and campsites can be entered into the GPS as waypoints prior to a trip to guide travel or during travel to guide a return. Positioning and navigation Go-To functions are universal, and high-end GPS receivers with adequate storage and memory can accept and display map downloads from PCs. These maps are typically created and sold by the GPS manufacturer (copyright and/or copy protected), but some units are compatible with other map sources. The downloaded maps are an extra-cost item. Different types of map sets are available, some for road travel and topographic maps for off-road activities. These topographic maps are usually 1:100,000 scale or 1:24,000 scale (1:25,000 for metric scale), which are equivalent to the USGS 7.5 minute topos. Some GPS models may also have barometric altimeters and electronic compasses added; these features are in addition to the basic elevation and compass features of the GPS and add little functionality with increased battery drain.

Some Factors to Consider

One may consider these factors among others in choosing a GPS unit:

- A 12-channel parallel receiver, capable of receiving up to 12 satellite signals
- Size, weight and controls layout (personal preference)
- Screen color—black and white is adequate, but a color screen improves readability in all conditions, with backlighting for low-light conditions
- Screen size—bigger screens are better
- Battery type—alkaline is common, or NiCad and NiMH rechargeables, or Lithium, which lasts longer
- Storage capacity—replaceable MicroSD cards for downloading city and topo maps to the unit from a PC.

Given the number of options available, testing a friend's GPS in the field or taking a class (try before buy) is a good idea. And there are numerous on-line sources of reviews and other information.

The various smartphones on the market are GPS enabled. A variety of mapping applications is available to transform your phone into a GPS device for hiking. Although these applications do not yet match the functionality of a full-featured GPS designed for hiking, they provide good location information. Users should be aware that some applications come with a set of maps loaded into the phone; others receive the maps via the network in real time.

While a GPS receiver cannot replace skill with map and compass, it can provide added capability and accuracy once its capabilities and limitations are understood.

Global Positioning System

A handheld GPS receiver is one piece of a three-part navigation system, consisting of the space segment (satellites), the control segment (ground stations), and the user segment (the receiver/processors).

A minimum of 24 operational satellites circle in six circular orbit planes, about 12,551 miles (20,200 km) above the earth, with a 12-hour period. The satellites are spaced in orbit so that at any time a minimum of 6 and as many as 12 satellites will be in view to a user anywhere in the world. The master control station is in Colorado Springs, with monitor stations and ground antennas located throughout the world. The GPS receivers (including processing and antennas) work worldwide, and allow land, sea, or airborne operators to receive the GPS satellite broadcasts and compute their precise position, velocity, and time. More information on the GPS system can be found at <http://www.gps.gov/>

GPS Operation

GPS operation is based upon satellite ranging. By measuring their distance from the group of satellites in space, user receivers calculate their position on the earth. The satellites act as precise reference points. Each GPS satellite transmits an accurate position and time signal. A GPS receiver measures the time delay for the signal to reach the receiver, which is the direct measure of the apparent range to the satellite. Measurements collected simultaneously from four or more satellites are necessary to process and solve for the three dimensions of position, velocity, and time—which provides a position location and elevation.

Accuracy

Although today's handheld GPS can achieve horizontal accuracy to within 10 feet with good satellite coverage, many factors can influence actual performance. When GPS signals are reflected off the local terrain, foliage, or structures, reception is affected in the same way FM and cell phone signals can fade in and out while one is driving in traffic in urban canyons. Receivers can be confused by multi-path reception (receiving direct and reflected signals), interruption in the line of sight to a transmitting satellite, and poor satellite distribution in the sky. For outdoors users, the effects of thick foliage in a forest and poor line-of-sight location (e.g., in a deep canyon) can significantly affect the achievable accuracy. Conversely, hiking in the desert or along a mountain ridge offers the best accuracy potential.

AIDS TO MAP USE

Maps may be carefully folded and taped together with write-on tape on both sides when used for navigating near the edges of the maps. The margin information need not be cut off, but can simply be folded under prior to taping the edges together. It is much more difficult to do terrain/map recognition, to plot bearings, or to estimate distances when the maps are used separately.

For 7.5' maps that do not have the UTM grid overlay, which is close to true north, the UTM lines can be drawn in using the tick marks at the edges. For accurate positioning on a UTM grid, there are UTM templates that provide Northing-Easting accuracy to 1 millimeter (better than 1/20 inch, or 100 feet).

Maps may also be folded accordion style parallel to the edges, so that the folds represent N-S lines.

It is best to fold the map to show the specific area of interest and then change the folding as the trip progresses. A map which is quickly available and needs no unfolding, especially in the wind or rain, is most useful for route following. Special map holders, available at outdoors stores, are available to protect maps from abrasion, wind, and water. Re-sealable plastic bags work too.

Maps can be stored at home flat and protected in stiff cover folders available from art supply stores or can simply be rolled up.

There are map-measuring devices that utilize a little wheel to trace a route and measure the distance. A calibrated readout wheel shows the distance on maps of various scales.

There are slope angle–contour spacing scales or templates for easy assessment of terrain slope angles (see Fig.6-4).

For a visual scale reference on a 7.5' topo in the area to be traveled through, draw a line 1 mile long (2.6'), and divide 1" of it into 10 parts, each 1/10" long. These "building blocks" of 1/10" equal 200 feet exactly.

FIELD NAVIGATION

The primary goal of field navigation is to execute the trip plan effectively and safely while staying found. The leader needs to know how the group is progressing from point A to point B, which involves connecting the map to the terrain (map orientation), tracking and locating the group's position as it progresses, and leading the group towards its objective in an organized fashion.

Map Orientation

A map is oriented to the terrain when it is horizontal and the direction of its features is in line with (conforms to) the corresponding features on the ground. A map may be oriented by inspection in a number of ways, most directly by rotating the map so that corresponding map and terrain features are in line by direct observation. If an observer knows his or her current position on the map and can locate on the map some recognized terrain feature, then an imaginary line can be drawn between these two map locations. The map can then be oriented by rotating it so that this imaginary line points to the terrain feature. The map may also be oriented with a compass by placing the compass on the map with the compass N-S bearing line parallel to a map N-S

line or the edge of the map. The map and compass are then rotated together until the compass indicates the map is aligned to true north. In this case the compass needle itself will be contained within and parallel to the orienting arrow. Another practical way is to draw a N-S line in the ground with a stick or the boot, then use that line as an accurate N-S reference to realign the map after having been turned in a different direction.

Position Location—by Terrain Inspection and Correlation with the Map

The group's position on a map can generally be determined in open country by establishing correspondence between the map and the observed terrain. For example, when standing on the shore of a lake, align the map so that the lake shore features on the map are in line with the actual features. It can be more difficult if one is in a canyon bottom and must identify observed side features with those shown on the map. Among trees it may be impossible.

When on trails that switchback or wind in and out of gullies or around ridges, the navigator may determine the location on the map relatively easily if one keeps track as these points are passed. Some leaders even count switchbacks or gully crossings, a simple and effective technique. Local bearings can be very useful.

Skill in estimating distances to terrain features and in estimating elevation differences helps considerably in map to terrain correlation (and vice versa) once a map is N-S aligned. For example, the fact that a cliff is judged to be 1000 feet high and three kilometers distant may help considerably in searching the map for the corresponding feature.

In climbing a ridge or slope, one can often gain an awareness for the altitude by noting neighboring peaklets or saddles that are about level with one's position and the elevation of which can be determined from the map.

As one works from the map to the terrain and vice versa, all the available clues should be used. For example, one could note the width, height, direction, curvature, and length of a gully on a map and compare these features with what is visible in the gully to see what fits. Gullies A and B in Figure 6-2 diverge near 8,600 foot elevation. Gully A leads almost directly south (175°) and climbs 1,200 feet to the saddle. Gully B is slightly shallower, has a more open shape, and disappears below the saddle. The bearing is 156° , and that bearing tops out on the ridge roughly 100 feet above the saddle. Gully C generally parallels B, but is much deeper, is distinguished by an intermittent stream, and leads toward West Baldy summit. These are sufficient clues to confirm a reliable identification.

SOME RULES OF THUMB

A linear bearing error of 1° yields

92.4 feet @ 1 mile or about 100 feet @ 1 mile
(roughly $1/20$ inch on a 7.5' topo)

An index finger width held at arm's length

is roughly 1.5° to 2° , which yields

138 feet to 185 feet @ 1 mile
(roughly 0.07 to 0.1 inch on a 7.5' topo)

A hand width (4 fingers, no thumb) held at arm's length

is roughly 6° to 8° , which yields

555 feet to 740 feet @ 1 mile
(roughly 0.28 inch ($3/10''$) to 0.37 inch ($4/10''$)
on a 7.5' topo)

One may estimate remaining daylight

by measuring the distance of the sun's path to the setting point on the horizon (the sun moves $15^\circ/\text{hr}$):

A four-finger-width at arm's length yields
roughly 30 minutes.

Two four-finger-widths yield roughly 60 minutes
(1 hour).

Position Location—by Fixes

Some map-indicated features are visible in the surrounding terrain and can accurately identify a position. These include benchmarks; section markers; prominent summits; trail junctions; trail switchbacks; trails crossing ridges, ravines, and streambeds; and man-made objects.

Map and Compass Bearings

An observer's location on the map can be determined in the field by taking at least two bearings to identified features and then plotting these bearing lines on the map. Ideally, their intersection is supposed to be the observer's location. For accuracy the bearings should be as nearly perpendicular to each other as possible. If the observer's position is known to be on some identified line such as a trail, road, gully, or ridge, then only one bearing is needed as nearly perpendicular to the known line as possible. A third bearing to another known point can be used to check and

SOME USEFUL CONVERSIONS

Attention here is confined to USGS maps with a scale of 1:24,000 (7.5') and electronic maps that are printed on a 1:1 basis (e.g., one actual inch on the map does indeed correspond to 24,000 inches on the ground). With the variety of printing scales available with the software, a computer-generated map may not be on a 1:1 basis with the actual map published by the USGS, so some of the measures listed below will not apply. The base plates of appropriate compasses provide scales that read directly in English (miles) and/or metric (kilometers) systems that can be used to measure distances on the 1:1 map.

Linear Conversions

On the Ground

1 kilometer (km)	=	0.6214 miles
1 mile	=	1.609 km
1 meter	=	3.281 feet = 39.4 inches

On the Map

1 unit on the map	=	24,000 units on the ground
1 inch on the map	=	24,000 inches on the ground
	=	2,000 feet on the ground
	=	0.379 miles
2.64 inches on the map	=	1 mile on the ground
1.64 inches on the map	=	1 km on the ground
0.1 (1/10) inch on the map	=	200 feet on the ground, exactly (The "building block" for 7.5' topos)

Pacing

When navigating in conditions of poor visibility, as in a dark night or a heavy whiteout, one must move from one point to another, keeping the segments short, limited to what visibility allows. In such conditions the ability to estimate the distance traveled by counting steps can be useful. This works best over nearly level or slightly undulating terrain. Here the word "pace" means the length of a step in walking-left foot to right foot. If one's pace is about 2.5 feet long (typical), every fourth pace marks 10 feet. Counting every fourth pace as 1, 2, 3, etc. is easier to keep track, and then multiply that number by 10 feet to get the paced distance. After a predetermined count is reached, say 100 (or 1000 feet), a second person is signaled to keep track of the 100s, and you can start counting fourth paces over again. Some military recon teams use this technique. Each individual must find the typical size of his or her own pace (that is practical to use) and own technique for keeping track of it.

usually improve accuracy of the location. The three bearings will ordinarily not intersect at the same spot but will create a bearing-bounded triangle (called an "error triangle" or "cocked hat"). The best location estimate might then be in the middle of the triangle, depending on the relative accuracy of the three bearings.

Navigation in terrain with distinctive relief with USGS maps and a compass can be done with good precision. Most of the time people achieve reasonable accuracy in taking bearings within two to three degrees. Following a bearing with an error of about three degrees will result in an offset of about 300 feet per mile. Errors of this order can be expected when navigating over featureless terrain (desert,

snow fields, etc.) with the aid of compass bearings. From a known location on the map, a bearing may be measured from the map, and the compass can be used to locate accurately the feature in the field. Conversely, a bearing may be taken to an unidentified physical feature and then plotted from the current position on the map to identify the feature in question.

Route Following

The best way to follow the planned route is to keep track of location on the map at all times, i.e. "to stay found."

A leader should look at the terrain, recognize the features on the map, and carry a mental image of movement and location on the map. Carrying the map close at hand and looking at it often, the leader is able to read the minor features shown by the fine detail in the contour lines. Trip planning and scouting the trip can be very beneficial in enhancing these skills.

Selecting visual terrain points (attack points) to walk toward for the next trip leg of the trip plan is a useful procedure. Switchbacks and other local trail wanderings are ignored in this process; it is the general trend that counts. The navigator picks out a clearly visible point on or near this trend line as an attack point and proceeds toward it. Desirable features of an attack point are that it is actually near or on the route, can be kept in view en route, and is identifiable once it is reached. If the attack point cannot be kept in view, pick a closer in-line object to serve as a local heading reference towards which the route can be directed for a given distance.

A navigator should always think ahead and predict future terrain features based on distance (or time) from a known or presumed position. For example, when hiking on a trail through timber in the western Sierra at an estimated speed of 3 miles/hour, the group crosses a small stream that they believe they have correctly identified on the map. About one mile farther the map shows another small stream crossing the trail. The leader thus predicts that the second stream will be reached in twenty minutes. The time is noted, or the stopwatch started, and if in fact a stream is reached in about twenty minutes, the leader has a strong confirming clue that the original identification of the streams and the group's previous and current positions are correct.

Dead Reckoning

Dead reckoning is the process of moving from a known point for an estimated distance in an estimated direction to reach a desired destination without visible clues along the way. The process may be done in distance, in direction, or in both. Dead reckoning is used in featureless terrain or at times of limited visibility, but can also be useful in general, even hiking along a trail.

Distance traveled is most easily obtained by estimating one's speed of travel and multiplying by elapsed time. For directional dead reckoning with limited visibility as in timber, darkness, or fog, navigators must carry a compass in hand and walk as closely as possible along a compass course. It helps to pick out an object, such as a tree or rock, which lies on the compass course and is as far ahead as visibility permits as an attack point and to walk to the object. The

process is then repeated. This method gives greater accuracy than trying to follow an exact compass course, and it allows one to pick a good path and to move around obstacles. When moving over a snowfield in a fog, it may be useful to send another person ahead to the limit of visibility and then to move to the person and repeat the process.

As an example, a leader descends from a desert mountain at dusk. The automobiles are known to be out on the desert one mile away at a bearing of 85 degrees. The leader estimates that in crossing the desert, the group will move at 3 miles/hour. The leader sets the compass dial at 85 degrees, notes the departure time on a watch (or starts a stopwatch), aligns the compass needle, selects a large rock (still visible) about 1/4 mile away to home on, and starts off. After about twenty minutes of walking with a few more homing points, the group should encounter the vehicles. A better technique, however, would be to offset the chosen direction deliberately, say to 80 degrees; then there would be no doubt about which way to turn (to the right) when reaching the road. The cars would be reached about 500 feet further.

A Compass Technique— Bearing of a Local Route Segment

Navigation technique frequently is most needed in conditions of limited visibility such as in a forest, in fog, or at the bottom of a gully or valley, and especially when the leader has lost track and is not sure of his or her position. For these cases, a useful technique is to measure the bearing of the local route one is following, such as a segment of a ridge, dry creek bottom, trail, or hillside slope as a check on the presumed position. If the leader has fallen behind in the position-monitoring task, he or she may examine the surrounding terrain, take an altitude reading, and search the map for a segment with corresponding bearings or other attributes to reestablish his or her position. Also, one may ask for information from the group.

Updates along the Way

Dead reckoning and the compass-based techniques can lead to lateral drift in position as time goes by. The perceived position can be reset to actual position by using one or more of the position fixing routines. Reaching predicted attack points, monitoring the altimeter as particular altitudes are passed, and recognizing particular small-scale landforms such as gully crossings can serve this purpose. The focused leader will take advantage of any break to establish a new fix. Indeed, break locations are often planned with this in mind.

ROUTE FINDING

Leading

In the field the ability to choose a good path along a planned route grows with experience. The terrain visualization phase of the trip planning serves to put the big picture of features such as major ridges, canyons, and roads well in mind. The leader can do such good things as be alert, look around, and try to register the terrain in one's brain. Develop a two- or three-dimensional image of the terrain. Grow beyond the one dimensional, head-down, trail- or compass-following mode. The big picture in reality can often dissolve into a mess of local terrain features dominated by brush, rocks, dry waterfalls, washes, and other terrain features. These have scales that are less than a contour interval and do not show up on the map. Probably because maps do not reflect and even written guides often ignore these features, they often come as unpleasant surprises. Fortunately, with experience, one can develop a sense of the terrain from a quick observation and pick a reasonable path through brush, over talus, or up a ridge.

The "reasonable path" is actually selected by assessing the perceived possibilities. Some guidance for selecting the detailed route might be provided by past experience with different types of terrain and vegetation coverage. For essentially identical plan and profile view but different ground cover, the relative times to progress over a given plan segment could be significantly different. These unexpected conditions are not foreseen in the trip plan but should give motivation for the leader to examine alternative routes at the scene.

When attention must be devoted to solving immediate small-scale problems, the leader still must keep the big picture in focus. If for some reason the leader falls somewhat behind in knowledge of the group's exact location on the map, the position should be reacquired and verified by taking a fix at the next convenient break. On some terrain even relatively slight departures from the desired route are embarrassing at best or near catastrophes at worst. On peak climbs these often occur on the descent and can be as apparently innocuous as making (or not making) a slight turn that results in being on the wrong ridge. Even experienced leaders have made major errors atop rounded and forested peaks with no conspicuous trails, where "down" is in all directions or when clouds block all views. A back bearing here can be essential to find the right way down.

Being concerned about the return trip, on the way in the leader should stop, look back frequently, and make mental notes of key turning points. Written notes as to appearance, time, location, altitude, and other cues can help, as can leaving route markers as appropriate, such as

ducks, branches, marks in the dirt made by hiking poles or other objects, and wands (all removed on the way out). Best is to record some return bearings.

In the Sierra a leader need not worry about momentary loss of the trail. If correct about the general route of the trail, one will find the trail in good time. This is an example of the old saw "Where would I go if I were a trail?" or "If I go where it makes sense, the trail will find me." On the other hand, for some local peaks on the Hundred Peaks list, staying on the route can be critical to minimize lengthy encounters with brush. A major factor in establishing HPS routes in these cases is avoidance of brush, so the route can sometimes proceed seemingly all over the place.

A leader must keep the group together and maintain visible or audible connecting ties to the rear leader (the sweep), particularly at turning points where people may go astray or with use trails that do not appear on the map or in guides and that may be misleading. Walkie-talkies are very useful. Every thirty minutes or so, one may let the rear catch up and verify that all is well. Because large groups have a peculiar tendency to spread out over the landscape during the last stages of trips proceeding across relatively flat terrain, the leader should take special precautions.

Techniques

Depth perception as to ridges and gullies can be gained by moving back and forth a few feet or by walking a few tens of feet and noting how terrain in front seems to move relative to terrain behind. On exploratory trips the seasoned members of the group may help solve the immediate problems. The leader may send out scouts as appropriate to find the best local route but should maintain control by telling them how far to go, when to come back, and how to communicate.

One must be especially careful in descending ridges to keep to the correct ridge at branch points; a mistake of a few feet at a branch point high up can lead to a mistake of a few miles at the bottom of the mountain. Streambeds diverge going up, and choice of the wrong gully can lead to a surprise at the top of a secondary ridge far from the summit objective.

A number of other techniques aid in "staying found": keeping a sense of direction and route always in the forefront; learning to track footprints and to follow one's own footprints upon return; knowing how to recognize the Big Dipper and locate the North Star; and making use of the fact that the morning sun is in the east, generally due south at local noon, and to the west as the sun sets. If one has an analog watch or a reasonably good spatial imagination, one can point the standard time hour hand at the sun to find south, which will be half way between that direction and 12

USEFUL NAVIGATION HINTS

- 1 For visual scale reference in the area traveled through on a 7.5' topo, draw a line 1 mile long (2.6"), and divide 1" of it into 10 parts, each 1/10" long. These "building blocks" of 1/10" equal 200 feet exactly.
- 2 At arm's length, index finger width subtends 1.5° to 2°, and a pinky subtends 1° to 1.5°, unique for each individual. Use what fits you.
- 3 One degree at one mile distance subtends 92.4 feet of linear distance, or approx 100 feet. A 3° compass error at 1 mile results in approx 300 feet linear offset for location error range.
- 4 At this time (2015), declination at Joshua Tree NP is 12°, at Mt. Wilson is 12°, and at Santa Barbara is 12.5°.
- 5 The North Magnetic Pole is in Northern Canada and moving to NNW, at double the historical rate since 2000. Currently in Southern California that translates to a declination decrease of 1° about every 12 years.
- 6 Take a set of three independent bearings of the same object. The resulting spread in degrees is a measure of your compass use accuracy. Also, the average of your three bearings results will tend to be more accurate than any single reading.
- 7 After taking a bearing in the field, point the compass back at the object to see how close to the object the bearing points. Use finger technique (2 above) to estimate degrees off.
- 8 For any good compass, the most import feature is a free and easy dial movement.
- 9 When the compass is laid on a topo, the magnetic needle "disappears," i.e. it becomes useless. There is one exception—when you are using the compass to orient the map to true North.
- 10 Bearing taken on a topo with N-S lines using the compass as a protractor is always accurate for identifying the correct object in the field. Bearing taken of object in the field using the compass as a magnetic instrument will almost always be less accurate.
- 11 To locate one's position in the field on a topo, the closer an object is, the more accurate its bearing will be for locating it on the topo.
- 12 When triangulating with two bearings, choose two objects whose lines of sight from your position are as close to 90° apart as possible.
- 13 On a topo, a single closed contour line may represent a terrain feature anywhere from 1 foot to 79 feet high. That feature is always visible, especially close by.
- 14 To locate and go to a destination object in the field, follow its bearing from the topo. Visually pick out a distant terrain point and walk toward it (don't lose sight of it). Then on the topo, take a reference bearing from the destination object to another object that is nearly at a right angle to the path traveled. Following the path direction, periodically check to see if the reference bearing points to the reference object yet. When it points to the reference object, you are at your destination.
- 15 Man-made features can and will change over time, but even a recently revised topo may not show the latest additions or deletions. An example is the North end of Boy Scout Trail on the Indian Cove topo.
- 16 Highlight or color-dot prominent high points on the topo that are most likely visible to the eye. This allows for easier N-S alignment of the topo and facilitates timely terrain recognition.

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- 17 To keep a topo easily N-S aligned, draw a N-S line on the ground with a hiking pole or your boot. The topo N-S lines can then be quickly and easily aligned with the line on the ground.
 - 18 When N-S lines have not been drawn, a map may be folded accordion style parallel to the edges, so that the folds represent N-S lines.
 - 19 When using a topo for terrain recognition, always have it essentially N-S aligned.
 - 20 For any UTM Region, the UTM grid N-S lines are true north only at the centerline of the region. Moving outward, they diverge to about $+2.5^\circ$ on the west border and to -2.5° on the east. UTM lines can be used as N-S lines for the compass, as long as the compass declination is adjusted for the UTM N-S line divergence. To west of the centerline, the UTM angle (GN on the topo) is added to the topo declination. To east of the centerline, the UTM angle (GN on the topo) is subtracted from the topo declination.
 - 21 For 7.5 maps that do not have the UTM grid overlay, the UTM lines (instead of N-S lines) can be drawn in using the tick marks at the map edges. For accurate positioning on a UTM grid, use UTM templates or scales that provide N-E location accuracy to 1 millimeter (better than 1/20 inch).
 - 22 Maps may be carefully folded at the edges and taped together with write-on tape on both sides. Do not cut off the map edges. Write-on tape permits lines to be drawn on the tape when plotting near the taped edges of the maps. It is almost impossible to do terrain/map recognition, to plot bearings, or to estimate distances when the maps are not taped together.
 - 23 It is best is to fold the map to show the specific area of interest and then change the folding as the trip progresses. A map which is quickly available and needs no unfolding, especially in the wind or rain, is most useful for route following. Special map holders, available at outdoors stores, are designed to protect maps from abrasion, wind, and water while being viewed. Re-sealable plastic bags work too.
 - 24 Copy Fig.6-4, Contour Line Spacing of Slopes onto a Vu-graph transparency. Then cut out and trim the contour spacing area to use as a template for overlay on a topo. When the template is overlaid on any topo contour lines, select the best spacing match to determine the angle of the slope on the topo.
 - 25 The trail or dirt road dash marks on a topo are 151 feet point to point. There are 35 of these to the mile.
 - 26 There are map-measuring devices which utilize a little wheel to trace a route and measure its distance. A calibrated readout wheel shows the distance on maps of various scales.
 - 27 When the sun is highest around local noon, the shadow of a vertical stick points to the north.
 - 28 At equinox in March and September, the sun is above the horizon for twelve hours. It rises at 90° East and sets at 270° West.
 - 29 There is a natural 3:2 rule for going up a steep hill, versus coming down the hill. If it takes three hours to reach the top, it will take about two hours to come back down.
 - 30 If you know where you are on a map but you don't know what the declination is, here is how to find it. First take an accurate magnetic bearing of an object (align the needle with the dial meridian lines). Then, on the map take the geographic bearing from where you are to the object. The difference in bearings is the declination.
 - 31 To improve depth perception between two objects in the field, move alternately to the left and right, while observing the relative movement of inline near and far objects.
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o'clock. The leader needs to keep track of how the margins built into the original pre-trip plan are faring, especially time. On longer day trips be aware of the time of sunset—information readily obtained from newspapers, weather reports, internet resources, or from most GPS receivers. Near the end of the day, the daylight time remaining can be estimated by measuring the distance of the sun's path to the setting point on the horizon in portions of four-finger hand widths. The width of the four fingers of the hand at arm's length is approximately 6° to 8° , depending on a person's width of fingers. Since the sun moves fifteen degrees/hour, each four-finger width corresponds to about 30 minutes of sunlight. It is important to remember that the sun approaches the horizon at an angle. So the 30 minutes four-finger width is measured along the path of the sun.

Stress and Emergencies

It is important to recognize that navigating becomes much more difficult under stressful conditions. Stress may occur in the leader for a variety of reasons: the party is delayed and darkness is near, the trail on the topo is wrong, the map tore or blew away, leader and party fatigue has set in, or someone in the party may challenge the leader and create uncertainty as to the location and route. Stress may destroy memory and make judgment faulty. Fatigue and stress are most manifest mentally as a reduction in one's capacity to pay attention to more than one thing at a time. Consequently, the leader must consciously work to keep cool, clear, and focused. It helps to take time, write things down, and consult with experienced and knowledgeable people in the party. Experience and preparation are the best preventatives for stress, and practice is the way to obtain experience. For example, one may practice navigating while pretending that the map or compass is lost.

If, notwithstanding trip planning and attempts to keep track of the group's progress, the leader becomes unsure of the group's location, he or she should stop and analyze the situation and not count on luck or rely on "gut feel." One should study the map and try to reconstruct what might have happened, then form hypotheses as to position by methodically looking for a match between the observed terrain and a corresponding place on the map. To get a different view, one may climb a rock or a nearby hill or send out a few group members for a short look around. One should use all available navigational techniques to support one another. Navigation is a gathering of clues, and redundancy of information is good. Does all of the evidence about position add up—bearings to features, altitude, terrain shape, gradients of local slopes and pathways of the immediate past, distances to features, size of features,

bearings of local route segment, successive fixes along the route? Then, after concluding that it all adds up, the leader can compose a plan and try it out on other experienced and knowledgeable members of the group. Throughout the situation, the leader needs to maintain control, communications, and composure. Resist snap decisions and think it through.

Expect Error

Seasoned leaders recognize that none of their instrumental measurements is error free and that small errors uncorrected can, over time, turn into large errors. The most effective means to compensate for error buildup is to make appropriate fixes. These are times when a GPS receiver can come into its own.

Other methods help compensate for error buildup. Under many circumstances the easiest is to live with it, as when the group is returning to the (unseen) cars parked at the end of a desert road and the leader uses a bearing offset to assure that the group actually hits the road. When an objective is an obscure point rather than a line, the leader may use the group as a resource. When near, but somewhat before reaching the estimated point, the group may spread out, say, five scouts in a line abreast at thirty feet apart and proceed. This procedure can compensate for about a 200-foot (1/10 inch) error on the topo. The spacing and number of scouts can be adjusted to suit the circumstances. If a group approach is not pertinent, a solo search procedure can be conducted. One strategy is to start at the best-estimate location, then walk north for ten paces, east for ten paces (25 feet), south for twenty paces (50 feet), west for twenty paces (50 feet), north for thirty paces (75 feet), adding paces in this expanding pattern until the point is found. Depending on the nature of the point and circumstances, the pattern increment, e.g., ten paces in the example, can be reduced or increased. Also, when other help is available, more people can be recruited to broaden the pattern.

TRIP/ROUTE PLANNING

Trip planning is essentially an exercise in foresight by identifying possibilities and their associated pros and cons and deciding among the alternatives. A good leader selects reasonable objectives, achievable by reasonable routes. The process begins with terrain familiarization to set the scene and view the physical constraints; then proceeds to the route planning needed to get from A to B with safety, efficiency, and maximum enjoyment; and ends with contingency possibilities, developed to try to address unexpected but possible events. In developing route possibilities from the

map, the planner can consult other information sources, including guidebooks, DPS and HPS guides, trip reports published in GSC newsletters, and hearsay; other maps, such as big-picture maps and those that show local interest; and trip-specific factors like the historical, natural history, geographical or geological aspects. Best is to scout the trip in advance. If this is not feasible, sources such as the above are invaluable—and can identify leaders who have recently led the same or similar routes, so they can be contacted for up-to-date information.

Terrain Visualization

On the map the leader initially locates points A (start) and B (goal). Then the planner carefully studies all the features and aspects between A and B presented on the map(s) and in other available material to develop a mental picture of the territory and its characteristics. Indeed, reading a topo map—that is, converting the map images to a good mental image of the terrain—is the heart of route planning. The converse skill of viewing the terrain and correlating this with the map is the heart of navigation by inspection. Both skills are complementary and require practice at the desk and in the field.

Software can be a great aid for terrain visualization with neighboring maps connected seamlessly, local regions magnified at will, and physical size of the areas depicted on the computer screen readily changed. Some programs even provide 3-D viewing under different lighting conditions, side by side with plan views. The planner may see the bigger picture either by zooming in and out of different scales on the computer-generated maps or by comparing the printed 7.5' USGS map with a larger scale map which shows a broader area in less detail.

The topographic map of Figure 6-2 shows some of the distinctive landforms typical of the San Gabriel range as well as the trails to Mount San Antonio and beyond and the road through Manker Flat from Baldy Village. Cut by intermittent streams and having steep sides, the gullies exhibit the characteristic sharp uphill pointing V's on the map. The ridges, however, may be quite rounded and appear as downhill pointing U's. A similar map for the High Sierra would appear as the converse, because the principal water courses (basins) were cut by glaciers and appear as broad U's, while the ridges are frequently very narrow and appear as sharp V's. The map clearly illustrates the features of converging gullies and diverging ridges going downhill, and the converse going uphill. These are major factors to be considered in route selection.

The east-west ridge along which the trail runs dominates the general shape of the terrain in the upper middle of Figure 6-2. Small closed contour lines marking a high point are represented at West Baldy, Mount San Antonio (Mt. Baldy),

Mount Harwood, and others. These peaks are further noted as high points by their elevation notations, the triangle and bench mark on West Baldy, and the x on Mount Harwood. The saddles on the ridge on either side of Mount San Antonio illustrate a characteristic necked-down appearance with contours showing high points on either side and with contours showing draws in the perpendicular direction. Other characteristics to grasp are the distances to landforms and relative elevations. For example, the map shows that Mt Harwood is about 3/4 mile (1.25km) distant and about five hundred feet lower than Mount San Antonio. When correlating the terrain in the field with the map, one should verify the presence of all of these clues.

On the color version of the map, some gullies are shown with blue line symbols for intermittent streams. This symbol is used for the more important channels in a given watershed. Most of the time in Southern California and the desert regions, no water is in any of the intermittent streams. The canyons without this marking, furthermore, may be just as prominent from the ground as those that have the marking.

Route Formulation

Route Formulation Principles—Generalities

If good route descriptions exist in reliable guides, leaders usually follow the guide. Typical local hikes and standard route HPS and DPS trips tend to fall into this category, as do trips described in the local and regional hiking guidebooks. Even in this case it is wise to plot the trip on the topo, noting roadheads, trail junctions, clearings, stream crossings, passes, and other major waypoints along with some time estimates. When actually conducting the trip, the leader should use these places as checkpoints as they are passed.

Other more navigationally intensive trips—such as in pathfinding, exploratory, or adventure hiking to new areas where specific route descriptions do not exist—require more attention to route planning.

Some general travel considerations that can be helpful in laying out possible routes include the following.

Choosing Available Trails—Any trip segment that can be done on a trail will almost invariably be less strenuous and demanding than a cross-country equivalent. Also, on trails accurate location-estimation as the actual trip progresses ordinarily requires the leader simply to pay attention to the time and have some appreciation of the average speed. Location-fixing is also simple when the group is on a trail.

Minimizing Encounters with Brush—The green colored vegetation-type-coded symbols on the map can generally be relied on to differentiate between scrub and woods, although not necessarily to the vegetation density.

With mountainside chaparral southern exposures are usually worst. Snow may cover the brush deeply enough for snowshoe travel.

Minimizing Side-Hill Travels—Side-hill traverses can be very tedious, slow, and even dangerous on steep terrain. Because they often involve much moving in and out of small gullies, traverses around in-route high points can be longer and more time consuming than a direct route over the top.

Considering Gully Routes—Gullies, including intermittent streambeds, are sometimes good travel possibilities. They tend to be more chaparral free than surrounding slopes, especially on northern exposures. Gullies provide route segments that are readily identified on the map, and they tend to have a steady gradient. The downsides of gully travel can include willows and other brush that may be present near water and unexpected dry water falls (common in the desert). Dry waterfalls can be very steep, are often quite slick, and may not show up at all on the contour map because they may be less than the contour interval in height. Gullies near and beyond the angle of repose may have rock fall problems, so careful attention should be paid to the slope angles. Finally, because gullies and streambeds diverge going up, the choice of the wrong branch can lead to unhappy consequences higher up. The conjunction of two gullies can be a crucial transition point for a route and should be defined on the route card by location and the bearing of the correct branch.

Considering Ridge Routes—Ridges are likely to be relatively brush-free and provide route segments that have one line that is readily identified on the map. Possible downsides include rocky ways, uneven and awkward terrain, impassable gendarmes, and significant exposure, especially in the Sierra. Ridges can be very unpleasant or even dangerous in the wind or bad weather, especially when lightning is about. Just as with gullies going up, diverging ridges going down require attention to assure that the right one is selected. Again, the conjunction point can be a crucial location point for the route card. Going down the incorrect ridge can be a major error.

Noting Water Sources, Good and Bad—Water replenishment sites can be helpful by reducing the water-carrying needs of the party. Because getting across larger streams can be crux points for an entire trip, crossings must be thoroughly planned. Bridges can be a great boon and may be worth miles of extra travel under high water conditions. Stream flow is shallower and slower where the stream is wider and has a lower gradient, factors that should be considered when locating a potential ford. Preparations for spring and early summer crossings of most Sierra streams and some others should include safe crossing procedures.

Planning the Return Trip—For starters, the back bearings immediately off the summit and to the roadhead

should be noted for possible routes. Terminal route segments over featureless ground (like the desert) should be set up with an offset to an appropriate side of the starting point. When a GPS is available, the roadhead location can be very useful both at the start of the trip, to be sure one is really at the desired point, and at the end of the trip to the cars.

With these considerations and the terrain visualization, the leader may sketch out some possible routes. This process is aided by mentally progressing along each route, following the ups and downs, switchbacks, and ridge and stream crossings along the way—virtually hiking on the map. This thought process should also pick out orientation and route following features as possible navigational clues, clue sequences, trail junctions, check points, bearings to conspicuous objects, and back bearings that become available as one progresses along the virtual route. A leader should remember to include the small-scale features, such as gully crossings of a trail, where the trail line and the gully line define a fix, or the more gross aspects, such as switchbacks in number and sequence. Some of these points may have even greater possible value in anticipation of reduced visibility or bad weather. A catalog of the more prominent and potentially useful of these cues and clues of the virtual trip may be entered on the possible route card.

Route Formulation Principles—Details

Underlying Criteria

The most desirable route for a group is one that best satisfies the following criteria:

- **From the group's standpoint**, the selected route should proceed from A to B with safety, efficiency, and maximum enjoyment. The route must be compatible with
 1. The number in the party (without doubt, the most important and yet often the most neglected factor in mountain safety);
 2. The varieties of experience and physical condition of party members;
 3. Time constraints on the trip;
 4. The motivating objectives of the trip, like a peak climb or observation of special natural features;
 5. Projected weather variables and minimum conditions.
- **From the leaders' standpoint**, the selected route should permit a continuous high level of situation awareness. In other words, the leaders should always be aware of
 1. Current location on the map,
 2. The group and individual status,

3. Appropriate steps and alternatives to cope with the unexpected.

Trails with many junctions, routes with lots of stream crossings, or routes in heavy forest or brush can give the leaders of large, diverse groups some real challenges in keeping the group together or even maintaining a good appreciation of the group's status. The possibility of unexpected events—such as lost or strayed participants, injuries, etc.—is always present and needs to be foreseen as part of the visualization process.

