TACOMA MOUNTAINEERS

Intermediate Climbing Manual

2016

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Welcome to the Tacoma Mountaineers

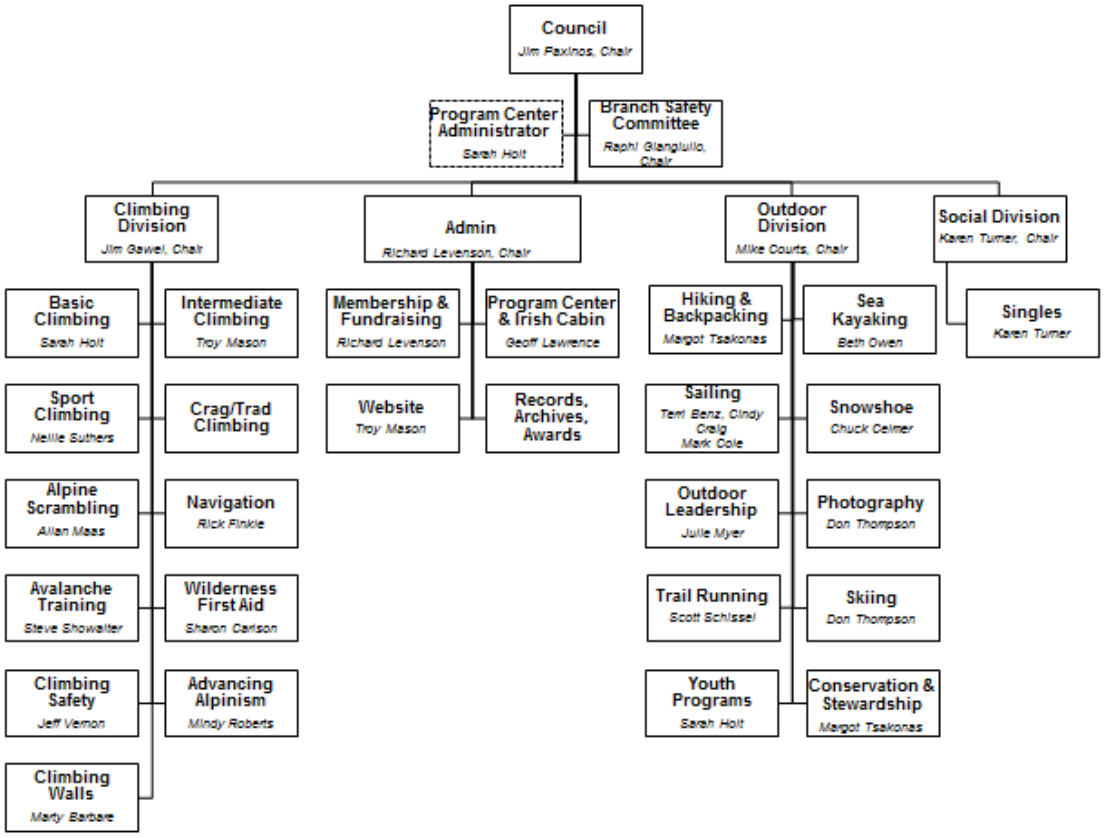
The Tacoma Mountaineers Branch is the second oldest branch of The Mountaineers, and is a vibrant and active community. Intermediate Climbing is just one of the many courses and activities offered year round in Tacoma.

Tacoma has an elected council made up of club members, which oversees the business of the branch. Outside of the council, the branch is organized into four divisions: Climbing, Admin, Outdoor, and Social, each of which has a chair. Each division is further divided into one or more activities, which have a chair and committee reporting up through the division chair.

This information is provided for two reasons. First, to make you aware of all the excitement offered through Tacoma. You may just wish to explore one of the many activities offered outside of climbing! Secondly, the org chart is provided so that you're aware of the structure of our community and the communication path to take should you have the need or desire.

Your 2016 Intermediate Climbing course has a seven person committee, led by the chair. The chair reports to the Climbing Division chair, who in turn reports to the Branch Council chair.

Branch Org Chart



Course Information

Course Description

The 2016 Intermediate Climbing course teaches skills for climbing at the intermediate level. This generally consists of climbing up to 5.6 rock, 55-degree snow and ice, and easier mixed climbs. Students will practice snow anchors, belays, emergency shelters; leading on rock, including how to place protection, build and equalize anchors, swing leads and perform self-rescues.

The course teaches various snow and ice skills, including placing ice screws, other ice anchors, German and French techniques, and introduces steep (55 degrees) ice climbing. Lectures include expedition planning and high-altitude climbing (up to 20,000 ft.), such as for the Mexican volcanoes and Denali. The emphasis is on alpine climbing and all-around rock, ice, and snow technique rather than on developing a high level of technical skill.

Additional course requirements include successful completion of Level 1 AIARE avalanche training and the Outdoor Leadership Seminar, both offered in Tacoma.

Intermediate skills can be used on thousands of routes in the Cascades, Sierras, Tetons, Canadian Rockies and other ranges around the world. Skills taught in the course are required to lead technical basic climbs. The course also provides a good foundation for advanced skill development, such as 5.9+ rock, Class 4 ice, difficult mixed climbing and aid climbing.

2016 Intermediate Course Roster

Intermediate Climbing Committee

Name	Email	Position
Troy Mason	troy.mason@tacomamountaineers.org	Chair
Joe Petersen	jspeter@gmail.com	Co-Chair
Logan Sailer	logan.sailer@gmail.com	Critical Skills
Nellie Suthers	nellie.suthers@gmail.com	Lectures
Jim Gates	jimgates@korsmo.com	Field Trips
Jeff Wirtz	jrwirtz73@gmail.com	Records
Rick Yasger	ryasger@comcast.net	Manuals
Jim Paxinos	jim.paxinos@tacomamountaineers.org	Branch Council Chair
Jim Gawel	jimedgawel@gmail.com	Climbing Division Chair

Intermediate Climbing Students

Name	City	Email	Phone

**The final roster will be updated and this page redistributed after completion of the conditioner test.*

2016 Intermediate Course Schedule

Type	Date		Event	Location
Info Night	1/4/2016		Course Introduction, Expectations, Mentoring	Tacoma Program Center
Lecture	1/14/2016		Intermediate Qualifier Refresher	Tacoma Program Center
Field Trip	1/23/2016		Qualifier - Skills Test	Tacoma Program Center
Field Trip	1/24/2016		Qualifier - Conditioner	Mt. Si
Lecture	1/28/2016		Winter Mountaineering, Conditioning, and Injury Avoidance	Tacoma Program Center
Lecture	2/11/2016		Winter Overnight, Snow Travel, & Keys for Basic Instructors	Tacoma Program Center
Field Trip	2/20/2016	2/21/2016	Winter Overnight	Mt. Rainier
Lecture	3/3/2016		Expedition Planning & Climbing Logistics	Tacoma Program Center
Lecture	3/17/2016		Climbing Leadership & Response to Emergency	Tacoma Program Center
External Course	3/19/2016		Leadership Seminar	Tacoma Program Center
Lecture	3/31/2016		Leading on Rock	Tacoma Program Center
Mentor Night	4/5/2016		Mentor Night	Tacoma Program Center
Field Trip	4/9/2016	4/10/2016	Rock I / Intro to Leading	Squamish
Lecture	4/14/2016		Advanced Rock Leading	Tacoma Program Center
Mentor Night	4/19/2016		Mentor Night	Tacoma Program Center
Lecture	4/21/2016		Rock Self Help	Tacoma Program Center
Mentor Night	4/26/2016		Mentor Night	Tacoma Program Center
Field Trip	4/30/2016		Rock II / Advanced Leading	Leavenworth
Field Trip	5/1/2016		Rock II / Self-Help	Leavenworth
Lecture	7/21/2016		Ice I / Hard Snow & Intro to Ice Climbing	Tacoma Program Center
Field Trip	7/30/2016	7/31/2016	Ice I / Intro to Ice	Observation Rock
Lecture	8/4/2016		Ice II	Tacoma Program Center
Field Trip	8/6/2016	8/7/2016	Ice I / Intro to Ice	Observation Rock
Field Trip	8/13/2016	8/14/2016	Ice II / Ice Climbing	Mt. Baker
Field Trip	8/20/2016	8/21/2016	Ice II / Ice Climbing	Mt. Baker
Lecture	10/13/2016		Intermediate Course Exam	Tacoma Program Center
External Course			AIARE	Various

2016 Intermediate Student Participation Tracking Sheet

Use this sheet to keep track of graduation requirements that you must complete for the course within the first two years. When a task is finished, note the date and put a big, fat "X" in the "complete" column. This will help immensely both for completing unfinished business, as well as when filling out your graduation application.

COMPLETE	Event Type	Description	DATE
	Other	AIARE 1	
	Other	Outdoor Leadership Seminar	
	Other	Intermediate exam	
	Field Trip	Winter Overnight	
	Field Trip	Rock 1	
	Field Trip	Rock 2	
	Field Trip	Emergency Self Help	
	Field Trip	Hard Snow / Ice I	
	Field Trip	Ice II	
	Lecture	Winter Mountaineering	
	Lecture	Winter Overnight	
	Lecture	Expedition Planning	
	Lecture	Leadership & Emergency Response	
	Lecture	Rock Leading	
	Lecture	Advanced Rock Leading	
	Lecture	Self Help	
	Lecture	Hard Snow and Intro to Ice I	
	Lecture	Ice II	
	Basic Field Trip	FT 1 Prep: Fundamentals, Knots, Prusiking	
	Basic Field Trip	FT 1: Fundamentals, Knots, Prusik Test, Belaying	
	Basic Field Trip	FT 2: Belay Test	
	Basic Field Trip	FT 3: Winter Overnight	
	Basic Field Trip	FT 4: Rock I	
	Basic Field Trip	FT 5: Rock II	
	Basic Field Trip	FT 6 Prep: Crevasse Rescue	
	Basic Field Trip	FT 6 and 7: Crevasse Rescue	
	Basic Field Trip	FT 7 Hard Snow	

Course Policies and Requirements

General Notes

1. Successful completion of both days of the Intermediate Qualification field trip is a prerequisite to course participation
2. Satisfactory completion of the Intermediate Rock 2 and Self Help field trips is a prerequisite to participation in Intermediate rock climbs unless the leader's permission is obtained. But, no credit will be given for rock climbs until completing both the Rock 1 and Rock 2 field trips.
3. Satisfactory completion of the Intermediate Ice 2 field trip is a prerequisite to participation in Intermediate glacier/ice climbs unless the leader's permission is obtained. But, no credit will be given for ice climbs until completing both the Ice 1 and Ice 2 field trips.
4. No one shall leave a climb or field trip without the permission of the leader.
5. To get credit for an Intermediate climb, the student is expected to: swing leads, participate in route finding, assist in the evaluation of climbing hazards, and obtain the leader's approval. No credit is earned unless the student completes the scheduled objective.
6. All private climbs submitted for Intermediate credit must meet the Climbing Code.
7. Upon timely application and good cause shown, the Intermediate Climbing Committee may permit a modification of any climb, age or time requirement.

Late for Lecture / Absenteeism Policy

The content of each lecture is an integral part of the Intermediate Course. A great deal of work has gone into each presentation, and each topic is important for the development of intermediate climbing skills. The instructors have volunteered their time and energy to prepare and deliver each lecture.

Students who are late for a lecture and do not have an acceptable excuse ***will not receive credit for that lecture***. The Intermediate Committee will determine if an excuse is acceptable. **Repetitive tardiness will not be excused!** Moreover, the coursework is intended for in-person presentation. Recording for later viewing is not an acceptable alternative**. Please block the dates and attend each lecture on-time and in-person.**

Conservation Requirement

The Tacoma Mountaineers has a policy requiring students in courses to perform a conservation related activity as a course graduation requirement. This is a brief summary of what is required, how it applies to you, and what you need to do to complete this requirement.

The obvious question is what kinds of work parties will these be, and where? The types of work parties are pretty open-ended. Trail maintenance is certainly one area and anything else to help maintain and preserve the environment. This would include work in local, state and national parks, wilderness areas, etc. One important point is that these activities are coordinated with the managers of the sites where the work parties will take place and there will be a site representative on hand to identify the tasks and provide any how-to instructions. Washington Trails Association holds trail maintenance activities year round and is recommended. Find out more at wta.org.

Our goal is to make a positive contribution in an area where there is great need, and to spark an awareness and interest in conservation. If you have any questions please call the Conservation Chair or seek assistance from the Intermediate Climbing Committee.

Winter Overnight Requirement

- Two winter overnights or one overnight and one BA as a climb leader must be completed
- The destination does not have to be a peak
- The climb must be in challenging winter conditions as to gain snow experience, which often means between Dec 1 and March 31. However, the final determination of winter conditions is up to the climb leader to affirm
- The leader does not have to be an approved climb leader
- The overnight does not have to be a listed climb on The Mountaineers website
- You need a minimum of three Mountaineers to count for credit

Basic Climbing Field Trip Teaching Requirement

Part of your graduation requirement is to teach at every Basic Climbing Course Field Trip within the first two years of joining Intermediate Climbing. This requirement not only provides the Basic Course with the instructors needed, it more importantly reinforces and refreshes the lessons that you have learned in the Basic Course. Teaching Mountaineering skills is imperative to maintaining your proficiency in those skills so that you can successfully build on them in the Intermediate Course. The following schedule is provided for planning your 2016 instruction participation in the Basic Climbing Course.

Basic Climbing Field Trip Schedule

DATE	FIELD TRIP
1/24/2016 OR 1/25/2016	FIELD TRIP 1 Prep
1/27/2016 OR 1/28/2016	FIELD TRIP 1
3/13/2016	FIELD TRIP 2
4/2/2016 – 4/3/2016	FIELD TRIP 3
4/23/2016 OR 4/24/2016	FIELD TRIP 4
5/7/2016 or 5/8/2016	FIELD TRIP 5
5/27/2016 OR 5/28/2016	FIELD TRIP 6 Prep
6/4/2016 – 6/5/2016	FIELD TRIP 6 FIELD TRIP 7

Mentor Program

Time / Place: 7PM – 9:30PM, Tacoma Program Center
Dates: Tuesday, April 5th
Tuesday, April 19th
Tuesday, April 26th

Please direct all questions regarding the mentor program, critical skills, and skills development to the Critical Skills Chair.

An intermediate mentor program has been set up to provide incoming students with a dedicated source for developing critical skills, answering questions about the program, and help the students integrate into greater Tacoma intermediate climbing community! The program will be primarily focused around mentor nights scheduled at the Tacoma Program Center, with additional one-on-one mentoring scheduled as appropriate.

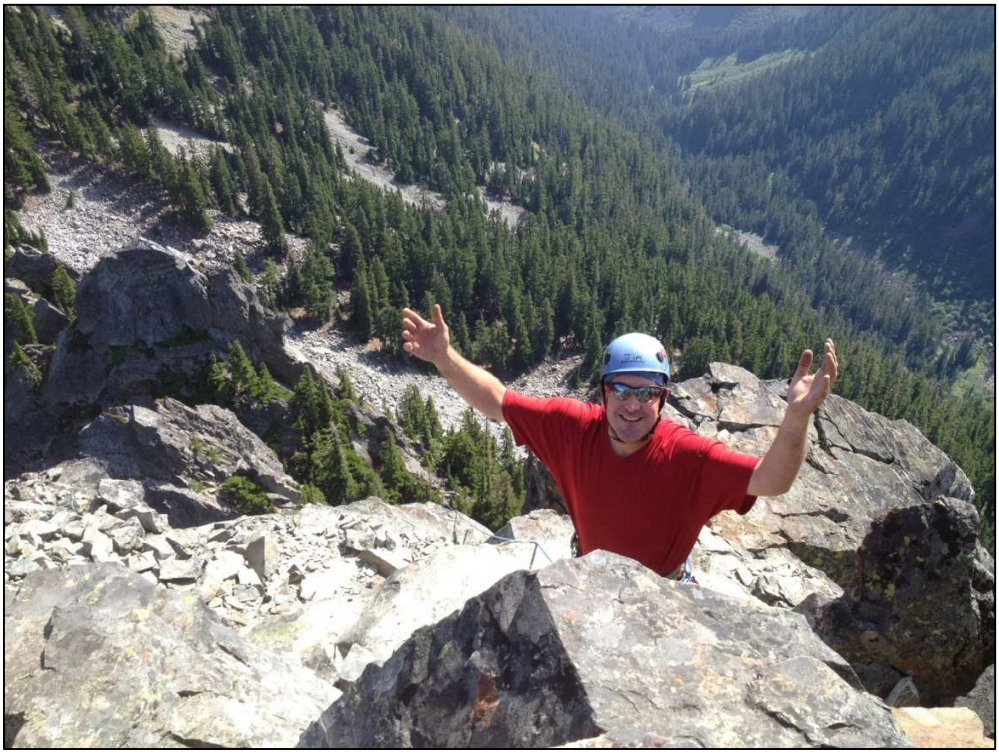
The climbing walls and classroom at the Tacoma Program Center have been reserved for mentor nights, with one evening a month from March to August (two in April). Staffing will be adjusted by polling students on their perceived needs the lecture prior to each mentor night.

The program is not meant to be as structured as the basic mentoring program; it is up to the students to utilize the time as they see fit. For example, mentor nights could be utilized as a one-on-one mentoring opportunity by some students, or as a more open-forum practice space for those more confident in their skills. If a student would like additional help outside of the normal mentoring nights, please coordinate with the Critical Skills Chair.

The program is not mandatory. However, students should keep in mind participation does provide an additional channel for climb leaders and climbing committees to solicit feedback on a student's progress and capabilities, which is invaluable when awarding climb lead status and when selecting rope leaders from the pool of students.

In the case a student fails a critical skills test, e.g. leading on rock, they will be required to attend mandatory mentoring as necessary to develop the skill to an acceptable level before they will be allowed to re-test; students will not be able to progress in the class until they have passed a re-test. Be aware that, in general, students will have to wait until the following year to re-test in a skill. It is up to the students to assess their readiness before a test and utilize the mentor program as required. However, keep in mind a student's skill development, including potential re-tests, will be handled on an individual basis. It is hoped that all students will be able to progress beyond their basic climbing abilities to some extent during their first year in the program, even if they don't pass every test on the first try, and all students will be provided opportunities to challenge themselves and develop their skills throughout the year. Climb on!


OSPREY



Rope Leader, Climb Leader, & Graduation Policies

Rope Lead Process

Basic Glacier Rope Lead Proficiency Process

- Pass the Intermediate Qualifier and Conditioner
- Attend the Winter Mountaineering Lectures
- Successfully complete the requirements of the Intermediate Winter Mountaineering field trip
- Successfully instruct at the Basic Winter Overnight field trip

The Intermediate Committee will review the proficiency -- determined by instructor evaluation in the field trip books, Basic committee feedback and any other available and appropriate sources -- of the intermediate students following the Basic Winter Overnight field trip. A student is either determined proficient or given an opportunity to work with a mentor. After the conclusion of the Basic Climbing Snow 1 field trip the committee will communicate the students' status. This will also be passed on to the Basic committee.

Basic Rock Rope Lead Proficiency Process

- Pass the Intermediate Qualifier and Conditioner
- Attend the Intermediate Rock Leading lecture
- Successfully complete the requirements of the Rock 1 field trip
- Attend the Advanced Rock Leading and Emergency Rescue lecture
- Successfully complete the requirements of the Rock 2 field trip
- Successfully complete the requirements of the Emergency Self Help field trip

The Intermediate Committee will review the proficiency (determined by instructor evaluation in the field trip books and any other source available) of the students following the Rock and Emergency Self Help field trips. A student is either determined proficient or assigned a mentor to work with. One week after the conclusion of the Rock 2 field trip the committee will communicate the students' status. This will also be passed on to the Basic committee for their information.

Climb Leader Criteria

Intermediate Course Participation

- Membership Current
- Basic Graduate or equivalent
- Pass Intermediate Qualifier
- Pass Intermediate Conditioner

Basic Glacier Rope Lead Proficiency Process

- Attend the Winter Mountaineering lecture
- Successfully complete the requirements of the Winter Overnight field trip
- Successfully instruct at the Basic Winter Overnight field trip
- Successfully complete the AIARE I avalanche course

Basic Rock Rope Lead Proficiency Process

- Attend the Intermediate Rock leading lecture
- Successful complete the requirements of the Rock 1 field trip
- Attend the Advance Rock Leading and Emergency Rescue lecture
- Successfully complete the requirements of the Rock 2 field trip
- Successfully complete the requirements of the Emergency Self Help field trip

Basic Alpine Climb Leader

- Attend Leadership Seminar
- Successfully complete AIARE I avalanche
- Lead Successful mentored climb (BA, R, or GL) mentored rock/glacier climb
- Basic and Intermediate Committee Approval

Basic Climb Leader

- Complete AIARE I & Leadership Seminar
- Instruct Basic Rock 1 and 2 Field Trips
- Rope lead at least two Basic Rock Climbs
- Instruct Basic Crevasse Rescue Field Trip
- Pass Intermediate Ice 1 Field Trip
- Rope Lead at least two Basic Glacier Climbs
- Demonstrate General Leadership Skills and Good Judgment
- Complete a Basic Rock Mentored Climb
- Complete a Basic Glacier Mentored Climb
- Pass the Intermediate Written Examination
- Obtain Basic and Intermediate Committee & Climbing Chair Approval

Intermediate Climb Leader

- Complete AIARE I & Leadership Seminar
- Complete All Intermediate Field Trips
- Pass the Intermediate Written Examination
- Complete Requirements for All Basic Field Trip Instruction
- Participate in one or more Intermediate Climb(s)
- Demonstrate General Leadership Skills and Good Judgment
- Intermediate Committee & Climbing Chair Approval

Assumptions and Exceptions

- A leader can begin rope leading basic rock or glacier without becoming a Basic Alpine Climb Leader
- The Climbing Committee may seek and allow individuals to lead climbing activities based solely on the approval of the Climbing Committee and/or Climbing Chair
- The mentored climb to become a basic alpine climb leader can be basic alpine, glacier, or rock. Glacier and rock generally come your 2nd or even 3rd year, so a mentored BA climb is the way to become a BA leader more quickly

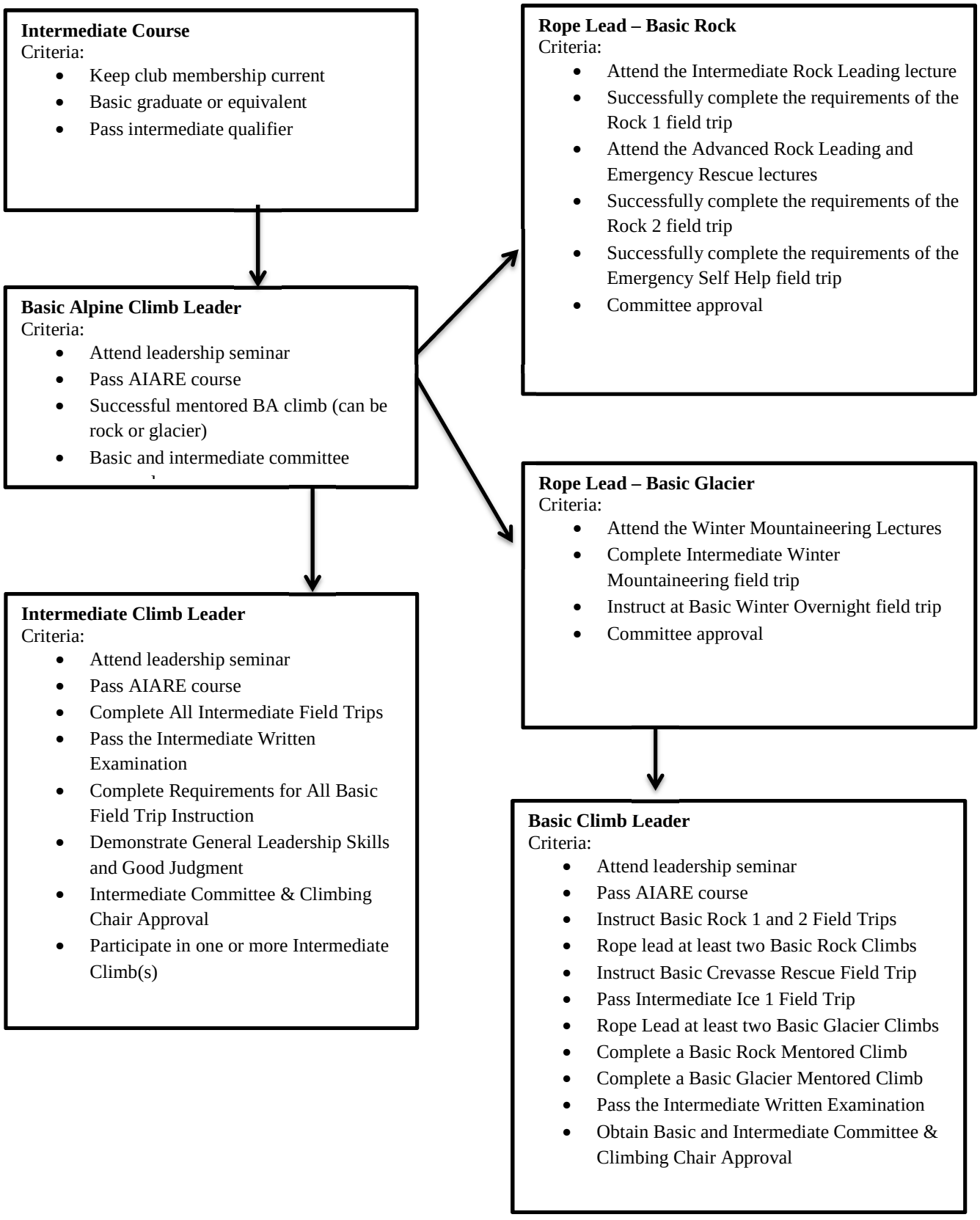
Demonstrate Good Judgment

- Lead climbs well within capabilities
- Be safe and always follow the Mountaineers Climbing Code
- Make sound decisions under adverse conditions
-

Climb Leader Approval

- Petition the committee for BA, Intermediate, or Climb Leader status by sending appropriate form to both the Records Chair and the Committee Chair only. They will disseminate to appropriate committee members for approval.