The visualization process outlined above will ordinarily result in one or two feasible route possibilities, usually with one obvious favorite. The rest of the job is to finalize the details. These are covered below.

Layout of the Route on the Map and Development of Trip Statistics

The projected route should be drawn (or at least sketched out) on the map. For standard routes the DPS and HPS guides are excellent. These guides and associated topo maps ordinarily provide good starting points. Although of great value to the leader-planner, the existence of these guides can foster complacency; to be prepared, the leaders should still go through the route visualization and other preliminary steps carefully.

When more elaborate logistical plans are called for, the leader must start afresh with the maps and other pre-planning tools. This used to be a tedious process: maps were often meticulously joined to provide a seamless character, while route possibilities, distances, bearings, and profiles were fiddled with manually. Now all the manual details can easily and rapidly be accomplished with the software aids. Ideally the route should be detailed in both plan and profile views, although only the plan view is essential.

Plan View Features—Focus on trail(s) directions, junctions (including where the other trails go), major direction changes; natural or artificial waypoints; switchbacks; stream crossings; special observation points; potential rest or renewal locations; and similar points.

Marking the map with colored dots or “flags” at key points, such as tops of surrounding peaks or other visible high points can provide helpful references to aid location awareness on the trip. They can also be valuable references for rapidly aligning the map to the terrain and can provide a sequence of UTM coordinates for possible use with GPS receivers.

Handrails—In some cases possible routes can be referenced to so-called navigational “handrails.” These are usually linear features on the map that lie in the right direction or orientation to be used as navigational aids or as occasional confidence builders that one is on route. Trails,

ridges, and gullies are obvious examples (and may even be the route); fences, power lines, borders of fields, valleys, streams, and edges of lakes or marshes are other possibilities. Handrails can be helpful in maintaining location sense and general situation awareness. Marking the map to focus on the trends of such dominating major topographical features as ridges helps to identify potential handrails and the development of a big picture visualization of the terrain.

Finally, for backup purposes it is desirable to have a catch line (sometimes called a baseline). This is an unmistakable line, such as a road, power line, river, or lakeshore, of broad extent that lies across the trip's general direction and is thereby more or less always in about the same direction from the trip's route. Following a bearing to the catch line is a last resort when otherwise hopelessly lost. It shouldn't happen but has, especially in heavily forested areas.

Profile Features—The trip profile depicts the route in the vertical plane, essentially a plot of altitude versus distance. Such qualitative profile features as saddles or ridge crossings, stream (or gully) crossings, major gradient changes, or gradients of steep sections can all be identified from the map itself. The profile adds the quantitative details. A detailed examination of the contours enables one to select the least tiring line up a mountain. It also provides an appreciation for the shape of the land forms as seen along a specific route. Although somewhat more subtle, gradient changes can be properties of a desired route just as trails are in the plan view. The route profile provides all sorts of valuable information, including route gradients; changes to average gradient as clues for real-time progress and orientation, even as potential route markers; and actual elevation increments for energy and timing estimates along various trip segments.

Trip Statistics—The distances and elevation gains on segments of the trip are the usual quantitative descriptions of the trip. These can be obtained in various ways. Distance along trails may be obtained from published information. For cross-country or mixed routes the simplest and most accurate procedure is to use the features of mapping software programs.

Distance—Distances can be measured from the route traced on the map using several techniques. One common scheme is to break up the route into approximately linear segments and then use a ruler-like strip of paper or dividers (from a drafting set) to add up the several segments. The total length is then converted to miles or kilometers using the scales on the map. Another method uses a map measurer, a tiny wheel with dial scales calibrated to convert map lengths to actual distance at several map scales. Rolled along the route on the map, these miniature wheel measurers have the advantage that any highly curved sections of the route

can be followed without appreciable error. The dashed lines depicting trails on the map provide another way to measure distance because there are about thirty-five trail dashes per mile (twenty-two trail dashes per kilometer). These are not always easy to see, but can sometimes be of value in making distance estimates. With 1:24,000 maps the map scale is small enough to show trails accurately with quite fine resolution. Therefore, all but the shortest switchbacks and other small details are usually represented, and distance measurements as reflected onto a flat plain surface can be quite accurate.

Because the distance measurement is of a route projected onto a horizontal plane, any slopes encountered will increase the actual distance. As an extreme example, consider the direct ascent up a slope of 34°, the angle of repose. Here one would travel about 20% farther than the horizontal distance. For travel on an 11° grade, the additional horizontal distance can be ignored. This disparity is not present with mapping software where the profile data gives actual distance as well as horizontal distance.

Elevation Gain—The elevation gain is the second major trip statistic, easily computed by mapping software. Otherwise the development of a detailed profile (see Trip Leg table) can be quite time consuming. One may manually construct a terrain profile or simply progress along the route on the map and tabulate all the major uphill segments using the contours. The altitude loss is not considered (although the loss will become a gain if the route returns over the same ground).

Putting It All Together

With the entire physical route, trip visualization, and key factors developed, sufficient information is available for final route assessment. At this summary level

- The physical route—general description, plan, and profile views—is in hand;
- The crux points, the key transitions in the route—such as trail to cross-country, branch points in diverging ridges and gullies (complete with bearings), trail junctions or other locations where confusion might develop, stream crossings, and rockfall or exposure areas—have been identified;
- Handrails and perhaps some attack points may have been identified.

Considering the crux points and other characteristics of the route, the planner can finalize the route details and markers. Some of these transition and/or crux points may also be candidates for GPS waypoints. One should include route markers that can be useful for mid-course fixes or in emergencies. The route markers should then be formally incorporated into **trip leg table**.

Estimates of Time, Speed, and Distance

In trip planning and in some aspects of field navigation estimating the time required to travel a given distance or, conversely, to estimate the distance traveled in a measured time is desirable. The basic technique is the same; one estimates speed and divides it into distance to obtain time required or multiplies estimated speed by measured time to obtain distance traveled. For this reason, a watch is a vital navigation instrument.

Time can be determined from the trip plan statistics. Rest stops, lunch breaks, signing peak registers, and other stops need to be added. Five minutes per hour may be sufficient for breathers for tigers, but ten minutes is more realistic, with 15 to 30 minutes for snacks and lunch.

Formula times should be increased for long trips to account for fatigue as well as squiggle factors such as brush, soft snow, talus and scree, high winds, swamps, downed trees or brush, and avalanche path debris that will slow the speed and increase the time considerably. Times for fighting through thick brush or floundering through deep snow could be four hours per mile or more.

Besides fitness levels, individual differences among the participants can significantly change the trip time required. Speeds for descending vary considerably among individuals. A group which might vary 25% in ascending time could vary 50% or more in descending times, depending on the terrain and the group. This is partly the effect of relatively greater fatigue on the weaker participants. Individuals also vary greatly in their ability to descend talus blocks, loose scree, and snow slopes. Generally speaking, the larger the group, the longer the trip time; an approximate time addition is one percent per person. For a group of twenty-five people, the total trip time should be increased by about 25% over that estimated by the formulas.

Bottlenecks can further add a major amount of time for a large group. For example, thirty people each taking two minutes to cross a stream will add one hour for zero distance traveled. Fifteen people each taking six minutes to be belayed up and down a twenty-foot 3rd-class pitch will add three hours to the round-trip time.

In arriving at time estimates, navigators should measure their own performance under various conditions in order to calibrate themselves relative to the simple procedures. Because so much of navigation in the field relies on dead reckoning (speed x elapsed time), navigators should also develop their skill in speed estimation. It is often convenient to think of speed in terms of minutes/mile or minutes/kilometer. Thus, 3.0 mph is twenty minutes/mile or fifteen minutes/kilometer. A kilometer is the distance equal to one side of a UTM grid square.

Some general caveats are necessary. First, all of the schemes use formulas, which have been simplified by using rounded off approximations, which are good enough. Second, because of the variables of the route conditions and group effects on speed, the estimates can provide only rough guidance. And third, the most important variable not included is the leader-planner's own judgment and experience. Stated another way, time estimates can be made for a particular trip using all the schemes; the estimates will all be different; and, most likely, all will differ in detail. But they will provide a pattern that, when leavened with the leader-planner's past experience and judgment, permits a decent estimate to be made prior to the trip. Again, this estimate can be logically modified during the trip to account for the real situation. One must not take any one estimate or plan too seriously.

Naismith Rules

The Naismith Rules are used to estimate the time it takes to do a trip or a trip leg for hikers or for backpackers. They consider both distance and elevation gain. The Naismith time is accurate when it is possible to walk over unobstructed firm terrain in a straight line or on a good trail. Otherwise, additional time must be considered in addition to the Naismith Rules. This additional time accounts for terrain difficulty and is estimated separate from the basic Naismith Rules by utilizing the Squiggle Factor below.

Naismith Hiker Rule

The Hiker Rule estimates the time to travel a specified distance and climb a specified elevation gain when traveling on a good trail carrying a typical daypack. It assumes a rate of 3 mph, plus another hour of travel time for each 2,000 feet of altitude gain. As a reference time to build on, it does not take into account off-trail (cross-country) travel and other factors. The terrain difficulty requires additive times to the Hiker Rule and is addressed via the Squiggle Factor. The Hiker Rule is

$$T = D/3 \text{ mi} + H/2,000 \text{ ft.}$$

T is time, the distance is expressed as D for all types of travel, and H is elevation gain (uphill only) in thousands of feet. D/3 means travel is at 3 mph. H/2,000 means an elevation gain of 2,000 feet adds one hour of travel time. The altitude term should be ignored for downhill segments, but the downhill terrain difficulty is addressed by the Squiggle Factor.

Naismith Backpacker Rule

The Backpacker Rule estimates the time to travel a specified distance and climb a specified elevation gain when traveling on a trail carrying a typical backpack. It assumes a rate of 2 mph, plus an hour of travel time for each 1,000 feet of altitude gain. As a reference time to build on, it does not take into account off-trail (cross-country) travel and other factors. The terrain difficulty requires additive times to the Backpacker Rule and is addressed via the Squiggle Factor. The Backpacker Rule is

$$T = D/2 \text{ mi} + H/1000 \text{ ft.}$$

Again, T is time, the distance is expressed as D for all types of travel, and H is elevation gain (uphill only) in thousands of feet. D/2 means travel is at 2 mph. H/1,000 means an elevation gain of 1,000 feet adds one hour of travel time. The altitude term should be ignored for downhill segments, but the downhill terrain difficulty is addressed by the Squiggle Factor. The slower travel reflects the effects of carrying a heavier load.

Squiggle Factor

A squiggle factor, as used in the Angeles Chapter LTP Navigation arena, allows for considering and applying to trip planning any terrain or trail conditions that impede a wilderness traveler.

Whenever it is not possible to walk from one point to another in a straight line or on a trail or over unobstructed terrain and at a desired reference speed, we need a squiggle factor to apply in our trip planning. Since we use the Naismith Rule to estimate time, the reference speed is three mph for hiking and two mph for backpacking. The squiggle factor time is then added to the Naismith time to account for all types of terrain difficulty in the real world that we walk through. A simple Naismith time is on a good trail or over solid ground with no impediments.

The expression "cross-country" (XC) is widely used and misused. Nobody ever defines what XC means, other than it is off-trail. Hence, it is a catchall that does not mean much. Using the squiggle factor concept, however, allows planning to include specifics of real terrain. A squiggle factor can be used to account for all types of off-trail terrain. Terrain aspects that slow our progress include brush and trees, sandy ground (desert, washes, and beaches), wet or slippery ground (including scree slopes, pine needles, and wet rock), rock-strewn ground, and boulder-covered ground. Included are easy and difficult non-technical bouldering. A dry waterfall in a canyon choke point might require 15 minutes or much longer to overcome! The following are some range estimates

based on experience, to be added to basic Naismith trip legs:

- Baseline is a solid ground with no impediments;
- Typical desert terrain requires a squiggle factor of 10 to 15%;
- Wooded terrain requires 10 to 20%, with slope 20 to 40%;
- Wet and rock strewn ground might be 10 to 30%;
- A sandy wash or a beach might require 20 to 40%;
- Easy bouldering might be 25 to 50%;
- More difficult bouldering might be 100+%;
- Wet rock might be 20 to 200% (or not passable at all!);
- A steep scree slope might be 50 to 100+%;
- Wet terrain is always more difficult than dry;
- Time required for significant choke points like dry waterfalls or serious scrambling on boulders can only be determined by scouting and personal experience.

As one gains experience over varied off-trail terrains in different locales, the judgment for selecting appropriate squiggle factors for trip segments becomes easier. Squiggle factors are rational estimates, never precise, and are difficult to select until you have seen the ground you will be hiking on.

Can a squiggle factor apply to trails also? Yes, if the trail is sandy, a wet grade, or rocky requiring balance and careful planting of feet, a squiggle factor needs to be considered. Just as cross-country does not describe the condition of the terrain, so the word trail does not guarantee a solid path without impediments.

Physical conditioning and number of participants are important but should be addressed separately from the squiggle factor in trip planning.

Sample LTP Trip Plan

A detailed trip plan to show Advanced (E) level LTP Navigation requirements fully is provided below. It is not meant to be a requirement in all its detail at the Basic (I/M) level of navigation checkout and certainly not for beginner-level practice. Many basic-level students will create a modified plan approaching this sample. Many others will use a less-detailed approach to arrive at essentially the same trip plan with similar results. There is no “right” or “wrong,” just how well the student has thought through the route and terrain and whether one has significantly missed or underestimated the plan. That is part of the learning process.

There are three parts for LTP Navigation checkout: a comprehensive written exam mailed to candidates before

the checkout, a homework assignment to prepare a detailed trip plan prior to the checkout day, and most importantly the navigation exercises in the field. The trip plan requires a detailed and well-thought-out approach, documented in three parts: first, a topo marked with the proposed trip route and any alternate routes; second, a chart showing details of distance, elevation, and time for about 15 trip legs, which describe the whole route; third, a trip-leg-elevation diagram showing the elevation profile of the trip.

A detailed homework sample that meets all current LTP requirements is shown in Fig. 6-8, Trip Route Plan; Fig. 6-9, Trip Leg Table; and Fig. 6-10, Trip Leg Elevation Profile. A blank Trip Leg Table form can be found in Appendix C. Using the Queen Mtn 7.5' topo, the route starts at Utah Trail road, at the 2,800 foot contour line, just before the North Entrance Station of the Joshua Tree National Park (JTNP). The route proceeds generally westward to the top of the Queen Mountain range at over 5,000-foot level. It then turns northward into 49 Palms valley and down the 49 Palms Canyon to 49 Palms Oasis. From there it continues northward to the parking lot at the end of the 49 Palms Canyon Road. The general route can be reconstructed on the topo from the Trip Leg Table, by following the General Geographic Direction and Trip Leg Distance information for each leg.

Trip Route Plan

The actual 7.5' topo with the route drawn in is shown in reduced size in Fig. 6-8. The route selected is generally based on choosing the apparently easiest approach as indicated by the spacing of the contour lines. This is particularly important not only going up the mountain but also going down through the canyons. Going uphill in a ravine with an intermittent stream may not always be best because it may contain dry waterfalls or big boulders blocking the way. Areas of relatively flat terrain are always preferred. Areas where the contour lines are very “jiggly” should be avoided, because they indicate vertically haphazard terrain that is probably difficult to traverse, like the JTNP Wonderland of Rocks. Trip legs and their length are selected according to similar terrain. Going uphill, portions of similar but not necessarily identical steepness would be a trip leg. Generally flat areas and portions of lesser steepness can be trip legs. Similarly, trip legs going downhill or through a canyon should be of comparable steepness. Generally, trip legs will be in the range of 0.5 to 1 mile. The trip should be divided into 10 to 15 trip legs to ensure that differences in terrain are adequately addressed along the route.

Trip Leg Table

The table is best constructed using a spreadsheet software application (e.g., Excel). The chart can easily

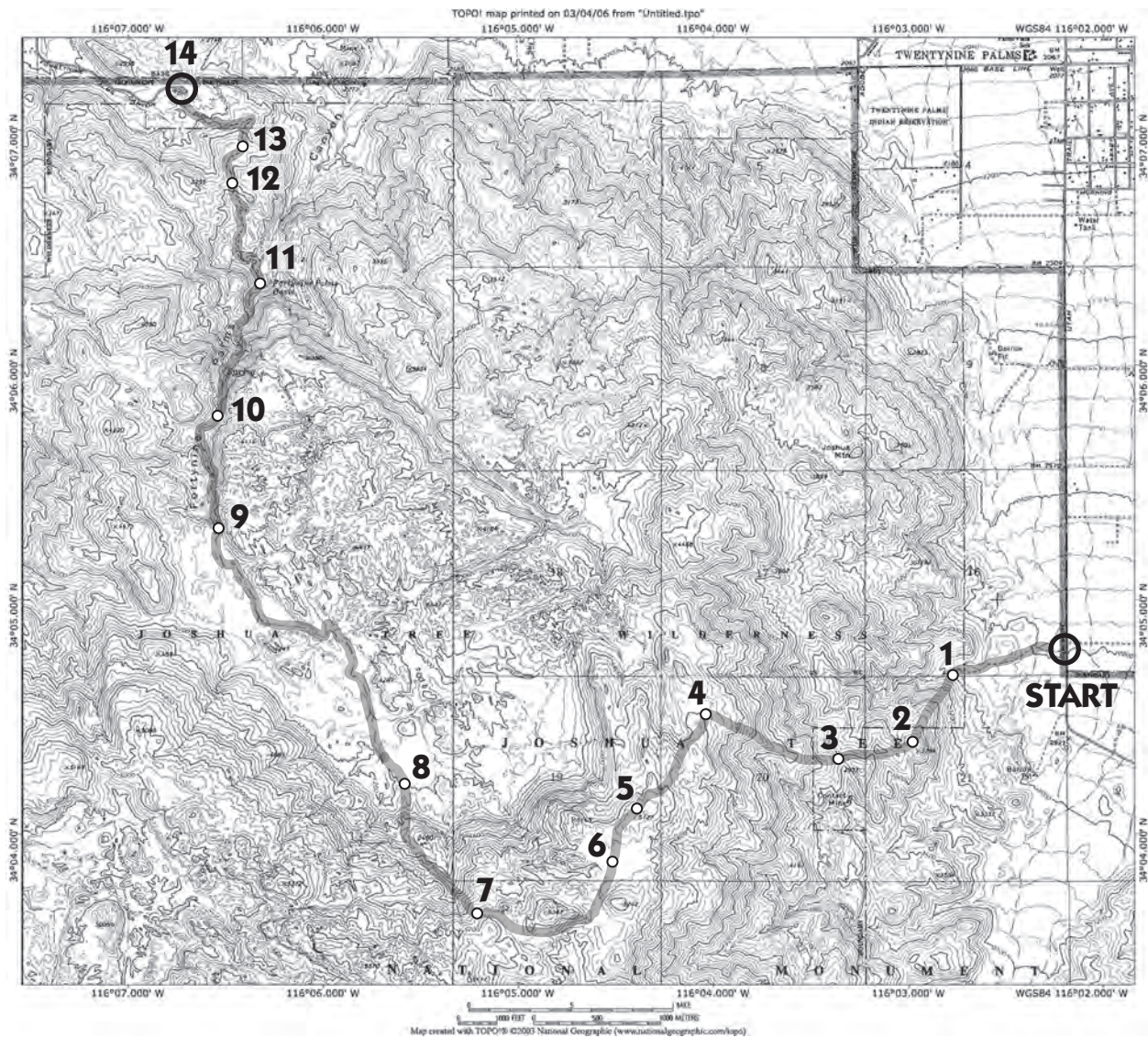


Figure 6-8. Trip route plan

A digital or hard copy of the full-size map may be obtained from the LTC Navigation Chair.

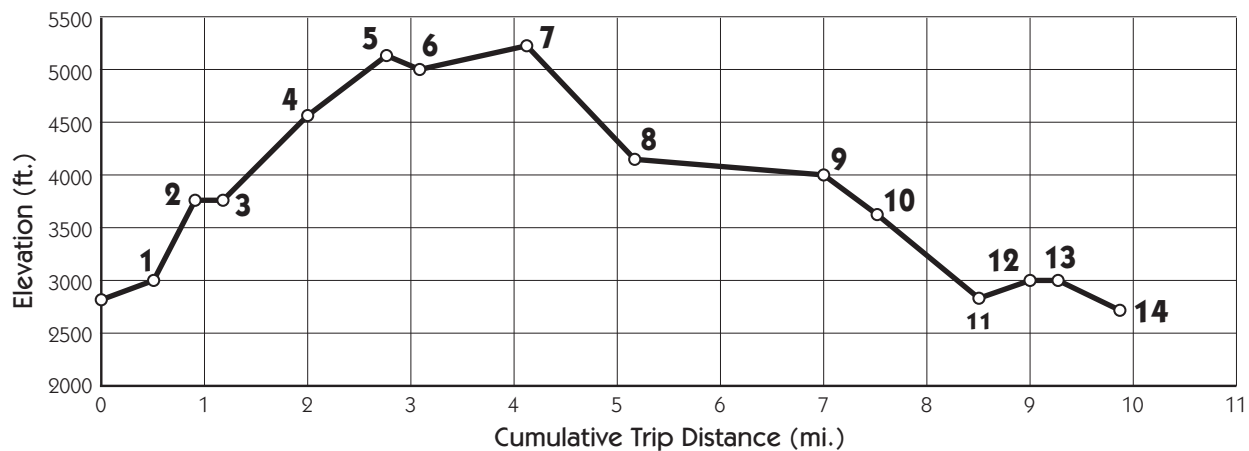


Figure 6-10. Trip leg elevation profile

Trip Leg	Description of Leg	Geograph. Direction	Leg Dist. (Mi.)	Cum. Dist. (Mi.)	Elev. (Ft.)	Leg Elev. Gain (Ft.)	Leg Elev. Loss (Ft.)	Ave. Slope (°)	Naismith Time (Min.)	Squiggle Factor (%)	Adj. Time (Min.)	Cum. Time (Min.)	Cum. Time (Hrs.)	Comments and Break Times	
START - 6:00 AM at roadhead					2,800										
1	Road to mountain	WSW	0.5	0.5	3,000	200		5°	16	5%	17	17	0.3	Trailhead at road	
2	To top of x3784	SW	0.4	0.9	3,784	784		25°	32	200%	95	112	1.9		
	BREAK								10		10	122	2.0	Short break & snack	
3	Hilltop traverse	W	0.4	1.3	3,800	116		5°	11	25%	14	136	2.3		
4	To top of plateau	WNW	0.7	2.0	4,560	760		20°	37	200%	110	246	4.1		
	BREAK								10		10	256	4.3	Short break & snack	
5	To highpoint	SW	0.7	2.7	5,120	560		8°	31	20%	37	293	4.9		
6	To viewpoint - 49 Palms Valley	SW	0.4	3.1	5,000		-120	5°	8	10%	9	302	5.0		
	LUNCH										30	332	5.5	Lunch with a view	
7	Top of canyon	WSW	1.1	4.2	5,200	200		2°	28	15%	32	364	6.1		
8	To Bottom of canyon	NNW	1.0	5.2	4,200		-1000	25°	20	100%	40	404	6.7		
	BREAK										10	414	6.9	Short break & snack	
9	49 Palms Valley	NW	1.8	7.0	4,000		-200	0°	36	10%	40	454	7.6		
10	To 49 Palm Canyon Flats	N	0.5	7.5	3,600		-400	10°	10	100%	20	474	7.9		
	BREAK										10	484	8.1	Short break & snack	
11	To 49 Palm Oasis	NNE	1.0	8.5	2,800		-800	10°	20	150%	50	534	8.9		
	BREAK										10	544	9.1	Short break & snack	
12	Up to plateau	N	0.5	9.0	3,000	200		3°	16	10%	18	562	9.4		
13	Flat trail	NNW	0.3	9.3	3,000			0°	6	0%	6	568	9.5		
14	To parking lot	NW	0.6	9.9	2,700		-280	5°	12	0%	12	580	9.7	End at road	
FINISH - 5:06 PM					9.9 mi.	2,820 ft. -2800 ft.			283 min.			666 min.	11.1 hrs.	+15% for group size	
Date: 3-27-05		Sunrise: 5:38 AM	Moonrise: 7:09 PM	Moon Phase: Full	Sunset: 6:01 PM	Moonset: 6:35 AM	Weather Report: Mostly sunny - High ~80°F, Low ~45°F	Water: 3 qt. + expect some at Oasis							

Figure 6-9. Trip leg chart

be constructed manually, but it simply takes longer and lacks the advantage of the software basic math formulas, which facilitate calculations and changes. The columns in the chart provide a clear and understandable accounting of various trip leg parameters. As such, not all of them are necessary to arrive at a rational trip plan. The English system is commonly used and universally understood, but the metric system can work equally well. The columns are discussed below.

- Serially number each Trip Leg, with a short description to identify each. Identify any peaks, benchmarks, or geologic and manmade features.
- Give a General Geographic Direction for each trip leg. This can be useful in locating the trip leg on the topo or recreating the route on another topo. Examples are N, NNE, NE, ENE, E, etc.
- Identify the Trip Leg Distance in miles; one decimal place is usually adequate. The distance in miles is used as the D value in the Naismith formula. Do consider trail nonlinearity, such as multiple switchbacks.
- The Cum. Distance at each trip leg provides a cumulative tracking of the trip progress.
- The Elevation in feet identifies the altitude at each trip leg start and finish.
- The Trip Elevation Gain in feet for each trip leg is used as the H value in the Naismith formula. It is also helpful to track the Trip Elevation Loss along the route. Even though elevation loss along the route is not used in the Naismith calculations, it provides more understanding of the route. Since the gain and loss amounts are independently estimated, the two totals may not be quite equal.
- The Average Slope in degrees estimates the average slope of each trip leg as a general measure of overall difficulty.
- Naismith Time in minutes gives the result of using the formula $T = D/3 + H/2000$. D is distance in miles, and H is elevation gain in feet.
- The Squiggle Factor is an estimated terrain difficulty factor, which can be used to account for all types of terrain impediments encountered. It is added as a percentage increase over the basic Naismith time calculated. See the Squiggle Factor sidebar for description.
- The Adjusted Time in minutes is the Naismith Time with the Squiggle Factor percentage

time added. It represents a more realistic time to traverse a trip leg, considering the terrain encountered. Specific times are added for short breaks and lunch. The short breaks become naturally longer toward the end of the trip.

- The Cum. Trip Time in minutes at each trip leg provides a cumulative tracking of the trip progress. Periodic translation into hours provides a useful reference.

For planning reference, at the bottom of the chart are provided the sun and moon rise/set times and the weather report for the trip day. It is important to consider water availability and how much water to carry for the day. For the reference date of 27 March, there are 12 hours and 23 minutes between sunrise and sunset, which gives reasonable daylight for the 11.1 estimated hours of the trip. Without any mishaps (the 15% group size factor), the trip would finish about 4:00PM. It is interesting to note that the time adjusted for terrain difficulty is about twice the basic Naismith time estimate.

The trip plan should also consider some optional route segments where appropriate, depending on the terrain. Turn-back points should be identified in the event of an emergency or deteriorating weather that compromises the trip plan. With rain, the rocks become wet and slippery, and on slopes and in canyons it may become too dangerous to continue so that it may be necessary to bivouac overnight. The ten essentials, clothing, and any shelter equipment can then become essential for survival.

A good trip plan table can also be summarized on a route card for easy reference.

Trip Leg Elevation Profile

The trip plan elevation profile is best constructed using spreadsheet software such as Excel. With Excel, select menu "Chart-Chart Type-XY (Scatter)" and choose the curve desired. The various length Cum Distance values will be accurately plotted on the X-axis against the corresponding elevation values.

As always, the profile can easily be constructed manually, but it may take longer and not look as pretty, which is fine for the homework. It shows the major ups and downs along the way and can be useful in timing breaks and checking the time progress along the way.

Route Cards: A Useful Planning Option

In contrast to the LTP Trip Plan, which is tailored for the I-, M-, or E-level leader candidate, the Route Card approach allows for a less rigorous trip planning solution. The route card approach considers all the basic elements of trip planning, but arranges the relevant information in

a more informal manner. It also adds some key “handrails” reference information, which will help the leader stay on course at key points on the route. Often less focused on the technical aspects of trip planning, it can include some information on the geology, flora, and fauna along the route, as well as historical points of interest. Some trips are ideally suited to include ample time to “smell the flowers,” as distinct from the peak-bagging end of the spectrum. One can tailor a route card to individual needs and preferences, provided that it contains all necessary trip plan information.

A route card is a sequential listing of details that define a navigational scenario for a trip. It provides an organized trip plan, including provision for recovery from unanticipated events. Because leaders differ greatly in their styles, route cards can range from casual mental checklists to masterpieces of logistical planning. For trips over unfamiliar or cross-country terrain, the very process of preparing a written route card can provide an organized structure for planning and executing the trip. Part of the process is to extend the planning focus beyond the ideal route outline to considerations of situations and poor conditions that depart (for whatever reason) from the nominal envisioned at home. This foresight can be valuable to support safe operations by the leader under stressful conditions that might be encountered during the trip. In any case, the preparation of a route card is a good practice for trip leaders who intend to lead new routes or who wish to rejuvenate and add to their experiences about familiar routes.

From the logistics standpoint the preparation of a route card is a desirable end result of the trip planning process because it reflects essentially everything the leader has considered. After the trip, the entry onto the card of corrections or additional comments can provide a log as well as a guide for future trips.

Elements of a Route Card

The Route Card is the culmination of the trip planning process. It summarizes the organized navigational scenario, in sequence, and includes such things as

- Basic segments of the trip (these are at least partly defined by the points listed below);
- Transition points—such as trail junctions; branch points for gullies on ascent and ridges on descent; major gradient changes as with entry/exit of a significant gully; stream, ridge, power-line crossings—that can serve as easy location fixes are useful for the leader’s on-going dead-reckoning-based awareness of exactly where the party is on the map;
- Intermediate guidance objects to home in on or take direction from;
- Crux points that are not already identified

as transition points, e.g., key waypoints for conditions of bad visibility or unexpected events. Note that poor visibility for the party as a whole can often be anticipated, as with cross-country travel in heavily forested areas, so terminal locations and route bearings between them become entries in the route card. Crux points also include escape points that provide for recovery from unanticipated events like injuries or party separation that may require changes in the conduct of the trip;

- Points of interest (POI) along the way, such as overlooks and natural history objectives;
- Any other waypoints that might be useful to the leader to maintain situational awareness and assure reasonable congruence between the actual trip and the plan.

NAVIGATION CHECKOUT

Objective

The navigation checkout objective is to determine that the LTP candidate has the required knowledge and skill to navigate in the mountains or deserts and to do route planning and route finding at the particular level of the checkout (Basic I/M or Advanced E). The ultimate objective is safety, to ensure that a candidate who has successfully completed a checkout can lead a group in the field with sufficient navigation prowess for the level of outing undertaken. In all checkouts, candidates need to demonstrate their problem solving, decision-making, and judgment—the leadership skills—as well as their technical skills. Technical skills alone are not sufficient to pass.

Knowledge

The candidate is expected to know the material contained in this chapter at a level sufficient to pass a comprehensive written exam mailed prior to the checkout. Before the checkout event, the candidate will be asked to prepare a selected trip plan as homework and then to explain the reasoning for the choice of route, terrain analysis, and detailed time estimates to an examiner during the day of the checkout. Since not all Chapter 6 material is covered in the exam and field demonstrations (GPS is an example), the checklists below have been provided as guidance for checking off at the I/M and E levels. If an LTP candidate feels slighted in not passing, he/she is strongly encouraged to continue, gain experience, and then pass with confidence. Just barely passing may be demeaning to a candidate’s self-worth and reputation. Repeat practices and/or checkouts are strongly encouraged.

I/M Level Checkout

Field demonstrations (“noodles”) and written/oral exams may include

- Knowledge of topographic map symbols, colors, and marginal information (revision date, magnetic declination, grid vs. true north);
- Knowledge of the primary map grid systems used in the United States (Lat/Long and UTM);
- Identifying basic geographic features (hills, saddles, depressions, ridges, etc.) from their contours on the map;
- Orienting the map with true North-South using two techniques; demonstrating the ability to realign the map to N-S quickly during an en route stop;
- Locating prominent terrain features on the map and identifying them in the field (with and without using a compass);
- Locating visually prominent features in the field and identifying them on the map (with and without using a compass);
- Locating a complex visual skyline in the field and tracing it on the topo map;
- Demonstrating knowledge of the various types of compasses available, their principal elements, and their advantages/limitations;
- Demonstrating basic knowledge of magnetic declination and how to deal with it when using a compass to take bearings with respect to true north;
- Taking a bearing from one’s location to a distant object with sufficient and repeatable accuracy (e.g., 3 degrees or better) and knowing how one can improve it;
- Demonstrating use of the compass as a protractor to measure bearings on the map to an accuracy of one degree;
- Demonstrating the use of multiple bearings to identify one’s location on the map by triangulation, discussing how to select the best objects to use for such bearings, and the use of more than two or more bearings to improve positional accuracy;
- Demonstrating and/or explaining the use of the compass to take local bearings;
- Discussing the rule of the “V”s;
- Describing alternate approaches (no compass) for estimating true north in the field (e.g., sun, stars, glaciers, moss on trees, man-made objects);
- Describing different aspects of trip planning

and travel time estimation, including Naismith hiker and backpacker rules and use of squiggle factor; estimating the squiggle factor in the areas where the checkout is conducted;

- Using terrain recognition to identify one’s location on the topo map and to estimate the accuracy of the result based on the surrounding terrain, discussing how to use the compass to verify the result and which technique is likely to give the more accurate answer at one’s location;
- Demonstrating one’s ability to follow an instructor-specified route from point-to-point (the “nav noodle”), using the techniques above in a combination best suited to the area;
- Discussing techniques for dead reckoning in circumstances of poor visibility or where one cannot see the destination (e.g., finding a car parked along a road);
- Discussing the pros and cons of a GPS.

E-Level (Advanced) Navigation Checkout

The skill of the E-level candidate is expected to be advanced and comparable to that of an LTC navigation examiner. No ambiguity is recognized for competency at the E-level navigation checkout; marginal performance is not acceptable.

The E-level candidate is expected to know all material identified above regarding navigation principles and use of the map and compass and to be able to demonstrate this knowledge in the field. The E-level candidate, however, is expected to exhibit a higher degree of proficiency (for example, by taking more accurate and repeatable bearings to distant objects using a compass and by an ability to correlate finer terrain features with the topo map).

In addition, the E-level candidate must understand the theory and function of the barometric altimeter, including how the readings can be affected by macro- and micro-weather phenomena. The candidate must demonstrate use of altimeter, in synergy with map and compass, during field demonstrations on the day of the checkout. To that end, E-level checkouts are conducted in locations that have significant elevation changes to demonstrate use of the altimeter.

Finally, the E-level candidate must demonstrate a basic understanding of the GPS device. This basic understanding can be satisfied by attending one of the GPS courses offered by the Leadership Training Committee or some reputable commercial offering of at least four hours duration with some hands-on practice in the field. During the checkout, the candidate may be asked to use a GPS to demonstrate such knowledge.

SUGGESTED READING

Burns, Bob, and Mike Burns. *Wilderness Navigation: Finding Your Way Using Map, Compass, Altimeter, & GPS*. 2nd ed. Seattle: The Mountaineers, 2004.

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Letham, Lawrence. *GPS Made Easy: Using Global Positioning Systems in the Outdoors*. 5th ed. Seattle: The Mountaineers, 2008.

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7

Rock Climbing

This chapter outlines the skills, knowledge, and equipment required to lead groups competently on 3rd and 4th class rock. It describes the procedures, requirements, and standards for the LTP rock checkout. As the *Leader's Reference Book* is not intended to stand alone, it also provides references to rock climbing information, which is readily available in standard sources. Those sections relevant mainly to E candidates are prefaced with an (E).

SAFETY COMMITTEE REQUIREMENTS

The LTC trains and certifies leader candidates to general standards set by the Safety Committee, (i.e. a 3rd class rock outing requires an M-rated leader, 4th class an E-rated leader). An E leader may perform several protected moves such as might be encountered on a 5th class summit block, again presuming safety is not compromised. Conversely, an M leader should not normally plan rappels on steep terrain where most of the rappeller's body weight is borne by the rope. Recovery from an emergency in such a rappel is one of the technical requirements of the E checkout. Therefore, planned vertical rappels on backcountry outings are outside the scope of an M trip.

In order to comply with Safety Committee standards, the M and E checkouts are aimed toward the difficult end of the 3rd and 4th class spectrum. Technical multi-pitch 5th class climbing remains outside the scope of E outings.

SCOPE OF THE LTP ROCK CLIMBING PROGRAM

LTP candidates must not be beginners and are expected to gain at least some of the required skill on their own, on climbs or training sessions scheduled by other Angeles Chapter organizations, or at the many commercially provided classes and courses now available. The LTP, however, does offer training and practice associated with most workshops and checkout sessions. This chapter describes the checkout procedures in sufficient detail for candidates to measure their own readiness for a successful checkout.