Typical Path to Attain Climb Leader Status



Graduation Requirements

To sign-up for the course, you must:

- Be at least 18 years of age or have prior committee approval.
- Be a Basic Climbing Course Graduate or equivalent as determined by the Intermediate Committee.
- Successfully pass the course qualifier and conditioner test.

To graduate, you must complete all requirements of the course and apply for graduation by submitting a completed copy of the Intermediate Mountaineering Course Graduation Application to the Intermediate Climbing records chair with course chair and co-chair cc'd.

1. Hold a current Mountaineering Oriented First Aid (MOFA) card or equivalent within one year of registration and keep it updated.
2. Attend all Intermediate lectures and pass the Intermediate written exam within two years of registration.
3. Attend all Intermediate field trips and meet the minimum requirements for each within two years of registration. Note that participation on most climbs is contingent upon successful completion of related field trips.
4. Within two years, perform satisfactorily as an instructor at each of the Basic Field Trips.
5. Attend the Tacoma Leadership Seminar or approved alternate course.
6. Complete the AIARE Level 1 avalanche course.
7. Satisfactorily complete, as a rope leader, five Basic (or Club) rock or glacier climbs (at least one each rock and glacier). In addition, at least two of the climbs must be as a climb leader. The fulfillment of the requirement as a climb leader will be contingent upon your application to the Basic Climbing Committee for climb leader status and approval by the combined Basic and Intermediate climbing committees (your mentored leads will count for this requirement).
8. Complete the following eight climbs at the Intermediate level:
   a) four scheduled Intermediate climbs:
      1) One rock climb.
      2) One glacier/ice climb.
      3) One rock or glacier/ice climb.
      4) One rock, glacier/ice or mountaineering climb.
   a) four scheduled or private Intermediate climbs:
      1) One rock climb.
      2) One glacier/ice climb.
      3) One rock or glacier/ice climb.
      4) One rock, glacier/ice or mountaineering climb.
   c) Overall, of the eight intermediate climbs, only one may be at the Grade I level.
9. Complete two over-night winter back-country trips, or do one over-night and lead one mentored Basic Alpine trip. Overnight trips should be done in winter conditions to gain experience under outdoor winter camping conditions.
10. Complete at least one Conservation/Trail Maintenance Activity while in the Intermediate course. The conservation/trail maintenance activity must be approved by the Conservation Chair of the Tacoma Mountaineers.
11. Participate in other Leadership Activities: Demonstrate mountaineering competence and leadership abilities to the satisfaction of the Climbing Committee through participation in two or more of these activities:– Instruct at Intermediate field trips and lectures; Organize and lead mountaineering activities such as Basic Climbing Course field trips; Serve on the climbing course committees; Participate with mountain rescues. During these activities you must demonstrate sound mountaineering judgment and technical competence.
12. Maintain membership in the Mountaineers. All course requirements must be completed while a member of the Mountaineers.

NOTE: Subject to the approval of the Intermediate Committee, a student may be allowed limited substitution credit for certain requirements by showing that competence has been gained through recognized mountaineering courses geared specifically to that requirement, or by substantial experience in that requirement. The Intermediate Committee is the final authority on all course requirements.

Climb Leader & Graduation Applications

When you have fulfilled the requirements to graduate Intermediate Climbing or to become an Alpine, Intermediate, or Basic climb leader, you must feel out an application. In addition, when leading a mentored climb there is a mentored climb evaluation form that is your responsibility to have your mentor fill out and submit. In a change from years past, the mentor must submit the document. A simple "yes I approve" will not suffice.

The forms are provided in the PDF format. Please complete the form(s) on your computer, save the documents, and submit as a PDF to the records chair.

The forms are named as follows:

- Alpine Climb Leader Application
- Intermediate Climb Leader Application
- Basic Climb Leader Application
- Intermediate Graduation Application
- Mentored Climb Evaluation Form

You can locate the forms on the "course materials" tab of the 2016 Intermediate Climbing page on The Mountaineers website.

https://www.mountaineers.org/about/branches-committees/tacoma-branch/committees/tacoma-climbing-committee/tacoma-climbing-subcommittee-intermediate/course-templates/intermediate-climbing-tacoma/intermediate-climbing-tacoma-2016

That is a terribly long link. You can get to the same page by:

- Navigate to Mountaineers.org and sign in
- Click your name in the upper right
- Select "my courses"
- Click the "Intermediate Climbing - Tacoma - 2016" link
- Click the "course materials" tab about half way down the page
- Click "climbing forms"

If you have any questions about the forms or their use, contact the records chair.

Intermediate Climbs

General Information

Safety Considerations

Mountain climbing is inherently a dangerous activity. Some of the hazards are beyond your control, such as naturally falling ice or rock. You and your climbing partners can reduce other hazards. One of the greatest risks as a climber is suffering a serious or fatal head injury from falling rock, ice or other objects, or from striking your head while falling yourself. A superior quality safety helmet may well save your life, but only if you are wearing it.

Helmets: While participating in this course, you will often be required to wear a helmet. But any time you climb, you should consider wearing a helmet if the potential for a head injury exists. Don't be swayed by careless decisions of others—***IT'S YOUR HEAD***. Unlike cake and other commodities, you must use it to save it.

Intermediate Student Responsibility: As an intermediate student you immediately take greater responsibility for your own and others safety. You have more freedom and accountability for your own safety. Furthermore, you assume some safety leadership for basic students at field trips and climbs. One of the quickest ways to expand your ability to judge what is safe is to read accident reports. Each year the American Alpine Club publishes "Accidents in North American Mountaineering". You can buy these, borrow them, or get them from the library. In addition, the Mountaineers website has safety information posted on the site including guidelines, safety reports, and safety recommendations. Reading about the events that led to accidents in the past can help you recognize when you and your party may be getting into an unsafe situation. These are not guided climbs and each climber has safety responsibility to make sure climbers come back to the trailhead safely. The primary responsibility for your safety is always your own!

About the Climbs

Intermediate climbs vary from the equivalent of extended basic climbs to the most difficult rock and ice routes. The variation in these climbs can present new intermediate climbers with perplexing problems in deciding what climbs are best suited to their desires and abilities.

This brief guide, when used in conjunction with the various climbing guidebooks available, should help you in expanding your climbing horizons. A few general comments on intermediate climbs are appropriate.

First, simply because a climb is at the "intermediate" level, do not be intimidated; the field trips of this course are designed to prepare you for nearly all the climbs offered by the intermediate program.

Second, the level of technical difficulty on the field trips at least meets and generally exceeds that encountered on most intermediate climbs.

Third, all intermediate climb sign-ups are at the leader's discretion; feel free to ask about the climb; the leader will in most cases ask about your background allowing the leader to assess the strengths and weaknesses of the party.

Fourth, as a general rule the leader has not pre-climbed the route, therefore it is incumbent upon each party member to recognize that various problems may arise, i.e. route finding, etc. Because of this each climber should be familiar with the route description and be ready to contribute to the success of the climb. **These are not guided climbs!!**

Finally, though the climbs are a team effort, the leader has the ultimate responsibility and authority. That is not to say that climb members must blindly follow. To earn intermediate credit for the climb you must actively participate in the decision making and leadership of the climb.

In summary, intermediate climbs are private climbs that fit the intermediate program and they offer all the rewards, demands, hazards and frustrations that climbing offers.

Climb Grade and Class

The grade of a climb indicates the overall difficulty of the entire climb and is represented by Roman numerals I through VI. The factors in a grade assignment include: length and difficulty of the approach, ease of escape from the route, availability of protection, objective hazards, amount and difficulty of technical climbing, and the time and degree of "commitment" required for the climb. Generally, a competent party can complete the technical portions of a:

Grade I ..... Climb in several hours,

Grade II ..... In half a day,

Grade III ..... In most of a day,

Grade IV ..... In a very long day (possible bivouac and if rock at least 5.7),

Grade V ..... In more than one day (bivouac and if rock at least 5.8),

Grade VI ..... Several days with major technical difficulties.

The class of a climb indicates the difficulty of the hardest pitch of a climb. Because of the annual and seasonal variations of ice climbs, the class of an ice climb gives an indication of technical difficulties to be expected, or class if it actually includes technical rock. The class descriptions are as follows:

2	Scrambling - such as on a talus slope
3	Steep scrambling, some exposure, hands used
4	Steep rock, more exposure, smaller holds
5	Technical rock climbing, divided into 13 points as follows:
5.0 - 5.4	There are two hand and two foot holds that become smaller as the class increases.
5.5 - 5.6	Two hand and two footholds are there, obvious to the experienced, but not necessarily to the beginner.
5.7	The move is missing one hand or foothold, strenuous.
5.8	The move is missing two hand or footholds, very strenuous.
5.9	The move has only one reasonable hold, very strenuous.
5.10	No holds. The choices are to pretend a hold is there, pray a lot, or go home.
5.11	Obviously impossible; however someone actually accomplishes it. Since there is nothing for a handhold, grab it with both hands.
5.12	The surface is as smooth as glass and vertical.
5.13	The same as 5.12 but overhanging rock.
5.14	Rock & Ice Magazine says it's been done. Get your suction cups for your hands and feet out.

The rock you encounter at the intermediate rock field trip varies between 5.0 and 5.6, though possibly higher if you are really daring. This practice gives you some feeling for class but only with experience will you be able to appreciate the subtle differences between each point; a 5.6 face may feel very different than a 5.6 crack. Practice is of great value in understanding and preparing for intermediate rock climbs.

Most Basic climbs are Grade I. Some Intermediate climbs are Grade I, but most are at least Grade II.

Those climbs made slightly more difficult by problems involving steep snow, route finding or lengthy section of class 3 or class 4 are designated Mountaineering (IM) climbs,

More difficult intermediate climbs of Grade II and above are designated simply as Rock (IR) or Glacier/Ice (II). Grade II (IR) and (II) climbs will involve some technical climbing, though usually of a limited nature - either lengthy and moderate or short and difficult. These are especially good first and second year climbs. When you have some experience and are feeling really bold, you might try some Grade III+ climbs.

These lists are not all encompassing. They are intended to give you the flavor of intermediate climbs. The climbs listed in the bulletin will indicate: IM, IR, or II, grade, class if applicable. Consider the grade and class of a climb when preparing to sign-up or lead a climb, remembering that the grade and class is an estimate of the difficulty to be expected by an average experienced party under normal conditions. **The grade of difficulty will also vary with seasons and climbing conditions.** Do not hesitate to take credit for the difficulty of a climb on a day you did it regardless of what the guidebooks say. Good luck on your climbs and the course!!!

Summits and Credit

In the intermediate course, intermediate climbs are an opportunity to apply a wide range of mountaineering skills to certain alpine mountain routes. There are no intermediate climbs at rock practice areas even though many such rock climbs are very difficult. Although the mental focus of students is often on the technical rock and ice climbing involved, the whole spectrum of mountaineering challenges may be encountered during the journey from trailhead to summit and back. For many students, the best lessons on experience climbs have occurred on "epics" that never got close to the summit. While these are valuable experiences, they are not climbs of the mountain.

All intermediate climbs require the attainment of the summit, even if it is technically easy. On many routes the technical difficulties are way below the summit but completing the climb is part of the total mountaineering experience. Almost all intermediate climbs require reaching the main summit. There are a limited number of routes which naturally culminate at a subsidiary summit. For example, the climb of Mount Index, North Peak, North Face route ends at the North Peak and does not require attaining the main summit of Index for credit.

Climb Information

Intermediate Mountaineering (IM) Climbs

This is not a comprehensive list. Please see mountaineers.org for full listing, if available

Bonanza Peak, Mary Green Glacier	II, 3	Mt. Constance, Traverse	III, 4
Bonanza Peak, Traverse	II, 5.5	Mt. Formidable, N Buttress	II, 4
Chiwawa, Lyman Glacier (after Aug)	II	Mt. Rainier, Fuhrer Finger	II
Colchuck Peak, North Buttress	II, 4	Mt. Rainier, Pt Success, Success Cleaver	II
Dome, Dome Traverse	II, 4	Mt. Shuksan, Fisher Chimneys	II, 3
Eagle Peak, N Ridge (winters only)	II, 3	Overcoat Peak	I, 4
Goode, SW Couloir	II, 4	The Brothers Traverse	II, 3
Guye Peak, S Rib	I, 4	The Brothers, SW Ridge	II, 3
Jack Mt., N Ridge	II, 4	Triconi, N Ridge	II, 4
Mt. Anderson, W Peak	II, 3	Twin Sisters, Twin Sisters Traverse	II, 4
Mt. Baker, Park Glacier Headwall	II, 3		

Climbing Intermediate Rock

Intermediate Rock climbs vary from very short (three pitches) to very long (twenty plus pitches) climbs. Third and fourth class sections that may require unroped climbing are often encountered. Many climbs involve long cross-country approaches (often with brush and hard snow) that while not technical are certainly demanding. In the face of deteriorating weather, many climbs are difficult to retreat from after a certain position has been reached.

On the other hand, the longer and more difficult the climb the greater the potential for a satisfying alpine experience. To be able to rapidly negotiate trail, brush, scree, snow, and 4th and 5th class climbing can be very exhilarating. A bivouac on route under the stars can be savored for years. Certain practices have proved their worth for Intermediate level climbers. Most Intermediate rock climbs are strenuous and require being in excellent shape. Being well rested and used to carrying loads, having done several moderate climbs (such as Basic leads and scrambles), having invested time in rock practice (especially in Leavenworth during the off-season), and being organized and mentally prepared can all contribute substantially to your success and enjoyment.

A few special circumstances should be borne in mind. Many rock climbs, especially in the Cashmere Crags and Washington Pass areas, can be done throughout the season (often when west side conditions are soggy). Other climbs are more time and condition dependent. For example, many North Cascade climbs require long days, adequate snow cover (over brush, gullies, loose rock, crevasses and ice), reasonable weather, temperatures that allow for a light load (and still a bearable bivouac), and hard snow and stable ice conditions. Early in the season (especially during high snow years and late springs) there may be snow masses and cornices perched on rock surfaces that melt out from underneath and can suddenly discharge. Also in early and mid-season, rainy weather and warm daytime temperatures can trigger wet snow avalanches. Hanging glaciers can be hazardous throughout the season.

Much of the Cascades are composed of mediocre rock with loose debris and poor opportunities for protection. Rain or rapid warming often triggers rock fall. Even the good granite of the Mt. Stuart region has much loose rock in places. Finally, it is hard to overemphasize the importance of an early start (such as moving by first light) and rapid progress, even on short climbs. Having thought through the climb and the time involved, you can assess whether you are making it or not.

Intermediate Rock (IR) Climbs

Argonaut Peak, E Ridge	II, 5.1	Forbidden Pk., NW Face of N Ridge	III, 4 + ice
Argonaut Peak, NW Arête	III, 5.6	Forbidden Peak, NW Face	IV, 5.6
Big Four Mt., N Face	IV, 4	Forbidden Peak, W Ridge	II, 5.6
Black Pyramid, NE Face	II, 5.6	Gunsight, Main Peak	II, 5.6
Burgundy Spire, N Face	III, 5.8	Johannesburg Mt., SE Arête	II, 4
Chair Peak, East Face	II, 5.5	Kangaroo Temple, NW Face	II, 5.7
Chimney Rock, E Face Direct	II, 5.3	Liberty Bell, NW Face	III, 5.8
Cutthroat Peak, SE Buttress	III, 5.7	Liberty Bell, SW Face	II, 5.6
Dorado Needle, S Ridge	III, 5.5	Magic Mt., N Face	II, 4
Dragontail Peak, N Face, Hidden Col.	III, 5.7	Mt. Challenger, NE Spur of E Face	II, 5.0
Dragontail Peak, Serpentine Arête	IV, 5.7	Mt. Cruiser, W Face	II, 5.5
Eldorado Peak, W Arête	IV, 5.7	Mt. Fury, N Buttress	IV, 5.0
Eldorado Peak, W Face	III, 4 + ice	Mt. Garfield, S Face of W Peak	III, 5.7

Mt. Goode, NE Buttress	III, 5.4 + ice
Mt. Index, N Face of N Peak	III, 5.6
Mt. Stuart, N Ridge	III, 5.4
Mt. Stuart, W Ridge	II, 5.4
Mt. Temple, E Face	II, 5.6
Mt. Terror, E Ridge	III, 5.6
Mt. Thompson, W Ridge	II, 5.4
Mt. Torment, N Ridge	II, 4
Mt. Torment, S Ridge	II, 5.5
Mt. Triumph NE Ridge	III, 5.5
Mt. Washington, E Ridge	I, 4
Mt. Washington, SE Buttress	II, 5.0
Prusik Peak, W Ridge	II, 5.7
Sherpa Peak, E Ridge	II, 4
Sherpa Peak, W Ridge	II, 5.6
Sloan Peak, W Face	III, 5.6
The Tooth, SW Face	II, 5.5
Vesper Peak, N, Face	III, 5.6
Whitehorse Mt., E Ridge	II,

Climbing Intermediate Ice

It has been said that the charm of ice lies in its changeability, it differs from hour to hour, day to day and month to month. Unlike rock pitches which are relatively unchanged from year to year, ice climbs constantly evolve and may be "in condition" at only certain times of the year or often only for certain hours of the day. As more experience on steep hard snow and ice is acquired, a sense of what will work develops. A smooth relationship among tools, techniques and self-knowledge will enable the ice climber to safely succeed when conditions are right. An understanding of mountains, the cycle of snow and ice and of weather and timing will enable you to sense when conditions are right.

Most Intermediate "Ice" climbs are a mix of snowfields and glaciers, hard snow and glacial ice, usually in the 35-60 degree range. Unlike the great ice faces of the Canadian Rockies and Alaska, the Cascades offer more moderate but nonetheless challenging climbs, mainly on the slopes of the volcanoes and the hanging glaciers of the North Cascades. Technical sections are mainly at angles of 40 to 55 degrees for five hundred to several thousand feet. Often it is necessary to begin ice climbs very early (in the dark) to allow the party to get above certain hazards before the first sunlight hits the slope. Many climbs on the volcanoes are best done in early season (June through mid-July) before lots of rock and icefall develops. High freezing levels following rapid warming trends can render many routes hazardous and they should not, as Beckey emphasized, be attempted. Conversely, other alpine ice climbs bloom when the winter snow cover is reduced and hardened in late season. For this reason, a number of ice climbs can only be done for ice credit after August 1st.

When planning for ice climbs keep in mind the snow pack that year, trends in spring melt, the recent weather history (such as heavy snowstorm last week followed by hot weather), change in icefall and crevasse pattern and the immediate weather conditions. The diversity of even summer weather is such that cold and severe storms can arrive quickly and prompt a hasty retreat. As Beckey puts it "A number of tragedies have occurred because a party underestimated the severity of such storms and 'dug in' or kept climbing with inadequate equipment."

Practice and development of skills for ice climbing are somewhat harder to come by than for rock. The Nisqually Glacier on Mt. Rainier and the lower Coleman Glacier on Mt. Baker are two common areas. Much practice can be gained by actually doing modest climbs (such as Basic level and Mountaineering climbs) so that snow and ice techniques come naturally and automatically when needed.

Intermediate Glacier / Ice (II) Climbs:

Glacier Peak, Scimitar Glacier	II
Johannesburg Mt., Cas-Johan.Couloir	III
Keyes, Pride Glacier Headwall	II
Lane Peak, The Zipper	I
McClellans Butte, N Coulier (winter)	II
Mt. Adams, Adams Glacier	II
Mt. Adams, N Face of NW Ridge	II
Mt. Adams, N Lyman Glacier	II
Mt. Baker, Coleman Headwall	III
Mt. Baker, N Face	II
Mt. Baker, N. Ridge	II
Mt. Baker, Roosevelt Glacier	II
Mt. Buckner, N. Face	II
Mt. Formidable, Formidable Glacier	III
Mt. Hood, Cathedral Ridge	III
Mt. Hood, Leohold Coulier	II
Mt. Maude, N Face	III
Mt. Rainier, Kautz Glacier (after Aug1)	II
Mt. Rainier, Liberty Ridge	III
Mt. Rainier, Mowich Face	IV
Mt. Rainier, Nisqually Icefall (early season)	III
Mt. Rainier, Ptarmigan Ridge	IV
Mt. Rainier, Tahoma Glacier	II
Mt. Shuksan, N. Face (early season)	III
Mt. Shuksan, Price Glacier	IV
Mt. Shuksan, Upper Nooksack Glacier	II
Redoubt, NE Face	III
Sinister, N Face	III

Equipment List for the Intermediate Course

A few words about the equipment needed for the Intermediate Course. Although some of the equipment used on Intermediate Climbs is for comfort or convenience, much of it is absolutely necessary for safe climbing. Be aware that much of intermediate climbing is a combination of efficient technique and the use of properly designed equipment, whether the medium is ice, rock or snow. What may appear to be a "good buy" in the store can turn out to be an aggravation or even a hazard on a climb. Good equipment is a pleasure to use and justifies many times over the difference in initial cost from a "bargain". Whenever possible, buy the best equipment you can afford—it will pay off in the long run.

In general, when evaluating equipment, consider the following factors: function, weight, versatility and durability. Knowing how you will use an item will dictate the features that are most important. Simplicity in form and function are often the key to well-designed equipment. Try selecting equipment that will serve you well in a variety of situations so you need not have one thing for every purpose.

Please keep in mind that since equipment necessary for climbing at the intermediate level is more specialized and demanding, it is often costly. If you are in doubt as to what type of specific item you want, borrow or rent one and try it out. Swap with other people at field trips to get a feel for different designs. Only after using an item do you become acutely aware of its benefits and limitations, and what features are most important.

Look for used equipment. Many of the equipment shops have bulletin boards for their patrons. Some of the best deals are at used equipment sales. The Tacoma Basic Climbing Committee will hold a used equipment sale —- check it out. Seattle and Olympia branches have their own used equipment sales—see the Go Guide for dates.

Be sure to shop around before you make a major purchase. Prices vary substantially from store to store, and many items can be found on sale at regular intervals. Remember, in the US we generally pay a lot more for our climbing equipment than in other countries. Browsing some of the different magazines will show a wide range of prices - beware that shipping, duty and insurance charges may be added to the advertised prices.

For the Intermediate Course you will need, in addition to all the gear you used in the Basic Course: a sleeping bag, a stove, a larger pack (minimum of 65 liters / 4000 in^3) for carrying all the gear listed on the following pages and a shelter. Several excellent sturdy and lightweight tents are available. Gore-Tex bivouac bags are preferred over tents on many climbs.

Equipment Needed For Rock Practice, Emergency Self-Help Practice, and Most Rock Climbs:

- **Climbing Harness**
- **Rope –** Dynamic kermantle of 9.6 to 10.5 mm diameter is good for general use. Some climbers use 9 mm ropes for glacier and ice climbs, and double the rope if necessary on very steep technical sections. The 200 ft. length (60 meter) is preferred over the 165 ft. (50 meter) rope, as it allows longer leads and fewer rappels, saving time on longer climbs. Also, if the rope will be used in wet conditions (and keep in mind we live in the Pacific Northwest), it should have a dry treatment. Moreover, wet ropes are much heavier. **Do not buy a used rope!!!** Be sure the rope is UIAA approved. Purchase of a rope is recommended, but if you don't have one you can usually pair up with someone who does. One rope per two climbers is adequate for field trips and climbs.
- **Rappel and Belay Device –** In order to conduct belaying from the Anchor, you will need a device such as the Black Diamond ATC-Guide or the Petzl Reverso.
- **Chocks**
- **Helmet -** Make sure the helmet you buy is designed to be used for climbing and has been approved by the UIAA. No bike helmets!
- **Carabiners**
- **Runners**
- **Gear Sling -** Can be made from webbing or purchased. The specially made gear slings have a wide padded strap which makes it more comfortable across the shoulder.
- **Cordelette**
- **Chock Pick**

Optional Equipment for Rock Climbs and Rescue Practices:

- **Rock Shoes**
- **More Chocks**
- **Extra Slings:** Short slings, or quick draws, are tied from 3 feet of 7 mm perlon or 2 feet of webbing. They are very useful when climbing bolted routes. More singles are always useful.
- **Camming Devices:** These spring-loaded camming devices have revolutionized climbing protection. They are rapid to place and remove, and offer security in places otherwise unprotect able (vertical and flaring cracks, pockets).