The LTC has authorized certain persons to schedule and conduct LTP rock checkouts. These rock examiners are appointed by the LTC Rock Chair as the need arises and on the basis of their experience and skill with the concurrence of

the LTC Chair. No others are authorized to perform LTP checkouts, although other staff may be used in a support role. Only a few selected examiners are authorized to give E checkouts. All checkouts require an advance reservation with the E-rated rock examiner leading the outing. E checkouts must be approved by the LTC Rock Chair beforehand.

The preferred method of checkout is attendance at a scheduled event. The LTC sponsors several M-level and E-level checkouts per year, which are shown on the LTP Schedule (available at the LTP website <http://angeles.sierraclub.org/ltc>). The notes on the LTP activities calendar give more details on specific trips. The end of this chapter provides details on LTP checkouts.

Typical locations for rock practice and checkout climbs are Stoney Point (Chatsworth), Mt. Rubidoux (Riverside), Joshua Tree National Park, the San Gabriel Mountains, and the Sierra Nevada wilderness and nearby areas.

ROCK CLIMBING REFERENCES AND SOURCES OF LTP INFORMATION

Additional rock climbing information is included in the references in the Bibliography at the end of the book, as well as in this chapter. Candidates are held responsible for this type of information. In addition, they must possess a broad knowledge base, which should be obtained from participation in actual climbing trips.

ROCK LEADERSHIP

Leader's Responsibility

The leader's job is to provide direction and motivation, which safely allow all participants, including the leader, to enjoy their mountaineering experience. Individual goals, even on a rock trip, may include peak bagging, experiencing nature, exercising, socializing, or just leading people—a wide spectrum of possible interests. The leader should provide a boundary, a framework, in which all participants can most fully meet their own expectations with the maximum possible safety margin. The leader should maintain a balance between enthusiasm for climbing and the needs of the participants within the group.

M leaders must be able to climb at the highest standards of 3rd class rock with an ability to follow up to at least 5.2, and E leaders must be able to climb at the highest 4th class level with the ability to follow at 5th class rock up to a 5.6 rating. Because they must be able to do this under the most severe pressures of group responsibility and leader fatigue, the LTC requires leaders to have personal climbing skills

above the rating levels at which they expect to lead so that they have enough reserve to handle out-of-the ordinary situations.

Planning M and E Rock Trips

Rock trips pose a few special planning problems. The leader must determine whether the proposed climb is within the approved Safety Committee limits of 3rd or 4th class. The climb should also be within the leader's real limits and abilities. In addition, the leader must screen the participants carefully to ensure that they are qualified to make the climb. Restricted trips on rock—all E-level and all M-level trips on which a rope is expected to be used—require prior approval, and all participants must be Sierra Club members (see chapters 3 and 4 for more information and the Mountaineering Outing application in Appendix C).

Climbers soon discover that climb ratings are somewhat subjective. Class 3 is often defined as easy rock climbing requiring use of hands on most moves; a rope should be available for some climbers. Class 4 is defined as moderate climbing requiring a rope for safety; anchors may be needed. Some definitions state that a fall on 3rd class would probably not be fatal, whereas a fall on 4th class probably would be. Exposure is not factored into class 3 or 4 ratings, but a long, steep and exposed class 3 climb, such as Middle Palisade, can be a "no fall" zone where a fall could be lethal. Rather than relying solely on class ratings, leaders need to recognize safety factors based upon the terrain and the ability of their participants and adjust their risk management plan accordingly. In actuality, each climb is a unique problem, and the main value of ratings is an experientially gained knowledge of what the climbing community has in mind, in a general way, when it assigns a certain rating.

A leader should not automatically assume that having obtained an M rating, he or she is ready to lead any climb that someone has labeled as being class 3. A long 3rd class ridge at 14,000 ft on Mt. Russell in the Sierra is a totally different situation than a 3rd class move on Strawberry Peak in the San Gabriels. Initially, the M rating should be viewed as a license to practice leading. Skills will most likely be enhanced with practice.

Probably the best source of information for climbs commonly done by the Sierra Club is back issues of climbing section newsletters such as the Sierra Peaks Section *Echo*. The climbing sections of both the Angeles and Loma Prieta Chapters of the Sierra Club also post excellent online climbing archives at their web sites. Many experienced climbers have rather complete files and can supplement them with personal recollections. The Sierra Peaks Section and Desert Peaks Section peak lists contain fairly accurate

difficulty ratings for each peak when climbed by the easiest route.

Guidebooks also provide a fundamental source of information. Especially outside of California, they often can use a variety of systems to rate climbing difficulty, systems which then need to be translated into our familiar Yosemite Decimal System. Perhaps the most complete discussion of rating systems is that given in *Mountaineering: The Freedom of the Hills*.

Guidebooks are notorious for underrating climbing difficulty. Any description written prior to about 1960 is apt to be grossly understated by modern standards, perhaps

reflecting a feeling that anything that could be climbed in mountaineering boots could not be very hard. Remembering that mountaineers really did do some hard climbs before 1960 and that the rating systems have changed, look on such ratings with a skeptical eye,

Although a trip as planned may be moderate, any number of things can happen suddenly which can make a climb much harder, with a higher effective rating. For this reason LTP candidates must demonstrate climbing ability above the level they plan to lead. These factors include snow or rain, ice on the route, high wind, fog or whiteout, darkness, unforeseen difficulty, losing the route, climber

CLIMBING MATERIALS

All climbing must be done with dynamic climbing ropes that are UIAA approved. The use of static ropes, utility cord, and webbing in place of a dynamic climbing rope can produce fatal fall factors on even very short falls.

Prusiks are generally made of kernmantle type utility cord of 5 mm to 6 mm diameter. The cord must be very flexible; some brands are not and may not conform to and thus not lock on the climbing rope. Because Gemini cord is too stiff and Spectra has a very low melting point, they should not be used for prusiks. Other friction knots such as Klemheists can be made from tubular webbing. Experimenting with the performance of sizes and brands under safe conditions is highly recommended.

For slings, 1 inch tubular nylon webbing is recommended. Ends of all nylon rope, cord, and webbing should be hot cut or melted after cutting to prevent unraveling. Commercially sewn slings, available in various lengths, eliminate the presence of the knot, which weakens the sling. Some common lengths are listed here that fit average-sized climbers. Lengths here and elsewhere in the LRB refer to "as cut" lengths.

Slings, 1-inch nylon webbing:

5 ft, 3 in	Single short anchor sling
9 ft	Double long anchor sling
10 ft	Parisian Baudrier
30 ft	Anchor building

Prusiks, kernmantle cord:

3 ft, 5-6 mm	Self-belay
5 ft, 5-6 mm	Self-belay
8 ft, 5-6 mm	Foot loop
20 ft, 7 mm	Cordelette

Commercial climbing harnesses are light and inexpensive and are preferred over swamis with or without a seat sling and over bowlines on a coil for both safety and comfort. Have at least two locking carabiners and various regular carabiners, a belay/rappel device, ample runners, and prusiks.

The leader must require helmets on class 3 rock whenever a rope is used as well as higher-level rock and anytime on climbs that are known to have rockfall hazard. Some leaders may wish to require helmets on class 3 rock even when a rope will not be used; this is a wise safety practice.

Instruction on the use and tying of runners can be found in *Mountaineering: The Freedom of the Hills*. Commercial sewn runners are also discussed.

Make prusik loops (or other friction knots) from 3 to 5 feet of 5 to 6 mm utility cord, using a double fisherman's knot.

(E) A suggestion for a starter rack is to use a set of stoppers, hexes, and some spring-loaded camming devices (SLCDs) particularly for the medium to larger sizes. *Mountaineering: The Freedom of the Hills* discusses the use of chocks and types of equipment racks.

“freak out,” climber fall or injury, climber inexperience, and climber fatigue.

Trip Write-ups

For safety's sake and for the enjoyment of qualified participants, the leader is required to set certain minimum standards for a 3rd or 4th class rock trip. The trip offering should be as explicit as possible in describing the technical difficulty of the rock climbing and should define the minimum participant qualifications. Further, the participants should be asked to substantiate their qualifications in writing. All questionable responses require follow-up by the leader. Experienced leaders know that it requires a lot of work to screen potential participant lists, but the extra work is rewarded in the field.

Prior to the trip, participants should be sent accurate information on the planned rock climbing activities. This can serve as one more final self-check on the part of the participants to determine whether they are truly ready for the trip. The leader should indicate the required rock equipment; a suggested list will be found in the sidebar on page 107.

Leadership on the Trip

A well-planned trip is already off to the right start. Before leaving the roadhead, the leader should make sure everyone has the required equipment and distribute any group climbing equipment equitably. Use spare moments

during the trip to become better acquainted with each participant's personal climbing history. Later, when the group is on the rock, the leader will want to determine who can be counted on for responsible roles, such as scouting and belaying, and who is apt to need special encouragement or help. Belaying is especially critical and cannot be delegated to unqualified persons. The leader must exercise control over and provide appropriate limits for overconfident and disruptive people. The leader may need to abort a trip and should not hesitate to do so.

In general, the leader should not be tied down to a routine task. The leader's job is to make sure the outing all comes together, and on a rock trip that takes a lot of overall supervision. Likewise, the leader's physical position may not necessarily always be at the head of the group, either going up or down. For example, if the group has one outstandingly weak member, the leader may temporarily have to spend some time coaching and encouraging that person; this is one task that is not always easy to delegate.

Injury and rescue are beyond the scope of this chapter, but emphasis on safety can reduce the likelihood of injury.

Safety on Rock

Participants expect and deserve an adequate margin of safety on climbs sponsored by the Sierra Club. Risk containment is perhaps the leader's most serious responsibility, requiring pre-trip planning, active trip leadership, mountaineering expertise, and mature judgment. For added safety all participants on class 3 and higher terrain

FALL FACTOR

When a leader fall is caught, the climber, belayer, rope, protection, and anchor system are all subjected to a violent jolt. Fall forces are potentially dangerous, yet they can be reduced significantly by managing the fall factor.

The severity of the fall force actually depends on two things. One element is the length of the drop, which is usually twice the distance the climber ascended above the last point of protection. The climber can minimize the drop by placing protection frequently or before a risky move.

The second factor is the length of the rope running between the climber and the belayer. Modern climbing rope is designed to absorb shock force by stretching. The climber's distance from the belayer determines the shock-absorbing capacity: a long run of rope can stretch a great deal and absorb a lot of energy, but a short run of rope can absorb relatively little.

A hypothetical example demonstrates how these two elements work together. A climber leaves a ledge and ascends 10 feet over an exposed face before falling with only 10 feet of rope paid out. The fall factor is 20 feet of fall divided by 10 feet of rope, which yields a severe 2.0. Theoretically, 2.0 is the largest fall factor a climbing team can experience. If the same climber places protection and falls from just 5 feet above the last placement the fall factor is 10 divided by 10, or 1.0. If the second scenario occurs farther up the pitch, from 5 feet above protection but with 50 feet of rope paid out, the fall factor is 10 divided by 50, which yields a relatively mild fall factor of 0.2.

when a rope is used or in an area where a significant rockfall hazard is present are required to wear climbing helmets. Some leaders may wish to require helmets on class 3 rock even when a rope will not be used.

How do people get hurt on rock? *Accidents in North American Mountaineering*, published yearly by the American Alpine Club, gives insight. By far, the majority of accidents occurred on rock terrain, with the initial cause being mostly due to a fall or slip on rock. Much smaller percentages were due to falling objects, rappel and anchor failure and equipment failure in that order. Contributory causes summarized in *Accidents in North American Mountaineering* include climbing unroped, exceeding abilities, inadequate equipment, climbing alone, bad weather, darkness, party separated, exposure and/or exhaustion, faulty rope, no helmet, failure to test holds, placed no protection, improper tie-in to the rope, waist harness failure, rappelling off the end of the rope, and miscellaneous, including such bizarre incidents as asphyxiation by rope after a fall, drug overdose, and tripping on equipment and falling. Each issue of *Accidents in North American Mountaineering* includes a description and analysis of accidents that occurred during the year, ranging from one paragraph to several pages. Reading these accident reports may be the best way of learning about risk reduction short of serving in a mountain rescue organization. They are highly recommended.

A leader has at least some control and responsibility over almost every category of contributory cause listed in *Accidents in North American Mountaineering*. Indeed, in hindsight the majority of accidents covered could have been prevented or minimized by effective risk management by the leader. For example, darkness and exhaustion are most often results of inadequate planning or participant screening. Active leadership could even uncover inadequate personal gear such as a decrepit climbing harness.

Rockfall is a very common hazard, but one which is often controllable through group discipline. On high angle slopes, the leader can switchback so that climbers are never above one another. Where chutes are unavoidable, the leader can send one, two, or three climbers at a time in closely-bunched groups. The leader can keep the area below a rappel clear of other climbers. No matter the difficulty of the climb, helmets should be made mandatory on climbs where rockfall potential exists and are now required by the Sierra Club on all climbs of class 3 and higher when a rope is used. Again, the key to effective risk management is active leadership.

All safety precautions must be weighed against the time required to implement them. In some cases, such as when there are conflicting hazards such as rockfall and lightning, the leader must carefully weigh alternatives such as choosing lowering with a Münter hitch belay over rappelling.

ROCK TECHNIQUES AND EQUIPMENT

Climbing

Learning to rock climb is largely experiential but can be enhanced through study. Many excellent climbing books and videos illustrate the do's and don't's of climbing, and rock gyms and classes are available to climbers today. Leader candidates can use them to review the various moves and skills which must be demonstrated during the LTP rock checkout, such as friction climbing, liebacks, edging, counter-force, stemming, and jams. For most climbers, good jamming technique in cracks does not come naturally but must be learned and practiced. Crack climbing includes finger cracks, hand and fist cracks, off width cracks, and chimneys, all of which should be practiced.

For leaders, however, good climbing technique is only one of the required leadership skills. They must also have the skill to recognize participant weakness and take corrective action before safety margins are reduced. This recognition involves monitoring of individual performance to detect fatigue, fear, overconfidence, or lack of required skill, then taking appropriate action.

Inexperienced climbers sometimes over-estimate the quality of rock. On most peaks, the rock is often only a whisper away from becoming debris. In such cases it is appropriate to shelve advanced climbing techniques and remember the old adage about always having three points of contact with the rock. Climbers should test all potential handholds by pulling or striking them with the base of the palm before committing weight to them. Water and gravel often trap the unwary, especially when climbers are descending smooth slabs. Here the leader can encourage extra caution with words or the belay rope and remind participants throughout the trip to "climb with your eyes," to evaluate holds before moving.

Belaying

The cornerstone of modern roped climbing is the belay, consisting of rope, anchor, belayer, and climber. Belays must be used on all 4th and 5th class climbs. When should one belay on 3rd class climbs? Abilities differ, as do attitude and strength; if anyone on a climb wants to rope up, he or she should be belayed with no argument. Weather is a major factor, as wind can make balance poor, cold loosens the grip, and rain or snow can make holds treacherous. A long climb, poor coordination, illness, or nervousness can make a climber who was strong and sure an hour earlier suddenly very shaky; a leader should watch for these signs and rope up.

When screening participants, a leader should be aware that those whose experience is limited to roped practice climbs frequently feel uncomfortable on low difficulty rock when it is combined with mountain exposure.

Mechanical devices such as ATCs used with harnesses are most commonly used to belay climbers on 3rd, 4th and higher class terrain. The ability, however, to establish a belay without equipment using techniques such as the hip belay remains a necessary skill in case of emergencies or lost equipment. The leader must be familiar and knowledgeable with the various models of belay devices and harnesses that may be encountered on their outings, as well as belay, rappel, and anchor techniques that do not require equipment.

Although a bowline on a coil is adequate for easy 3rd class climbs, participants should normally be required to have a harness if a significant amount of roped climbing is anticipated during an outing. If a climber is injured and must hang for a prolonged period of time, a harness provides for greater safety. The harness economizes on the climbing rope and offers the potential of saving time with large groups. The climbing rope should be tied to the harness using a figure eight follow-through; that is the required method in the LTP. Experienced trip leaders sometimes ask their participants to clip in to the climbing rope using a locking carabiner. A locking carabiner connected to the harness and to a figure-eight knot in the rope may be acceptable for an occasional belay in mountaineering, especially when a large group is involved and the climbing required is less than a rope length or uses a fixed line. The locking carabiner method of attaching the climber to the rope, nevertheless, is usually not used to avoid the risk of an unnecessary link in the belay chain.

Traditionally, the climbing signals are “On belay? Belay on. Climbing. Climb. Off belay? Belay off.” A variation can be used when a leader has anchored in at the top of a pitch and pulls in the rope until the second yells “That’s me” to indicate that there is no more rope instead of “On belay?” When ready, the leader will then say, “Belay on” without further prompting from the second. The remainder of the signals stay the same. As a reminder, the belay is not established until the leader says “Belay on.”

Good anchors are the cornerstones of belayed climbing. Without them the safety of the rope is merely an illusion. Two good anchors should always be sought. A useful acronym to remember when building an anchor is SRENE. Anchors must be *solid*, *redundant*, and *equalized*, and have *no extension*.

On most 3rd class climbing, one solid anchor plus a bombproof seat is acceptable. On select occasions, an experienced leader may be able to belay safely with only a body anchor, but this places great responsibility on the leader’s judgment. The whole point of belaying in the first

place is to insure against mistakes and unknowns, and everyone is fallible.

With only a body anchor, the leader forfeits the comfort of relaxing or shifting during a lengthy belay, and it makes a fallen climber tie-off impossible. These considerations generally mean that all 3rd class belays should be anchored, except for an occasional upper belay on a short, easy, but exposed slope where the climber can be lowered back easily to a secure position. A body anchor should not be used where there is a chance of a dynamic fall such as when traversing or rappelling.

Natural anchors include large boulders, rock protrusions, and live trees at least two inches in diameter. The fastest, easiest, and safest anchor is usually a runner over a solid horn or around a sturdy tree. Runners or the climbing rope itself can be placed around the anchor. Runners are often better for rope economy and the increased friction and stability of 1 inch webbing; they also protect the rope from abrasions, tree sap, and cuts. Also the use of a cordelette can provide a great connection to natural as well as artificial anchors.

Anchors must hold regardless of where or in which direction the belayed climber might fall. More than one belayer has been injured because of a side pull or because of too much slack between the anchor and belayer, which allowed a falling climber to pull the belayer off position.

Where a fixed rope is used, climbers should attach their harness with both a locking carabiner and a friction knot attached to separate short slings. Anchor points should preferably be placed at rest positions so that the climber may safely move the tie-in around the anchor point.

A fallen climber may be tied off a number of ways. The leader must be able to handle a tie-off with available equipment. Leaders should always look for safe, quick, and bombproof anchors on which a climber tie-off can be accomplished with a minimum of difficulty and contortions. The leader also should be familiar with belaying with a Mnter hitch or a belay device connected either to the harness or directly to the anchor.

(E) When anchoring with chocks or nuts, the leader must distinguish between the terms “strength” and “security.” Strength refers to the ability of a chock to withstand loads, provided it stays in place; security, on the other hand, refers to the ability of a chock to stay in place. No one would use a tiny wired chock for a belay anchor because it would not have the required strength. Even large wired chocks, however, sometimes do not make good belay anchors, especially where the anchor must stay in place over a long period of time or there is a lot of activity at the belay station. Side forces on the stiff wire tend to rotate or dislodge such wired chocks. Artificial protection always should be connected to the rope with an intermediate

sling or runner and carabiner to prevent the protection from dislodging as a result of rope drag. Advanced anchor techniques also include the use of opposition to increase the security of a single chock placement and the use of a cordelette to construct an equalized anchor composed of multiple chocks.

Rappelling

LTP candidates are trained and tested on the dulfersitz rappel because of its traditional importance and because no special equipment is needed. Leaders should also be acquainted with the arm rappel.

Mechanical rappel devices are most commonly used by climbers, and leaders should be familiar with their use. Tuber devices like the ATC are now very common. Leaders should also be able to rappel with a Münter hitch. Leaders should be familiar with using the various belay/rappel devices and also be sure that the participants are using them correctly.

Rappelling is a hazardous affair, and mistakes are often lethal. To minimize risk, leaders should become familiar with the objective hazards of rappelling and be able to tell at a glance if participants are using suitable gear and suitable technique. The leader not only needs to know how to dulfersitz but also needs to recognize the correct setup on someone else. In the dulfersitz, the rappeller should lead downward with the leg under which the rope runs to avoid losing the wrap. Also, keeping both hands on the rope allows one to maintain rope control.

Friction knot self-belay, such as the Auto Block, can offer some safety but have shortcomings. Inexperienced persons frequently allow the friction knot to become jammed, sometimes out of their reach. At the other extreme, a falling climber may inadvertently cling to the friction knot so that it fails to jam when needed. Tests and accidents, particularly with cavers, have shown that a partially jammed friction knot can melt through after two or three feet of slippage. Finally, a climber cannot hang for long if a swami belt or a bowline on a coil is being used, so a reprieve from a fall on a steep slope is short lived.

Although the LTP teaches and tests for the friction knot self-belay, leaders should be aware of the drawbacks and risks. In situations where rock fall is not a hazard and a rappel device is used, pulling on the lower end of the rope can control or stop the descent (known as an army-belay or firefighter's belay)

Rappel anchors need to be bombproof. Use two or even three anchors to be sure. Too much is at stake to depend on old rotten slings that someone else has left behind or to be too cost conscious to leave behind a backup chock.

To safeguard against overrunning the rappel, two knots, one in each strand, are used, allowing the two strands

to untwist individually and facilitating retrieval.

M candidates are required to rappel down a near vertical slope which has an easy transition at the lip. E candidates are required to rappel over a sharp transition onto a vertical wall where all of their weight is borne by the rappel rope.

Prusiking

Prusiking is useful for a rappeller who must reverse the descent for some reason; a second climber following a hard pitch; a leader recovering from a fall on an overhanging wall; and rescue work, particularly in crevasses. Proficiency must be demonstrated during the E checkout.

(E) With practice and prusiks or other friction knots properly sized to the climber, prusiking can be relatively efficient. Otherwise, it can be a slow, strenuous process. Climbers should carry prusiks on all climbs on which a rope will be used. They can be used on rock as well as on all climbs with crevasse hazards.

(E) A prusik or other friction knot may be rigged and used a number of ways. In most rock climbing situations where special equipment has not been brought, two normal prusiks are used. One is attached to the climbing rope with a prusik knot and to the harness at the waist with a locking carabiner. The second or foot prusik is attached also with a prusik knot to the climbing rope below the first. The second prusik can be extended with a runner for a foot or feet to stand on, which can be made more secure with a girth hitch to fit the foot or feet. The foot prusik should be backed up by a runner to a locking carabiner on the waist harness in case the waist prusik fails. While it is preferred that a normal prusik (or other friction knot) be used for the feet, applicants may use a Texas prusik with two leg loops. A third prusik should be carried to assist the climber to get back over the start of the rappel where the rope goes over a lip.

(E) Chest harnesses are typically used when the climber has a heavy pack or is traveling on a glacier. While the waist harness takes the body weight, the chest harness prevents the climber from inverting.

(E) Using a tree limb or garage rafter, one may adjust the rig using trial and error. Standing on the foot prusik, one raises the waist prusik, sits on the waist prusik, and slides up the foot prusik. The waist prusik should not be so long that it is out of reach, and the foot prusik should not be so close to the waist prusik that it can be slid up only a few inches at a time.

(E) If problems are encountered prusiking over a lip, a third prusik may be attached to the rope as high as possible above the lip, perhaps by working a carabiner under the loaded climbing rope to allow insertion of the prusik. A runner then can be attached to the third prusik and stood on if necessary.

FORCE MULTIPLICATION

Belays and rappels are often rigged with multiple anchors to provide a safety margin by dividing the load among two or more anchor points. Proper construction is critical because incorrect rigging can produce the opposite effect and expose each anchor to forces many times greater than intended. Forces are multiplied by the geometry of the system and by the methods used to connect the parts. These two factors must be understood in order to avoid overloading the entire system.

Multiplication by Angle—If one anchor could be placed above another, perfectly in line with the direction of the load and identically tensioned, each anchor would support 50% of the force. This arrangement is rarely possible, and as anchors spread farther to the left and right of each other, the force carried by each anchor increases. Figure 7-4 shows that the downward force on each anchor in a basic “V” arrangement is combined with a lateral force that pulls the anchors toward each other. The graph in Figure 7-5, which plots the force on each anchor, clearly shows that loads increase dramatically as the “V” angle widens.

Multiplication by Method—Force multiplication by angle is charted on the table in Figure 7-6, which also compares “V” construction with a triangular sling. The triangular sling, shown in Figure 7-7, links the two anchors directly to each other, increasing the lateral pull between them and nearly doubles the multiplication caused by the angle alone. Forces generated by the triangular sling can be extremely dangerous, yet there may be times when only one sling is available for the job. Tying the sling off to each anchor with clove hitches or other appropriate stop knots isolates the anchors and makes the entire system behave like a “V” (see Figure 7-7). If the sling running between the two anchor points is slack and the stop knots are secure, the anchor system will only be subjected to force multiplication by the angle, as seen in the “V” arrangement.

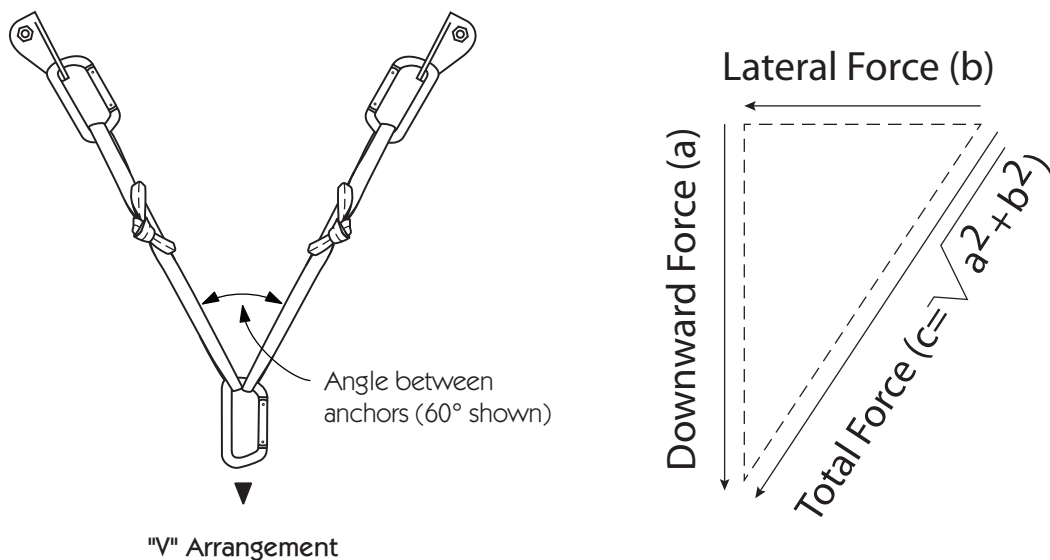


Figure 7-4. Force multiplication on each anchor. The vector lines demonstrate that the total force (c) is always larger than the downward force (a), and increases as the angle between the anchors increases. (All anchors are shown as bolts for convenience.)

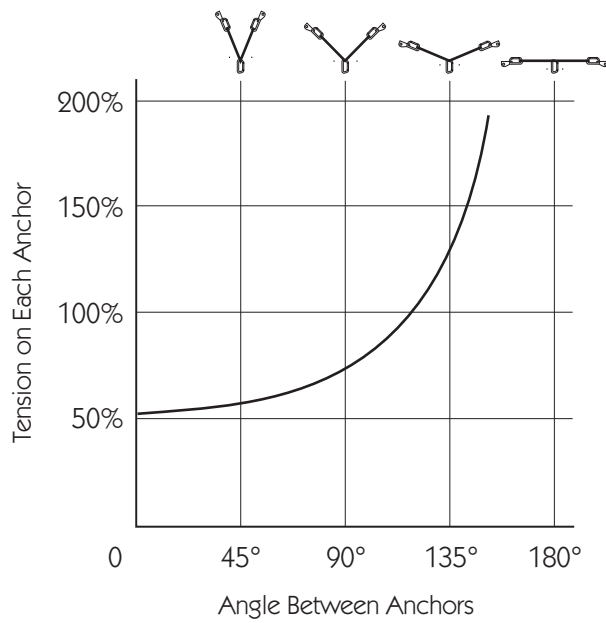


Figure 7-5. The angle-dependant force on each anchor in a "V" arrangement.

Angle Between Anchors	Force on Each Anchor "V"	Force on Each Anchor Triangle
0°	50%	70%
60°	60%	100%
90°	71%	130%
120°	100%	190%
140°	150%	290%
150°	190%	380%
160°	290%	570%
170°	580%	1100%

Figure 7-6. The force on each anchor increases as the angle at the bottom of the connecting sling increases.

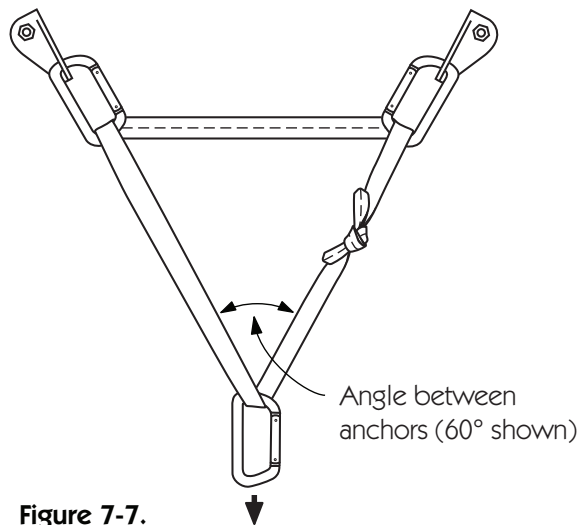
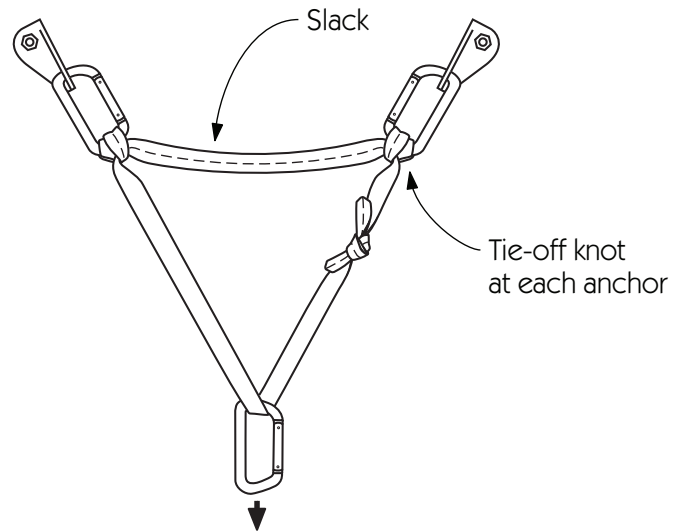


Figure 7-7.

DANGEROUS!
Do Not Use This Triangle Arrangement
 See text on page 112.



A triangle sling with the anchors tied off behaves like the "V."

(E) Before trusting one's weight to the prusiks to climb up the rope, the climber must tie off to the rappel rope as a backup in case something should go wrong. Never trust one's life to one prusik! The tieoff loop must be placed so that a fall would be caught by the rope before the climber would hit the ground. This is known as tying in short. Additional loops may be tied as the climber ascends the rope to minimize the potential dynamic fall distance.

(E) The prusiking procedure is probably the most difficult part of the E checkout and must be practiced until the climber can perform it smoothly and efficiently. When prusiking is called for, a rappel may have been aborted or a climber may be injured so that time and proficiency could be critical.

ROCK CHECKOUT

General Information

The M- and E-level rock checkouts are designed to evaluate a candidate's technical readiness to lead M- and E-level provisional rock outings. The checkouts include more than the minimum requirements necessary for the successful completion of a rock outing. Situations can change rapidly in the mountains and can dramatically alter the course of action needed to complete the objective safely. The objective itself, typically a peak ascent, may change from a seemingly benign scramble to an urgent self-rescue on difficult terrain in deteriorating conditions. Rock leaders must be prepared to address the higher technical demands of unplanned events as they escalate.

The checkouts are not meant to be a simple checklist of tasks that are checked off as they are completed. The evaluator will be looking for demonstrations of leadership, as well as the confidence that comes from a thorough knowledge of the material. The best way to learn what is required in a checkout is to attend one or more LTP rock practices where the exercises will be explained and demonstrated by examiners and practiced by participants.

Climbing helmets and harnesses are required of all participants at all LTP rock practices and checkouts. LTP provides climbing ropes and gear for participants' use at practices, but checkout candidates must use their own rope and gear. It is unrealistic to assume that a candidate has the knowledge and experience necessary to be an effective rock leader without ever owning his or her own rope and gear. LTP does not provide a list of gear or materials necessary to complete the checkouts; however, all of the materials needed for a checkout will be demonstrated at LTP rock practices. Putting together your own rack of gear for the checkout, or

preparing the right gear for a provisional outing is a vital part of the leadership learning process.

The latest LTP calendar lists scheduled workshop and checkout dates. All M checkouts are by advance reservation with the scheduled trip leader.

Other than some basic exposure to rock climbing, no specific rock experience requirements are prerequisite to attending a rock workshop. The M checkout typically requires at least three or four days of formal teaching sessions and some outside experience in climbing in addition to participation on several M-level trips involving rock climbing. E candidates are expected to be experienced mountaineers. All participants must be current Sierra Club members, and no beginners may participate.

The normal and preferred method of checkout is for the candidate to attend a scheduled LTP checkout session. At each scheduled checkout, the Rock Chair endeavors to schedule enough examiners to perform the reserved checkouts. Other experienced personnel are often used as assistants. Checkouts begin the first thing without practice beforehand during that session.

(E) All E checkouts are by advance reservation with the LTC Rock Chair, not the trip leader. Candidates must send their qualifications and are expected to have mastered the checkout exercises before the checkout. Candidates should plan to devote the entire day to the rock checkout.

Candidates are tested for skill, judgment, leadership, and knowledge, with emphasis on skills demonstration. Examiners will, however, weigh heavily judgment, knowledge, and leadership factors. Submitting a detailed resume of the candidate's rock and mountain experience is to his or her advantage for the checkout.

The assessment of judgment is a subjective process. A candidate may satisfy all other checkout requirements but be subjectively perceived as needing additional experience and the judgment that develops with it. All doubt will be resolved in favor of the many outing participants, who may rely on the candidate for their safety.

Candidates must demonstrate knowledge of basic and technical rock-climbing details (for M and E respectively) contained in the references listed in the Bibliography, plus relevant material from this chapter.

If the candidate is successful, the examiner will forward the signed-off checkout form to the Rock Chair, who will in turn forward the candidate's name to the LTC Administrative Chair. No action is required by the candidate.

The candidate must complete all checkout procedures at a single checkout. Failing this, the candidate must repeat all procedures at a future checkout. As soon as candidates demonstrate that they are unable to complete correctly any checkout procedure, they will be told that the procedure has been failed, that the checkout may be attempted again on a

future date, and that the rest of the day may be spent in rock practice specifically designed to help develop the necessary skills. The trip leader will endeavor to assign assistants for this purpose if available, but the first priority is given to the checkout.

Candidates are expected to be ready for the checkout procedures. Formal checkouts require a considerable amount of volunteer time from the limited list of certified rock examiners, and candidates are requested not to use formal checkouts as de facto practice climbs.

The LTC Rock Chair has the final approval of an LTC rock checkout but welcomes correspondence relating to the effectiveness of the rock checkouts.

The following paragraphs describe the requirements and standards for M and E-level checkouts. This material plus the checkout forms themselves should give the candidates enough insight to evaluate their readiness for the checkout or to identify areas which require more practice.

M- and E-Rock Requirements and Standards

Candidates are required to wear a climbing helmet and climbing harness during the checkout. Candidates must use their own ropes and gear for the checkout. Examiners must insure that whenever candidates and participants are climbing, rappelling, or being lowered from a belay, they are secured with a backup belay.

Knots

A rock candidate will need to know about eighteen climbing-related knots. Many more knots are used in rock climbing, but these are some of the most commonly used. Candidates will not only need to demonstrate how to tie each knot, but they will be asked to explain their primary use in rock climbing.

Climbing and Downclimbing

Many of the checkout exercises involve rock climbing. Candidates will be evaluated throughout the checkout on their climbing ability as well as their comfort level on the rock. M- and E-level Sierra peaks typically require just as much downclimbing as climbing up. For some less experienced outing participants, downclimbing can be daunting and unnerving. Rock leaders will need to be able to guide participants of varying ability over difficult terrain by identifying unsteady participants and giving them the confidence they need to get down safely and quickly. This may involve demonstrating how to downclimb a difficult section, identifying where the good hand and foot holds are, and providing a comforting spot and assuring encouragement from below.

Top-Roped Climbing

The top-roped climbing exercise will evaluate a candidate's climbing ability on the more vertical terrain of 4th and low 5th Class rock. The candidate will demonstrate how to belay a climber with a belay device, and how to catch a falling climber with the device. The candidate will also instruct a climber in the proper belay technique, safety checks, and climbing commands.