They are also very expensive and hence recommended for serious climbers. Consider also the less expensive non-spring devices.

Equipment Needed for Hard Snow and Ice Practices and Glacier/Ice Climbs:

- **12 Point Crampons**
- **Alpine Ice Axe**
- **Climbing Axe**
- **Ice Screws**
- **Helmet**
- **Pickets**

Optional Equipment for Ice and Hard Snow Practices and Glacier/Ice Climbs:

- **Stiff Boots**
- **More Ice Screws**
- **Avalanche Rescue Beacon -** The club may supply beacons for the Winter Mountaineering Field Trip, but they are not generally available for personal loan. If you plan to do much climbing in winter conditions or backcountry skiing, consider purchasing this valuable item.

Equipment Chart

Description	Number	Unit Cost	Required Cost	Total Potential Cost	General Mtnring	Rock	Snow/Ice	Required or Optional
Bivy bag or lightweight tent	1	$150 and up	$0	$150	X		X	Optional
Wands (can be homemade)	>10	$5 to $30	$5	$30	X			Required
Shovel	1	$40	$40	$40	X		X	Required
Avalanche Transceiver	1	$300	$0	$300	X			Optional
ATC-Guide Belay Device	1	$28	$28	$28		**X**		Required
Pickets	2	$20	$40	$40	X		X	Required
Rope	1	$150	$75	$150	X	X	X	1 per 2 people
Starter Rack								Required
Stoppers/nuts/chocks	6 to 10	$8	$48	$80		X		Student choice on number
Hexcentrics or tricams	2 to 4	$15	$30	$60		X		Student choice on type
Carabiners	10 to15	$8	$80	$120	X	X	X	Student choice on number
Single Slings	6 to 8	$5	$40	$40	X	X	X	Student choice on number
Double Slings	3	$7	$21	$21	X	X	X	Student choice on number
Cordelette	1	$20	$20	$20		X	X	Required
Daisy Chain	1	$20	$0	$20	X	X	X	Optional
Rock Shoes	1	$80 to $120	$0	$100		X		Optional
Chock Pick	1	$20	$20	$20		X		Required
Rappel Rings	2 to 4	$3	$0	$12		X		Optional
Ice Screws	3 to 4	$50	$150	$200			X	Student choice on number
Second Tool	1	$30 to $150	$30	$150			X	Student can rent tool for Ice 1 *
Two climbing Tools	2	$50 to $300	$50	$300			X	Student can rent tools for Ice 2 *
Subtotal			**$677**	**$1881**				

General Camping Gear from Basic

Sleeping bag and pad
Backpack
Stove and pots

General Climbing Gear from Basic

Boots (leather or plastic)
Crampons and ice axe
Harness and helmet
Belay device and parabiner
Snowshoes or skis
Prusiks and rescue pulley
Slings and biners
Leader tie-off

*Tacoma Mountaineers may have a few tools to loan out for Ice 1 and Ice 2; please talk to Intermediate Chair. Some local outfitters rent; some don't. Check around. We encourage students to borrow equipment from friends or from the Tacoma Mountaineers. We discourage people from buying ice tools until after Snow/Ice 1. If cost of equipment would keep you from attending a field trip, talk to Intermediate Chair. In other words, if at all possible **borrow your ice tools** for the Ice 1 Field Trip!

Learning to be Weight-Smart

By Bruce D. Sanchez

Introduction

As a Basic Student, you were required to bring equipment on climbs that often was, depending on the situation, "overkill" for a particular climb. One of the reasons is that as a Basic Student your climbing skills were not well formed, and some extra insurance in the form of a heavier, warmer sleeping bag or an extra jacket could prove life-saving in extraordinary circumstances.

In the Intermediate Course, you MUST be "weight-smart." The approaches are longer, slopes steeper, and climbing grades harder. A climber burdened down with an overly heavy pack, regardless of his or her physical strength, is a liability to their climbing party. You can save on weight in a number of ways:

- Leave equipment at home
- Use lighter equipment
- Use a piece of equipment for multiple purposes

The next section focuses on the second point. I will compare similar pieces of equipment with dramatically different weights.

Comparison of Sample Equipment Weights

The following pages detail a comparison of different equipment and their associated weight(s). The lightest and heaviest equipment is then grouped together to show the weight savings for a summer overnight rock climbing trip.

Note that the purpose of this exercise is NOT to make recommendations on what a given climber should take on a given trip. The equipment you carry will vary dramatically based on anticipated weather conditions, personal comfort levels for temperature and exposure, climbing ability, climbing route, etc. The purpose is to raise your consciousness about the cumulative effects of the equipment you take on a climb, and thereby help you make more intelligent decisions in your selection and purchasing of climbing equipment. Note also that I'm not making specific recommendations on manufacturer or model type.

For the less metrically-inclined, one ounce equals approximately 28 grams and one pound equals approximately 454 grams.

Hats	**Weight (grams)**
Lightweight Wool	76
Nylon Exterior, Pile lined, with Ear Flaps	114
Boots (all size 42)	**Weight (grams)**
La Sportiva Trango S Evo GTX	1522
Scarpa Freney GTX	1850
La Sportiva Nepal Evo GTX	2024
First Aid Kits	**Weight (grams)**
Small Kit – Adventure Medicals Day Tripper	558
REI Large Kit	850
Bivy Shelter	**Weight (grams)**
REI Minimalist Bivy	430
Outdoor Research Aurora Bivy	665
Black Diamond (Bibler) Tripod Bivy	1180
Packs	**Weight (grams)**
Black Diamond Speed 30 (30L)	1050
Wild Things Ricesac / Icesac (52L)	1330
Arcteryx Khamsin 50 (50L)	2100
Gregory Denali Pro (106L)	3510
Slings	**Weight (grams)**
Black Diamond Dyneema Single Slings (ten total)	364
1" Webbing Tied Single Runners (ten total)	590
Carabiners – full size	**Weight (grams)**
Wild Country Helium (ten total)	330

Black Diamond Ovals (ten total)	620
Rock Protection	**Weight (grams)**
Black Diamond Stoppers (#3-#12, ten total)	388
Black Diamond & other SLCD's (small Metolius to #2 Camalot, ten total)	753
Headlamp	**Weight (grams)**
Petzl Tikka XP	95
Black Diamond Icon	188
Crampons	**Weight (grams)**
Stubai Ultralight	607
Grivel G12	950
Helmets	**Weight (grams)**
Petzl Ecrin Roc	445
Petzl Meteor III	235
Waterproofing	**Weight (grams)**
30 Gallon Plastic Garbage Sack	34
Nylon Pack Cover	125
Tents – 2 person	**Weight (grams)**
Black Diamond Firstlight (3 season)	1490
Integral Designs MK XL (4 Season)	1928
Mountain Hardwear Trango 2 (4 season)	4560
Sleeping Pads – regular length	**Weight (grams)**
Therm-a-Rest RidgeRest	400
Big Agnes Air Core Mummy	539
Rain Shells	**Weight (grams)**
Marmot Precip Jacket	367
Arcteryx Theta AR Jacket	548
Pile Pants and Top	**Weight (grams)**
200 Weight Pants and Top	1028
300 Weight Pants and Top	1240
Sleeping Bags – 20 degree F	**Weight (grams)**
Feathered Friends Swift (down)	964
Mountain Hardwear Lamina 20 (synthetic)	1346
Snow Shovel	**Weight (grams)**
Black Diamond	553
Voile	815
Water Purification	**Weight (grams)**
Iodine Tablets	28
Katdyne Water Filter	662

Sample Pack - Summer Overnight Rock Trip

Here's a comparison of the same equipment functionality but with significant weight savings. Although you may quibble with my equipment choice in the heavy pack, I've seen Basic Students show up on climbs with this type of equipment. The light pack is fairly typical of what I take on a weekend overnight rock climb. Note that not all items taken on the trip are listed here. For instance, extra clothing, food for the trip, map, rock shoes, etc. are left out. Evaluate the weight savings, however, with just the equipment listed below and apply the same thinking to your individual needs.

Heavy Pack		**Light Pack**	
Item	**Weight (g.)**	**Item**	**Weight (g)**
Gregory Denali Pro Pack	3510	Wild Things Icesac Pack	1330
Mountain Hardwear Lamina Bag	1346	Feathered Friends Swift Bag	964
Mountain Hardwear Trango 2 (50% total wt.)	1780	REI Minimalist Bivy Bag	430
Big Agnes Air Core Sleeping Pad	539	Therm-A-Rest RidgeRest Sleeping Pad	400
Arcteryx Theta AR Jacket	548	Marmot Precip Jacket	367
300 Weight Pile Pants and Top	1240	200 Weight Pile Pants and Top	1028
REI Large First Aid Kit	850	Small First Aid kit	558
SLCDs (ten total)	753	Stoppers (ten total)	388
Black Diamond Oval biners (ten total)	620	Wild Country Helium biners (10 total)	330
Petzl Ecrin Helmet	445	Petzl Meteor III Helmet	235
1" Webbing Slings (ten total)	590	Black Diamond Dyneema Slings (ten total)	364
Black Diamond Icon Headlamp	188	Petzl Tikka XP Headlamp	148
Pile Hat w/ear flaps	114	Lightweight wool hat	76
Katadyne Water Filter	662	Iodine Tablets	28
Total	13185 grams 29 lbs. 1.1oz	Total	6646 grams 14 lbs 10.4oz

Total Savings = 6539 grams, or approximately 14 lbs 7oz. Which pack would you prefer to carry?

Course Preparation Module

The course prep module consists of lectures and field trips intended to help students brush up on skills learned in the Basic Climbing Course, as well as prepare for the practical skills and conditioning tests.

Intermediate Qualifier Refresher

Date: Thursday, January 14th
Time / Place: 7PM, Tacoma Program Center
Reading: Intermediate Qualifier Scoresheet
Basic Climbing Course Manual
Basic Climbing Course Field Trip Instruction Manual
FOTH VIII: Any relevant pages needed for self-study.

Lecture Objectives:

- Allow students a chance to practice basic climbing techniques and instructional abilities that will be tested at the Intermediate Qualifier.
- Offer a final chance for students to ask questions about the practical exam or conditioner.

Learning Outcomes:

- I know what skills I will be expected to perform and teach at the intermediate qualifier.
- I will identify the basic mountaineering skills that I need to practice in order to pass the qualifier.

Equipment:

Climbing Harness	6 Carabiners	3 Runners	Leader Tie-Off
Ice Axe	Rescue Pulley	Prusik slings	Helmet
Belay Gloves	Belay Device	10 Essential Systems	Picket
Autoblock	2 Locking Biners		

Program: Practice basic techniques and instructional abilities for the following areas:

1. Navigation
2. Crevasse Rescue
3. Belay Drops
4. Rappels
5. Knots
6. Prusiking
7. Rock Climbing Technique
8. Snow Belays
9. Snow Travel Techniques
10. Ten Essentials

Note: This is a review. Use this time to get prepared for the qualifier. At the qualifier field trip you are expected to come prepared to demonstrate your knowledge of basic techniques and ability to instruct them!! There, you will be graded. A passing grade is required for continuation in the Intermediate course.

Intermediate Qualifier Practical Exam

Date: Saturday**,** January 23rd

Time / Place: 7AM, Tacoma Program Center

Reading: FOTH VIII*:* 5, 9, 10, 11, 12, 16, & 17
Basic Climbing Course Manual
Basic Climbing Course Field Trip Instructor's Manual
Intermediate Qualifier Score Sheet

Learning Objectives:

- Allow the Climbing Committee an opportunity to test and evaluate each student's basic level of performance and instructional skills in order to determine his/her ability to continue with the Intermediate program.
- Introduce techniques used in the Intermediate course and ensure the use of standardized techniques in the Basic course.

Learning Outcomes:

- I will pass the qualifier with a minimum of 80 points
- I will pass each section at or above the minimum score required

Equipment:

Climbing Harness	6 Carabiners	3 Runners
Leader Tie-Off	Ice Axe	Rescue Pulley
Prusik slings	Helmet	Belay Gloves
Belay Device	10 Essential Systems	Autoblock Sling
Picket	2 Locking Biners	

Program: PRACTICAL EXAM of basic techniques and instructional abilities for the following areas:

1. Navigation
2. Crevasse Rescue
3. Belay Drops
4. Rappels
5. Basic Course Knots
6. Prusiking
7. Rock Climbing Techniques
8. Snow Belays
9. Snow Travel Techniques
10. Ten Essential Systems

Note: This is a **practical exam**, not a review. You are expected to come to the field trip prepared to demonstrate your knowledge of basic techniques and ability to instruct them. You will be graded, and a passing grade is required for continuation in the Intermediate course.