Instruction, teaching a participant a technical component, is an often-overlooked leadership quality. Even experienced outing participants can have memory lapses under duress. Fear and uncertainty often adversely affect concentration. Participants may have trouble remembering how to tie a particular knot; they may fumble with belay or rappel set ups; they may lose confidence in their climbing ability. Taking the time to teach them effectively through these incidents, rather than just doing something for them, is time well spent in context with the outing as a whole.

Unanchored Belay

The checkouts are structured so that the belays, anchors, and rappelling progress from using the least amount of gear to more complex scenarios requiring more gear. Rock leaders need to know when a quick sitting hip belay is sufficient and when situations demand more secure anchors. Saving time by using just the right amount of gear can be a safety factor in getting the group back to camp quickly, but real safety should never be compromised by time constraints.

Throughout the checkouts there will be repeated flaking, uncoiling, throwing, and coiling the climbing rope, done in the context of a climbing scenario. Rope management is an important time saving factor in the mountains. Time spent untying a rope mess is time wasted. Candidates must demonstrate proficient rope handling during each exercise.

Considerations for a secure sitting hip belay include a secure position where the belayer can be braced with one or both feet, a stable area where rocks and debris will not be released on climbers below, and an area sufficient to manage all of the participants comfortably and safely.

During all of the belaying and rappelling exercises, the candidate must verify safety checks, utilize proper climbing commands, and demonstrate good rope handling and group management.

Anchors

Proficiency at anchor building comes first from knowledge—learning how to build anchors and learning how to find them in the mountains—and second, from lots of practice.

A multipoint anchor is one that utilizes more than one

anchor point. A natural anchor is any suitable object found in nature, such as a large tree or a large rock. An equalized anchor is one that ties two or more anchor points together in such a way that the down force from a falling climber is equal on each anchor (which also achieves redundancy). A master point is the equalized knotted loop where the climber ties in to the anchor. A redundant master point has more than one loop so that if one fails, the other will back it up—it can be easily achieved with a BHK knot.

Anchored Belay

Anchored belays are required when the terrain or exposure is such that the belayer might be at risk of being pulled off when belaying a falling climber. This is a judgment call that the rock leader must make based upon knowledge and experience; when in doubt, build an anchored belay. Another important reason to use an anchored belay is that there is a possibility that the belayer will need to tie off the belayed climber and escape from the anchor. This may be required if a climber falls and is injured and cannot continue; the leader (belayer) must then secure the climber to the anchor and effect a rescue.

An anchor is simply a way to tie the belayer and the climber securely to the earth. An anchor can be a large tree, a large rock, a piece of climbing protection securely placed, or a combination of all three tied together at a master point.

A redundant anchor is more than one anchor tied together at a master point. It could consist of a rope tied around a tree and a runner looped around a rock; when tied together at a master point, one of the anchors may fail under a heavy load from a falling climber, but the other anchor will hold.

The master point is where the redundant anchors are tied together, where the belayer secures himself to the anchor (clove hitch), and where the belay is attached (Münter hitch). Redundancy at the master point is achieved by tying a BHK knot instead of a simple overhand knot.

Redundant anchors may not always be necessary on an outing. Just as the leader must make a judgment call about whether to use a sitting hip belay or an anchored belay, he or she must also decide if the anchored belay requires redundancy. This decision must also be made from a knowledge and experience base; when in doubt, build a redundant anchor. For the purpose of the checkout, all anchors must be redundant.

Tying off a fallen climber with a Münter-mule knot can be one of the most challenging hitch-knot configurations to learn, but once learned, it is one of the easiest to remember. The Münter hitch has become the standard in the rock climbing community for belaying a climber up from below to an anchor. The belay can be tied off securely, allowing the belayer to leave the anchor, and the belayer can easily

undo the tie-off and re-establish the belay, without ever compromising the climber's safety.

(E) Before establishing a redundant anchored belay, E-level candidates must be belayed while leading a class 4 pitch up to a suitable belay site. A class 4 pitch requires protection placements to insure the leader's safety in the event of a fall. Protection placements may be natural anchors such as slings around a secure rock formation or tree and/or any number of nuts, chocks, or camming devices placed in cracks or pockets in the rock. E-level candidates will be evaluated on the effectiveness of their protection placements by their choice of location as well as the correctness and security of each piece. Use of extensions is important to keep the rope running as straight as possible to reduce rope drag.

Rappelling

In the mountains, rappels are usually not belayed. For the purpose of the checkouts, however, all rappels must be belayed. The belay is a safety precaution that is easily achieved in the context of the checkout environment. Typically, the examiner will belay the candidate during rappels.

On an outing with several participants, belaying rappellers is unnecessary and can use up twice as much time. If the leader or a climber is unsure of the climber's ability to complete a rappel safely, the leader should lower the climber from the anchor with a Münter hitch.

Rappelling is arguably the most dangerous thing climbers will do in the mountains. During rappels, climbers must surrender their hold on the rock and put their trust solely in the equipment they use and their ability to use it. When climbers have their hands and feet on the rock, climbing or downclimbing, roped or unroped, they are able to make choices, sometimes taking calculated risks, other times retreating to safer, more comfortable ground. During a rappel, the choices a climber can make are severely limited. If something goes wrong during a rappel, such as anchor failure, a climber is at the mercy of gravity.

The most dangerous part of a rappel is at the anchor when the climber must insert the rope into the rappel device. It takes two hands to do this, which leaves the climber vulnerable because the feet are the only two points of contact on the rock. This precarious situation is compounded by the fact that rappels are usually set up because of steep or unstable terrain that is deemed unsafe to downclimb. Climbers can minimize their risk at this time by first securing themselves to the anchor with a personal anchor tether.

Commercially made personal anchor tethers are available with different names and configurations, but one can easily be made with a double length sling girth hitched to the harness with a locking carabiner to clip in to the anchor master point. When the rappeller clips into the anchor, he

or she will have hands free to set up the rappel device safely. When the climber is ready to rappel, with the break hand securely on the rope, he or she unclips the carabiner from the anchor.

The Dulfersitz rappel is a very old, minimalist, but effective rappel technique that does not utilize a harness or a rappel device. It can save a lot of time but should only be used on short, relatively low angle rappels. For the purposes of the checkout, a harness and personal anchor tether must be used, as well as a backup belay.

An Auto Block is a safety system used during rappels that backs up the break hand and locks onto the rope, halting descent if a rappeller loses control of the break hand.

The Münter hitch is a versatile configuration that is most commonly used for belaying but can also be used to rappel if a climber loses his or her belay/rappel device.

(E) E-level candidates must not only rappel over an overhang, but they must also ascend the rope over the overhang with friction hitch prusiks. Prusiking is a term used to describe a way of ascending a climbing rope with two or more friction hitches attached to the rope and the climber's harness. Prusiking can be done with a prusik hitch or a klemheist hitch. Rock leaders should be familiar with both hitches. A hitch, unlike a knot, is releasable and moveable, allowing a climber to ascend a rope by weighting a waist prusik, thus unweighting the foot prusik to allow the foot prusik to be moved up the rope. Then, the climber stands up on the foot prusik, unweighting the waist prusik so that it can then be moved up the rope. This process is repeated until the climber reaches safety at the top. Near the

top, if the rope is weighted tight against the rock the prusiks may not slide up the rope; it may be necessary to attach a third prusik above the overhang to unweight the rope.

Fixed Lines (E)

(E) E-level candidates must set up a horizontal fixed line for a traverse. A fixed line is a climbing rope that is anchored at both ends of the traverse or ascent. There must also be several interim protection placements (or anchors) at various points along the rope. Leaders must demonstrate and instruct a climber on how to travel along the rope with a self-belay. A self-belay on a fixed line traverse may be achieved by attaching a personal anchor tether to the rope with a locking carabiner. Passing the anchor points may be achieved by clipping the tether through the anchor carabiner, or by using an additional tether on the rope; a lead tether is clipped ahead of the anchor point before the trailing one is removed and reattached. The climber must never be unattached to the rope until the end of the traverse or ascent.

(E) E-level candidates must also set up a fixed line for an ascent. Leaders must demonstrate and instruct a climber on how to travel along the rope with a friction hitch self-belay. Unlike a traverse, a fixed line ascent may have the potential for a lengthy fall. A tethered carabiner self-belay would not stop such a fall. A friction hitch, such as a prusik or klemheist attached to the rope and clipped to the harness with a locking carabiner, must be used on vertical or ascending fixed lines, or whenever there is the potential for an unrecoverable fall.

SUGGESTED READING

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8

Snow Climbing

Chapter 8 discusses some aspects of snow climbing with information drawn principally from the references listed in the Bibliography, especially *Mountaineering: The Freedom of the Hills*. This chapter is not a substitute for the information in the references; therefore leaders are urged to study the references and become familiar with them.

Snow climbing leaders need to understand that there are many variations in techniques. This particularly can apply to simplified methods sometimes taught by guide services to clients so as not to overwhelm the novice with many techniques or ways to react. The novice climber in this situation may come away with a rather distorted view of proper technique in some situations, thinking that what has been taught is the “best” and not realizing that compromises were made.

Notably, leaders should consider that just because something is described in print does not mean it is without potential hazard. Leaders are likely to encounter various opinions about attaching, grasping, and using the ice axe for climbing and glissading. Climbers will invariably argue that their own preferences are the safest. Each practice may offer benefits and potential risks. Leaders should understand these issues thoroughly, gain practical experience using the various options, and make sure methods employed by trip participants are used correctly.

This chapter represents a compilation of “standard of care” techniques for most climbing situations encountered by the M- or E-rated leader. Those sections relevant to E candidates are prefaced with an (E).

M AND E SNOW CLIMBING

“Snow climbing” and “ice climbing” are sometimes discussed separately, but the line of separation is somewhat arbitrary since snow is really ice mixed with air and can be found in various conditions ranging from fluffy new powder to hardened snow pack barely penetrable with the axe. Several terms may be helpful in understanding the terminology in the literature. Alpine ice (AI) is frozen precipitation (snow) that has undergone a metamorphosis under the influence of time, pressure, and temperature changes. Water ice (WI) has frozen directly from a liquid state, even though it may have originated from snow or alpine ice before it became liquid. Technical ice climbs may be rated with a prefix AI or WI followed by a number 1

through 8. For purposes of M and E snow climbing, which is done usually as part of climbing a peak in the Sierra Nevada, most climbs would be rated AI1 or less (unrated). The reference books discuss snow climbing with crampons in the chapters on ice climbing. As the term is used here, “snow climbing” includes travel over very hard snow where crampons may be used.

A distinct difference in snow climbing compared to rock climbing is the increased importance of judgment. A rock route typically will have a rating of class 3, class 4, or the various subdivisions of class 5. Given constant good weather conditions, this rating and the associated degree of difficulty will be virtually the same day after day. Snow climbs do not fit so nicely into these categories. For example, the lowest rating for a snow climb would be AI1, which would include slopes up to 50 degrees. Most climbs on Sierra peaks are not this steep. Also complicating the issue is that the same route will change from hour to hour during the day with fluctuations in temperature and weather. The leader must recognize that climbing conditions vary with hardness of snow as well as steepness of the slope. A 45 degree slope with soft snow may be much less difficult than a 30 degree slope with an icy surface and no run out. A route climbed in the cold morning may be more—or less—difficult in the warm afternoon sunshine. Because of these variables, leader experience and judgment are especially important on snow slopes. The leader’s experience is more important than knowing the degree measure of the slope. As a result, it is best not to judge differences in M- and E-level snow slopes based only on slope steepness. Some guidelines, however, may be presented to distinguish between the two levels (M and E) for the purpose of training, checkouts, trip listing, participant screening, and chapter approval of trips. The actual climbing of snow or ice may be fairly straightforward, but judging the conditions can be difficult.

M Category (class 3)

M category snow climbing should really be synonymous with class 3 rock climbing. The kind of climbing envisioned as the core of the M level is that found in the High Sierra from late spring into summer on slopes that without snow cover would be class 1 or 2. M-level snowfields would generally be consolidated with negligible avalanche or crevasse hazard. M trips typically require skill with an ice axe and ability to use crampons in the flat foot technique. Rope use would be equivalent to that in 3rd class rock climbing, and rappelling may be done using the same techniques as in rock climbing. Belaying the lead climber during the ascent, as would occur in class 4 or exposed climbing, is for the most part beyond the M level.

E Category (class 4 or 5)

E category snow climbing should be synonymous with class 4 or class 5 rock climbing. This extends snow climbing conditions beyond the M level, in which use of a rope becomes necessary for most climbers and/or exposure becomes significant. The E level also includes glacier travel with crevasse hazard and bivouac survival risk; therefore crevasse rescue is a required skill. E trips may use simultaneous roped travel or fixed ropes for ascending, and belay of a leader who is above the belayer may occur.

Route Selection, Planning, and Survival

Selection of climbing route, terrain, weather, importance of speed, and alpine (pre-dawn) starts are important considerations for the leader. References in the bibliography discuss these variables and how each will affect the climb. The snow climbing leader should be knowledgeable of these variables and the hazards associated with them.

These hazards may contribute to a forced bivouac. Because a bivouac is a possibility, the leader must know what to do. This includes seeing that participants have proper clothing and equipment prior to starting the trip. A snow shovel may be a great help. Bivouac gear includes means for isolating the climber from the snow and gear that provides a windbreak and chill protection. A snow cave or other emergency shelter may need to be constructed.

Leading

The snow climbing leader must have the personal skill to climb under varied conditions. Much of the M or E snow checkout pertains to these skills. Snow climbing skill, however, is not sufficient; the leader must also have leadership ability and sound judgment. The leader observes trip participants, corrects improper techniques being used, gives encouragement, and stops any dangerous activities or moves. Requiring each individual to demonstrate the necessary skill before entering hazardous terrain may be warranted. When in doubt, the leader should modify the objective or route, turn people back, or cancel the trip.

TREKKING POLES

Use of trekking poles for hiking has become more common in recent years. They are effective tools for maintaining balance and can absorb some of the shock delivered to the knees during descents. They are not,

however, substitutes for an ice axe. When the snow is hard or the slope steepens, one must ask if an arrest can be accomplished with trekking poles. If the answer is no, put the poles away and get out the axe.

When traversing slopes with trekking poles, some participants forget to adjust the length of their poles or choke up on a pole. This means that the uphill hand is held high. Because this position can be quite fatiguing over time, a good rule of thumb is to hold the poles in a way that keeps the hands below the level of the heart.

Holding the uphill pole perpendicular to the slope, rather than vertically, improves balance on a traverse because the pole keeps the climber from falling inward on the slope. When a climber falls inward, the feet tend to lose traction and slip outward. Grasping the pole along the shaft (choking up) and holding it perpendicular to the slope or more horizontal helps maintain balance and tends to engage the pole in the snow if the climber slips.

ICE AXE

General

Climbers have differing views on using and holding the ice axe. Most issues have several sides. Proper resolution or compromise depends upon snow conditions, slope, individual skill, climbing experience, exposure, and personal preference. The LTC avoids rigid prescriptions but offers some summary observations and urges leaders to try the various techniques and use those appropriate to the circumstances. Leaders should be able to observe participants who utilize a number of techniques and know the strengths and limitations of each technique. The leader also should know the ice axe parts and variations in styles and design.

Length

A long axe is hard to handle, particularly on steep slopes, and is awkward to carry on a pack. On the other hand, a short axe is a less secure self-belay device for an anchor when using the shaft. It is hard to use in the cross-body position and is a poor cane for all around use, especially when going downhill facing forward. For M and E snow climbing in the Sierra Nevada, an axe long enough to reach from the palm of the hand to about the ankle is a good compromise.

Tether and Leash

A climber should never drop the axe. On even moderate slopes, a dropped axe may be a lost axe with serious

consequences. The LTC requires some form of attachment to the axe. This is not simply an “idiot” attachment to prevent losing the tool, but a very useful piece of gear. A leash connects the axe to the wrist. A tether connects the axe to the waist or other fixed body part, typically a sling around the upper body or a harness. A leader should know the advantages and disadvantages of each technique since participants may prefer one to the other. Always use anchor-worthy materials for attaching the ice axe.

A wrist leash is typically long enough so that the axe can be carried in either hand with the leash attached to only one wrist. This allows the climber to move the axe from hand to hand on switchbacks without removing the leash. Step chopping or technical climbing may call for a leash that is long enough to support the hand and prevent dropping the axe. Support is provided by passing the leash around the shaft of the axe, making a hitch near the spike, and attaching the loose end to the wrist.

Some climbers use an axe with a short leash attached to a glide ring that slides up and down the shaft. Glide rings tend to interfere with rope handling during boot axe belays. A short leash that is wrapped around the head of the axe keeps the axe head firmly in the climber’s grasp, even if the grip is lost during a fall. A short leash, however, must be changed from wrist to wrist when the climber changes direction on switchbacks, temporarily breaking the climber’s safety attachment to the ice axe. This constant switching causes delay in the climb as the climber pauses to shift the leash from hand to hand with gloves.

Leashes can be used for belays, provided the leash webbing is anchor-worthy and proper knots are tied. Long leashes can be attached directly to the climber, while short leashes require separate slings to give the necessary length. A long wrist-type leash is often used with the wrist loop carabiner-clipped to a separate sling that runs around the climber’s body.

A tether is tied to the axe head at one end and attached to the climber’s body at the other. The tether should be long enough to permit unrestricted use of the axe in any grasp, but not so long as to be a trip hazard. A tether allows the climber to move the axe from hand to hand. A tether, however, can interfere with clothing changes, pack straps, and the climbing rope. Regaining control of a tethered ice axe can be difficult if the climber lets go during a fall.

Sharpness of Edges

For typical snow climbing in the Sierra, the edges of the axe may be somewhat dull and still be quite functional. Obviously, the more ice-like the surface, the sharper the edges must be to be useful. In LTP arrest practice sessions,

the use of protectors on the adze is mandatory.

Grasp

How should one grasp the axe? The answer depends on many factors, including the climber's preference. The reference books have figures showing various techniques.

Much hiking and climbing is done with the axe in the cane position. The self-belay grasp has the palm of the hand over the adze. This is a good grasp on the axe because the pick is pointed away from the body. The self-belay grasp allows firm placement of the axe for self-belay, particularly on long sustained snow climbs where the hand can tire. If a climber slips, a self-belay is the first line of defense. If the self-belay fails, the climber must switch over to the self-arrest grasp in order to arrest. The preferred grasp should be practiced until self-belays and self-arrests are accomplished reliably and immediately under stressful, real-world conditions.

SNOW CLIMBING

Step Kicking, Ascending, and Descending

Kicking steps is an integral part of a snow climb. Changes due to snow conditions happen as weather changes and the sun warms the snow. The leader is constantly evaluating the snow and the team as the climb proceeds. On descent, the leader must be competent in use of the plunge step, self-belay while heel kicking, and step kicking when facing into the slope using the axe in stake position or low dagger position.

Step Cutting

The leader must be able to cut steps with reasonable facility. Occasionally in making a snow climb, a small patch of ice or hard snow may be encountered. The party may not have crampons, or it may be quicker to chop steps rather than to put on and take off crampons. Sometimes a snow slope is topped by a short pitch of a steeper slope or small cornice. The leader may need to chop comfortable steps up the short pitch for the party.

Self-Belay

A self-belay is an ice axe planted with the shaft in the snow, which is used for support and to which the climber clings if a slip occurs. The first line of defense regarding a slip is not to fall at all. This means that during the climb the climber pays attention continuously to balance and

planting the feet and the axe firmly. If a slip occurs, the climber should immediately use the self-belay with the properly planted axe.

Self-Arrest

Self-arrest is a learned technique that should be mastered in all its possible modes of occurrence. This includes holding the axe in the right or left hand. The arrest should be practiced from a fall resulting in slides with head first, with feet first, on one's back, on one's belly, with and without pack, and with different grasps of the axe when the slide begins. One must also know how to arrest without the axe. Normally, one should strive to achieve an arrest quickly before picking up much speed in the fall.

Self-Arrest with the Ice Axe in Soft Snow

If a fall occurs in soft snow on moderate slopes and the self-belay gives way or is not used for some reason, an arrest must be initiated. The pick of the axe alone may not arrest a slide in soft snow. In soft snow it is desirable to use the part of the ice axe with the most surface area to engage the snow, namely the shaft. The general idea is to end up in a sitting position facing down the slope as in a sitting glissade.

The hand on the spike end of the shaft presses the shaft of the axe into the snow, while the hips and body push against the shaft to engage the broad side. The upper hand grasps the axe head in the preferred grasp with the pick pointing away from the body, and the heels of the feet dig in.

This arrest technique has several advantages. First, the widest part of the axe shaft is contacting the snow. Second, the climber is facing down the slope, seeing what is happening and where he or she is going rather than facing directly into the snow. Finally, the heels of the feet can dig into the snow very effectively due to the strength of the leg muscles.

Self-Arrest with the Ice Axe in Hard Snow

Self-arrest while wearing crampons is done by lifting the feet up so that the crampons do not touch the snow. When practicing a hard snow arrest, one should not wear crampons and must have a safe runout. A technique for hard snow arrest while wearing crampons is to be on one's side with the knees slightly bent, looking down the slope for upcoming obstacles with feet up off the snow. The pick of the axe is engaged into the hard snow; the shaft is held by the other hand up off the snow surface, forcing the pick into the hard snow. The advantage to this technique is that the

climber now sees where he or she is going.

Self-arrest from a fall on hard snow or when the climber is wearing crampons is well described in *Mountaineering: The Freedom of the Hills*. All techniques should be practiced in the various starting positions until they become second nature.

Glissading

Glissading is a fast and enjoyable way to descend, but control must be maintained. Visibility of a safe descent to the bottom of the slope is essential. Three postures are used: standing, crouching, and sitting. The standing glissade is the hardest to learn. The crouching glissade keeps the climber dry but is tiring to the legs. The sitting glissade is easy but wet.

In the sitting glissade, the ice axe may be held in the self-belay or self-arrest grasp. The other hand engages the shaft into the snow. If the self-belay grasp is used, the pick points away from the climber's body, and the fingers of the hand grasping the head of the axe wrap nicely around the adze. This position protects the climber from the points of the adze and is a very natural position. If the snow consistency or slope suddenly changes, however, a self-arrest may be necessary, and the grasp must be switched over to the self-arrest grasp to perform the arrest.

Using the self-arrest grasp during the glissade allows the climber to arrest immediately without changing the grasp. Using this grasp during a sitting glissade, however, creates an awkward hand position and requires considerable attention to keeping the pick pointed safely away from the body. The choice of grasp is up to each climber. Leaders must know the ramifications of each grasp and make sure participants know how to glissade and arrest correctly.

CRAMPONING

Usage

When the steepness of the slope and hardness of the snow do not permit secure footing by kicking steps, steps can be cut or crampons can be used. Step cutting for extended periods is very slow and requires a great deal of energy. Unless only a few steps need to be cut or crampons must be put on and taken off repeatedly, crampons are generally safer and faster than step cutting. At the other extreme, the snow can be so soft that it balls up under crampons, making cramponing slower than climbing without crampons and increasing the chance of a fall.

Flat Footing

The flat foot (or French technique) uses ice axe placement and direction changes that are similar to those for step kicking, with the exception that the feet are flat on the snow so that all crampon points are utilized. Flat footing requires bending the ankles. As the slope becomes steeper, the toes point more downhill. On moderate slopes, the axe is used in the cane position. As the slope steepens, other techniques with the axe should be used, such as the stake position or cross-body position.

Descending while wearing crampons is done with a variety of foot and ice axe techniques that match the conditions. For easy slopes one simply walks down using the ice axe in the cane position. On steeper slopes, a diagonal path using the cane or cross-body position may be better. Other ice axe techniques for descent include the support and banister positions. The leader should be aware of additional techniques shown in the reference books and their accompanying advantages and disadvantages.

Front Pointing

(E) On very steep hard snow, front pointing (or German technique) may be the preferred technique. The ice axe can be used in the low dagger position, high dagger position, traction position, or anchor position. Front pointing may be useful for one or two steps in changing direction in a normal flat-footed zigzag ascent. A useful compromise between flat footing and front pointing is the three o'clock (or American) technique, in which one foot is in a front point position while the other is in a flat footed placement. The feet can be switched as needed and should be changed frequently before extensive fatigue occurs.

Mixed Climbing

Frequently, a snow climb will require some scrambling over rock while wearing crampons. Although this dulls the crampons, the dulling usually is not significant for most snow climbs done in the Sierra. With modern alloy steel, the points should not bend or break. This is not true for aluminum crampons. Because putting on and taking off crampons is very time consuming, keeping crampons on over short distances on rock is a significant time-saving practice.

ROPED TRAVEL

Simultaneous Roped Travel

(E) Ascending or descending snow slopes simultaneously while roped is faster than climbing by a succession of belays, but it has the hazard of the domino effect of “one fall, all fall.” If a climber falls, he or she should yell “falling,” and the other climbers should go into an arrest position. Simultaneous roped travel is used primarily on glaciers with crevasses; however, it can be useful in aiding a tired, weak, injured, or inexperienced climber. Unanchored rope travel on snow slopes other than glaciers is discouraged except when there is sound reason for roping and traveling together. Another alternative is for the leader to fix the rope as he or she moves up or down the pitch. The rope can be fixed with anchors in the snow, such as pickets, and fixed at each end. The members of the team then clip onto the rope with a friction knot or ascending device and move along the rope. The trailing climber then cleans the gear as he or she follows. This technique requires carrying some extra gear, and climbers should be reminded not to step on the rope with crampons.

Glacier Travel

(E) For glacier travel the entire team must pay attention to rope management. All climbers should use a proper body harness. Each climber should carry friction knots or ascenders attached in a ready position on the rope. Depending on the climber’s position on the rope team, methods of attaching to the rope vary. The E leader needs to know the different set-ups in tying a leader, middle person, or trailing climber into the rope.

BELAYS AND ANCHORS

Belayed climbing can be done when the climbing slope dictates, a climber is nervous, or the consequences of falling are serious. A variety of belay positions and anchors can be used, each with advantages and disadvantages. The appropriate anchor to use and its security are highly dependent on the particular snow conditions, the equipment available, the skill of the team, and the expected load the anchor might need to handle. Most snow anchors compared to those used on rock are relatively weak, but generally so are the forces generated by a fall. For snow it is best to use

two or more independent anchors whenever possible and reasonable. To keep shock loads to a minimum, dynamic belays are preferred. Slack in the rope system is another critical factor that can increase the shock load to an anchor or a climber trying to hold an arrest. For this reason, slack should be kept to a minimum for most roped travel.

Anchored Sitting Hip Belay

(E) The anchored sitting hip belay is a secure belay and fairly easy to do for most leaders. Its disadvantages include the time necessary for preparation, cold conditions of sitting in the snow, and difficulty in exiting the belay hook-up if a belayed climber needs help.

Boot Axe Belay

The boot axe belay technique is quick. It has several variations: the “C” or the “S” technique, depending on how the rope is wrapped around the boot. The “C” and the “S” variations differ significantly in the rope handling, but not much in the actual anchor performance since the weakness in this belay is not the rope friction across the axe and the boot, but the tendency of the axe to come out of the snow. This means that placement and control of the axe during the belay or holding a fall are critical.

Standing Carabiner-Ice Axe Belay

The standing carabiner-ice axe belay has easy rope handling, uses the dynamic addition of the belayer’s body, and is more secure than the boot axe belay. It takes slightly longer to set up than the boot axe belay, and a carabiner and sling are required. If the climber uses a properly tied leash on his or her axe, it can immediately become the sling, and all that is needed is the carabiner. Both the boot axe and standing carabiner belays require sinking the length of the ice axe shaft, which may not always be possible.

Planted Ice Axe

A planted ice axe can be used with the leash or tether for a quick self-belay. When ice axes are planted vertically in the snow for use as anchors, however, they tend to pop out under load, so the axe must be held firmly in place by hand or some other means. The anchor’s strength is also dependent on the snow conditions.

Bollard

A bollard can be an excellent anchor with the advantage that no extra equipment is needed, although padding may be useful to keep the rope from slicing off the bollard or freezing in place. It usually takes a long time to set up. The strength of a bollard varies greatly, depending on the hardness of the snow, especially the underlying layers where the rope engages the snow. If a bollard is used as an anchor for a rappel, a separate sling should be used, not the climbing rope because it could freeze in place.

Buried Ice Axe

An ice axe buried horizontally with a tie into the middle of the shaft and the pick down can be a very secure anchor, depending on snow conditions. It is another type of deadman anchor.

Snow Pickets and Flukes

(E) Pickets and flukes are good anchors but require carrying the extra gear. Snow flukes are difficult to place and have few advantages over pickets and therefore are seldom used. Pickets are versatile and can also be buried as deadman anchors.

Crevasse Rescue

(E) The first action following a crevasse fall is to keep others from falling in. If roped, the other climbers immediately go into self-arrest. It must then be determined whether the fallen climber can climb out on his or her own or must be rescued. Anchors are placed, and rope team members have specific roles to assist the fallen climber or set up a rope system for hauling. If the fallen climber is unable to help, he or she must be hauled out using a system of pulleys. Leaders should know the single pulley, “Z” pulley, and the “CZ” pulley techniques. Because these techniques may be quite complicated and time-consuming to use in a real situation, practice is mandatory to maintain a level of proficiency with these techniques. Redundant anchors with belays and in-crevasse assistance to the victim should be used if equipment and personnel are available.

AVALANCHES

Snow climbing leaders must be able to identify avalanche hazards. These include local conditions,

topography, weather, snow accumulation, recent snow activity, and a host of other issues. A leader should study the references and be thoroughly familiar with the various conditions that can change a safe slope to an unsafe one.

SNOW CHECKOUT

For the purposes of snow checkouts, snow consistency is identified as soft or hard, the difference being that on hard snow secure boot steps cannot be easily stomped into the snow and step cutting or crampons may be required for safe travel.

Snow slopes are identified as low, moderate, and high angle. On low-angle slopes that do not require the use of an ice axe to arrest a slide, one may use trekking poles to aid balance and ease travel. On high-angle slopes or hard snow it may be difficult or impossible to arrest a slide with an ice axe. E-level exercises on high-angle slopes should be performed with a rope belay. Climbing helmets must be worn when using the ice axe and when arrests are practiced.

Snow checkouts, like any Sierra Club activity, should be performed with safety as the foremost consideration. The snow checkout location is selected carefully with safety in mind. Any self-arrest slope must have a safe runout in case a candidate cannot arrest the slide. An experienced climber should test the runout first by glissading to the bottom. If any danger is detected, another location should be chosen. Arrests shall be performed and evaluated in conditions where sufficient momentum can be achieved to require the use of an axe to arrest a slide. The ice axe pick must always be pointed away from the body. The adze of the axe during practice or a checkout should be covered with a thick layer of duct tape or some other suitable material to prevent possible injury.

Leadership

The LTP candidate is required to have leadership ability and judgment sufficient to lead a party safely with reasonable speed. The candidate is expected to have read and be familiar with the material in the reference books. The candidate may be confronted with situations to sort out during the checkout. The snow examiner will evaluate all pertinent aspects of the candidate’s knowledge, skill, judgment, and leadership ability. Also evaluated are basic skills with ropes, knots, belaying, rope handling, and rappelling, as well as the speed and expertise with which all of the above are accomplished.

E-Level Requirements

The E-level leader is expected to be more skillful, knowledgeable, and experienced with snow climbing than the M-level leader. In particular, this applies to arrests, rope handling, anchors, bivouacs, avalanche, and general overall judgment on situations. The E checkout will include situation responses. The checkout examiner will give each E candidate a variety of situations that require the candidate

to come up with feasible solutions. In most cases these will be created by the checkout leader in a realistic way so that the situations will be self-evident. The candidate is then expected to use available resources and people to solve the problem(s) presented. The element of time is stressed, and, of course, there may be more than one solution to a particular problem. The checkout leaders grade and observe candidates for accuracy, speed of response, technical competence, decisiveness, and awareness of other factors which may be present (rock fall, weather, and party condition).

SUGGESTED READING

Eng, Ronald C., ed. *Mountaineering: The Freedom of the Hills*, 8th ed. Seattle: The Mountaineers, 2010.

Lowe, Jeff. *Ice World: Techniques and Experiences of Modern Ice Climbing*. Seattle: The Mountaineers, 1996.

Moynier, John. *Avalanche Aware: Safe Travel in Avalanche Terrain*, 2nd ed. Helena, MT: Falcon, 2006.

Westwide Network: Avalanche forecasts and safety information. Website: <http://www.avalanche.org>

9

Additional Outings Notes

Most of the material in the preceding chapters is applicable to general outing situations, but emphasis in chapters six through eight has intentionally been placed on hiking and mountaineering. This section includes some leadership information and guidelines for conducting bus trips, ski tours, bicycling tours, and sailing outings.

BUS TRIPS

Bus trips have certain recognized advantages over carpools in terms of expense, comfort, convenience, and smaller carbon footprint. Besides the net savings of gasoline, participants avoid the effort of driving. On a bus, the entire group can get acquainted quickly, and plans can be made and coordinated with participants. But getting a group of thirty-five to forty people together and managing them do have their own unique aspects which must be handled. Bus trip leaders will doubtless develop their own methods, but experience shows that good planning, organization, and cooperation from the participants are essential to a successful trip.

Types of Trips

Almost any type of outing can be run as a bus trip. Some successful examples include cross-country or downhill ski trips, bicycle trips, sightseeing tours, camping trips, day hiking, nature study trips, and even backpacking trips.

Insurance

According to the California Vehicle Code, a bus is “any motor vehicle, other than a motortruck or truck tractor, designed for carrying more than ten persons including the driver, and used or maintained for transportation of passengers.” Therefore, minibuses and some vans are legally buses. Sierra Club insurance carriers require that ALL buses be chartered. Outings cannot use a rented, leased, or lease-chartered bus. The insurance carriers also require that the chartering company carry the Sierra Club on their liability insurance as an “additional insured.” The chapter has a list of the charter bus

companies that currently have a certificate of insurance naming the Sierra Club as added to their policy. Any of these companies may be used. A leader may call, e-mail, or request this list by mail from the person listed as handling bus insurance under the Outings Management Committee.

Trip Planning

Advance planning includes scouting the route and destination(s), if possible, and knowing road conditions; location of diesel fuel stops, rest areas, food stops, campgrounds and other accommodations; and telephone numbers of highway departments, local sheriff, and the highway patrol for assistance. When looking for campgrounds, a leader must ensure that they are accessible by bus. Roads into and within the campground should not be too steep or the curves too sharp, and any bridges must support the weight of the bus, usually twenty tons.

Time Scheduling

The leader should have a detailed schedule for each day, including driving times, length of and time for meals, departure, length of each activity, and arrival at lodging. Plan at least fifteen minutes just to load and unload forty people from the bus at each stop. Having made the plan a realistic one, the leader should try to stay with it; otherwise, the group may take advantage by prolonging the stops.

Bus Arrangements

When the trip is scheduled, the leader should also reserve a bus by calling several approved companies and describing the trip, including camping conditions and the possibility of dirt roads, snow, and the like. The leader should request a written quote including the cost, number of seats on the bus, dates and times, due dates for the deposit and balance, and firmness of the quote.

Driver

The bus driver can make or break a trip. The more primitive the outing, the more important it is to get a driver who enjoys or at least is willing to endure the anticipated outing conditions. If it is a camping trip, the leader may need to furnish the driver with necessary equipment, food, and supplies. If it is a snow trip, the leader should ensure that the driver has experience in snow and that the bus is equipped with snow chains. The leaders should try to establish a rapport with the driver and be aware of and look after his or her comfort.

Applicant Reservations

A “C” (conducted) trip does not require a rated leader, only someone to supervise bus activities. Other outings need a properly rated leader and an assistant for each activity group or subgroup within the outing. It is best also to list a reservationist in the trip announcement to handle reservations and the wait list. This person will keep the records of who is on the trip and what each has paid, answer phone calls about the trip, and assist in finding replacements for cancellations. The trip should have a clearly stated and well-publicized reservation and cancellation policy. Sometimes a leader leaves one or two seats open to carry refreshments for the drive. Some trips have a cook appointed to plan and supervise the preparation of meals en route or at the destination.

Cost

The most important rule is always to have a trip that supports its expenses. In planning, one should list all the expected expenses such as the bus, driver's tip, lodging (including the driver's room, if necessary), meals and food (including on-board refreshments), entrance fees, phone, and mailing expenses. Either by a refundable contingency fee or an understanding about possible increase due to higher bus, fuel, or lodging costs, a leader should be prepared to cover contingencies. To determine the price per participant, the total costs are divided by the number of paying participants. Then the price is adjusted so that the trip can still go if not all the seats are sold. Leaders sometimes add 10% for non-members. Is the trip competitive with similar trips? Unless the trip is advertised as a fund-raiser, any extra money should be refunded to the participants or spent on the participants, perhaps by paying for an extra meal or a party. On some bus trips, a cook plans, purchases, and prepares meals for the group (up to forty people). When this affects the cook's participation in daily trip activities, it is reasonable to reduce or even eliminate the fee the cook pays for the outing. In even rarer cases, the leaders may have such a burden of planning and administration that they too receive a reduction. In these cases, the paying participants should know that they are being charged extra to make up the difference.

Seat Selection

Seat selection is a matter that can be easily settled. At the final pick-up point, the bus should be emptied. The leaders are called first, and then the participants in the order that their reservations were received. They board the bus in this order and select their preferred seat for the

trip. Some leaders prepare a seating chart and send it to all participants prior to the trip. If the trip consists of many travel days, the passengers may be given the opportunity to rotate seats occasionally. The smoking policy should be firmly determined, announced, and enforced. If a toilet is available, participants should be advised to use it only in case of real need.

BACKCOUNTRY SKIING

Many possible types of backcountry ski trips exist, largely determined by the type of equipment used and the terrain covered. The leader's responsibility is to determine that all participants have suitable ski equipment and the skills necessary to use their gear in the conditions expected during the proposed outing.

Trip Ratings

Many of the ski trips run by the Sierra Club (many of which are bus trips) take place where there are set tracks in the snow. These trails are often marked by colored markers in the trees and usually have some terrain suitable for beginners. Because leading such trips is not much different from leading a hike on a trail, such tours are generally rated O. Leaders need mainly to watch out for the problems of fatigue caused by unfamiliarity with equipment (hence extra effort) and temperature problems. People on these trips may need a lot of help with equipment problems and advice about drinking enough water, eating enough food, and dressing properly. Participants should be encouraged to carry warm clothes, but to dress lightly, especially during periods of heavy exertion.

More difficult trips are led away from prepared trails. The group must break trail and often returns down moderately steep and untracked slopes. Such trips, generally rated I, are for more experienced skiers.

The most difficult trips are ski assaults of mountain peaks and ski traverses over high Sierra passes. These are rated T (technical) and often require ice axe and crampons, thus making them restricted mountaineering outings, in addition to skis and climbing skins. T ratings are not covered by the LTP.

Equipment

Due largely to changing ski technology, there has been much discussion about backcountry ski equipment. Generally speaking, Nordic gear (lightweight boots, bindings and non metal-edge skis) is the lightest, lowest in cost, and most flexible for use on gradual up and down terrain.

Narrow width Nordic skis are classified as light touring for in-track or trail touring, while general touring skis are wider for better stability and flotation in off-trail conditions. Primarily for off-trail use, backcountry skis are wider still and heavier. They may have full or partial length metal edges and greater sidecut for turning. Nordic skis are available in waxable and no-wax style bases. The traditional waxed skis require carrying a waxing kit and having knowledge of snow compositions and waxing techniques. No-wax skis are built with a pattern of fish scales underneath to allow climbing up moderate slopes without sliding backwards. No-wax skis are easier to use, especially for beginners and in changing snow conditions, but are generally slower than a well-prepared waxable ski.

Ski mountaineering is a choice between telemark (free heel) or alpine touring (AT or randonnée) gear for its durability and performance on downhill runs. At one time, weight, cost, and skiability were considerable differences in these two methods of backcountry travel. The differences have almost disappeared, except that heels are either free or locked down on the downhill ride. Plastic boots and wider skis provide both kinds of gear with equal control and skiability. Weight and cost factors are also very much the same. Free heel skiers enjoy the option of the telemark turn and continuous free heel versatility, while AT skiers appreciate releasable bindings and the added control of locked down heels. Climbing skins, made from fuzzy nylon or mohair, are attached to the ski bases for a secure uphill climb over variable snow conditions and are easily removed for the downhill run.

Skills

Backcountry ski leaders should possess the same skills required of a backpacking or climbing leader, such as group control, navigation, route finding, and first aid. In addition, they must be knowledgeable of winter survival skills, avalanche avoidance, and snow evaluation. Current weather information is more important during winter since weather changes can more sharply affect the group's safety and comfort.

Snow Conditions

Because some snow conditions are easier to ski than others, the skilled leader can find the good spots by "reading" the snow. One thing to look for is the slope's exposure to the sun. The north-facing slopes often have different conditions than south-facing slopes, and this may change as the sun advances during the day. Timing of a ski descent can make the difference between ice, ideal snow, breakable crust, or soft and mushy snow. Especially if open slopes are wind-blown,

the skiing may be better in the trees, or the tree route may be clogged with deep banks and low branches. The leader must think about the strength of the group when deciding when to start the tour and when to turn back. Will icy or difficult snow conditions endanger, delay, or exhaust the group?

Avalanches

Avalanche evaluation is a very involved science, but general guidelines are available so that dangerous times and

locations can be avoided. Information on expected terrain can be obtained from personal accounts, scouting the area, or consulting guide books and maps. Snow conditions and depths can be obtained from published reports and telephone calls to the Park Service, Forest Service, Highway Department, and private resorts. The Eastern Sierra Avalanche Bulletin web site is quite helpful: <http://csac.org/Bulletins/Calif/esierra.php> With this information, the trip leader can guide the group to the safest slopes best suited to their skill levels.

SKI MOUNTAINEERING QUALIFYING TEST

The Ski Mountaineering Qualifying Test is administered to determine the candidate's competence to engage in easy cross-country ski trips. Good form is desirable but is not insisted upon. Certification shall be by a qualified ski mountaineering leader.

Required Demonstrations

1. Good form and effective propulsion on the level with the proper use of the poles
2. Kick-turns to the right and left on the level
3. Side-step up a steep slope
4. Herringbone 50 feet up a 20-degree slope
5. Traverse up a slope of 100 feet, using a kick turn between traverses
6. Snowplow 50 feet on a 15-degree slope to standstill at a designated point from a direct descent
7. Four connected snowplow turns on hard snow
8. Straight running in a downhill position for not less than 100 yards on a 10-degree slope, either direct descent or diagonal, under complete control (time not to exceed 20 seconds on the course)
9. Side-slipping for 20 feet to the right and to the left over a hard-packed surface, on a 15- to 20-degree slope. Controlled side-slipping to be either down the fall line or diagonal on both sides
10. Four linked stem or telemark turns on a 10- to 15-degree slope, each through at least 120 degrees, executed slowly under complete control and separated by long traverses with skis parallel, upper ski leading
11. Ascent and descent of approximately 500 feet vertical elevation, with a pack as described below, to test reasonable climbing and downhill running ability. Proper right and left kick-turns must be demonstrated on the climb. Climbing aids are permitted. Proper use of the ski poles expected throughout the test. Time limits, depending upon snow conditions, will be fixed by the judges. Alternative: a cross-country tour of from three to four miles in length, during which the candidate must demonstrate to the accompanying judge his or her ability to cope with ordinary obstacles, to use poles properly to climb, to do kick-turns, and to run downhill for considerable distance with steadiness proportionate to Fourth Class proficiency. The number of falls must not be so great as to tire the candidate nor to slow up the tour. Climbing aids are permitted. The candidate must carry a pack of at least 10 pounds containing the requirements for an easy day's tour.

Alternative

This test may be passed in the course of a ski tour involving the ascent of at least 500 vertical feet with an average slope of 15 degrees or more. A skier who exhibits adequate climbing techniques and who skis down without delaying the party and without the need for excessive kick-turns and traverses shall be deemed to have passed the test. In marginal cases, the specific skills listed above should be checked.

Participant Selection

An essential job of a backcountry ski leader is to select participants who can ski well enough. Evaluation of the participant's skill level without previous observation can be difficult. People tend to overestimate their ability, but with a few questions, a good idea can be obtained. If they ski downhill, what specific ski areas or slopes do they ski? What type of ski gear do they own? Where have they skied in the backcountry and how often? If the outing involves a snow camp, what previous experience do they have? Have they skied with a pack before, and can they make downhill turns? Can they supply references of others with whom they have skied?

Further evaluation of participant skiing skills may be based on application of the Ski Mountaineering Qualifying Test (Sierra Club 4th Class Test), shown in the sidebar.

BICYCLE TOURS

A bicycle outing can vary from a social day ride to a multi-day tour covering hundreds of miles over a wide range of conditions. Outings can be on a bike path, city streets, or highways or can be mountain bike rides on trails or fire roads.

Planning

The leader should be familiar with the route planned, the road conditions, and the locations of emergency facilities, food stops, and repair facilities. After planning the route, the leader should provide a route sheet and map for each rider on the outing.

Equipment

All riders should have a tire patch kit or spare tube, a tool kit, and a tire pump. The leader must ensure that each rider knows the type of outing, the kind of bicycle and special gear, if any, that are required. Equipment should be in proper mechanical condition. The leader should be skilled in a variety of repairs but should avoid becoming a rolling repair stand for the unprepared. The ride leader must require the wearing of appropriate safety helmets on all rides.

Regroup Points

In order to keep together, the leader should establish and announce regroup points. At each regroup point, everyone waits for the followers to catch up, so that the

head count can be confirmed. At regrouping points, the leader tells riders where the next regrouping point will be. An assistant is always at the rear to take care of problems and help stragglers.

If an emergency arises at the rear, the assistant should send a strong rider forward to notify the leader. The leader should call a halt and investigate if the sweep takes too long to reach the regroup point or is conspicuously absent for a long period.

At the Finish

At the conclusion of the ride, the leaders must wait for the last riders to come in. If necessary, a sag wagon may go back along the route to pick up slow or disabled riders. This may be especially necessary if it becomes dark before they arrive.

Leaders of mountain bike trips should be sensitive to conditions of the trails and roads they ride and make certain that trip participants ride with consideration for the trail and for others using the trail.

Sierra Club Mountain Bicycle Policy

As adopted by the Sierra Club's Board of Directors in May 1985, the basic background and specific policy regarding mountain bicycles in wilderness and on other public lands are as follows.

Mountain Bicycles in Wilderness

Background: The 1964 Wilderness Act calls for exclusion of mechanized vehicles from wilderness. A bicycle, though non-motorized, gives a mechanical advantage (wheels and gears) and is therefore clearly covered by the exclusionary clause. In addition, in many states, bicycles are covered by vehicle codes, being required to travel in the same direction as other vehicles and having similar rights for occupancy of space. The Sierra Club strongly supports the exclusion of bicycles from all state and congressionally designated wilderness.

Policy: The Sierra Club reaffirms its support of the Wilderness Act's prohibition of "mechanized modes of transport," including non-motorized bicycles, from entry to designated wilderness.

Mountain Bicycle Use on Other Public Lands

Sierra Club policy on mountain bicycle use on other public lands recognizes that a quiet sightseeing or exercise experience on a bicycle is a legitimate use of certain public

lands. The Sierra Club expects the managers of public lands to assume the responsibility for analysis and designation of bicycle trails and will expect to participate in the public process preceding those decisions.

SAILING

Sailing is a complex team sport requiring coordination between the skipper and crew. Seafaring tradition has it that the skipper's word is law. In modern practice, a leader/skipper will seldom need to throw his or her weight around. Generally, the leader need do nothing more than keep a quiet eye on things while others sail the boat. They manage the boat, however, with the leader's permission, and the leader is still the one who has taken responsibility for the success and safety of the trip. With experience and good judgment comes a firm confidence, which people will instinctively follow.

Trip Ratings

Sailing trips are rated T (technical), except for conducted trips, rated C, in which professionals do the sailing. Each T sailing trip requires a leader and assistant. Each boat requires a skipper and a mate and possibly other skilled crew members.

Skills

The skipper of each boat must have the skills of a yachtsman, including navigation, piloting, small boat handling, sailing knowledge; an understanding of maritime law and the rules of the road; and knowledge of fire safety, etc. The skipper must be able to demonstrate the ability to use this knowledge, possibly in a tight spot. Skippers usually must pass a checkout conducted by the chartering organization.

APPENDIX A: MAPPING SYSTEMS AND UTM COORDINATES

Latitude and longitude have been used to locate positions on the earth for centuries. While most people learned about latitude and longitude in school, the Universal Transverse Mercator (UTM) coordinate system, which is an important feature on USGS topo maps, may be relatively unfamiliar. UTM references were indicated by tick marks in the margins of USGS topos prior to 1989. Maps printed since then are often overlaid with a grid of UTM reference lines, which are spaced in metric intervals. Learning the UTM system goes hand in hand with adapting to the metric system: both offer convenience and can be learned with a little effort.

Latitude and Longitude

Any point on the earth can be located by measuring two geographic coordinates, latitude and longitude, which are actually angles. Latitude is the angle between the point in question and the equator; longitude is the angle between the point and the prime meridian, which runs through Greenwich, England (see Figure A-1).

Latitude and longitude are measured in degrees, minutes, and seconds of arc either north or south of the equator and either east or west of Greenwich. Latitude parallels are always true east and west, and meridians of longitude are always true north and south. USGS topo maps use latitude parallels and meridians for their borders, and the slight distortion of the meridians, which converge at the poles, can be seen on a 7.5 minute map, where the upper border is slightly shorter than the bottom.

Universal Transverse Mercator (UTM)

UTM offers several benefits over latitude and longitude. The system is based on a square grid with linear dimensions rather than angular relationships; the basic unit is the meter rather than degrees, minutes, and seconds. This means that the distance between any two points is always described in terms of distance instead of angles. The UTM grid is printed in one-kilometer squares on many newer USGS topo maps, and coordinates describe the distance east, then north of certain reference points (see Figure A-2). All coordinates are positive numbers, and because they are metric, they use convenient decimal units rather than sixty seconds, sixty minutes, and 360° of arc.

The UTM system can be used without understanding the details of its creation, but knowing how the scheme works is important. Imagine slicing the earth like an orange into sixty equal wedges. Peel the skins away and lay them flat. These flattened skins are the basic representations of the earth's surface used in the UTM. Notice that imaginary lines running up the center of each section are the only straight north-south lines (meridians) on the map slices (see Figure A-3). Every other north-south line curves from the equator toward the poles. Likewise, the equator is the only true east-west line; all other east-west lines are slightly distorted when the orange peels are flattened.

A UTM rectangular grid, measuring one million meters wide by twenty million meters tall, is laid on top of each section. These dimensions are slightly larger than the slices of the earth, so the rectangle is positioned dead center over the orange peel slices with the straight meridian line at the rectangle's half way (500,000-meter) mark (see Figure A-4). The rectangle is divided into 1km squares. USGS topo maps indicate how far from true north the local

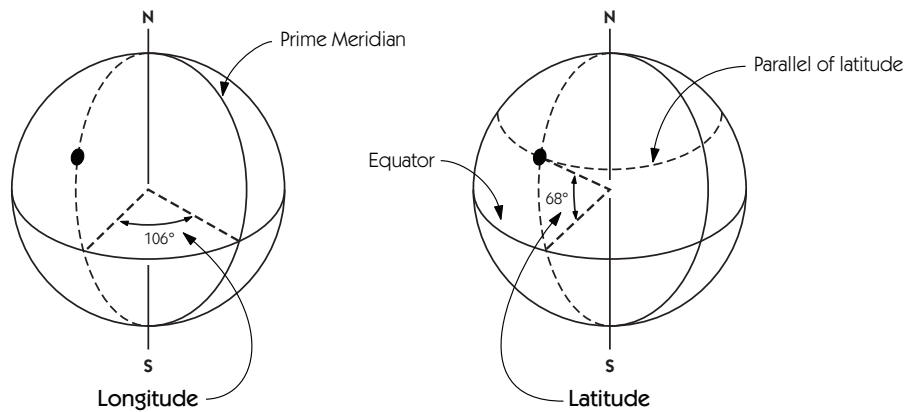


Figure A-1. Latitude and longitude are angles or arcs measured from the equator and the prime meridian.

grid lines run with the designation “GN” (grid north) in the magnetic declination legend on the lower margin.

Zones, Eastings and Northings, and Bands

The earth's surface has now been divided into sixty equal segments and each segment has a metric grid overlay. Making each point on the earth unique, however, requires a bit more. Each strip of earth surface is called a “zone,” and the zones are numbered from 1 to 60 beginning at the international date line (180° longitude) and proceeding easterly. Zone 1 covers 180° to 174° W longitude; zones 10 and 11 cover California.

The coordinates of any point within a zone are simply the distances in meters from certain reference points. The distances are referred to as “northings” and “eastings.” Northings are measured from the equator and eastings are measured from the 500,000m meridian at the center of the zone.

In the Northern Hemisphere, the northing values are natural measurements north of the equator, which is zero. To avoid negative numbers in the Southern Hemisphere, northings decrease from 10,000,000 meters at the equator. Since eastings are measured from the 500,000m meridian, locations west of the meridian are less than 500,000; those east are more than 500,000 (see Figure A-5). Because the UTM rectangular grid is wider than the orange peel slice of earth, eastings can never be close to zero.

The Northern and Southern Hemispheres are further differentiated by a series of horizontal bands, which are 8° of latitude high. These begin at 80°S latitude (the Polar Regions are ignored). The southernmost band is labeled “C,” and the bands progress alphabetically northward through band “W” at 72°N (the letters “I” and “O” are

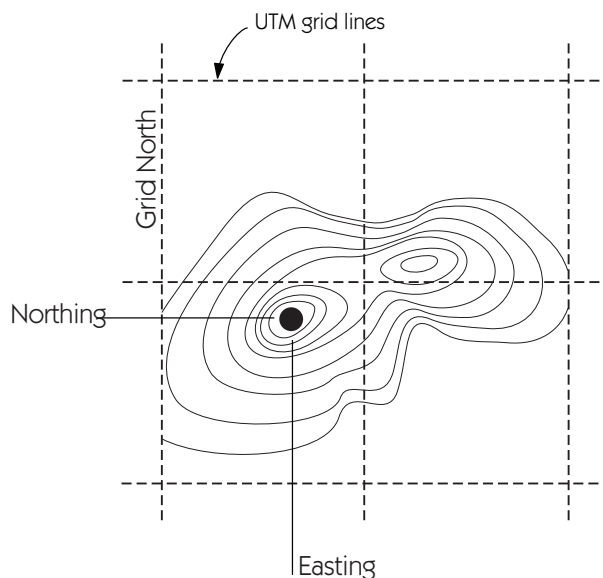


Figure A-2. UTM coordinates are distances referenced to a grid overlaid on a map.

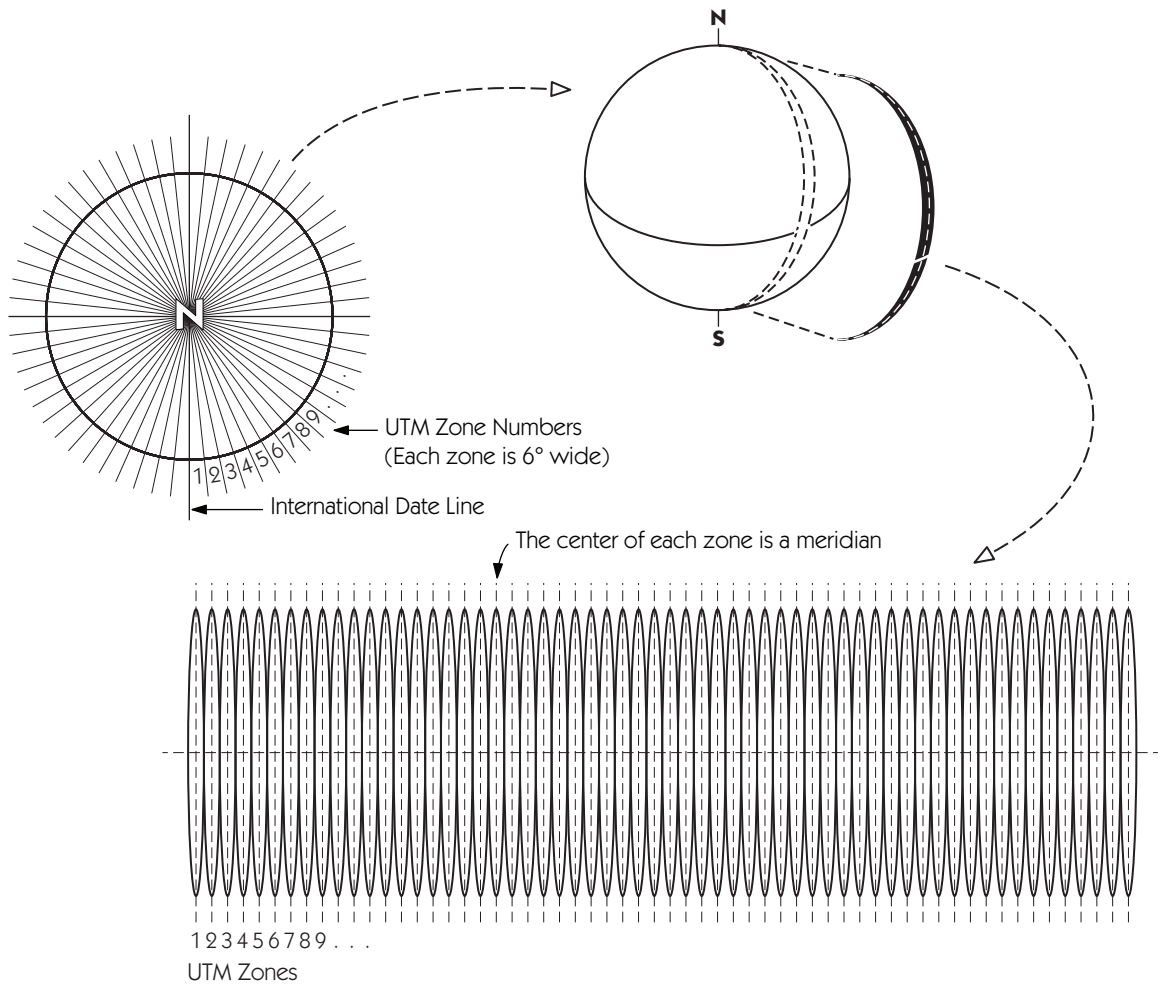


Figure A-3. Slicing the earth like an orange and peeling away the skins creates 60 UTM zones.

omitted to avoid confusion with the numbers “1” and “0”). Band “X,” which is wider than the other bands (12°), is the northernmost and terminates at 84°N latitude (see Figure A-6). California is in two bands, with S changing to T at 40° N latitude, about 70 miles north of Lake Tahoe. Band references prevent any ambiguity as to northings, but can be ignored for most navigation. GPS receivers will usually interpret bands automatically once the proper hemisphere is specified.

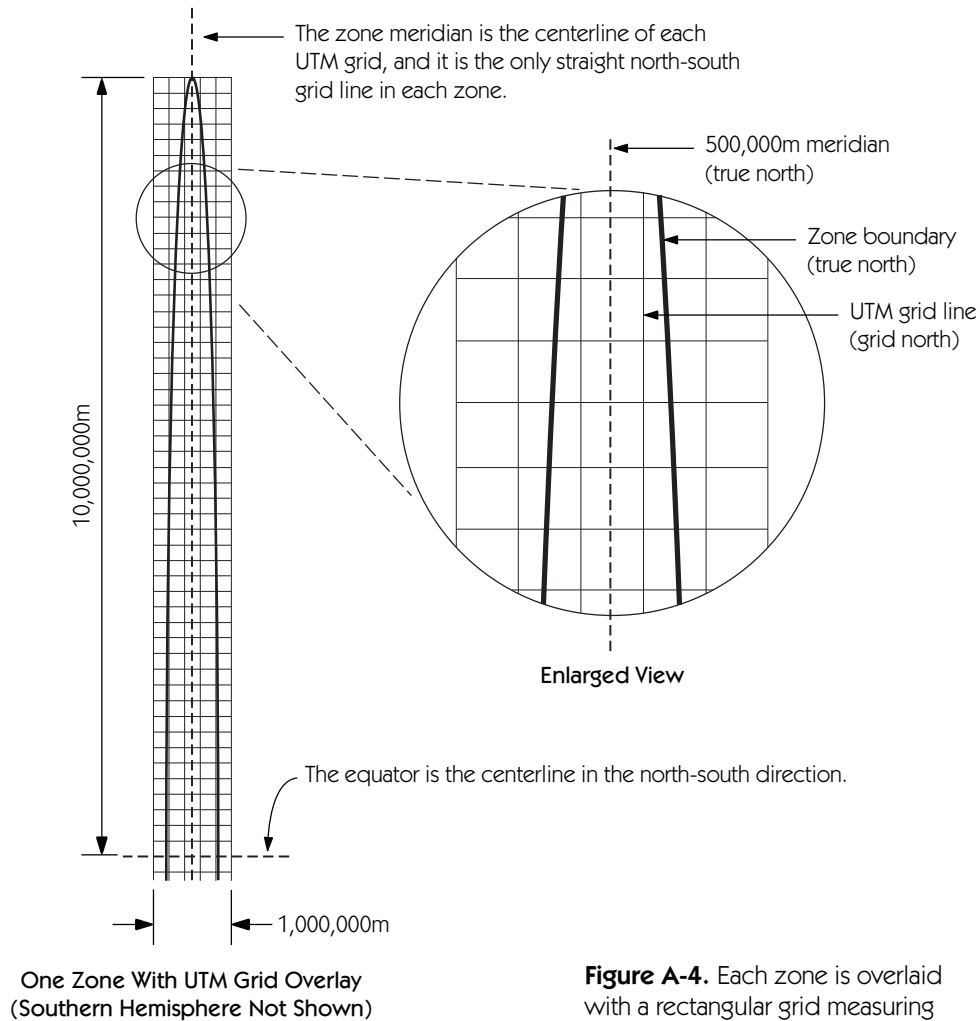
Datums

The map datum is the final complexity backcountry navigators need to understand. The earth is not a perfect sphere, so a datum, which is a mathematical model of the earth, describes exactly how a map’s grid overlay is positioned on the globe. Most GPS receivers default to the World Geodetic System of 1984 (WGS84) datum, but it

is not the only datum that hikers are likely to encounter. Two other systems, the North American Datum 1983 (NAD83) and North American Datum 1927 (NAD27) are commonly seen on the margins of USGS topo maps. NAD27 is gradually being phased out.

Selecting the correct datum for use with a GPS receiver is important; otherwise, coordinates may be off by tens or even hundreds of meters. USGS topo maps often indicate how to convert their coordinates from one system to the other. For example, for a map using an NAD27 grid, “move the projection lines 10 meters north and 84 meters east to place on the North American Datum 1983.” GPS receivers may allow selection from as many as 100 different datum systems and usually make the necessary conversions automatically. Hikers using GPS receivers to navigate in the field must select the datum specified on their maps.

For example, consider how the location of Mt. Whitney is represented by different datums. The geographic



coordinates of the summit are

36° 34' 45" N and 118° 17' 33"W.

In UTM coordinates it is in zone 11, band S. At this point it is necessary to pick a datum. With the NAD83 datum the location is

**Easting 384,356 meters and
Northing 4,048,961 meters.**

With the NAD27 datum, the location is

**Easting 384,436 meters and
Northing 4,048,764 meters.**

These two points appear to be 212 meters (about 700 feet) apart if the wrong datum is used.

Shorthand Notation Used With UTM Coordinates

The complete location of Mt. Whitney summit, according to the NAD 83 datum, would be written as

11S 384356 mE 4048961 mN.

Easting is always given first. Some GPS receivers drop the band letter (S in this case) and display the location as follows:

**11 3 84 356
40 48 961.**

The final digit, representing meters, will be dropped if the precision is only to within ten meters. Likewise, the last two digits will be dropped if the precision is only to within 100 meters.

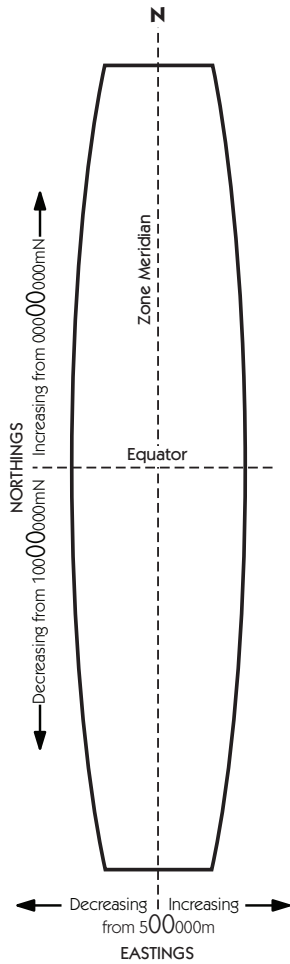


Figure A-5. References for eastings and northings (the zone diagram has been widened for clarity)

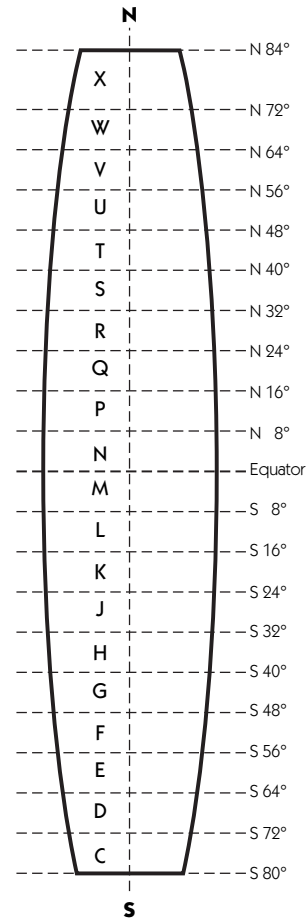


Figure A-6. UTM bands (the zone diagram has been widened for clarity)

A USGS topo map would show a tick mark along the edge of the map area at the 384th 1km easting grid line and at the 4048th 1km northing grid line in the zone, among others. These ticks would be marked

384 and 4048 respectively on a 7.5 minute map.

The superscripted numerals indicate resolution that is too coarse to be useful on this particular map. If these ticks happen to be cardinal on a particular topo, they might be marked more completely as follows to emphasize the 1 km grids and their principal digits.

384000 mE and 4048000 mN

Locating a Point on a Map Using UTM Coordinates

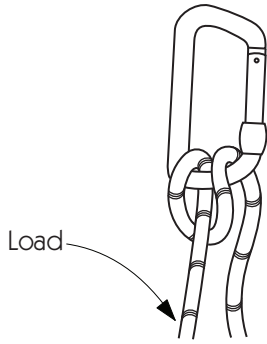
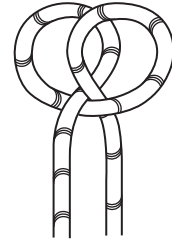
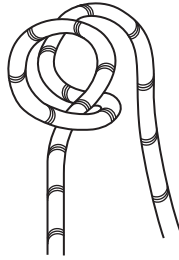
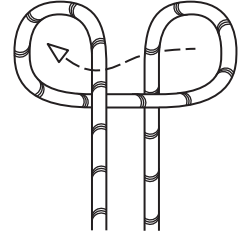
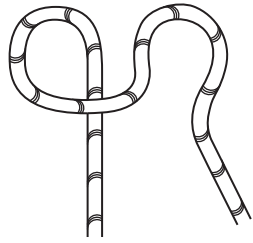
Here is where the UTM system shows its convenience. The summit of Mt. Whitney is located to the east (right) of the 384 grid line, about 1/3 of the way to the 385 grid line. This establishes the east-west location. Whitney summit is also above the 4048 grid line, almost to the 4049 grid, which gives the north-south position. If the UTM grid lines are printed on the map, the location is easy to plot by eye. The 1:24,000 (or 1:25,000 metric scale) scale on compass base plates, or the 1,000 meter scale in the map's margins can also be used to plot the position accurately.

Appendix B: Illustrations

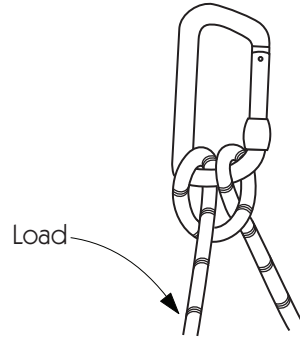
Knot Completion and Inspection

Casual knot tying creates unnecessary hazards. A loose or sloppy knot is liable to come untied during a climb or under the sudden force of a fall. Strands may slip, become crossed, and even twist into unintended knots. Poorly tied knots, furthermore, can be difficult to inspect.

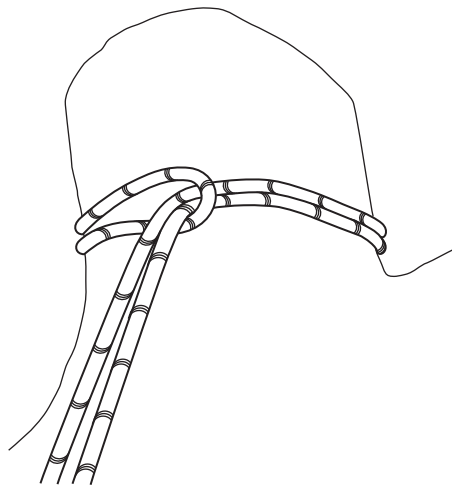
Dressing knots and tying proper finishing knots are fundamental principles of safe climbing. Dressing means working all the parts together, aligning the strands correctly and pulling everything tight. A finishing knot, such as the double overhand (half a double fisherman), provides a safety lock and reinforces reliable completion habits.



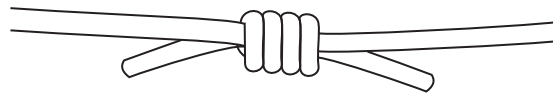
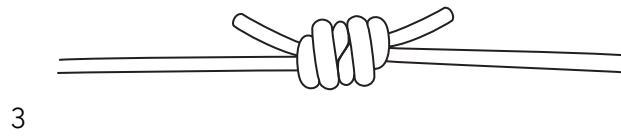
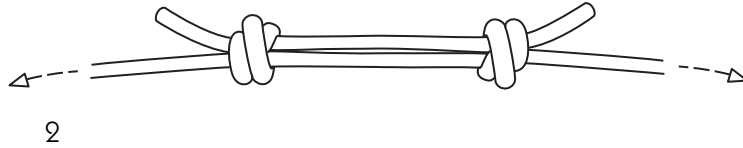
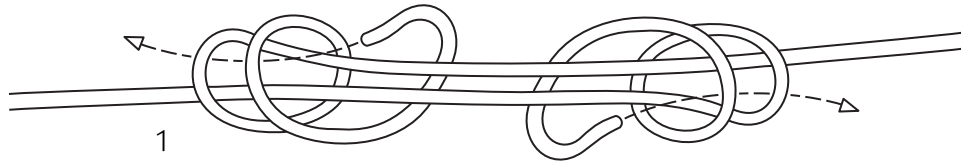
Münter Hitch



Clove Hitch

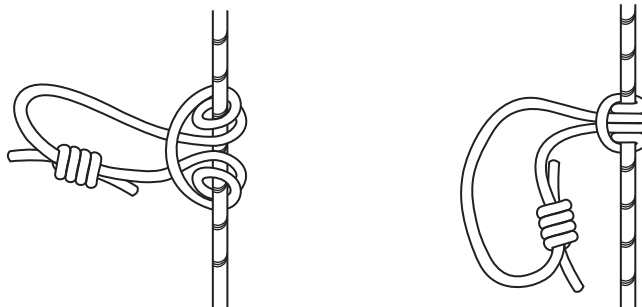


Girth Hitch



3a - view from the other side

Double Fisherman's Knot
(also called the "Barrel Knot")



Prusik Knot

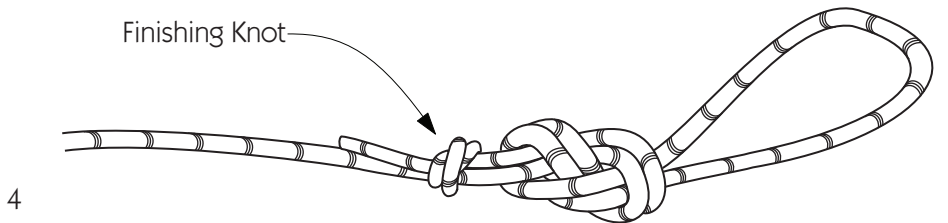
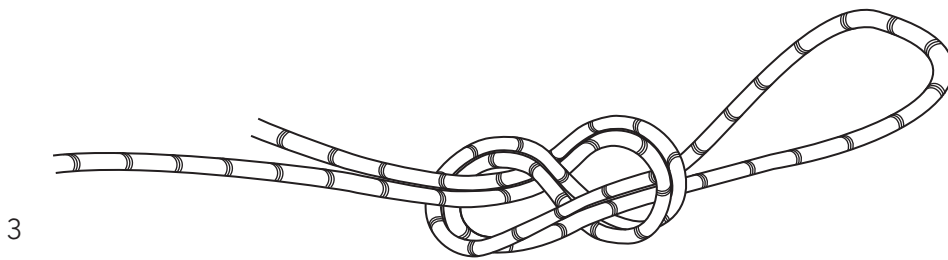
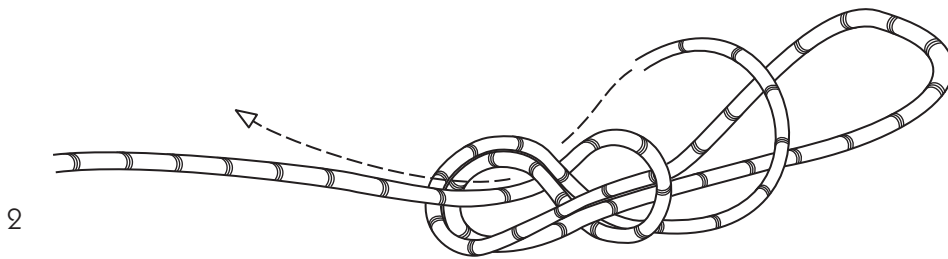
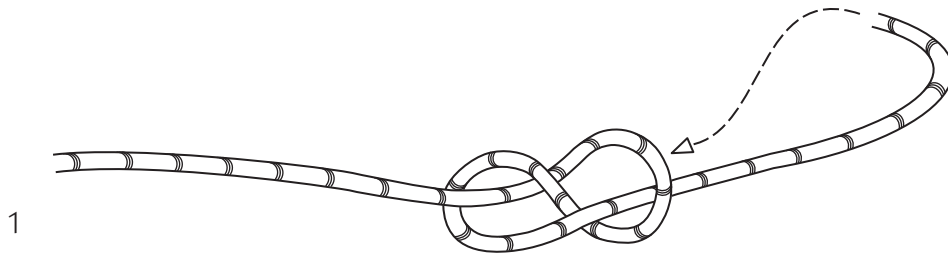


Figure 8 Followthrough

(Knots are drawn to show how they are tied, so the knots are not always shown fully dressed. Be sure all the parts are properly placed and tightened and the rope does not cross itself unnecessarily.)