Intermediate Qualifier Score Sheet

Station 1: Navigation - Possible Score (9)

Map & Walk Bearing	_____ (2)	Walk Bearing	_____ (3)
Triangulation	_____ (4)		

Station 2: Crevasse Rescue - Possible Score (12), Minimum Required (9)

Single Pulley	_____ (4)	Z Pulley	_____ (8)

Station 3: Belay Drops (4 total) - Possible Score (16), Minimum Required (13)

Anchor Set Up / Tie-In	_____ (3)	Munter Hitch	_____ (5)
Signals	_____ (3)	Other Belay Devices and tie off	_____ (5)

Station 4: Rappels - Possible Score (17), Minimum Required (14)

Rappel Set Up	_____ (6)	Stopping/Control	_____ (5)
Technique	_____ (5)	Autoblock Setup/Use	_____ (1)

Station 5: Knots - Possible Score (6)

Single Bowline	_____ (.5)	Fisherman's	_____ (.5)
Alpine Butterfly	_____ (.5)	Prusik	_____ (.5)
Bowline on a Coil	_____ (.5)	Bachmann	_____ (.5)
Munter Hitch	_____ (.5)	Water Knot	_____ (.5)
Figure 8 on a Bight	_____ (.5)	Clove Hitch	_____ (.5)
Rewoven Figure 8	_____ (.5)	Girth Hitch	_____ (.5)

Station 6: Prusiking (Texas Prusik) - Possible Score (8)

Set Up	_____ (3)	Resting	_____ (1)
Ascending	_____ (2)	Descending	_____ (2)

Station 7: Rock Techniques - Possible Score (10)

Face Climbing	_____ (2)	Layback Climbing	_____ (2)
Friction Climbing	_____ (2)	Chimney/Stemming	_____ (2)
Jamming	_____ (2)		

Station 8: Snow Belays - Possible Score (8)

Carabiner Ice Axe Belay		- Playing out Rope	_____ (2)
- Set Up	_____ (2)	Deadman Set Up	_____ (1)
- Taking in Rope	_____ (2)	Bollard Set Up	_____ (1)

Station 9: Snow Techniques - Possible Score (9)

Self-Arrest		- Head First Back	_____ (1.5)
- Feet First Front	_____ (1.5)	Rest Step /	
- Feet First Back	_____ (1.5)	Moving in Balance	_____ (1.5)
- Head First Front	_____ (1.5)	Ice Axe Use	_____ (1.5)

Station 10: Ten Essentials - Possible Score (5)

Hydration	_____ (.5)	Sunglasses/Sunscreen	_____ (.5)
Illumination	_____ (.5)	First Aid Kit	_____ (.5)
Nutrition	_____ (.5)	Repair (knife)	_____ (.5)
Insulation	_____ (.5)	Matches, fire starter	_____ (.5)
Navigation	_____ (.5)	Emergency shelter	_____ (.5)

Total Score

Total Score	_____ / 100

**Minimum score required for Intermediate Course = 80*

Intermediate Qualifier Conditioner

Date: Sunday, January 24th

Time / Place: 6:30AM, Mt. Si Trailhead

Learning Objectives:

- Students will demonstrate their fitness level is at the minimum standard for participation in Intermediate Climbing course.

Learning Outcomes:

- Gain understanding of one's current level of physical fitness, and measures needed to maintain it throughout the climbing season.

Directions:

Take Interstate 90 East from Seattle. Exit at Exit #31, 202W, North Bend. At the stop sign at the bottom of the freeway ramp, turn left (North). Drive 0.9 miles to a light in downtown North Bend and turn right (East) on to North Bend Way. Drive 1.4 miles to Mt. Si Road and turn left (North). Drive 2.4 miles to Mt. Si trailhead and make a left turn into the parking lot. All mileage is approximate. Arrive no later than 6:30AM for a 7AM departure from the trailhead.

Description:

The Conditioning Qualifier is intended to ensure that you have the basic level of physical fitness required to successfully participate in the Intermediate course. This is not a race! The exercise will, however, require you to exert yourself at steady aerobic output for two hours.

There is a total elevation gain of about 3,400 feet spread over a trail length of approximately four miles (to the base of the "Haystack"). Participants will target reaching the top from the parking lot in two hours or less (adjusted for trail and weather conditions) while carrying a pack weighing 35 pounds. Participants who cannot complete the exercise in this time period will not be allowed to proceed further in the Intermediate Course.

It is highly likely that the trail will be icy and snowy in its upper reaches, and crampons and ice axes are required equipment. In addition, you should also bring a set of ski poles to help with balance. This will also help increase your speed. Mountaineering boots are also a requirement. No soft-sided day hiking boots or tennis shoes.

Equipment:

Pack as if you are on a typical summit attempt. Pack could include ski poles for walking, crampons, ice-axe, snow shoes, mountaineering boots, two quarts water, ten essentials, and food. We will **have a scale** at the trailhead for you to check out your pack weight.

Climb Preparation Module

The climb preparation module consists of a series of lectures and field trips designed to introduce the student to a variety of new skills, techniques, and background information that will be useful for the intermediate level climber. Topics covered included winter mountaineering, leadership, instruction skills, personal conditioning and nutrition, and more!

Intermediate Lecture – Winter Mountaineering; Climbing Health

Date: Thursday, January 28th
Time / Place: 7PM, Tacoma Program Center
Reading: FOTH VIII: 3 (pg. 48-56), 4, 16, 26, 27
Additional Reference:

Learning Objectives:

- Introduce skills, techniques, and specific requirements uniquely related to the harsh conditions of winter mountaineering.
- Explain the challenges of getting in shape and staying injury free while training for climbing and mountaineering.
- Speak to nutrition and healthy habits for optimal fitness in terms of climbing and mountaineering.

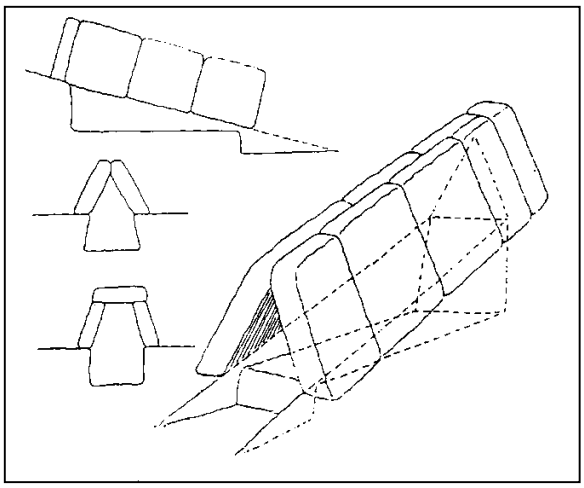
Learning Outcomes:

- I can identify and explain in detail the challenges and dangers of winter mountaineering.
- I can explain how the rigors of intermediate level climbing pertain to nutrition, conditioning, and injury avoidance.
- I will be able to develop a personal plan for conditioning and nutrition in order to be successful on intermediate level climbs.

Notes:

Snow Trenches

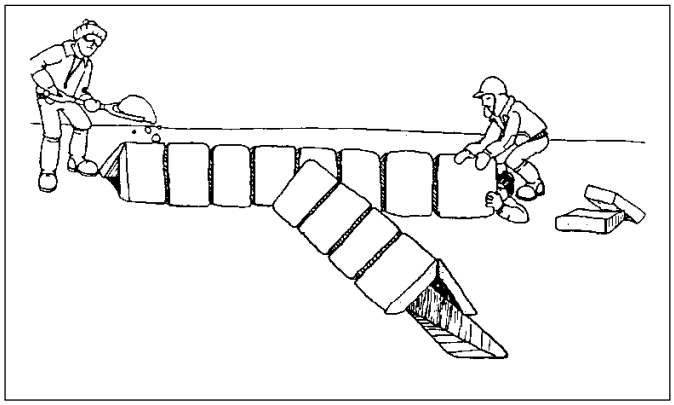
When terrain doesn't favor a snow cave, it is getting dark, or the weather is especially bad, a snow-block shelter might be your answer. The trench igloo built on either a slope or on the flat, is a quick emergency shelter for one or two people. Dig a narrow trench and then roof the trench, A-frame style, with snow blocks. (The blocks can be created as part of the process of removing snow for the trench, or they can be quarried nearby.) Then enlarge the interior and provide a vent hole. Smooth out any irregularities in the ceiling so that condensation will run down the blocks and not drip on the occupants. This shelter is not as easy to build as it looks, so practice first in good weather.



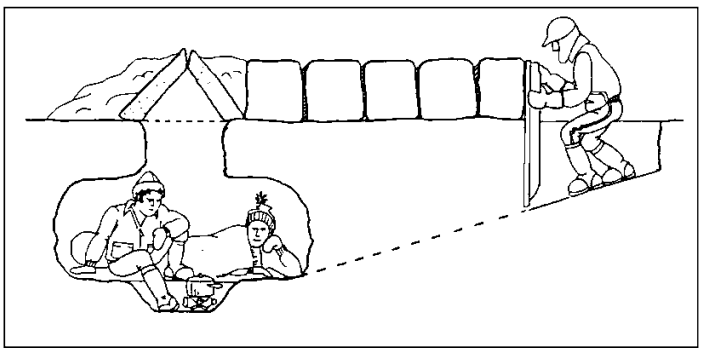
A more basic emergency snow shelter can be built by digging a trench some 4 to 6 feet deep and large enough for the party, then stretching a tarp over the top, perhaps gaining a slight angle by anchoring one side to a ridge of snow. This works well in wind or rain, but heavy snowfall can collapse a roof that is so nearly flat. The smaller the trench, the easier it is to keep warm. Again, be sure to provide ventilation.

Ranger Trench

The ranger trench is a glorified version of a classic snow shelter which has been described as a "coffin" and "grave" and probably a half dozen other names.



One of the main advantages of the trench is its simplicity. A ranger trench is simply a deep ditch with an A-frame roof and triangular-shaped cross section, wide end down. It starts 3 to 4 feet across and widens as it goes down. The roof blocks are shaped from the snow removed to make the trench.



Water: Why You Need More in Winter

By Dale Hegg

Consider the commercials pitched at thirsty athletes. They all feature hard bodies, hot competition and buckets of sweat streaming off every hard muscle flexing away at beach volleyball, basketball, weightlifting or aerobics. After being bombarded by these images, one would almost believe that skiers, snowboarders, hikers and climbers don't perspire.

Fluid replacement is clearly not just an indoor or warm weather concern, despite advertising suggestions to the contrary, H_2O may be the forgotten nutrient for many winter athletes. “Rehydration is equally important for winter outings,” says Dr. Bruce Paton, a professor of surgery at the University of Colorado in Denver and a dedicated cold weather athlete, who enjoys three to five day cross-country adventures in the Rocky Mountains every winter. “In some respects, winter rehydration is more important.” The truth is athletes actually need more fluid in winter. Why? Cold winter air is drier than warmer, wetter summer air. And dry air boosts fluid loss through evaporation. In addition, low temperatures combined with wind-chill effects add physical stress to cold weather workouts that can be dehydrating.

Other season specific factors derail the hydration process. For instance, the signal that tells us to drink, namely sweat, doesn't come across as clearly in winter. Sweat is largely invisible under layers of clothing, and today’s high-tech inner wear and outerwear which wicks sweat away from the skin and absorbs it can fool you into believing that you are perspiring less than you are. And sweat evaporates more quickly in cold, dry air, so it's less noticeable.

Flying to higher mountain elevations for a winter outing doubly saps the body of its fluid store. First the air in commercial aircraft is extremely dry and therefore, dehydrating. During a two hour flight, for instance the body can lose one pound of water. Second, altitude aggravates dehydration. Mountain elevations literally suck water out of the blood. “During your first day at altitude, fluid moves out of the blood and into the tissues,” says Paton. The result: headache, fatigue, swelling, malaise and the parched feeling of altitude sickness. “Hydrate on your way up and after you arrive. Drinking helps minimize altitude sickness. This also applies to your driving up to a higher mountain elevation.”

Once you’re out in the environment you need to pay special attention to fluid intake. Peak performance depends on your brain, muscles and circulatory system working efficiently and in concert. Since the brain is 75% water, even minor dehydration can impair concentration and coordination. Muscles are 70% water. “Dehydrate a muscle by only 3% and you lose 8% of speed and 10% of strength,” says Robert Cooper, Ph.D., Director of the Center for Health and Fitness in Bemidji, Minnesota. Minor dehydration also thickens the blood (85% water), impairing its ability to deliver food and oxygen to the brain and muscles and to carry away waste. Blood thickening may also stress the heart.

How much should a person drink? More than you're probably drinking now. The average person gets about 3.5 cups of water a day from food and half a cup as a byproduct of metabolism, a total non-beverage intake of 4 cups. Meanwhile, average daily water loss amounts to 2 cups through breathing, 2 cups through routine perspiration and 6 cups through elimination functions, a total outflow of 10 cups. “That's a 6 cup water deficit before any real exercise,” Dr. Cooper says. Hence nutritionists generally recommend drinking 6 to 8 cups of water a day.

But recreational athletes need more, and serious competitors need a great deal more. For every pound of weight lost during exercise, the body loses 2 cups of water. During a marathon (or a similarly strenuous activity) fluid loss can reach *24 cups*!

Fluids should be replaced before you feel thirsty. “By the time you become conscious of thirst,” explains Nancy Clark, M.S.R.D., Director of Nutrition Services at Sports Medicine Brookline near Boston, Mass., you're already dehydrated and your performance is suffering. In addition drinking in response to thirst replaces only half of lost fluid."

Personal fluid needs vary from person to person based on their metabolism and musculature (the more muscle, the greater one's fluid requirements). To gauge your own hydration level accurately, Clark recommends the straightforward “pee test.” “If you don't urinate several times a day,” she warns, “you're not drinking enough,” Urine color is also important, It should appear pale yellow. If it looks bright or dark, as it does in the morning, you should start drinking immediately.

Don't forget that diet factors into the hydration equation. A diet high in complex carbohydrates (starch), the body's major source of energy, is recommended over one high in protein (meat, eggs, cheeses) and low in carbohydrates (bread, pasta. potatoes, beans, cereals), which causes ketosis-a condition of incomplete metabolism that is dehydrating.

And if your idea of rehydrating is a few beers after a tough day of skiing, hiking or climbing, remember that alcohol is a diuretic. So before hoisting a few brews, hoist some water. H_2O may be the forgotten nutrient, but outdoor adventurers should never forget it-especially when the water outside is snow and ice.

Fluid Facts

1. All fluids aren't created equal. Go easy on beverages containing alcohol or caffeine (coffee, tea, soda). They are diuretics. Also steer clear of carbonated beverages, which can make you feel fuller than you actually are.
2. Drink one to two cups of fluid about 15 minutes before exercise, one cup every 20 minutes during workouts and several cups after exercise. (This would apply to indoor workouts, as it probably would not be feasible during ski trips, hikes or climbs.)

3. Sports drinks re-energize with carbohydrates as well as hydrate and are especially good for strenuous, sustained activities. However, since the drinks contain sodium, those on sodium restricted diets should check with their doctor first. Keep water from freezing by arranging your pack so that's it's close to your body. If you don't mind a little more weight and bulk, take a thermos. On strenuous, all day cross-country adventures take about two quarts per person. If you'd rather not drag all that fluid around, take a small backpacking stove and melts ice or snow.

Intermediate Lecture – Winter Overnight, Snow Travel, Student Instruction

Date: Thursday, February 11th
Time / Place: 7PM, Tacoma Program Center
Reading: FOTH VIII: 3 (pg. 47-55), 16(pg. 320-374)
Additional Reference:

Learning Objectives:

- Instruct the creation and use of snow anchors.
- Instruct and practice winter snow travel.
- Discuss snow camping and emergency shelters.
- Learn the challenges, pitfalls, and keys to success to instructing Basic Climbing students on basic field trips.

Learning Outcomes:

- I can identify the qualities of a good snow shelter.
- I can identify the qualities of a good climbing instructor.
- I will be able to identify the various types of snow shelters, how to build them, and their pros and cons.

Notes:

Keys for Success as Basic Instructors

Face of The Mountaineers

As intermediate students, you are required to instruct at each of the basic field trips within the first two years of the course. This means that you will spend a lot of time interacting with the basic class. As such, for many of the basic students you will be the "face of The Mountaineers."

The students will look up to you as mentors. The will look to you for guidance. They will look to you for keys and clues on how to behave, how to gear up, how to treat one another, and mostly importantly how to climb. Many of you will become role models and friends of the basic students. For this reason, it is critical that you are always presenting yourself properly. This means first and foremost acting, teaching, and climbing in a safe manner, in accordance with the standards set forth by The Mountaineers. Further, this entails maintaining a positive attitude at all times. Lastly, it is critical that you know the skills and the plan for the particular field trip at which you're instructing.

You must know the skills to be taught inside and out. Study and practice until you can achieve mastery and exude confidence in the material. Make sure you're up to speed by studying according to instruction by the field trip leader, and / or perusing the basic field trip manual.

Note that the basic instruction manual may be out of date in terms of location and time. It should, however, accurately reflect the skills and resources needed for each field trip. Be sure and ask any questions of the field trip leader (see list earlier in this manual).

Best Practices

Two simple rules to get you started and guide your teaching:

- As a student, what did you like best? Do this when you instruct!
- What did you not like as a student? Don't do this when you instruct!

Don't use one size fits all teaching. There are two main learning types

- Concrete Learner
  - Sequential ordering
  - Skill builder
  - Tactile
  - Skill driven
- Abstract Learner
  - Conceptual
  - Thought driven
  - Compartmentalized ordering

Teaching Process

- Demonstration
- Guided practice
- Assessment
- Review

Words of Wisdom

- The learning is achieved in the "doing." Let the students "do."
- Know when to get out of the way. Let the students make mistakes (but don't allow unsafe activity).
- If you give a student a task, let them do it.
- Encourage collaboration.
- Don't allow a lone wolf. Engage all participants.
- Treat students with respect. Avoid sarcasm.
- Avoid idle chit-chat, especially with other instructors. Be approachable.
- Call students by their names.
- Give objective, not subjective, feedback.
- Remove your ego from the teaching equation. Be confident in your skills, not arrogant.
- Where possible, have fun. Yet, remain professional.

Intermediate Field Trip – Winter Overnight

Date: Saturday February 20th & Sunday February 21st
Time / Place: 7AM, Longmire, Mount Rainier
Prerequisites: Winter mountaineering lecture

Learning Objectives:

- Learn and/or practice the fundamentals of winter snow travel, wand placement, snow anchors and belay techniques.
- Build and spend the night in an emergency snow shelter consisting of a snow cave, trench or igloo. Tents are NOT permitted.

Learning Outcomes:

- I can perform specific mountaineering skills including passing an anchor, building various snow anchors, belaying
- I will efficiently build a suitable snow shelter worthy of habitation

Equipment:

Sleeping Bag & Pad	Ice Axe	Crampons	10 Wands
10 Essentials	Shovel	Snowshoes or Skis	1 Stove per 2 Climbers
6 Carabiners	Avalanche transceiver	Pickets and runners	
Garbage & Blue bags	Avalanche Probe		

Equipment: (optional)

Ski Poles	Snow Saw	Bivy Sack or Tarp	Candles

Program:

1. Snowshoe to camp.
2. Prepare a snow camp—snow trench, igloo, or snow cave.
3. Responding to winter scenarios
4. Introduction to steep snow techniques
5. Snow Belay and anchors.
6. Responsibilities as a rope lead on basic glacier climbs

Note: Skis may be used instead of snowshoes if you are comfortable skiing with a full pack on moderate slopes.

A Field Guide to Snowpack Analysis

An On-the Snow Avalanche Hazard Guide for the Washington Cascades and Olympics

By Bill Doyle

Introduction

A good working knowledge of avalanche hazard analysis techniques is an essential skill for all Winter and Spring travelers. Probably one of the best ways to learn these skills is to participate in one of the multi-day classes and institutes presented by such professional organizations as the *American Avalanche Institute*. Combining lecture and on-the-snow instruction, students receive a thorough understanding of the principles of avalanche hazard analysis as well as their application to the snow pack in a local area. Unfortunately, these institutes are sometimes expensive and, perhaps more importantly, they are not always held in the areas Mountaineers members most frequently visit - the Washington Cascades and Olympics.

Another good way to acquire the knowledge is through study of a number of excellent books on the subject. Although these are prepared by some of the best researchers in the field and are very detailed, by definition they must be general enough to cover the wide variety of avalanche conditions found in the United States. Additionally, they cannot offer on-the-snow evaluation - an essential component for the winter traveler with little or no experience applying general principles to an actual snow pack.

Although these classes, institutes and books are excellent, only occasionally are they specific to the peculiarities of the weather patterns and snow pack metamorphosis of the Cascades and Olympics. Accordingly, although the general principles of snow pack analysis certainly apply to local conditions, without specific details it is often difficult to determine which conditions apply to local areas, and to what degree. The local winter traveler, then, may erroneously evaluate an avalanche hazard condition with potentially catastrophic results.

Purpose

The purpose of this discussion is to provide an on-the-snow field guide to snow pack analysis in avalanche terrain for the Olympics and Cascades. This field guide attempts to discuss the stability consequences of some of the most common weather conditions, snow pack structures, snow grain structures and principles of avalanche hazard analysis and apply them specifically to the Olympics, and the west and east sides of the Cascades. Because this field guide is intended to be a supplement and not a standalone text covering all aspects of snow pack development in avalanche terrain, users should have previously attended one or more lectures on avalanche hazard analysis and have become familiar with a variety of procedures and terms including crossing techniques, slope shape, collection zones, track, run out, natural and human triggers, and so forth. Additional reading suggestions are provided at the end of this field guide.

Although presenting avalanche hazard patterns specific to a single area may unintentionally increase the danger to the winter and spring traveler by appearing to limit the range of principles and variety of snow pack structures he or she thinks to look for, it appears that the working knowledge gained by learning specific local patterns would outweigh this risk. We should caution the reader, however, that the failure to describe one or more combinations of weather and/or snow pack structures does not necessarily mean that they do not occur in Washington and therefore, they should not be looked for. Rather, the reader is reminded to consider this field guide to be a presentation of only the most common weather and/or snow pack conditions most commonly encountered in the Washington Cascades and Olympics.

Snowpack History

Possibly the most important lesson to be taken from this field guide is that the more thorough your knowledge of a particular season's snow pack history, the more accurate will be your field hazard evaluations. If you already know what the pack structure is likely to be from either personal analysis and/or by consistently noting professional evaluations (such as the daily Northwest Avalanche Center messages), the quality of your field analyses will be enormously enhanced. You will know, for example, what snow grain and layering structures to look for, their sequence in the pack and their previous stability's. Against this background, you can evaluate a specific slope under current weather conditions, note expected and unexpected structures, evaluate their stability, and make a judgment as to overall safety for the type of activity you will perform on that slope. And, because different types of structures and snow grains fail under different loads, the type of activity you plan to engage in on a selected slope is an important variable to consider in your evaluations. It cannot be too strongly emphasized how valuable the knowledge of snow pack history will be to your individual field checks as you travel in avalanche terrain.

A good knowledge of the snow pack history will not only help you look for and identify these layers, bonds and crust, but when you travel to areas in the Cascades and Olympics not reported by professional organizations (e.g. above 7000', or before or after they terminate their reporting season), there will be fewer surprises for you and the quality of your field tests will be significantly enhanced.

Some Important Concepts of Snowpack History for the Cascades and Olympics

So that we may all begin at roughly the same level of understanding, it is important to identify and clarify some essential features and structures of snow packs in the Cascades and Olympics.

Volume

Possibly the single most important feature of our snow pack is the enormous volume of snow our climate creates. Frequent winter and spring storms, laden with moisture, deposit prodigious quantities of snow as they are temporarily held in check by the mountains. You should not be surprised to encounter single-storm depositions of three to four feet, over an equal number of days. Additionally, warm, on-shore marine flows carry very moist air to altitudes averaging some 6000 feet and above as they move up and over the mountains. The adiabatic cooling process causes this moisture to drop out as snow.

In addition to sheer volume of snow we receive, we need to pay particular attention to some important structural aspects of Cascade and Olympic snow packs. By understanding how snow pack structures interrelate, we can make educated guesses about the stability of a given slope at a given time.

Layering

The first of the three most important concepts of snow pack structure for the Olympics and Cascades is the prominence layering plays in stability analysis. For our purposes a layer is created under any or all of the following conditions.

1. There is snowfall accumulation of 1/2" or more;
2. Already fallen snow is wind transported to a new location;
3. Wind transported snow is packed into a slab;
4. The density and/or temperature and/or snow type (grain type) tend to be uniform and different from adjacent areas.

Slab

A slab is itself, a layer of snow, usually not less than a foot thick, that is internally strongly cohesive and tends to act as a unit. Such characteristics as temp, density, and granular type are uniform throughout the slab.

Bonding

The strength of the adhesion between immediately adjacent layers in a snow pack is termed the "bond" and is probably the single most important element in determining snow pack stability in the Cascades and Olympics. Because the strength of the bond is a function of the type of snow grain each layer is composed of, it is essential to understand the degree to which the different grains will bond to each other. The shear tests described briefly below provide clues to the strengths of these bonds.