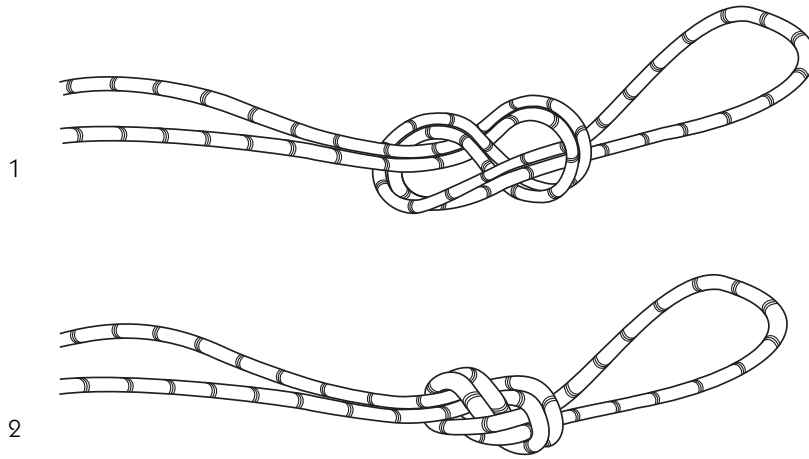
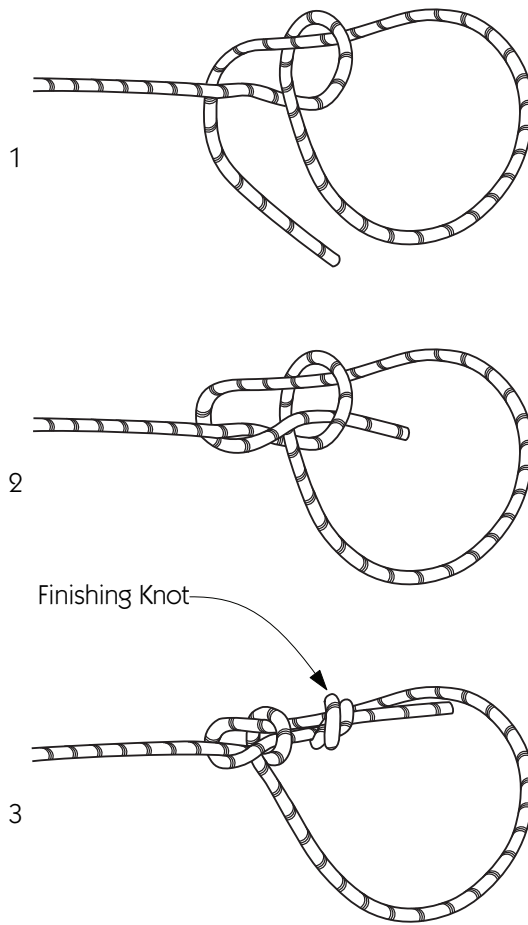
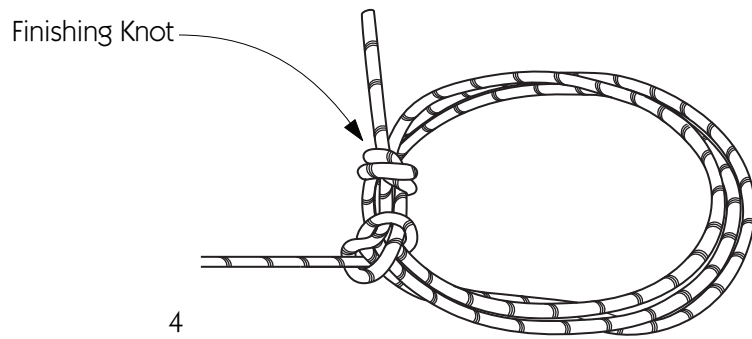
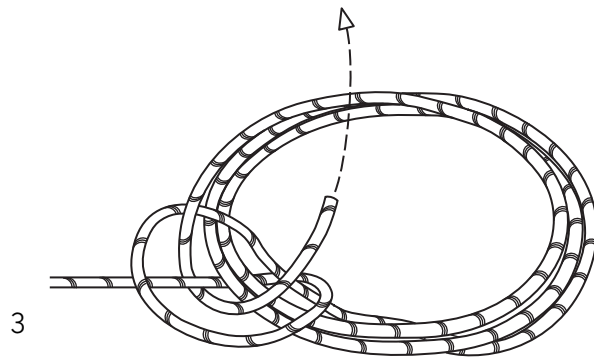
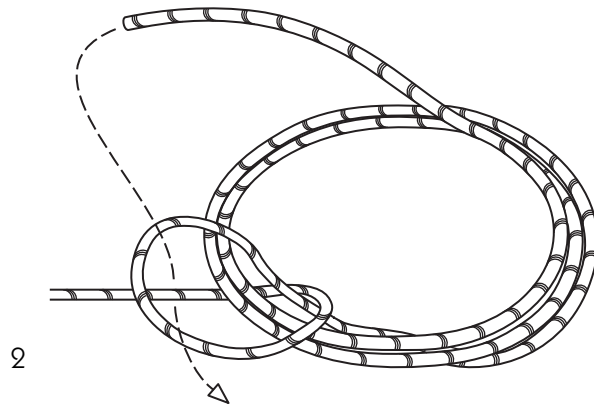
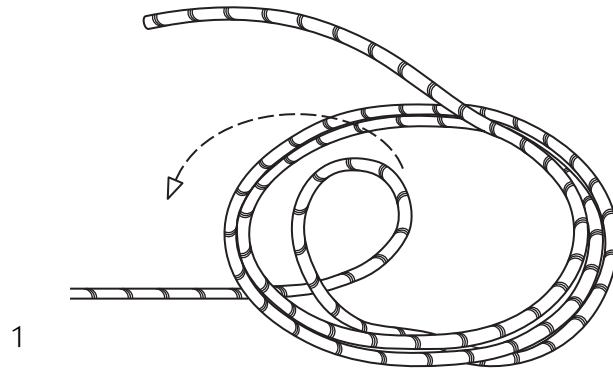


Figure 8 On A Bight

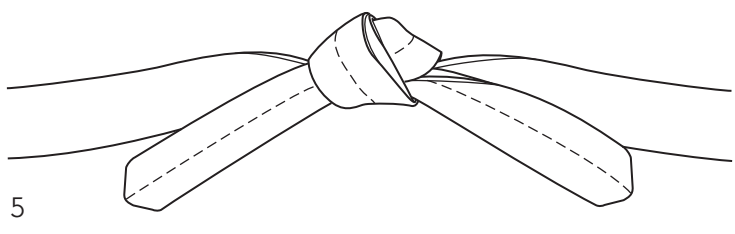
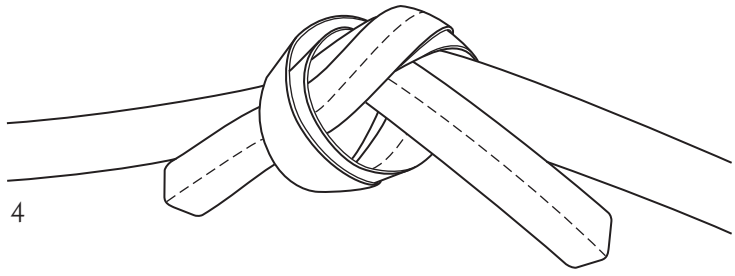
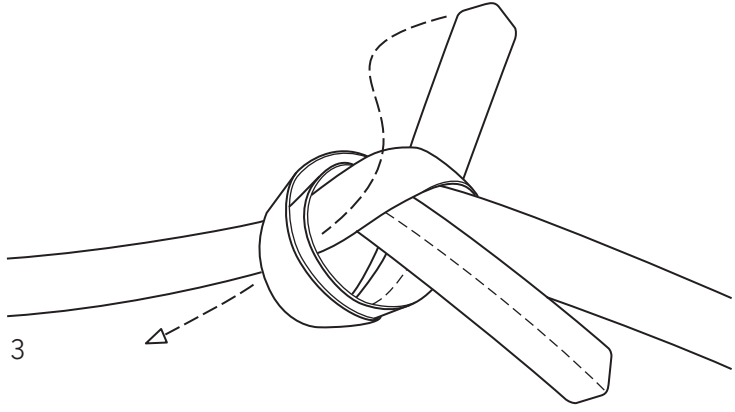
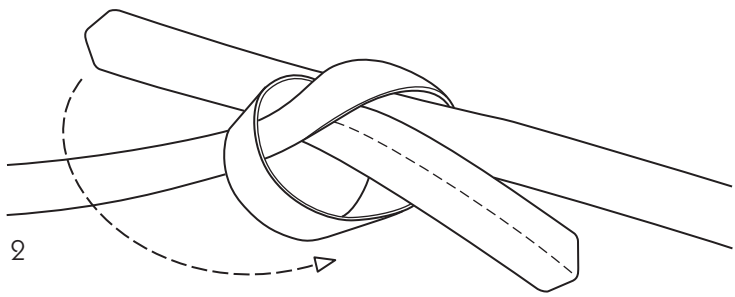
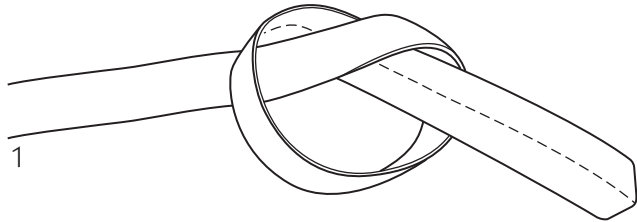


Bowline

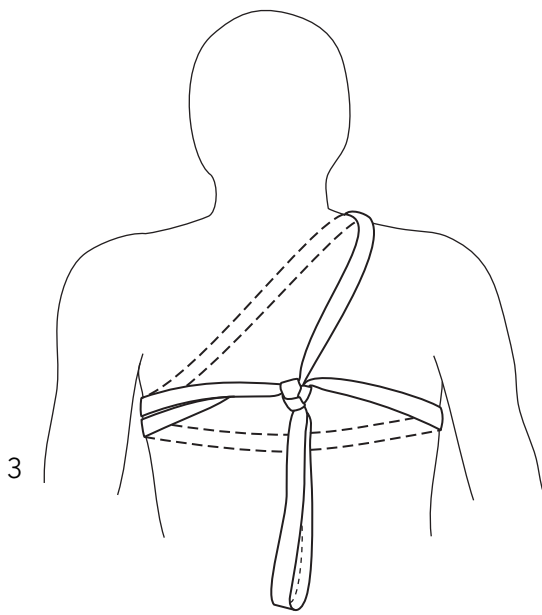
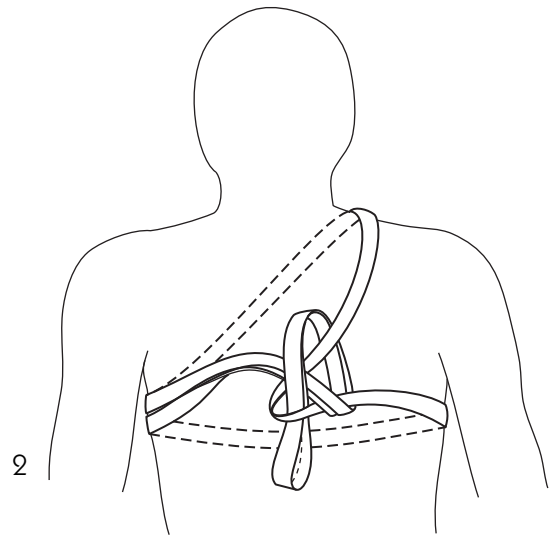
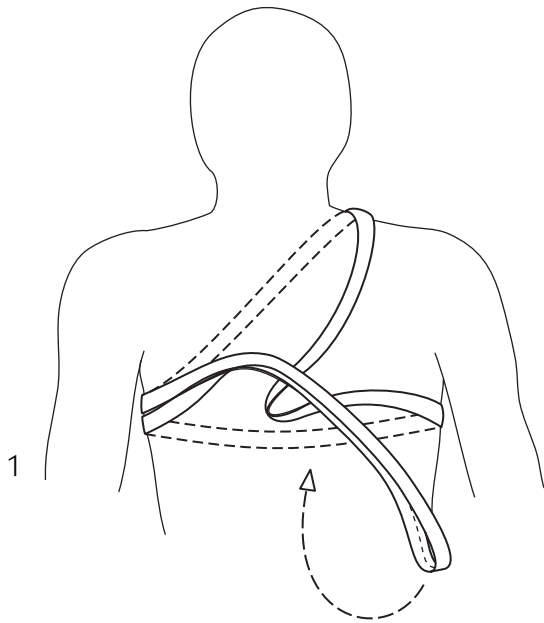
(Tighten and dress the bowline and finishing knot)



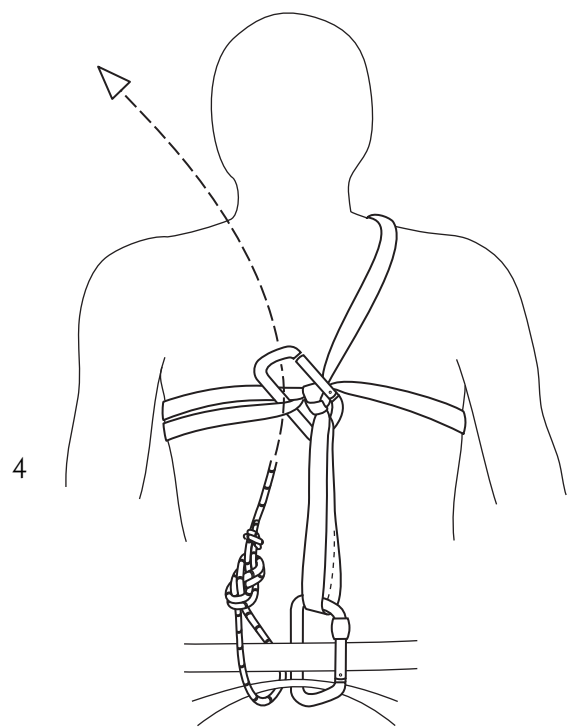
Bowline on a Coil
(Always leave long tails on knots and finishing knots.)



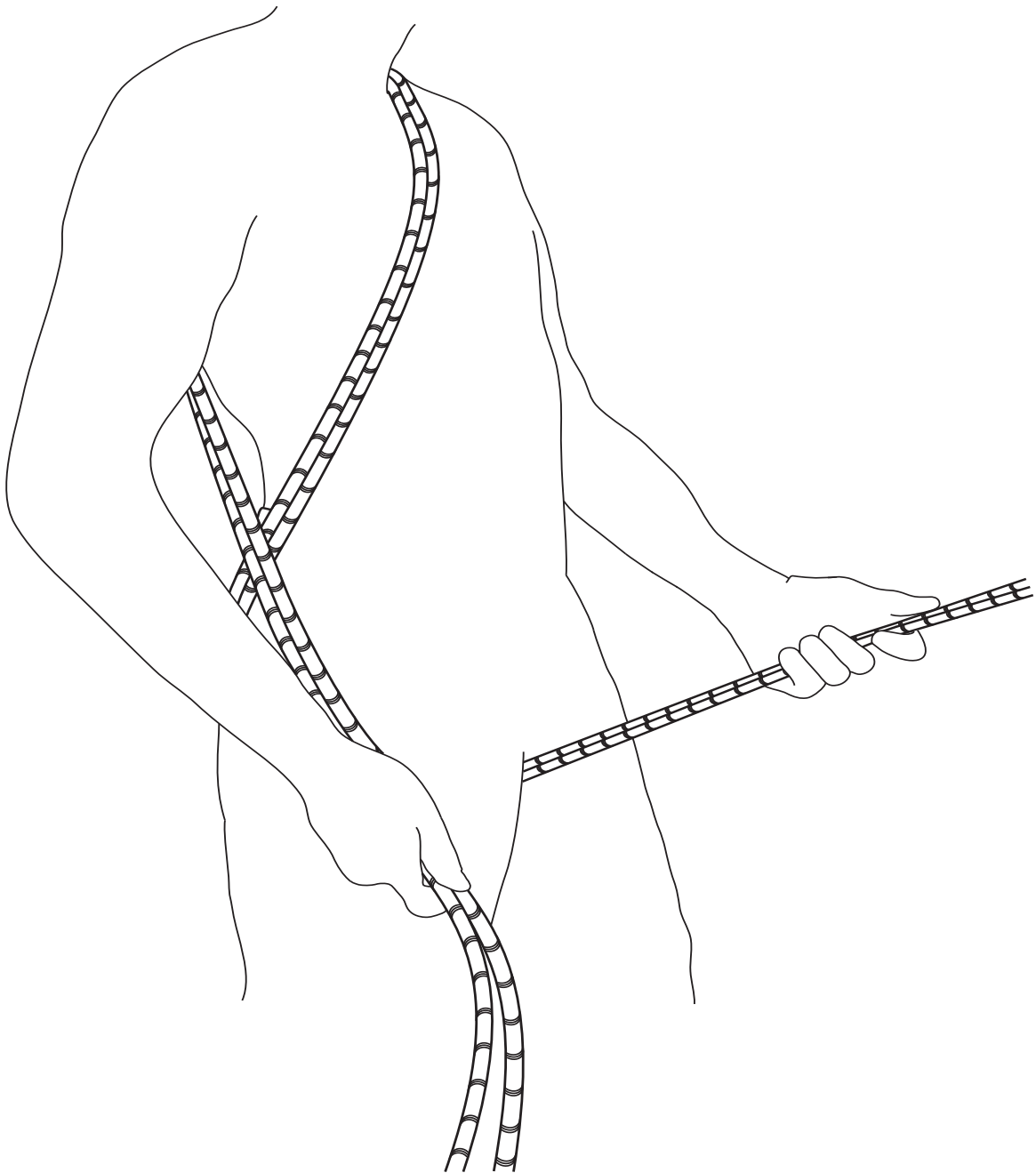
Overhand Followthrough
(also called the "Water Knot")



Clip to locking carabiner
on seat harness

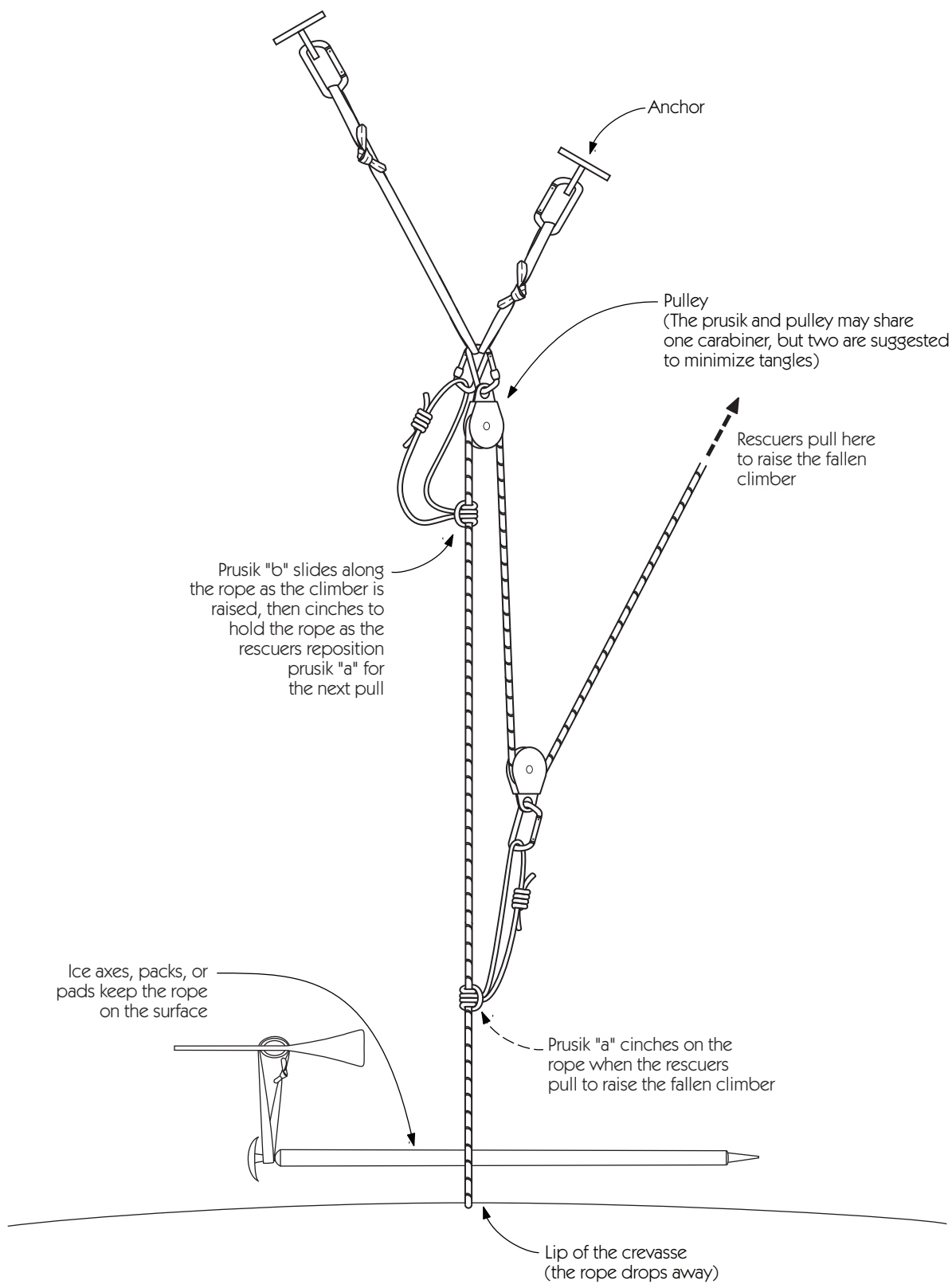


Parisian Baudrier
(also called the "Parisian Chest Harness")



Dulfersitz Rappel

(Clothing with neck covering must be worn to prevent severe rope burn.)



Z-Pulley System

(Distances between components have been shortened to show the entire system. In addition, use a separate, independent backup belay for the fallen climber.)

Appendix C: Official Forms

Most of these forms, which are revised often, are available from the LTC web site (http://angeles2.sierraclub.org/leadership_and_outings_resources_forms) or the National Sierra Club's leaders' extranet site (<http://clubhouse.sierraclub.org/outings>). Leaders should use the current forms at these web sites. The Outings Chair of your group, section, committee, or task force can also direct you to the appropriate form(s).

Forms are organized into three sections:

Sign-in Forms	148
See http://clubhouse.sierraclub.org/outings/local/forms if you have questions about which sign-in form(s) to use for various outings.	
Forms to Carry on All Outings	157
Forms for Restricted Outings	165
Leadership Training Program Forms	172

Sierra Club Sign-in Sheet and Liability Waiver

Outing:	Date(s):	Page of
Leader:	Assistant Leader:	

Sign-In Sheet & Acknowledgment of Outing Member Responsibility, Express Assumption of Risk, and Release of Liability

I understand that during my participation in this Sierra Club Outing, I may be exposed to a variety of hazards and risks, foreseen or unforeseen, which are inherent in each Outing and cannot be eliminated without destroying the unique character of the Outing. These inherent risks include, but are not limited to, the dangers of serious personal injury, property damage, and death ("Injuries and Damages") from exposure to the hazards of travel and the Sierra Club has not tried to contradict or minimize my understanding of these risks. I know that Injuries and Damages can occur by natural causes or activities of other persons, animals, trip members, trip leaders and assistants or third parties, either as a result of negligence or because of other reasons. I understand that risks of such Injuries and Damages are involved in adventure travel such as Sierra Club Outings and I appreciate that I may have to exercise extra care for my own person and for others around me in the face of such hazards. I further understand that on this Outing there may not be rescue or medical facilities or expertise necessary to deal with the Injuries and Damages to which I may be exposed.

In consideration for my acceptance as a participant on this Outing, and the services and amenities to be provided by the Sierra Club in connection with the Outing, I confirm my understanding that:

- I have read any rules and conditions applicable to the Outing made available to me; I will pay any costs and fees for the Outing; and I acknowledge my participation is at the discretion of the leader.
- The Outing officially begins and ends at the location(s) designated by the Sierra Club. The Outing does not include carpooling, transportation, or transit to and from the Outing, and I am personally responsible for all risks associated with this travel. This does not apply to transportation provided by the Sierra Club during the Outing.
- If I decide to leave early and not to complete the Outing as planned, I assume all risks inherent in my decision to leave and waive all liability against the Sierra Club arising from that decision. Likewise, if the leader has concluded the Outing, and I decide to go forward without the leader, I assume all risks inherent in my decision to go forward and waive all liability against the Sierra Club arising from that decision.
- This Agreement is intended to be as broad and inclusive as is permitted by law. If any provision or any part of any provision of this Agreement is held to be invalid or legally unenforceable for any reason, the remainder of this Agreement shall not be affected thereby and shall remain valid and fully enforceable.
- To the fullest extent allowed by law, I agree to **WAIVE, DISCHARGE CLAIMS, AND RELEASE FROM LIABILITY** the Sierra Club, its officers, directors, employees, agents, and leaders from **any and all liability** on account of, or in any way resulting from Injuries and Damages, even if caused by **negligence** of the Sierra Club its officers, directors, employees, agents, and leaders, in any way connected with this Outing. I further agree to **HOLD HARMLESS** the Sierra Club, its officers, directors, employees, agents, and leaders from any claims, damages, injuries or losses caused by my own negligence while a participant on the outing. I understand and intend that this assumption of risk and release is binding upon my heirs, executors, administrators and assigns, and includes any minors accompanying me on the Outing.
- I have read this document in its entirety and I freely and voluntarily assume all risks of such Injuries and Damages and notwithstanding such risks, I agree to participate in the Outing.

I have read the attached **Sign-In Sheet & Acknowledgment of Outing Member Responsibility, Express Assumption of Risk, and Release of Liability** in its entirety and I freely and voluntarily assume all risks of such Injuries and Damages and notwithstanding such risks, I agree to participate in the Outing.

Printed Name	Signature**	Home Address	Home Phone		Emergency Phone Name/Relation	SC Member	Car Plate	Early Sign-Out
			Email Address*					

** If a minor is going on the trip, the minor's guardian must sign on the minor's behalf.

Sierra Club Sign-in Sheet and Liability Waiver

Printed Name	Signature**	Home Address	Home Phone		Emergency Phone		SC Mem-ber	Car Plate	Early Sign-Out
			Email Address*	Name/Relation	Name/Relation	Name/Relation			
							Yes No		
							Yes No		
							Yes No		
							Yes No		
							Yes No		
							Yes No		
							Yes No		
							Yes No		
							Yes No		
							Yes No		

* Supply your email address to receive periodic communications from the Sierra Club.

Outing:	Date(s):	Page	of
Leader:	Assistant Leader:		

Sign-In Sheet & Acknowledgment of Risk

In consideration of the services of the Sierra Club and its officers, directors, employees, agents, and leaders, I agree as follows:

Although Sierra Club Outings has taken reasonable steps to provide me with appropriate equipment and skilled guides so I can enjoy an activity for which I may not be skilled, Sierra Club Outings has informed me this activity is not without risk. Certain risks are inherent in each activity and cannot be eliminated without destroying the unique character of the activity. These inherent risks are some of the same elements that contribute to the unique character of this activity and can be the cause of loss or damage to my equipment, or accidental injury, illness, or in extreme cases, permanent trauma or death. Sierra Club Outings does not want to frighten me or reduce my enthusiasm for this activity, but believes it is important for me to know in advance what to expect and to be informed of the inherent risks. The following describes some, but not all, of those risks:

- These risks include, but are not limited to, the dangers of serious personal injury to my person or property, or my death ("injuries and damages") from exposure to the hazards of travel in the areas the Outing will visit.
- I know that injuries and damages can occur by natural causes or activities of other persons, animals, trip members, trip leaders and assistants or third parties, and such injuries and damages can occur as a result of negligence or because of other reasons.
- I understand that risks of such injury and damages are involved in adventure travel such as Sierra Club Outings and I appreciate that I may have to exercise extra care for my own person as well as for others around me in the face of such hazards.
- I further understand that on Sierra Club Outings there may not be rescue or medical facilities or expertise that may be necessary to deal with the injuries and damages to which I may be exposed.

I am aware that Sierra Club Outings entail risks of injury or death to any participant. I understand that the description of these inherent risks is not complete and that other unknown or unanticipated inherent risks may result in injury or death. I agree to assume and accept full responsibility for the inherent risks identified herein and those inherent risks not specifically identified. My participation in this activity is purely voluntary, no one is forcing me to participate, and I elect to participate in spite of and with full knowledge of the inherent risks.

I acknowledge that engaging in this activity may require a degree of skill and knowledge different than other activities and that I have responsibilities as a participant. I acknowledge that the staff of Sierra Club Outings has been available to more fully explain to me the nature and physical demands of this activity and the inherent risks, hazards, and dangers associated with this activity.

I certify that I am fully capable of participating in this activity. Therefore, I assume and accept full responsibility for myself, including all minor children in my care, custody, and control, for bodily injury, death or loss of personal property and expenses as a result of those inherent risks and dangers identified herein and those inherent risks and dangers not specifically identified, and, as a result of my negligence in participating in this activity.

I have carefully read, clearly understood and accepted the terms and conditions stated herein and acknowledge that this agreement shall be effective and binding upon myself, my heirs, assigns, personal representative and estate and for all members of my family, including minor children.

Name	Signature	Address	Home Phone	Emergency Phone	Car License	Early Sign-Out

*If a minor is going on the trip, the minor's guardian must sign on the minor's behalf.

Outing:	Date(s):	Page	of
Leader:	Assistant Leader:		

Sign-In Sheet & Acknowledgment of Outing Member Responsibility, Express Assumption of Risk, and Release of Liability

I understand that during my participation in this Sierra Club Outing, I may be exposed to a variety of hazards and risks, foreseen or unforeseen, which are inherent in each Outing and cannot be eliminated without destroying the unique character of the Outing. These inherent risks include, but are not limited to, the dangers of serious personal injury, property damage, and death ("Injuries and Damages") from exposure to the hazards of travel and the Sierra Club has not tried to contradict or minimize my understanding of these risks. I know that Injuries and Damages can occur by natural causes or activities of other persons, animals, trip members, trip leaders and assistants or third parties, either as a result of negligence or because of other reasons. I understand that risks of such Injuries and Damages are involved in adventure travel such as Sierra Club Outings and I appreciate that I may have to exercise extra care for my own person and for others around me in the face of such hazards. I further understand that on this Outing there may not be rescue or medical facilities or expertise necessary to deal with the Injuries and Damages to which I may be exposed.

In consideration for my acceptance as a participant on this Outing, and the services and amenities to be provided by the Sierra Club in connection with the Outing, I confirm my understanding that:

- I have read any rules and conditions applicable to the Outing made available to me; I will pay any costs and fees for the Outing; and I acknowledge my participation is at the discretion of the leader.
- The Outing officially begins and ends at the location(s) designated by the Sierra Club. The Outing does not include carpooling, transportation, or transit to and from the Outing, and I am personally responsible for all risks associated with this travel. This does not apply to transportation provided by the Sierra Club during the Outing.
- If I decide to leave early and not to complete the Outing as planned, I assume all risks inherent in my decision to leave and waive all liability against the Sierra Club arising from that decision. Likewise, if the leader has concluded the Outing, and I decide to go forward without the leader, I assume all risks inherent in my decision to go forward and waive all liability against the Sierra Club arising from that decision.
- This Agreement is intended to be as broad and inclusive as is permitted by law. If any provision or any part of any provision of this Agreement is held to be invalid or legally unenforceable for any reason, the remainder of this Agreement shall not be affected thereby and shall remain valid and fully enforceable.
- To the fullest extent allowed by law, I agree to **WAIVE, DISCHARGE CLAIMS, AND RELEASE FROM LIABILITY** the Sierra Club, its officers, directors, employees, agents, and leaders from **any and all liability** on account of, or in any way resulting from Injuries and Damages, even if caused by **negligence** of the Sierra Club its officers, directors, employees, agents, and leaders, in any way connected with this Outing. I further agree to **HOLD HARMLESS** the Sierra Club, its officers, directors, employees, agents, and leaders from any claims, damages, injuries or losses caused by my own negligence while a participant on the outing. I understand and intend that this assumption of risk and release is binding upon my heirs, executors, administrators and assigns, and includes any minors accompanying me on the Outing.
- I have read this document in its entirety and I freely and voluntarily assume all risks of such Injuries and Damages and notwithstanding such risks, I agree to participate in the Outing.

	Name	Address	Member No	Emer Phone	Car License	Signature	Sign-Out
1							
2							
3							
4							
5							
6							
7							



Acknowledgment of Outing Member Responsibility, Express Assumption of Risk, and Release of Liability

I understand that during my participation in this Sierra Club Outing, I may be exposed to a variety of hazards and risks, foreseen or unforeseen, which are inherent in each Outing and cannot be eliminated without destroying the unique character of the Outing. These inherent risks include, but are not limited to, the dangers of serious personal injury, property damage, and death ("Injuries and Damages") from exposure to the hazards of travel and the Sierra Club has not tried to contradict or minimize my understanding of these risks. I know that Injuries and Damages can occur by natural causes or activities of other persons, animals, trip members, trip leaders and assistants or third parties, either as a result of negligence or because of other reasons. I understand that risks of such Injuries and Damages are involved in adventure travel such as Sierra Club Outings and I appreciate that I may have to exercise extra care for my own person and for others around me in the face of such hazards. I further understand that on this Outing there may not be rescue or medical facilities or expertise necessary to deal with the Injuries and Damages to which I may be exposed.

In consideration for my acceptance as a participant on this Outing, and the services and amenities to be provided by the Sierra Club in connection with the Outing, I confirm my understanding that:

- I have read any rules and conditions applicable to the Outing made available to me; I will pay any costs and fees for the Outing; and I acknowledge my participation is at the discretion of the leader.
- The Outing officially begins and ends at the location(s) designated by the Sierra Club. The Outing does not include carpooling, transportation, or transit to and from the Outing, and I am personally responsible for all risks associated with this travel. This does not apply to transportation provided by the Sierra Club during the Outing.
- If I decide to leave early and not to complete the Outing as planned, I assume all risks inherent in my decision to leave and waive all liability against the Sierra Club arising from that decision. Likewise, if the leader has concluded the Outing, and I decide to go forward without the leader, I assume all risks inherent in my decision to go forward and waive all liability against the Sierra Club arising from that decision.
- This Agreement is intended to be as broad and inclusive as is permitted by law. If any provision or any part of any provision of this Agreement is held to be invalid or legally unenforceable for any reason, the remainder of this Agreement shall not be affected thereby and shall remain valid and fully enforceable.
- To the fullest extent allowed by law, I agree to **WAIVE, DISCHARGE CLAIMS, AND RELEASE FROM LIABILITY** the Sierra Club, its officers, directors, employees, agents, and leaders from **any and all liability** on account of, or in any way resulting from Injuries and Damages, even if caused by negligence of the Sierra Club its officers, directors, employees, agents, and leaders, in any way connected with this Outing. I further agree to **HOLD HARMLESS** the Sierra Club, its officers, directors, employees, agents, and leaders from any claims, damages, injuries or losses caused by my own negligence while a participant on the outing. I understand and intend that this assumption of risk and release is binding upon my heirs, executors, administrators and assigns, and includes any minors accompanying me on the Outing.
- I have read this document in its entirety and I freely and voluntarily assume all risks of such Injuries and Damages and notwithstanding such risks, I agree to participate in the Outing.
- I have read, I understand, and I agree to the enclosed Sierra Club Outings Reservation and Cancellation Policy.

Name: _____

Signed: _____

Date: _____

Outing Name: _____

Outing Date (s): _____

If you are a minor (under age 18), your parent or legal guardian must sign this Agreement on your behalf.

I hereby agree and consent to the foregoing Agreement on behalf of the minor below.

Name and Age of Minor: _____
(Please Print)

(Age)

Signature of Parent or Guardian: _____ Date: _____

Please complete this form and return it to your trip leader

Revised: January 14, 2004



Acknowledgment of Risk

In consideration of the services of the Sierra Club and its officers, directors, employees, agents, and leaders, I agree as follows:

Although Sierra Club Outings has taken reasonable steps to provide me with appropriate equipment and skilled guides so I can enjoy an activity for which I may not be skilled, Sierra Club Outings has informed me this activity is not without risk. Certain risks are inherent in each activity and cannot be eliminated without destroying the unique character of the activity. These inherent risks are some of the same elements that contribute to the unique character of this activity and can be the cause of loss or damage to my equipment, or accidental injury, illness, or in extreme cases, permanent trauma or death. Sierra Club Outings does not want to frighten me or reduce my enthusiasm for this activity, but believes it is important for me to know in advance what to expect and to be informed of the inherent risks. The following describes some, but not all, of those risks:

- These risks include, but are not limited to, the dangers of serious personal injury to my person or property, or my death (“injuries and damages”) from exposure to the hazards of travel in the areas the Outing will visit.
- I know that injuries and damages can occur by natural causes or activities of other persons, animals, trip members, trip leaders and assistants or third parties, and such injuries and damages can occur as a result of negligence or because of other reasons.
- I understand that risks of such injury and damages are involved in adventure travel such as Sierra Club Outings and I appreciate that I may have to exercise extra care for my own person as well as for others around me in the face of such hazards.
- I further understand that on Sierra Club Outings there may not be rescue or medical facilities or expertise that may be necessary to deal with the injuries and damages to which I may be exposed.

I am aware that Sierra Club Outings entail risks of injury or death to any participant. I understand that the description of these inherent risks is not complete and that other unknown or unanticipated inherent risks may result in injury or death. I agree to assume and accept full responsibility for the inherent risks identified herein and those inherent risks not specifically identified. My participation in this activity is purely voluntary, no one is forcing me to participate, and I elect to participate in spite of and with full knowledge of the inherent risks.

I acknowledge that engaging in this activity may require a degree of skill and knowledge different than other activities and that I have responsibilities as a participant. I acknowledge that the staff of Sierra Club Outings has been available to more fully explain to me the nature and physical demands of this activity and the inherent risks, hazards, and dangers associated with this activity.

I certify that I am fully capable of participating in this activity. Therefore, I assume and accept full responsibility for myself, including all minor children in my care, custody, and control, for bodily injury, death or loss of personal property and expenses as a result of those inherent risks and dangers identified herein and those inherent risks and dangers not specifically identified, and, as a result of my negligence in participating in this activity.

I have carefully read, clearly understood and accepted the terms and conditions stated herein and acknowledge that this agreement shall be effective and binding upon myself, my heirs, assigns, personal representative and estate and for all members of my family, including minor children.

Name: _____ Signed: _____ Date: _____

If you are a minor (under age 18), your parent or legal guardian must sign this Acknowledgement on your behalf.

I hereby agree and consent to the foregoing acknowledgment of risk of the minor below.

Name and Age of Minor: _____ (Please Print) (Age) _____

Signature of Parent or Guardian: _____ Date: _____

Please complete and return this form to your trip leader



Medical Treatment Authorization & Consent Form

I, the parent or guardian of:

- 1) _____ (minor child name)
- 2) _____ (minor child name)
- 3) _____ (minor child name)

authorize _____ (accompanying adult name or trip leader name) to:

- arrange or provide medical treatment for the minor(s), including but not limited to helicopter evacuation, ambulance service, medications, first aid, hospitalization, and surgery;
- execute any forms, consents, and releases as may be useful under the circumstances; and
- delegate the authority granted herein to any other person(s).

I understand that efforts will be made to contact me if medical treatment should be needed. I will ensure that the minor will bring any necessary medications on the trip.

Parent or Guardian Name (print)

Signature

Date

Trip Name

Trip Leader Name

Trip Dates

Angeles Chapter - Sierra Club Incident Report Instructions

The Incident Report provides the Sierra Club with the information it needs to monitor and learn from incidents throughout the outings programs and to determine whether additional investigation is required. Trip leaders are responsible for reporting all incidents and illnesses immediately after the outing using this Incident Report Form. Failure to report incidents may jeopardize the leader and the Club. During the time of the incident, use the Patient Report or similar medical field assessment form. You can download both the Incident Report and Patient Report from the following extranet site: https://angeles2.sierraclub.org/leadership_and_outings_resources_forms

An Incident Report must be filed for:

Sierra Club Incidents	<ul style="list-style-type: none"> • A fatality. • Any incident that requires search, rescue or evacuation. • Any injury that requires advanced first aid. • Any injury or illness that could have future complications or require medical attention after the outing (i.e. animal bite, severe sprain). • Any act of suspected sexual harassment or child abuse. • Any act that violates the law. • Any act that results in property damage that could result in a claim.
Angeles Chapter Incidents	<p>Additional Angeles Chapter-only requirements: Any other incident that compromises the outing's objective for all or some participants, including:</p> <ul style="list-style-type: none"> • lost person(s) • altitude sickness or heat illness • a problem participant • recurrence of a prior condition.
<ul style="list-style-type: none"> • An Incident Report does not need to be filed for minor injuries such as scratches and blisters, or other personal illnesses that will not likely have future complications even if the illness causes the person to leave the trip. 	

Reporting Sierra Club Incidents	Reporting Angeles Chapter Incidents
Incident Report form with Sign-in Sheet or Individual Liability Waiver, and Participant Medical Form, and/or Patient Report if applicable.	
Original – mail to Sierra Club Outings, 85 Second Street, 2nd Floor, San Francisco, CA 94105	Original – mail to Outings Chair of sponsoring entity
Email: program.safety@sierraclub.org or Fax to (415) 977-5795	
Email:	<ul style="list-style-type: none"> • keithwmartin@sbcglobal.net Keith Martin 530 S. Lake Ave. Box 708, Pasadena, CA 91101 626-396-9701 for Angeles Chapter Safety Committee • outdoorJSimpson@gmail.com Jane Simpson for Angeles Chapter Outings Mgmt Committee • Chair of the sponsoring Group, Section, Committee • Outings Chair of the sponsoring Group, Section, Committee
Life-threatening incidents/emergencies/fatalities that require rescue or evacuation should be reported immediately by telephone to the Sierra Club Outings Department at: 1-888-OUTINGS (888-688-4647); after business hours press #6. International: 001-715-852-1701	

Revised: February 2015

Sierra Club Incident Report Form

Include the participant's waiver and medical form with this report.

Person making report : _____ Date: ____ / ____ / ____		
Address: _____ Phone: (____) _____		
Outing Details:		
<input type="checkbox"/> National	Trip Number: _____ Subcommittee: _____	
<input type="checkbox"/> Inner City	Outing Name: _____ ICO Group: _____	
<input type="checkbox"/> Local Outings	Outing Name: _____ Chapter/Entity Name: _____	
Leader Name:		
Copy of report sent to: <input type="checkbox"/> Chapter Outings Chair <input type="checkbox"/> Group Chair <input type="checkbox"/> Chapter Chair <input type="checkbox"/> ICO Group Chair <input type="checkbox"/> Group Outings Chair <input type="checkbox"/> Subcommittee Chair	Chair name and phone number: _____ _____	
Identity of ill, injured, or affected person:		
Name: _____	Age (check one): <input type="checkbox"/> 30 - 39 <input type="checkbox"/> 60 - 69	
Address: _____	<input type="checkbox"/> Under 18 <input type="checkbox"/> 40 - 49 <input type="checkbox"/> 70 - 79	
Phone: (____) _____	<input type="checkbox"/> 18 - 29 <input type="checkbox"/> 50-59 <input type="checkbox"/> 80 +	
	<input type="checkbox"/> Female <input type="checkbox"/> Male Height: _____ Weight _____	
	Sierra Club member? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Family of injured contacted? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, by whom? _____		
Family contact: _____	Relationship: _____	
Address: _____	Phone: (____) _____	
Public agencies contacted regarding this incident:		
Date: _____ / ____ / ____ am pm	Agency: _____	
Location: _____	Contact: _____	
By: _____	Phone: (____) _____	
Evacuation / Search & Rescue The incident required:		
<input type="checkbox"/> Immediate evacuation <input type="checkbox"/> Assistance (search & rescue) <input type="checkbox"/> Neither <input type="checkbox"/> Continued outing <input type="checkbox"/> Ended outing early		
Names of all other witnesses or persons involved in the evacuation or search and rescue:		
Name: _____	Address: _____	Phone: _____
_____	_____	(____) _____
_____	_____	(____) _____
_____	_____	(____) _____
_____	_____	(____) _____

Incident Details																	
Date of Incident: ___ / ___ / ___ Time ___ : ___ am pm	Weather Conditions:																
Location:																	
Brief factual description of injury or illness:	First aid provided (including any medication):																
	By whom:																
Provide full description of the incident including preceding events and conditions, and all measures taken after the incident. Do not state any opinions regarding the cause (use additional sheets if necessary).																	
<p>Activity participant was doing when incident occurred</p> <table border="0"> <tr> <td><input type="checkbox"/> Car Camping</td> <td><input type="checkbox"/> In camp</td> <td><input type="checkbox"/> River activity: kayak raft canoe</td> <td><input type="checkbox"/> Sledding</td> </tr> <tr> <td><input type="checkbox"/> Cycling</td> <td><input type="checkbox"/> International trip</td> <td><input type="checkbox"/> Skiing: x-country alpine</td> <td><input type="checkbox"/> Service Trip</td> </tr> <tr> <td><input type="checkbox"/> Hiking</td> <td><input type="checkbox"/> Kayaking: sea lake</td> <td></td> <td><input type="checkbox"/> Swimming</td> </tr> <tr> <td><input type="checkbox"/> Hiking with pack</td> <td><input type="checkbox"/> Mountaineering</td> <td></td> <td><input type="checkbox"/> Other:</td> </tr> </table>		<input type="checkbox"/> Car Camping	<input type="checkbox"/> In camp	<input type="checkbox"/> River activity: kayak raft canoe	<input type="checkbox"/> Sledding	<input type="checkbox"/> Cycling	<input type="checkbox"/> International trip	<input type="checkbox"/> Skiing: x-country alpine	<input type="checkbox"/> Service Trip	<input type="checkbox"/> Hiking	<input type="checkbox"/> Kayaking: sea lake		<input type="checkbox"/> Swimming	<input type="checkbox"/> Hiking with pack	<input type="checkbox"/> Mountaineering		<input type="checkbox"/> Other:
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<input type="checkbox"/> Hiking with pack	<input type="checkbox"/> Mountaineering		<input type="checkbox"/> Other:														

I have supplied the confidential information requested above for the Sierra Club, its insurance company, and its attorneys.

Signed _____

Date _____

Email reports to: program.safety@sierraclub.org

Fax Report to: (415) 977-5795

After emailing or faxing, mail original report, medical forms & participant waivers to:
Sierra Club Outings
85 Second Street, 2nd Floor
San Francisco, CA 94105

This report is intended to be confidential for transmission to and use by Sierra Club attorneys for litigation arising out of claims.

Revised: February 2015

EMERGENCY RESPONSE – PATIENT REPORT (ERPR) FORM USER’S GUIDE

Term on ERPR Form	Explanation
Mechanism of Injury	A description of the physical circumstances of the accident, e.g., “The patient fell backwards and struck his head.”
Chief Complaint	What the patient tells you when asked “what hurts?”
Cleared C-spine	Answer “XT” (see Note below) unless you have taken 16 hours or more of wilderness first aid and are trained in this assessment.
Disability (c-spine)	Immobilize c-spine if you are trained to do so. Otherwise, tell patient to lie still and not move head or neck.
Release Spinal Precautions	See “Cleared C-spine” above.
Neurological Exam	Memory—give the patient a number or color to remember and ask five minutes later what it is. Orientation—Who are you? Where are you? When is it? What is your situation? Pupils—Are they equal, round, and reactive to light? Sensation—can patient tell you when you pinch his little or big toe (making sure he can’t see what you are doing)? Strength—can patient squeeze your hands with both of his using appropriate strength? Can patient push up/down/in/out against your hands using his feet with appropriate strength?

Note: Keep in mind that this form with your answers could become a legal document. If you do not understand a term on the form or you are not trained in the assessment required, write “XT.” Then on the bottom margin, write “XT—exceeds training.”

Emergency Response – Patient Report

Include several copies of this form in your first aid kit

Patient Name		Sex M F	Age	Weight	Height	Date	Time
Consent to treat? Y N	Mechanism of Injury		Chief Complaint				
Cleared-Spine? Y N							
S T O P	Life Threatening Conditions (A B C D E)						T R E A T
	Airway Breathing Circulation/Severe Bleeding Disability (c-spine) Environment (cold/heat) Shock						
P A T I E N T H I S T O R Y	<u>Allergies</u> (medications, food, stings)		NOTE: See Back for Continuing Monitoring				
	<u>Medications</u> (dose, frequency)		Time				
	<u>Past Injury/Illness</u>		Pulse				
	<u>Last Oral Intake</u>		Respiratory Rate/Quality				
	<u>Events Leading to Incident</u>		Skin	W P D	W P D	W P D	
			Pupils (PERRL)	E R R L	E R R L	E R R L	
			Mental Status	Alert x ___ V P U	Alert x ___ V P U	Alert x ___ V P U	
		S I G N S	Skin – Is it W arm, P ink and D ry? Pupils – Are the E qual, R ound, and R eactive to L ight? Mental Status – Does patient know the 4 questions? 1. Who they are? 3. What Happened? 2. Where they are? 4. What time/day is it? If patient is not Alert X 4 , does he/she respond to Verbal command or Pain ? If not, then patient is Unconscious.				
Results of Head-to-Toe Exam:							
Spinal Assessment:		Release Spinal Precautions		Neurological Exam		Range of Motion Test	
Summary of Assessment:							
Treatment Plan:		Stabilize Cervical Spine Treat for Shock		Prevent Heat Loss Circulation/Sensation/Motion Check		Cool (if appropriate)	
Specific Treatments:							

Vital Signs & Continued Care (Minimum Information Necessary, add as needed)							
Time							
Pulse							
Respiratory Rate/Quality							
Skin	W P D	W P D	W P D	W P D	W P D	W P D	W P D
Pupils (PERRL)	E R R L	E R R L	E R R L	E R R L	E R R L	E R R L	E R R L
Mental Status	Alert x ___ V P U	Alert x ___ V P U	Alert x ___ V P U	Alert x ___ V P U	Alert x ___ V P U	Alert x ___ V P U	Alert x ___ V P U
Heat/Cool							
Treatment Site							
Evacuation Plan							
<u>Exact Location of Patient</u> ___ <i>Marked Map Attached</i>						<u>Helicopter Site</u> (100' X 100' Clear)	
<u>Resources on Site</u> (tents, bags, food, water, technical equipment, etc.)			<u>Messengers to notify</u> Rescue Agency: _____ Phone # : _____			<u>Terrain</u> <u>Distance to Roadhead:</u>	
<u>Personnel on Site</u>			<u>Communication Equipment on Site?</u> Cell Phone# Do you have reception at the site? 2 Way Radio? ___ Type: freq/channel:			<u>Current Weather</u>	
<u>Assistance Needed</u> ___ Medical ___ Helicopter ___ Carry-out ___ Search ___ Backboard ___ Technical Evacuation: Raise or Lower ___ Other:							
<u>Patient's Family Member</u> ___ Please contact							
_____ Name		_____ Address		_____ Phone		_____ Relation	
<u>Message</u>							

For life threatening emergencies or fatalities contact the Outings Department as soon as possible at: 1-888-OUTINGS (1-888-688-4647) or 01-715-852-1701 if calling internationally. Also send an Incident Report form to the Outings Dept. following the incident.

WFA Refusal of First Aid - Against Medical Advice (AMA)

Patient (Pt) Name:

First Aider (FA) Name:

Pt Phone Number:

FA Phone Number:

Pt Street Address:

FA Street Address:

Pt City, State, Zip:

FA City, State, Zip:

Date:

Time:

Location of Incident:

What Happened:

I have been advised by the first aider named above that I should receive medical attention for the following condition: _____

The specific procedure or treatment which has been recommended is:

Having been advised of the possible consequences of not having immediate medical attention, I hereby release the Sierra Club and the first aider(s) named above of any and all responsibility for my refusing first aid and/or leaving at this time. I understand that I am leaving of my own volition and am assuming responsibility both for safely reaching the roadhead, and for my own transportation.

Comments:

Pt Name:

FA Name:

Pt Signature:

FA Signature:

Date:

Date:

Witness Name:

Witness Address:

Witness Phone Number:

Sample Form

Safety Management/Emergency Response Plan

Using this form: This form will help you capture information *before* beginning your outing. It is generic – make adjustments as needed.

Basic Trip Information

<u>Trip name</u>		<u>Start date</u>	<u>End date</u>	<u>Total # of days</u>			
<u>Primary outdoor activity</u>		<u>Number of leaders</u>			<u>Number of participants</u>		
		Total:	M:	F:	Total:	M:	F:
<u>Leader roles</u>	<u>Leader names</u>	<u>Cell phone #</u>		Entry location and time:			
1.	1.	1.		Exit location and time:			
2.	2.	2.					
3.	3.	3.					
For Entry & Exit - give enough detail to locate on a map – such as map quad name, nearest road, name of trailhead. Use approximate times.							

Public/Private Land Use and Agency Information

<u>Location Name</u> (e.g., Ventana Wilderness)	<u>Agency who manages this area</u> (e.g., United States Forest Service)	<u>Agency contact person</u>	<u>Agency location</u>
<u>Agency phone</u>		<u>Hours</u>	<u>Ranger station or outpost facility information</u>

Medical Facilities

	<u>Medical facility #1</u>		<u>Medical facility #2</u>	
<u>Name</u>				
<u>Address</u>				
<u>Phone</u>	<u>Hours</u>		<u>Hours</u>	
<u>Services</u>				

Additional Emergency Contacts

	<u>Sheriff</u>	<u>Police</u>	<u>EMS or fire department</u>
<u>Name</u>			
<u>Address</u>			
<u>Phone</u>			

OVER →

Sample Form

Itinerary

Day	Date	Route: Include intended campsites and alternates, mileage, off-trail or on-trail, direction of travel, known hazards, map names, trail names, and landmarks.
		Evacuation: Include distance and type of help available (roadhead, ranger station, etc.).
1		
2		
3		
4		
5		
6		
7		
8		

Safety Management Checklist (all must be completed/packed before outing departs)

- Does the proposed itinerary **identify potential dangers** and **expected countermeasures**?
- Participant roster** (or Sign-in Sheet and Liability Waiver)*
- Signed liability waivers for each participant** (or one Sign-in Sheet and Liability Waiver signed by all)
- Two sets of Participant Medical Forms** (One set for leaders and a copy with each participant. Leaders should fill these out too. Form should include emergency contact information.)
- Copy of Safety Management Plan** left with a designated contact person (e.g., Outings Chair)*
- Patient Assessment Forms**
- Copies of permits**
- Group equipment list**
- Communication device** (whistles, cell phones, etc. Will it work in the field? Extra batteries on hand?)
- Emergency Response Card** (from the outings leader handbook)

***Make multiple copies of these forms.**

**For life threatening emergencies or fatalities, after contacting the proper authorities, contact the Outings Department:
1-888-OUTINGS (1-888-688-4647)**

SIERRA CLUB

Application for Mountaineering Outing Approval

NON-TRAINING TRIPS

This Application must be sent to the person in your group or subcommittee designated to review mountaineering outings. That person will then send your approved application to:

Ron Hudson, hudsonrf@verizon.net
Mountaineering Oversight Committee Chair
1590 Avenida del Manzano, Camarillo, CA 93010
e-mail submission is preferred

***APPLICATIONS WILL NOT BE ACCEPTED DIRECTLY FROM LEADERS,
each must be submitted and approved by your group designee.***

1. Name of Sponsoring Entity (chapter, group or section): _____
2. Trip Name: _____ Trip Dates: _____
3. Names of Leaders: _____
4. Email / postal address of primary leader: _____
Leader phone _____ Email: _____
5. On a separate sheet of paper, fully describe the qualifications of each leader, including experience, first aid, mountaineering certification, and Sierra Club membership number. New descriptions are not required if the leader has already led a trip this year.
6. PLEASE CHECK ONE: Leader description included Leader description previously submitted
7. Describe the intended route: _____

8. Describe the conservation theme of the trip: _____

9. Describe the technical difficulty of trip: _____

Over >

10. Describe the participant screening process, including experience requirements: _____

11. Will any paid guides or concessionaires be used? _____ If yes, you must obtain a certificate of insurance naming the Sierra Club as additional insured and send it to the Outings Department.

If your outing is approved, you will need to send the following to the Outings Department within 30 days or sooner of the completion of the trip:

- the *Acknowledgment of Outing Member Responsibility, Express Assumption of Risk, and Release of Liability* form from each participant signed prior to the outing.
- a complete trip roster/sign-in sheet of all participants, including addresses and membership numbers
- the *Medical Screening Form* for each participant.
- send in an Incident Report Form asap to report any serious incidents, injuries or illnesses.

Leaders who do not turn in the above documents will not be approved to lead future restricted outings

Please allow at least four weeks for the approval process

SIERRA CLUB

Application for Mountaineering Outing Approval

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This Application must be sent to the person in your group or subcommittee designated to review mountaineering outings. That person will then send your approved application to:

Ron Hudson, hudsonrf@verizon.net
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1. Name of Sponsoring Entity (chapter, group or section): _____
2. Trip Name: _____ Trip Dates: _____
3. Names of Leaders: _____
4. Email or postal address of primary leader: _____
Leader Phone: _____ Email _____
5. On a separate sheet of paper, fully describe the qualifications of each leader, including experience, first aid, mountaineering certification, and Sierra Club membership number. New descriptions are not required if the leader has already led a trip this year.
6. PLEASE CHECK ONE: Leader description included Leader description previously submitted
7. Estimated number of participants: Minimum: _____ Maximum: _____
8. Describe the type of training that will occur: _____

9. Describe the intended route: _____

10. Describe the technical difficulty of trip: _____

Over >

11. Describe the participant screening process, including experience requirements: _____

12. Describe the conservation theme of the trip: _____

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Leaders who do not turn in the above documents will not be approved to lead future restricted outings

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ABOUT THE MEDICAL FORM

The Medical Form is designed to be used by trip leaders to find out in advance of special medical conditions the participant may have, rather than learning about them in a crisis. Also, in the event of serious injury or illness, the Medical Form provides emergency medical personnel with useful medical history information. After reviewing the form, the leader might need to contact the participant to discuss whether the trip will be safe and enjoyable for him or her considering his or her medical history.

By law, medical information must be kept confidential. It should be seen on a “need to know basis” by only the trip leaders, medical personnel, or others who know and understand its confidential nature. The medical form will be retained along with the participant’s liability waiver for a period of time following the trip, after which it will be destroyed. If the participant chooses not to go on the trip, this form will be destroyed immediately.

Just remember, as the leader you are in charge of your trip, and you decide who is appropriate to participate on it. You need to be as best-informed as possible so that you can make excellent decisions. ,

Leaders also should complete and carry a Medical Form.

Why is it important to obtain medical information?

- You are gathering information to ensure the trip is appropriate for each participant, to help you be better informed, and to be a more prepared leader. More information allows you and potential medical personnel to make better decisions and provide better treatment in the event of a medical emergency.
- You are not gathering information to exclude people from the trip, although that may be necessary in some cases.
- Knowing a participant’s prior medical history can help you determine whether this trip is appropriate for him or her. The trip could be too physically challenging (due to poor fitness) or could cause the participant harm (due to a dangerous medical issue).
- Knowing a participant’s prior medical history also helps promote group safety. A medical condition that incapacitates a group member could impact your ability to manage the group safety.
- In addition to being helpful to you in the event of an emergency, the medical history of your participants, the medications they take, and any allergies they have can be very helpful to advanced medical personnel.

For further help with information you may receive on a Medical Form, see <http://clubhouse.sierraclub.org/outings/forms/> or <http://clubhouse.sierraclub.org/outings/medical/forms/how-to-use-medical-form.pdf>



Please complete this form and return it to your leader within 30 days.

We ask for this information so that the trip leaders will know in advance of special medical conditions you may have, rather than learning about them in a crisis. Also, in the event of serious injury or illness, this form provides emergency medical personnel with a useful medical history. After reviewing this form, the leader may contact you to discuss whether the trip will be safe and enjoyable for you considering your medical history.

We will keep the information on this form confidential. It will be seen only by the trip leaders, medical personnel, or others who know and understand its confidential nature. The form will be retained along with your liability waiver for a period of time following the trip, after which it will be destroyed. If you choose not to go on the trip, this form will be destroyed immediately.

General Information

Name: _____		Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female	
Address: _____			
City: _____		State: _____ Zip: _____	
Home: (____) _____		Work: (____) _____ Cell: (____) _____	
E-mail address: _____		Date of Birth: _____	
Height: _____		Weight: _____ Blood Pressure: _____ Resting Pulse: _____	

Primary Emergency Contact: _____ Relationship: _____
 Home: (____) _____ Work: (____) _____ Cell: (____) _____

Secondary Emergency Contact: _____ Relationship: _____
 Home: (____) _____ Work: (____) _____ Cell: (____) _____

Evacuation and Medical Insurance

We strongly encourage you to have medical and evacuation insurance and to bring your insurance card or other documentation with you on the trip.

<u>Evacuation Insurance</u> <input type="checkbox"/> NONE	<u>Medical Insurance</u> <input type="checkbox"/> NONE
Company Name:	Company Name:
Policy Number:	Policy Number:
Contact Phone Number:	Contact Phone Number:
Coverage Amount:	

Allergies NONE

Include allergies to medicines, foods, insect bites and stings, animals and environment (dust, pollen, etc.).

Allergy	Reaction	Medication Required (if any)

OVER →

Medications NONE

Please list all prescription, over-the-counter, and natural medications you are taking. *Use a separate sheet if necessary.*

Medication Name	Dosage	Frequency	Side Effects (known & potential)	Reason for Taking

Medical History

Please answer the following medical history questions. *Use a separate sheet to explain history in more detail.*

- Recent illness within the last 12 to 18? Yes No *If yes, please explain.*
- Have you had surgery or been hospitalized in the last year? Yes No *If yes, please explain.*
- Recent exposure to infectious diseases within 12 to 18 months? Yes No *If yes, please explain.*
- Do you have asthma? Yes No *If yes, please list any medications above and explain on separate sheet.*
- Do you have diabetes? Yes No *If yes, please list any medications above and explain on separate sheet.*
- Do you have a history of high blood pressure? Yes No
- Do you have a history of heart disease? Yes No *If yes, please explain.*
- Do you wear glasses? Yes No *(If you wear prescription glasses or contacts, we recommend bringing a spare set.)*
- Any history of eye or vision problems (e.g. glaucoma, detached retina)? Yes No *If yes, please explain.*
- Do you have any problems with your hearing? Yes No *If yes, please explain.*
- If female, are you pregnant? Yes No
- Do you have any bone, joint, or muscle problems? Yes No *If yes, please explain.*
- Have you ever had a seizure? Yes No *If yes, please explain.*
- Have you ever experienced altitude problems? Yes No *If yes, please explain.*
- Do you have any other medical issues that might affect your participation in this trip? Yes No

If yes, please explain: _____

- The outing may require vigorous activity, extended climbing and hiking, and other physically and mentally demanding exertion in isolated areas without medical facilities, medical providers, or means of contacting rescue medical personnel. Please state below all physical or mental limitations and restrictions of which you are aware:
If you have no such limitations, please initial here: _____

- **Tetanus:** It is strongly advised that you are inoculated against this fatal disease and you obtain a booster within every 10 years. The date of your most recent tetanus inoculation or booster: _____ / _____ / _____

Physical Examination

Date of most recent physical: _____ / _____ / _____ Physician's name: _____
 Address: _____ Phone Number: _____
 Physician's signature (if required): _____

◆ *Please notify your trip leader immediately if any information on this form changes.* ◆

Trip Name: _____	Trip Dates: _____
Signature (required): _____	Date: _____ / _____ / _____

Last updated 3/

Assistant Leader's Evaluation for O-Level Provisional Leaders
Sierra Club -- LEADERSHIP TRAINING PROGRAM -- Angeles Chapter

This completed form should be sent to the provisional leader, who will keep a copy and mail the original, along with his or her self-evaluation, to the LTC Administrative Chair. The evaluating leader should be familiar with the LTP requirements and guidelines for provisional outings as contained in the LRB, especially the Provisional Lead Pointers document. The evaluating leader is to fill out this form with information that will help the LTC and Safety Committee evaluate the leadership skills demonstrated by the new leader candidate and offer teaching moments and skill improvement suggestions to further the leadership growth of the provisional leader. Please avoid responses such as "fine" or "good," which do not give an adequate picture of the candidate's skills; please add specifics.

Provisional Leader's Name _____ (Please Print)

Name of Evaluator (Assistant Leader)

with e-mail or phone _____

Trip Location _____ Trip Date(s) _____

Did the trip meet National leader standards Level 2 outing requirements (overnight trip away from cars, such as a backpack)? _____

Please evaluate the leader's performance

Trailhead stagesetting: introductions, pertinent trip data, special regulations, equipment required, rules and sign-ins, proper waiver forms used.

Was any trailhead or pre-trip screening done to make sure participants were well matched to trip difficulty?

Pace setting, keeping the group together, rest stops.

Camp area selection, leadership in camp (if applicable). Leave No Trace principles demonstrated and enforced during hike and breaks?

Trip plan, route selection, trail junction, or other navigation decisions?

Awareness of risk situations, safety precautions taken.

Sensitivity to physical and emotional status of participants

Were educational or conservation elements included? How were these handled?

Were the number and range of participants enough for the candidate to demonstrate leadership skills?

Date _____ Signature _____

LTC form 107 (Rev Feb 2008)

O-Level Provisional Leader's Self-Evaluation

Sierra Club -- LEADERSHIP TRAINING PROGRAM -- Angeles Chapter

To receive credit for a provisional lead, the Provisional Leader is to complete this self-evaluation form and send it to the LTC Administrative Chair. The assistant leader is also to submit an Assistant Leader's Evaluation.

Provisional Leader's Name _____ (Please Print)

Name of Evaluator (Assistant Leader) _____

Trip Location _____ Trip Date(s) _____

Trip Nature (daypack, backpack) _____

Overnight backpack away from cars? _____ (Level 2 outing, per National leader standards)

Sponsoring Group or Section _____ Attendance (aside from leaders) _____

Trip Announced in Publication _____ Issue/month _____ Page _____

Altitude Gain _____ Distance _____ Duration _____

Please give a self-evaluation of your leadership (use additional sheets if necessary):

Roadhead orientation

Your confidence as a leader

Did any problems or unexpected events happen? How did you handle them?

What did you learn?

Describe the route used.

Planned time compared to actual?

Planned route OK?

How effective was the trip description or participant screening in matching the skill level and conditioning of participants to that of the planned trip?

Date _____ Signature _____
LTC form 106 (Rev Feb 2008)

Assistant Leader's Evaluation for I, M, and E-Level Provisional Leaders

Sierra Club -- LEADERSHIP TRAINING PROGRAM -- Angeles Chapter

This completed form should be sent to the provisional leader, who will keep a copy and mail the original, along with his or her self-evaluation, to the LTC Administrative Chair. The evaluating leader should be familiar with the LTP requirements and guidelines for provisional outings as contained in the LRB, especially the Provisional Lead Pointers document. The evaluating leader is to fill out this form with information that will help the LTC and Safety Committee evaluate the leadership skills demonstrated by the new leader candidate and offer teaching moments and skill improvement suggestions to further the leadership growth of the provisional leader. Please avoid responses such as "fine" or "good," which do not give an adequate picture of the candidate's leadership skills; please add specifics.

Provisional Leader's Name _____ (Please Print)

Name of Evaluator (Assistant Leader) with e-mail or phone _____

Trip Location _____ Trip Date(s) _____ Trip rating (I, M, or E) _____

Please evaluate the leader's performance

Trailhead stagesetting: introductions, pertinent trip data, special regulations, equipment required, rules and sign-ins, proper waiver forms used.

Was any trailhead or pre-trip screening done to make sure participants were well matched to trip difficulty?
How well did the leader do in matching skill and conditioning levels to trip difficulty?

Pace setting, keeping the group together, rest stops

Camp area selection, leadership in camp. Leave No Trace principles demonstrated and enforced during hike and breaks?

Trip plan, route selection other navigation decisions? Did the leader demonstrate to you the navigational skills required for I or M navigation? Were they able to answer questions and make demonstrations of navigational difficulties of the trip?

How did the candidate demonstrate good route-finding skills (as opposed to navigation) while on cross-country travel?

Awareness of risk situations, safety precautions taken (i.e., rockfall hazard, stream crossings, etc.)
Sensitivity to physical and emotional status of participants

Were educational or conservation elements included? How were these handled?

Problem management

Questionable decisions, actions, or plans?

Trip objective met?

Were the number and range of participants enough for the candidate to demonstrate leadership skills?

General leadership evaluation. Is this leader ready to lead at this level?

For M and E only

How did the leader do in leading the technical snow or rock?

How did the leader manage the group in this terrain?

Sensitivity to rockfall, snow conditions, or other technical hazards

Were club policies for restricted mountaineering outings followed (when appropriate)?

Date _____ Signature _____
LTC form 112 (Feb 2008)

I-, M-, and E-Level Provisional Leader's Self-Evaluation
Sierra Club -- LEADERSHIP TRAINING PROGRAM -- Angeles Chapter

To receive credit for an experience trip, the Provisional Leader is to complete this self-evaluation form and send it to the LTC Administrative Chair. The assistant leader is also to submit an Assistant Leader's Evaluation.

Name of Leader _____ Leader Category _____
(Please Print) (I, M, E)

Name of Evaluator _____ Trip Rating _____
(Assistant Leader) (I, M, E)

Trip Location _____ Trip Date(s) _____

Trip Nature (backpack, snow, rock?) _____

Sponsoring Group or Section _____ Attendance (aside from leaders) _____

Trip Announced in Schedule: Number _____ Page _____ Other _____

Altitude Gain _____ Distance _____ Duration _____

Please give a self evaluation of your leadership:

Pre-trip plan and screening of participants

Roadhead orientation

Your confidence as a leader

Did any problems or unexpected events happen? How did you handle them?

What did you learn?

Describe the route used.

How did this route meet the requirements for navigation and route finding?

Planned time compared to actual

Planned route ok?

How effective was trip description or participant screening in matching skill level/conditioning of participants to that of the planned trip?

For M and E only

What was the technical portion of the trip that complied with the rock or snow criteria?

How was this terrain handled by your group?

Your confidence in leading this terrain?

Date
(LTC form 111Feb 2008)

Signature

M-LEVEL ROCK CHECKOUT FORM
 Sierra Club – LEADERSHIP TRAINING PROGRAM – Angeles Chapter
 (Climbing helmet and harness are required. Candidates must use their own ropes and gear.)

Candidate Name: _____

Examiner Name: _____

Checkout Location: _____ Date: _____

(Examiners must insure that whenever candidates or participants are climbing, rappelling, or being lowered from an anchor, they are secured with a backup belay.)

Examiner: Assign number for each task; 0 = fail, 1 = marginal, 2 = good

1. Knots

- | | | | |
|--|-------------------------------|---|------------------------|
| _____ BHK | _____ Water Knot | _____ Slip Knot | _____ Figure 8 knot |
| _____ Figure 8 on a bight | _____ Figure 8 follow through | _____ Double Fisherman | _____ Triple Fisherman |
| _____ Bowline | _____ Bowline on a coil | _____ Bowline on a coil on another person | |
| _____ Girth Hitch | _____ Clove Hitch | _____ Munter Hitch | _____ Munter Mule |
| _____ Prusik | _____ Klemheist | _____ Auto Block | |
| _____ Leadership (Visually verify that knots tied by others are correct) | | | |

2. Climbing, Downclimbing (May be demonstrated in Parts 3, 4, and 6)

- _____ Friction, balance _____ Counterforce _____ Edging _____ Mantle _____ Jams: hand, foot, arm, leg
 _____ Leadership (Demonstrate how to do the various techniques)

3. Top-Roped Climbing and Belaying (Climb a top-roped pitch rated between Class 4 and 5.2)

Candidate will climb a top-roped pitch. Candidate will belay a climber with a belay device and catch an unannounced fall. Candidate will instruct a climber in the proper belay technique, safety checks, and climbing commands.

- _____ Safety checks _____ Climbing commands _____ Climbing technique _____ Belay technique
 _____ Judgment _____ Knowledge _____ Leadership

4. Unanchored Belay

- _____ Flake the rope for climbing
 _____ Coil the rope in a Mountaineers coil
 _____ With full daypack and carrying the rope, climb a Class 3 pitch
 _____ Uncoil and throw the rope down to a climber
 _____ Establish a secure sitting hip belay and belay a climber up with a right hand brake
 _____ Belay a climber down the pitch
 _____ Belay a climber up with the left hand brake
 _____ Use of appropriate climbing commands
 _____ Coil the rope in a Butterfly coil
 _____ Carrying daypack and rope, down climb the pitch
 _____ Judgment _____ Knowledge _____ Leadership (Explain climbing signals to others, verify climbers are properly tied in, demonstrate rope handling and group management)

5. Anchors

- _____ Set up 2 multipoint natural anchors with an equalized redundant master point

6. Anchored Belay

- _____ With a full daypack and trailing the rope, climb a Class 3 pitch
- _____ Establish a redundant anchor with a redundant master point for belay
- _____ Tie into the anchor with a clove hitch
- _____ Belay a climber up using a Munter hitch
- _____ Demonstrate a climber tie-off using a Munter Mule knot
- _____ Untie the mule knot and lower the climber down the pitch
- _____ Use of appropriate climbing commands
- _____ Judgment _____ Knowledge _____ Leadership (Same as unanchored belay)

7. Rappelling

- _____ Set up a redundant rappel anchor for a Class 3 rappel
- _____ Clip into the anchor with a personal anchor tether
- _____ Uncoil, flake, and throw the rope down for rappelling
- _____ Descend the pitch with a Dulfersitz rappel
- _____ Clip into the anchor with a personal anchor tether
- _____ Rappel the pitch with a belay/rappel device backed up with an Auto Block
- _____ Clip into the anchor with a personal anchor tether
- _____ Rappel the pitch with a Munter hitch backed up with an Auto Block
- _____ Retrieve and coil the rope
- _____ Use of appropriate climbing signals
- _____ Judgment _____ Knowledge _____ Leadership (Teach a climber how to rappel, inspect different rappel set-ups and devices for safety and proper use by participants)

8. Examiner's Comments (Examiners are encouraged to write comments during the checkout)

I certify that the named candidate has demonstrated the skill, judgment, and knowledge required for M-level Rock LTP checkout.

Signature: _____ Date: _____

Completed form with comments to be returned to the candidate, with copies to the LTC Rock Chair, and the LTC Administration Chair.
LTC form 108-M (Rev. December, 2012)

E-LEVEL ROCK CHECKOUT FORM

Sierra Club – LEADERSHIP TRAINING PROGRAM – Angeles Chapter

(Climbing helmet and harness are required. Candidates must use their own ropes and gear.)

Candidate Name: _____

Examiner Name: _____

Checkout Location: _____ Date: _____

(Examiners must insure that whenever candidates or participants are climbing, rappelling, or being lowered from an anchor, they are secured with a backup belay.)

Examiner: Assign number for each task; 0 = fail, 1 = marginal, 2 = good

1. Knots

_____ BHK	_____ Water Knot	_____ Slip Knot	_____ Figure 8 knot
_____ Figure 8 on a bight	_____ Figure 8 follow through	_____ Double Fisherman	_____ Triple Fisherman
_____ Bowline	_____ Bowline on a coil	_____ Bowline on a coil on another person	
_____ Girth Hitch	_____ Clove Hitch	_____ Munter Hitch	_____ Munter Mule
_____ Prusik	_____ Klemheist	_____ Auto Block	
_____ Leadership (Visually verify that knots tied by others are correct)			

2. Climbing, Downclimbing (May be demonstrated in Parts 3, 4, and 6)

_____ Friction, balance _____ Counterforce _____ Edging _____ Mantle _____ Jams: hand, foot, arm, leg
_____ Leadership (Demonstrate how to do the various techniques)

3. Top-Roped Climbing and Belaying (Climb a top-roped pitch rated 5.6)

Candidate will climb a top-roped pitch. Candidate will belay a climber with a belay device and catch an unannounced fall. Candidate will instruct a climber in the proper belay technique, safety checks, and climbing commands.

_____ Safety checks _____ Climbing commands _____ Climbing technique _____ Belay technique
_____ Judgment _____ Knowledge _____ Leadership

4. Unanchored Belay

_____ Flake the rope for climbing
_____ Coil the rope in a Mountaineers coil
_____ With full daypack and carrying the rope, climb a Class 3 pitch
_____ Uncoil and throw the rope down to a climber
_____ Establish a secure sitting hip belay and belay a climber up with a right hand brake
_____ Belay a climber down the pitch
_____ Belay a climber up with the left hand brake
_____ Use of appropriate climbing commands
_____ Coil the rope in a Butterfly coil
_____ Carrying daypack and rope, down climb the pitch
_____ Judgment _____ Knowledge _____ Leadership (Explain climbing signals to others, verify climbers are properly tied in, demonstrate rope handling and group management)

5. Anchors

_____ Set up a multipoint natural anchor with an equalized redundant master point
_____ Set up a multipoint gear and natural anchor with an equalized redundant master point
_____ Set up a three point gear anchor with an equalized redundant master point

6. Anchored Belay

- _____ With full daypack lead a Class 4 pitch placing protection
- _____ Establish a redundant anchor with a redundant master point for belay
- _____ Tie into the anchor with a Clove hitch
- _____ Belay a climber up using a Munter hitch
- _____ Demonstrate a climber tie-off using a Munter Mule knot
- _____ Untie the Mule knot and lower the climber down the pitch
- _____ Use of appropriate climbing commands
- _____ Climbing ability _____ Protection placements
- _____ Judgment _____ Knowledge _____ Leadership (Same as unanchored belay)

7. Rappelling and Prusiking

- _____ Set up redundant rappel anchor for a Class 3 rappel
- _____ Clip into the anchor with a personal anchor tether
- _____ Uncoil, flake, and throw the rope down for rappelling
- _____ Descend the pitch with a Dulfersitz rappel
- _____ Clip into the anchor with a personal anchor tether
- _____ Rappel the pitch with a Munter hitch backed up with an Auto Block
- _____ Set up a redundant rappel anchor for an overhanging rappel
- _____ Clip into the anchor with a personal anchor tether
- _____ Uncoil, flake, and throw the rope down for rappelling
- _____ Rappel half way down the pitch with a belay/rappel device and let the Auto Block lock off
- _____ Tie off short with a safety knot
- _____ Attach a waist friction hitch prusik to the rope and harness
- _____ Attach a foot sling friction hitch prusik to the rope and harness
- _____ Ascend the rope with prusiks up and over the overhang, tying off short on ascent
- _____ Retrieve and coil the rope
- _____ Use of appropriate climbing signals
- _____ Judgment _____ Knowledge _____ Leadership (Teach a climber how to rappel, inspect different rappel set-ups and devices for safety and proper use by participants)

8. Fixed Lines

- _____ Set up a fixed line for a traverse
- _____ Instruct a climber in passing anchor points with personal anchor tethers
- _____ Set up a fixed line for an ascent
- _____ Instruct a climber in self belaying with a friction hitch

9. Examiner's Comments (Examiners are encouraged to write comments during the checkout)

I certify that the named candidate has demonstrated the skill, judgment, and knowledge required for E-level Rock LTP checkout.

Signature: _____ Date: _____

Completed form with comments to be returned to the candidate, with copies to the LTC Rock Chair, and the LTC Administration Chair.

LTC form 108-E (Rev. December, 2012)

SNOW CHECKOUT FORM
Sierra Club -- LEADERSHIP TRAINING PROGRAM -- Angeles Chapter

This Checkoff sheet is intended for use by LTC candidates to determine when they are ready for signoff, and by LTC Snow Examiners in evaluating performance at the "M" and "E" levels. The techniques should each be performed with a degree of proficiency appropriate to the desired level.

Completed forms should be returned to the candidate with comments. Names of successful candidates should be forwarded to the LTC Administration Chair with copies to the LTC Snow Chair.

Ice axe demonstrations:

- (M,E)___ Demonstrate ice axe short term storage. (requires day pack)
- (M,E)___ Describe parts of the ice axe and various design trends.
- (M,E)___ Discuss and contrast various ice axe attachment methods.
- (M,E)___ Demonstrate and discuss the ice axe trail carry.
- (M,E)___ Demonstrate and discuss self-belay and self-arrest grasps.
- (M,E)___ Demonstrate ice axe self-arrest position and discuss technique.
- (M,E)___ Demonstrate ice axe cross-body position and discuss use.
- (M,E)___ Demonstrate ice axe stake position and discuss use.
- (E)___ Demonstrate grip for step-cutting and discuss use of wrist loop.
- (E)___ Demonstrate grip for ice axe traction and discuss wrist loop.

Ascent/descent demonstrations: (slope can be less than 34 degrees)

- (M,E)___ Discuss edging vs step kicking, leading and following.
- (M,E)___ Demonstrate step-kicking ascent with direction changes.
- (M,E)___ Demonstrate/discuss rest step and forced breathing techniques.
- (M,E)___ Demonstrate plunge step descent as on soft snow.

Self-arrest demonstrations:

- (M,E)___ Demonstrate a fast sitting glissade, either hand.
- (M,E)___ Arrest starting with self-belay and self-arrest grasps.
- (M,E)___ Arrest a head first fall, face down, left hand.
- (M,E)___ Arrest a head first fall, face down, right hand.
- (M,E)___ Arrest a head first fall, face up, left hand.
- (M,E)___ Arrest a head first fall, face up, right hand.
- (M,E)___ Simulate crampons, arrest on a steep slope and recover.
- (M,E)___ Secure ice axe for long term storage on day pack.
- (M,E)___ Demonstrate self-arrest without an ice axe.

Knots and rope handling:

- (M,E)___ Demonstrate rope uncoiling.
- (M,E)___ Demonstrate and discuss two rope throwing techniques.
- (M,E)___ Tie rope to yourself using a bowline on a coil.
- (M,E)___ Join two rope ends using a figure eight followthrough.
- (M,E)___ Join two rope ends using a double fisherman (barrel knot).
- (M,E)___ Attach rope to an anchor using a bowline.
- (M,E)___ Demonstrate a Munter hitch belay on a carabiner.
- (M,E)___ Join webbing using an overhand followthrough (water knot).
- (M,E)___ Tie a swami belt around yourself.
- (M,E)___ Tie rope to the swami using a figure eight followthrough.
- (M,E)___ Attach yourself to an anchor using a figure eight on a bight.
- (M,E)___ Attach yourself to an anchor using a clove hitch, adjust length.
- (E)___ Attach prussik loops for ascending. Discuss use.
- (M,E)___ Demonstrate rope coiling.

Candidate: _____ Level: _____

Crampon demonstrations:

- (M,E)___ Attach crampons to boots in a quick and efficient manner.
- (M,E)___ Demonstrate that crampons are secure and properly adjusted.
- (M,E)___ Discuss crampon fit, adjustment, and storage for travel.

Ascent/descent demonstrations: (slope should be more than 34 degrees)

- (M,E)___ Demonstrate leading a diagonal ascent with direction changes.
- (M,E)___ Demonstrate slip and recovery with self-belay/self-arrest grasps.
- (M,E)___ Demonstrate direct ascent/descent with ice axe in stake position.
- (M,E)___ Demonstrate slip and recovery with ice axe in stake position.
- (M,E)___ Demonstrate traverse with ice axe in cross-body position.
- (M,E)___ Measure angle of slope using a compass as a protractor.
- (E)___ Demonstrate step-cutting.
- (E)___ Demonstrate front point ascent/descent using anchor position.
- (E)___ Demonstrate front point ascent/descent with 2 ice axe traction.

Snow anchor demonstrations:

- (M,E)___ Construct and test a snow bollard anchor.
- (M,E)___ Place and test a buried ice axe anchor.
- (E)___ Place and test a snow fluke anchor.
- (E)___ Place and test a multiple equalizing anchor.
- (E)___ Demonstrate the "Z" pulley system using one of the above anchors.

Belay demonstrations: In groups of two, set up and test the following:

- (M,E)___ Boot axe belay.
- (M,E)___ Standing carabiner belay.
- (M,E)___ Munter hitch belay.
- (M)___ Sitting hip belay.
- (E)___ Anchored sitting hip belay, fallen climber tieoff procedure.

Roped travel demonstrations:

- (E)___ Discuss when to travel roped vs. setting up a belay.
- (E)___ Discuss harness, spacing interval, and rope attachment.
- (E)___ Discuss how to secure extra rope length and when to carry coils.
- (E)___ Tie in to rope teams of three or four.
- (E)___ Demonstrate diagonal ascent/descent with direction changes.
- (E)___ Arrest a hard fall by a rope team member, recover.
- (E)___ Simulate a snow bridge crossing.
- (E)___ Simulate glacier with crevasses: lead a route to avoid dangers.

Situation responses: Examiner is to assign at least one situation to each candidate. Some examples are listed below:

- (E)___ Climb down to a fallen climber and help him rejoin the group.
- (E)___ Belay the party across a steep ice chute.
- (E)___ Direct a simulated avalanche search.
- (E)___ Direct a simulated helicopter evacuation.

Leadership element:

- (E)___ Did candidate demonstrate superior personal skills *and* the ability help others with equipment and techniques?
- (E)___ Was candidate able to critically evaluate standard equipment and techniques and offer alternatives?
- (E)___ Did candidate demonstrate overall good judgement in dealing with demonstrations and problems?

Candidate: _____ Level: _____ # Missed: _____ ()Pass ()Not Pass

Examiners: _____ Date: _____ Location: _____

Comments: _____

Trip Leg	Description of Leg	Compass Rose Direction	Trip Leg Distance (mi.)	Cum. Distance (mi.)	Elevation (ft.)	Trip Leg Elevation Gain (ft.)	Trip Leg Elevation Loss (ft.)	Average Slope (XX °)	Naismith Time (minutes)	Squiggle Factor (%)	Adjusted Time (minutes)	Cum Trip Time (minutes)	Cum Trip Time (hrs.)	Comments & Break Times
	START - ____ AM													
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
														+ ____ % for Group Size
	TOTAL													
	FINISH - ____ PM													Trip time = ____ Hours
	Date													
	Start Time				Finish Time									
	Sunrise				Sunset									
	Moonrise				Moonset									Moon Phase
	Weather Report													Water Required

APPENDIX D: SAMPLE ROUTE CARD

Background Information and Statistics for Mount San Antonio Climb from Manker Flat

The route to Mount San Antonio (Mt. Baldy) from Manker Flat via the San Antonio Ski Hut is used here to provide a specific example of trip planning considerations and is the basis for an elaborate version of a route card. Ordinarily, the climb is about as routine a day hike as one can imagine. Under good visibility conditions there are essentially no route finding problems, and the climb is typically just a pleasant exercise. If something unexpected happens, however, to benight the party or if the visibility or weather conditions change, the climber can be faced with some very difficult and dangerous circumstances. Then this common walk in the park can become a survival and route-finding challenge.

The trip planning elements developed below are intended to take all these factors into some account and include the leader's homework in researching many of the interesting features encountered on the trip that can enhance the enjoyment of the participants. Then, the example route card developed is deliberately made elaborate enough to account for worst-case conditions, including such unexpected events as major changes in the weather and/or visibility. The example is overkill for such a simple outing but is intended to illustrate the process.

Route Considerations— Manker Flat via the San Antonio Ski Hut

Route, Crux Points, Alternate Routes Down

All have all been incorporated into the route card.

Trip Statistics

- Data from HPS Guide: "8 miles round trip; 3900' gain; 5-6 hrs r.t.; Strenuous"
- Data from MapTech, Route Profile: 7 miles round trip; 3892' gain
- Energetics: $E = 100[10+R+2C+4H] = 100[10+8+4(3.9)] = 3,360$ kilocalories
- Time estimate by Naismith's Rule: $T = D/3+H/2 = 8/3+3.9/2 = 4.62$ hrs = 4 hrs 37 minutes, all on trail, with no allowance for cross country.
- Time estimate by 600 cal/hr: $T = (3360)/(600) = 5.6$ hrs = 5 hr 36 minutes

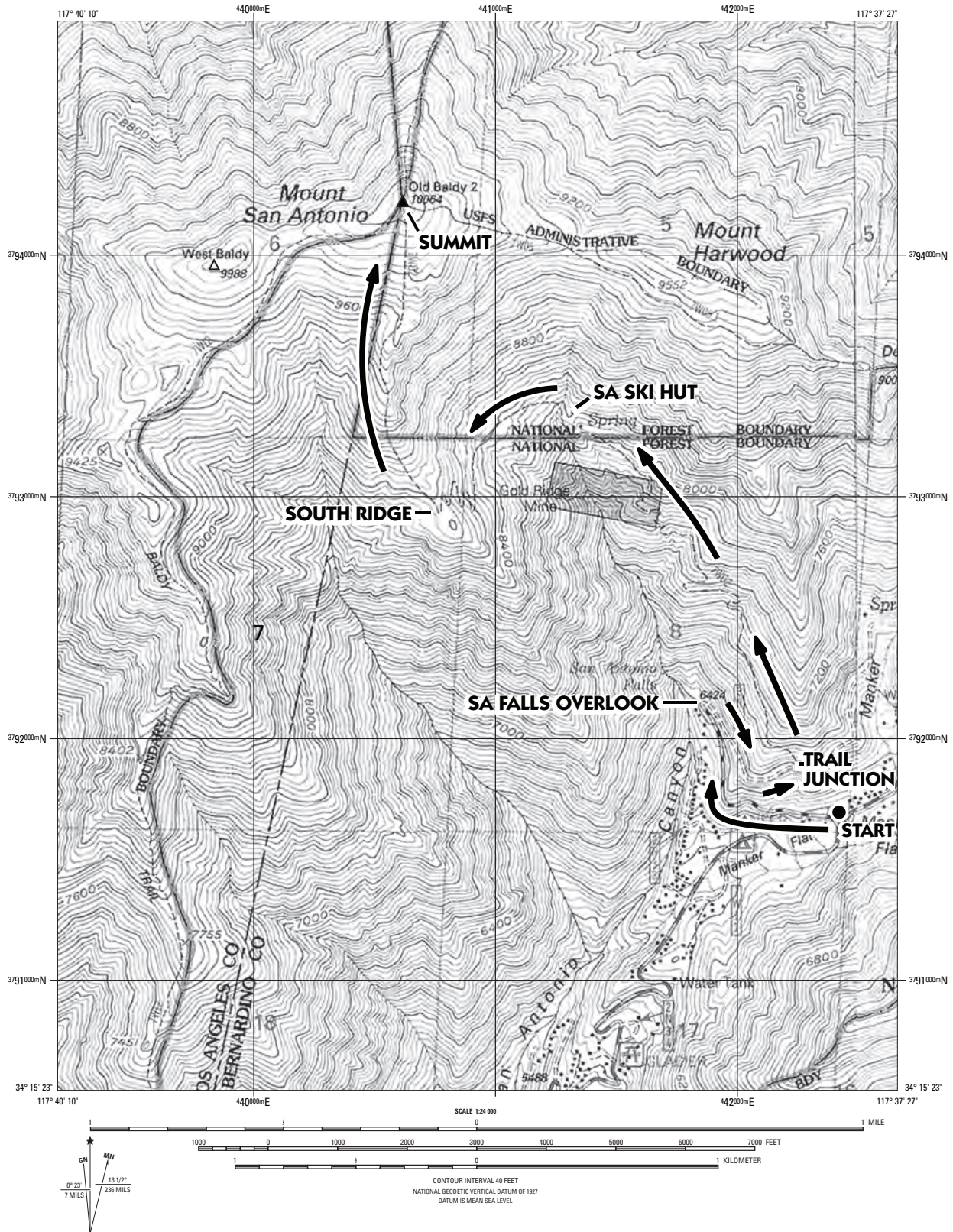


Figure D-1. Sample route plan for Mt. San Antonio

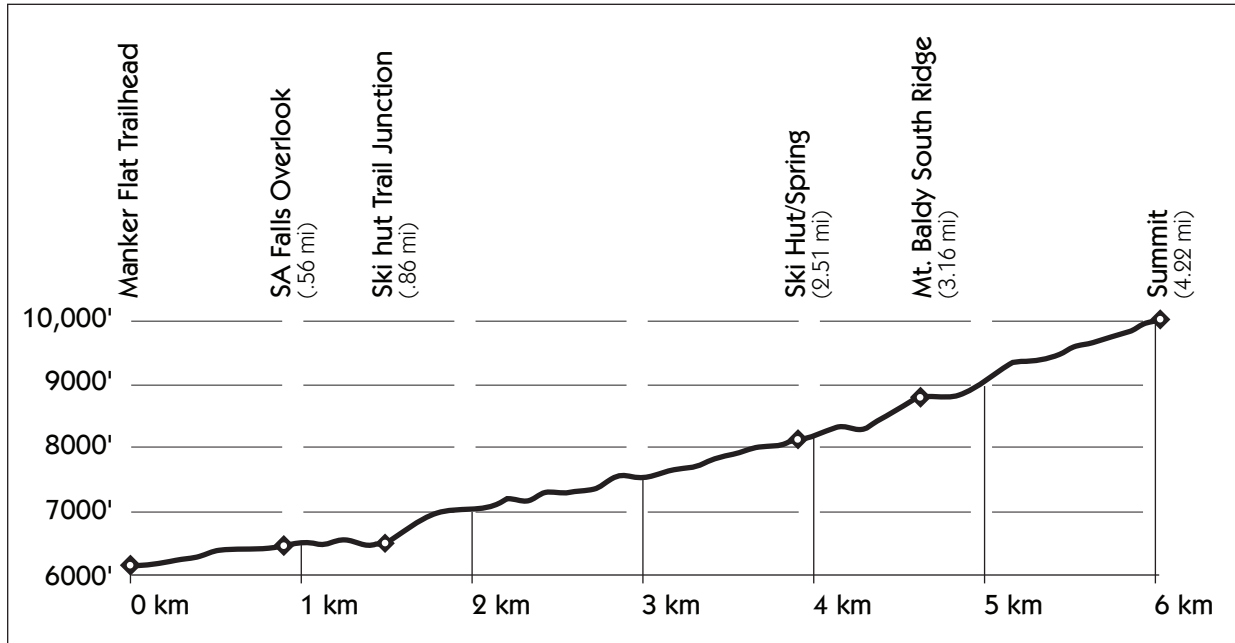


Figure D-2. Sample trip profile: Manker Flat to Mt. San Antonio

TRIP TABLE: MT. SAN ANTONIO FROM MANKER FLAT VIA BALDY BOWL

Leg	Destination	Distance (kilometers)	Gain (feet)	Travel Time (Naismith)	Additional Time	Total Leg Time	Elapsed Time	Notes
1	Mt. SA Falls Overlook	.90 km (.56 mi)	240 feet	.35 hr (0:21 min)	.08 hr ¹ (0:05 min)	.43 hr (0:26 min)	.43 hr (0:26 min)	¹ 5 min. clothing break
2	Ski Hut Trail Junction	.50 km (.30 mi)	200 feet	.23 hr (0:14)	.00 hr (0:00)	.23 hr (0:14)	.66 hr (0:40)	
3	SA Ski Hut/ Spring	2.65 km (1.65 mi)	1,600 feet	1.46 hr (1:28)	.17 hr ² (0:10)	1.63 hr (1:38)	2.29 hr (2:18)	² 2 - 5 min. rest/split breaks
4	Mt. Baldy South Ridge	1.05 km (.65 mi)	560 feet	.54 hr (0:33)	.08 hr ³ (0:05)	.62 hr (0:38)	2.91 hr (2:56)	³ 5 min. rest break (catch up)
5	Summit	1.70 km (1.06 mi)	1,340 feet	1.10 hr (1:06)	.00 hr (0:00)	1.10 hr (1:06)	4.01 hr ⁴ (4:02) ⁴	⁴ Minor difference due to rounding off
-	Summary	6.80 km (4.22 mi)	3,940 feet	3.68 hr (3:42)	.33 hr (0:20)	4.01 hr (4:02)	4.01 hr ⁵ (4:02)	⁵ 25 min. longer than Route Card (breaks)
6	On Summit	.00 km	0 feet	.00 hr (0:00)	.50 hr ⁶ (0:30)	.50 hr (0:30)	4.51 hr (4:32)	⁶ Lunch, sign register
7	Return to Manker Flat	6.80 km (4.22 mi)	0 feet	1.70 hr (1:42)	.17 hr ⁷ (0:10)	1.87 hr (1:52)	6.38 hr (6:24)	⁷ 2 - 5 min. rest breaks
-	Summary	13.60 km (8.44 mi)	3,940 feet	5.38 hr (5:24)	1.00 hr (1:00)	6.38 hr (6:24)	6.38 hr ⁸ (6:24)	⁸ Longer than in HPS Guide & Route Card

Figure D-3. Sample Trip Table. Time estimates on this table were made using km for distance. Calculations made using miles will differ slightly because the conversions in the Naithsmith Rules are rounded off. Rest breaks average 5 min./hour.

Trip Table

For more extended trips a more elaborate breakdown of the trip plan statistics can be useful. Typically this is presented in a tabular form that might include time allowances for rest and split breaks, lunch, etc. A sample trip table is given in Figure D-3. The careful reader will notice that several time estimates for this trip are slightly different. These depend primarily on the estimation method used and whether or not breaks are included.

Other Trails to/from San Antonio Summit

From Manker Flat via Devil's Backbone ("Southeasterly" from the summit): The route up this trail from Manker Flat starts as on the route card, but does not turn off on the ski hut trail. Continue on ski lift access road to Baldy Notch (7,802'). About 200 yd NE of the lodge is a junction. Left turn (towards WNW) leads to the Devil's Backbone Trail to the summit. A right turn (SE) is the road leading to Thunder Mtn. (14 mi r.t., 3,900' gain; 6-7 hrs r.t.; E = 3,960 kcals)

From Mount Baldy Village via Bear Canyon Trail ("Southerly" from the summit): Parking area on Bear Canyon Road opposite the Mt Baldy Lodge (4,200). At 1.75 mi (5,560') Bear Flats stream crossing. Three miles further (4.75 mi, 9,000') pass the "narrows." Another 1.62 mi, arrive at Baldy Summit (10,064). (6.37 mi one way, 12.75 mi r.t.; 5,864' gain; 10-12 hrs r.t.; E = 4,620 kcals) Contrast this time with an early record set by a Pomona College athlete in 1904 of 1 hr, 49 minutes to the top. Someone has surely done even better since then because various competitive runs have been made up the peak along several trails.

From Blue Ridge, Wright Mountain Area via North Backbone Trail ("Northerly" from the summit): From Blue Ridge Road junction with trail to Pine and Dawson (8310') proceed up steep, unmaintained, trail for 5 mi. to the summit. (10 mi. r.t., 1,754' gain; E = 2,700 to 3,200 kcals because of cross-country aspects)

Interesting Points on the Way

San Antonio Fault—Some evidence of the trace of the left-lateral strike slip San Antonio Fault is seen just a few yards above the locked gate near the starting point. The careful observer will note that some water-loving trees (anomalous vegetation) on the slope above the road appear to be quite out of place. Their water need is partially supplied by enhanced seepage through their base on faulted rock. Examined in more detail, at the beginning of the road is the mixed gneiss and migmatite characteristic of the San Antonio Canyon Group. A bit further along the roadcut shows an exposure of mylonite and then switches to Pelona Schist.

San Antonio Falls Overlook—The falls are a pleasant sight, but the rocks about them are dangerous and somewhat unstable areas to climb on. The springs above the ski hut are the main water source, reinforced by the drainages funneling the waters from the bowl into this particular gulch.

Geological Point of Interest—At the San Antonio Falls Overlook and further along the lower Ski Hut Trail, the view to the west shows the Vincent Thrust Fault, one of the oldest faults within the San Gabriels. It is marked by a southward and southwestward dipping zone of shear planes and mylonitic rocks—exposed on the high ridges to the west. Pelona Schist (from ocean floor sediments) is now on the bottom, topped by about 2,000' of mylonite, and then by the Vincent Thrust migmatite. This appears to represent northward thrusting of plutonic rocks over the Pelona Schist, probably in the early Tertiary (~60 million years ago). The Vincent Thrust Fault exposed quartz veins with some show of minerals within the vein. Gold and pyrite have similar freezing points ~600 to 700°C, so they tend to be close to each other along quartz veins that intrude joints as the last mobile melted material in the entire complex. Not surprisingly, there was a series of little gold and silver rushes in the San Gabriels near the turn of the 20th century.

Gold Ridge Mine—This mine is near the head of San Antonio Creek about 1.5 miles above the falls at about 7,400 feet, somewhat lower and across the canyon from the Ski Hut. It was started in 1897 by F. O. Slanker and W. I. Grable, who had a crusher and other equipment packed in. Claims were filed in July, and by August over one hundred people were living in the area. A few buildings were built; the fieldstone lower walls of one and the foundation of another still exist. The ore was so low grade and the cost of production so high that the project was shortly abandoned. In 1900 J. A. Way and C. R. Johnson took over the mine and dug a 600-foot adit. They sold out to a Los Angeles concern in 1904. The adit was drilled in the deformed rocks between the Pelona Schist and the mylonitic rocks of the Vincent thrust fault zone. A rotary mill, powered by a gasoline engine, was packed in to process the ore removed from the adit. The higher production rate of low-grade ore still did not pay off well enough. The end came in 1907 when huge avalanches destroyed the Gold Ridge houses and machinery, although some remains of the crusher and bits of the mill are still in place.

San Antonio Ski Hut—This Sierra Club jewel is the result of some remarkably energetic and inspired ski mountaineers. Dr. Walter Mosauer, an Austrian professor of zoology at UCLA and the "father of Southern California alpine skiing," was the teacher and guru of a small group of mainly college students comprising the "Ski Mountaineers of California." Starting in 1932 the group took many trips to the area of the Baldy bowl in pursuit of their

avocation. Mosauer suggested that a ski hut be built in the area to provide overnight accommodations. He was also instrumental in organizing the Ski Mountaineering Section of the Sierra Club. Under the Club's auspices, a Forest Service permit was issued, and the first San Antonio Ski Hut was built in 1935 with the volunteer labor of Sierra Club members. George Bauwens, who made the first ski ascent of San Antonio, designed the hut and supervised construction.

A fire in 1936 destroyed the hut, but it was rebuilt the same year. It has served the Club in many ways ever since.

Summit Lore (the Name)—Although uncertain just when it was first given, Phil Townsend Hanna notes that “Legend has it that it was named for Saint Anthony of Padua second-handed through Antonio Maria Lugo (1778-1860). Lugo was born at San Antonio de Padua Mission and christened there with St. Anthony's name by Junipero

ROUTE CARD: MOUNT SAN ANTONIO FROM MANKER FLATS VIA BALDY BOWL

Manker Flats, [6,160 ft; 11 442378 E, 3 791658 N] to the **San Antonio Falls Overlook**

[441821 E, 3792166 N] – 0.9 km (0.56 mi)

Proceed past the gate on the paved ski lift access road (initial bearing 280 deg). A few yds past the gate are rock changes and vegetation signs of the left-lateral San Antonio Fault. The overlook provides an excellent view of the falls.

San Antonio Falls Overlook to **Ski Hut Trail Jct** [6600 ft; 442208 E, 3791900 N] – 0.5km (0.3 mi)

Continue on the access road to the junction with the faint trail** to the Ski Hut on the left. [1.4 km (0.87 mi.) total to this point]

Ski Hut Trail Jct to **San Antonio Ski Hut and Spring** [8,200 ft; 441359 E, 3793283 N] – 2.65 km (1.65 mi)

Steep trail proceeds past a trail register about 75 yds from the junction, then turns to a bearing on-average of 330 deg to the spring (last reliable water) and the Sierra Club San Antonio Ski Hut. On the way there are good views of the Vincent Thrust Fault W across the canyon. At about the 7800 ft level one may be able to pick out some of the remains of the Gold Ridge Mine across the canyon to the W.

Ski Hut to **Mt Baldy South Ridge**** [8760 ft; 440869 E, 3792850 N] – 1.05 km (0.65 mi)

Cross the Baldy Bowl on an occasionally ducked, easy-to-follow use trail on an average bearing ranging from 260 until about the middle of the bowl, shifting to about 200 deg up the steep switchbacks leading to the ridge. (Back bearing from ridge jump-off to Ski Hut is 050°.)

Baldy South Ridge to the **Summit** [10064 ft; 440599 E, 3794245 N] – 1.7 km (1.06 mi)

Proceed up the ridge (bearing 322) along a use trail to about 9000 ft; [440502 E, 3793327 N], where the ridge direction shifts, and continue along a bearing averaging 005 deg to the summit.

Ascent Summary Statistics 3900 ft gain, 6.8 km (4.25 mi) total; 3 hrs 35 min by Modified Naismith Rule.

Possible Crux Points (indicated by **):

Going up –

1. The junction with the faint trail (on the left) to the Ski Hut (0.87 mi from Manker Flats, 6,200') is sometimes missed.

Going down –

1. From the summit start off to the south, avoiding confusion with the other trails converging at the summit;
2. On the Baldy South Ridge the route overlooks San Antonio Canyon and the Ski Hut. In poor visibility (weather, nightfall, etc.), depart from the ridge at 8,760' and proceed down the steep switchbacks.

Alternative Routes Down

A viable shortcut to the level of the Ski Hut is a scree run down the Baldy Bowl on a SE heading. This is a run of about 1,600-1,800 ft on generally good scree with many previously run routes.

Serra.” John Robinson found a reference to the name in a Los Angeles newspaper of 1858. The Whitney Survey final report of 1865 provides the first official mention of the name. St. Anthony (1195-1231) was perhaps the most famous follower of St. Francis.

Summit Lore (First Ascents)—Louis Nell, chief topographer of the Wheeler Survey, and a small group of soldiers made the first recorded ascent on July 1, 1875. His observations led to a calculation of the summit’s elevation as 10,191.9 feet, just 128 feet higher than the current value. Apparently, George Bauwens, who later on was active in the Sierra Club’s Ski Mountaineers, made the first ski ascent in 1922.

The Baldy Summit Inn—In 1910 William B. Dewey, who had first climbed the peak in 1882, established the Baldy Summit Inn, initially called Angel Camp, within eighty yards of the summit. The resort consisted of two small stone storehouses and six tents nestled among the stunted pines, all securely anchored against the wind. Mrs. Nannie Dewey was the camp chef. Dewey operated a string of pack animals to make three trips a week to Camp Baldy for supplies and mail; saddle horses and mules brought up those guests who did not prefer to climb the peak. Water was packed from a spring in Nail Keg Canyon, just east of

the summit. The camp was open about sixteen weeks each year in 1910-12. After a fire in 1913 destroyed nearly all the facilities, it was never rebuilt. Dewey made at least 133 ascents of the peak, and photos show him on top as late as 1936, 54 years after his first ascent.

Bearings and Distances to Surrounding Peaks from Mount San Antonio Summit

<u>Peak</u>	<u>Elevation</u>	<u>Bearing</u>	<u>Distance</u>
Pine #1	9,648 ft	3°	1.7 mi
Dawson	9,575 ft	30°	1.14 mi
Harwood	9,552 ft	104°	0.77 mi
Baldy Notch	7,779 ft	115°	2.3 (Can't see)
Telegraph	8,985 ft	124°	3.32 mi
Thunder	8,587 ft	125°	2.85 mi
Timber	8,303 ft	135°	4.3 mi
San Antonio Ski Hut	8,200 ft	140°	0.7 (Can't see)
Cucamonga	8,859 ft	142°	5.74 mi
Bighorn	8,441 ft	143°	4.72 mi
Ontario	8,693 ft	163°	4.42 mi
Sugarloaf	6,924 ft	168°	3.37 (Can't see)
Lookout #2	6,812ft	210°	3.25 (Can't see)
Iron #1	8,007 ft	269°	3.8mi

ENERGETICS

More fundamental, accurate, and flexible approaches can be developed based on the expenditure of energy. Gordon Waddell in 1965 developed an approximate formula for energy used on a one-day trip:

$$E = 100 (10 + R + 2C + 4H)$$

Here E is the energy expenditure in kilocalories (kcal), while R and C are the trail and cross-country distances in miles, respectively, and H is the elevation gain in thousands of feet. The 100 times 10 base term is the catchall estimate for basal metabolism for a day. As an example, for a day hike of 14 miles, with 11 miles on trail and 3 miles off trail, to a peak involving a total altitude gain of 2,000 feet, the energy needs are

$$E = 100 [10 + 11 + 2 \times 3 + 4 \times 2] = 100 [35] = 3,500 \text{ kcal}$$

The basal metabolism component can be reduced when the trip is less than a full day. For instance, it would be 500 kcal for a half-day trip.

Much experience on Angeles Chapter trips has demonstrated that on typical HPS or DPS day trips a projected energy expenditure of 600 to 700 kcal/hour gives good results when used for time estimates. Thus,

$$T = 100 [10 + R + 2C + 4H] \text{ divided by}$$

- < 700 for well-conditioned folk or
- < 600 for a fit but slower group

can be used to give time estimates for planning. Some leaders and highly fit participants can develop 1,000 kcal/hr or more. Because this is comparable to a well-conditioned athlete, values higher than 700 kcal/hr are inappropriate for all but more extreme hikes with a very fit group.

The energy expenditure, E, is an excellent tool in other ways.

- The formula provides a means to calibrate the arduousness of the trip. Thus, trips that require

Fewer than 2,000 kcals	Easy
2,400 – 2,800 kcals	Moderate
2,800 – 4,000 kcals	Moderately strenuous
More than 4,000 kcals	Strenuous
More than 4,500 kcals	Extreme*

*will almost certainly lead to exhaustion of someone in the party unless all have previously demonstrated that fitness level.

- The formula can be a help for individuals in building and assessing their fitness. Thus, a conditioning program starting with routes in the 2,400-2,800 kcals (moderate) level and gradually working up to 4,000-4,500 kcals can be a well-monitored progression to a high level of fitness.
- The formula gives the leader another basis to assess unknown potential trip participants for more strenuous trips. Many people who want to go on a trip tend to overplay their fitness in phone conversation; getting a few specific examples of recent climbs on the climber's resume can provide a more quantitative appreciation of just where the potential participant stands relative to the trip requirements.
- The energy requirement of a trip provides a basis for water consumption requirements. About 3/4 pints of water per 1,000 kcals energy expended is needed in winter, and about 3/4 quart in summer (more when very warm).
- When people are not drinking to the levels noted above, the leader should be aware that dehydration is a possibility. A deficit of only five pints causes decreased efficiency; a deficit of twelve to twenty pints may cause unconsciousness. Sometimes it is the leader who does not drink enough, thereby putting the whole party at risk.

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