Crusting—the Most Common Sliding Surfaces

For our purpose, a crust is a harder, denser layer (often ice) occurring both within and on the surface of a snow pack. In the Cascades and Olympics, a crust is the single, most common layer upon which snow slides and, the smoother the crust, the poorer the bond to the layer above, and vice versa. Although crusts of various types frequently form boundaries between layers in the snow pack, you should not conclude that there must always be a crust to separate layers. As we said above, a layer tends to have its own uniform properties (like temperature, wetness, etc.) and these alone may be sufficient to separate one layer from another.

Rain Crust

Due to the storm marine climate of the Olympics and the west side of the Cascades, rain crusts frequently form whenever the weather turns cold enough to freeze the surface of the pack after it rains. Often they are very hard, very thick and very smooth.

In the more continental and generally drier climate on the east side of the Cascades, rain crusts tend not to occur as frequently. However, due to the generally colder temperatures, when they do form they tend to be even harder and smoother than those on the west side.

A rain crust may persist for many weeks, or even months buried in a pack, and may remain the prime sliding layer for a slope until either a slide releases on it or water (melt-water or rain) percolates to it and freezes. By monitoring snow pack history you will know about how far down these rain crusts are so that you have some sense of how deep to dig your pit. In the winter of 1990 - 1991, for example, a thick rain crust formed at Thanksgiving, provided the principle sliding layer for upwards of 10 foot thick slab releases in the period January 6-15, 1991 in the Olympics and west side of the North and Central Cascades. These slides ran long and fast, destroying mature timber and triggering wind blasts and sympathetic releases, both on adjacent slopes and on the other side of narrow valleys.

Wind Crusts

Wind crusts are composed of snow grains packed tightly together by the force of the wind. Although they are usually not as hard as rain crusts, they may be quite stiff and brittle and provide excellent sliding layers for subsequent snow deposits. Although there may be many different wind crusts in a typical pack, typically only those in the top 1-5 feet are of concern. During the course of a storm, it is very common for a crust to be laid down, and then have the wind change direction and load

this new crust. Needless to say, the stronger the wind, the harder the crust: and the more frequent the wind changes, the more complex the loading and crusting patterns become and the more difficult it is to predict the stability of the pack.

Melt-Freeze Crusts

Melt freeze crusts are created when the sun warms the surface snow and it re-freezes at night. Although these occur most frequently during the spring (May and June), they do occur in winter (often during late January and early February) and provide excellent sliding surfaces for subsequent accumulations, which are often copious as the winter and spring storms pass through.

Two Types of Avalanches - Slab and Loose Snow

Slab Avalanches: Although your understanding of slab characteristics will increase as you read through this field guide, with the above concepts in mind we can define a slab avalanche as a layer of snow which releases from the general snow pack all-at-once and moves as a unit down slope. Slabs may involve any amount of snow, and frequently are some 1 to 4 feet thick and cover two to three football fields in area. However, slides in the Cascades and Olympics are often much larger, running 4 to 6 feet thick by 1/2 mile in length. Should you have difficulty visualizing the kind of forces involved in, say a 4 feet thick by two-football-field size release running a quarter of a mile, you should consider that under the proper circumstances of slope and velocity, such a slide could flatten 2-3 foot diameter mature, healthy timber or slice it off 10 to 15 feet above the ground.

Loose Snow Avalanches: Loose snow avalanches are (by comparison) smaller releases and they are characterized by starting at a single point (sometimes termed "point release slides") on a slope from which they collect additional surface snow as they run. Their characteristic shape is a "teardrop". Although there is a tendency to dismiss or minimize such releases, they can be quite dangerous as they can involve large volumes of snow, carry you over cliffs, into obstructions or bury you under several feet of snow. It is important to note that they may be symptomatic of deeper instabilities and they are frequently triggers for large, deep-slab releases.

Common Snow Grain Structures

Once the individual snowflakes fall and settle on the snow pack, they begin to undergo change (metamorphosis) almost immediately. They respond to changes in temperature; they are compressed by accumulations; they are transported by the wind and fractured; their points are broken off and so forth. For our purpose, the smallest unit of snow to work with is the grain. A grain is a small, cohesive structure that, when you look at it, is separated from other similar cohesive structures. A common example is the "corn" of corn snow found in the Spring.

As mentioned above, a key element in stability analysis is the evaluation of the strength of the bond between layers. The focus of your analysis should be (1) on the types of snow grains that compose the larger individual layers in a snow pack and (2) on the 1 - 12" thick properties of the following selected granular types.

Snow Grain Structures that tend to Stabilize:

"**Corn Snow**"—This is a rounded, high density (i.e. wetter) grain of old snow. Its many surfaces tend to readily attach themselves to other grains and to crusts. Accordingly, slopes consisting primarily of these rounded grains are typically very stable. However, in spring (especially May and June) be careful - the top several feet of the pack may be corn snow overlaying several unstable layers which will release. (Do not confuse corn snow with "hail" which is composed of ice balls and which, in accumulation, are extremely unstable.)

Snow Grain Structures that tend to Destabilize:

Graupel—One of the most common accumulations in the Olympics and west side (and to a lesser extent on the east side) of the Cascades is graupel. It is snow, not ice (i.e. hail). It is round, and looks much like a ball bearing or sometimes like the number "6" or the letter "a", in appearance. As little as 1/2" will destabilize subsequent accumulations when deposited on a crust, and accumulations of 4 - 6" are very common. A 4 - 6" thick layer of graupel on top of a crust can create extreme instability when covered by additional layers.

Surface Hoar—Surface hoar (a.k.a., constructive metamorphosis) is the sometimes spiked, sometimes large, flat mica-like crystals that form on trees, shrubs and surface crusts during periods of cold, clear weather. Although very fragile in appearance, they can readily support many feet of snow. When 2 - 4" or more of surface hoar rests on a crust, subsequent accumulations of snow can become very unstable. Surface hoar is often found on top of rain and melt/freeze crusts. It occurs throughout the Cascades and Olympics.

Depth Hoar—The results of very cold temperatures for prolonged periods of time, for many years it was thought that depth hoar simply did not occur in the Cascades because the temperatures are too warm. Not true. Although depth

hoar has not been reported on the west side, it is common on the east side where the pack is shallower and more continental climate prevails. Depth hoar (also constructive metamorphous) occurs when snow grains immediately adjacent to the ground grow into their classic inverted cup-shape. This forms an air pocket, creating an extremely unstable snow pack which may remain so through late spring. On the east side, your snow pit should always extend to the ground.

Faceted Grains—(Temperature Gradient weakening)—During prolonged periods of very cold weather, individual snow grains literally grow within the layers themselves (constructive metamorphosis), becoming progressively weaker as they do so. Additionally, their growth creates air spaces in the snow pack. As you test the temperatures of the various layers in the pit, you should be alert to very cold layers, and the presence of small mica-like grains (something like surface hoar). Look especially for grains that handle like granulated sugar—i.e., sift through the fingers and do not bond to each other (or anything else) very well. "TG", as temperature gradient weakening is known, occurs frequently on the East side of the Cascades, but only rarely on the West side.

Light Density Snow—Density is a relative term. Although we often think of light density snow as the "powder" skiers will gladly travel many miles to find, this definition is too narrow for our purposes. Although the Cascades and Olympics rarely get accumulations of the "true" powder mentioned above, these ranges do get copious quantities of snow which has a much lighter density than the other, heavy density snow that we also get in copious quantities. Lighter density snow is important to identify within a snow pack because it, too, is not as cohesive and contains lots of air spaces. Heavy density snow, on top of light density snow, on top of a crust is one of the classic snow pack patterns of the Cascades and Olympics and this combination can be quite unstable and must be searched for (more about this below.) The generally accepted definitions to measure degrees of density can be found in Snow Sense, in the bibliography.

Some Classic Snowpack Structures to look for in the Cascades and Olympics

This section attempts to pull together the individual concepts presented above into some important relationships and patterns you should look for in your snow pack analysis. Additionally it presents various general relationships to be mindful of when analyzing a pack.

1. **Heavier density material over lighter density material -** This is the classic pattern to watch out for on the west side of the Cascades and Olympics, whether during the winter months or during spring thaw periods. The important relationship to look for is the presence of heavier, wetter and warmer material overlaying lighter, dryer and colder material. Heavier, wetter material tends to destabilize the pack by overloading it. Look especially for heavy wet material on top of graupel, surface hoars and very light density snow on top of smooth, very hard rain and wind crusts. On the east side of the Cascades where average temperatures are considerably colder, this pattern is not as pronounced during the winter months, but is occurs very frequently in the spring as surface layers warm and melt.

2. **Wind slabs -** Wind slabs are caused by the transport and packing of snow. Frequently, the wind literally scours windward slopes and transports it to more sheltered areas or against obstructions (like rock bands and ridges) where it packs it into thick, often brittle slabs. Because the temperature, density and granular structure of a wind slab is so uniform, typically the bond between the general snow pack and the new wind slab is poor. For the same reasons, the bond between the slab and subsequent depositions is similarly poor.

3. **Liquid water -** Liquid water tends to be a destabilizing element and it should be actively searched for in your snow pack analysis, especially on the west side of the Cascades and in the Olympics. Liquid water has two broad effects on the snow pack: (1) it lubricates crusts causing relatively rapid destabilization of the overlying layers and (2) it dramatically increases the density of surface (or other upper) layers which may, in turn, lie above light density layers.

a) **In Winter -** liquid water is introduced into the pack primarily by rain. As it percolates, it wets the snow thereby increasing its density. Finally it reaches a crust which it tends to follow (rather than just melt through) and it lubricates. The result can be very unstable pack.

b) **In Spring -** liquid water is often introduced by runoff, especially from cliffs and rock bands adjacent to the snow pack. Like winter process, the water hits a crust and lubricates. But unlike rain which is readily perceptible, the undermining of the snow pack by spring runoff is subtle, with the greatest danger occurring on those bright, sunny days of May and June. A common visual symptom of this phenomenon is fracture lines running from cliff to cliff to tree and back to cliff again across the slopes, called "glide" (see below).

4. **Presence of very cold layers -** The discovery of very cold layers in a snow pack (usually in the range of 0 to -30F) signals the need to look for TG weakening and weak, faceted grains. in Eastern Washington, dig your pit to the ground in search of depth hoar as well.

Some Important Weather and Snowpack Processes in the Cascades and Olympics

Processes that tend to stabilize:

Although the purpose of this field guide is to present some important concepts and tools for analysis of an already existing snow pack, it is probably important to give an overview of some of the more general stabilizing and destabilizing processes more specifically affecting the Cascade and Olympic snow packs as well. As you will see, a number of the

processes that tend to stabilize a snow pack are identical to those that tend to destabilize the pack. For these otherwise similar processes, the difference is the rate at which they affect the pack.

In general, the snow pack is stabilized by settlement and consolidation. Settlement can be thought of as a general reduction in the depth of the pack. Consolidation can be thought of as the general breakdown of individual snow grains (destructive metamorphosis), which end their lives as corn snow and eventually, water.

1. **Gradually warming temperatures:** Although any warming of the snow pack may introduce instability, warming sufficient to cause grains to round, but not rapidly enough to introduce liquid water into the pack, slowly stabilizes the pack through settlement and consolidation. This process can be observed throughout the life of a snow pack in the Cascades and Olympics, including in the dead of winter.
2. **Light amounts of warm rain:** On an already relative stable pack, light amounts of rain enhance the stabilization process in the same way that gradual warming does. An important consideration is that the pack already needs to be relatively stable before the rain begins.
3. **Storms that start warm:** Although not as common in the Cascades and Olympics as storms that start cold and later turn warm, a storm that starts warm always forms a much better bond to an existing surface. Consequently, storms that begin as rain and / or wetter, high density snow, will typically bond well even to smooth, hard rain crusts. Furthermore, storms that start warm and then turn cold result in a more naturally stable accumulation because the heavier snow is on the bottom with lighter density snow on the top.
4. **Melt-Freeze cycles:** Although predominantly a spring (May and June) phenomenon, the melt-freeze cycle can also occur in the winter. It is characterized by intense solar radiation on southwest to west aspects with attendant melting (and, at the beginning of this process, avalanching) of the snow pack. At night, however, air temperatures fall well below the freezing mark, causing the pack to refreeze quite solidly. Repetitions of this daily process eventually result in a very well consolidated pack consisting primarily of corn snow with a very solid surface crust.
5. **Avalanching:** Avalanching is, in the final analysis, a process nature uses to reach equilibrium, or in our terms, to stabilize. Provided nothing of value to humans is in the avalanche path, it is one of the best ways to stabilize the pack. One word of caution however: although an avalanched slope is justifiably considered safer than an non-avalanched slope, just because a slope has avalanched does not *a priori* mean it is safe. Rather, it may mean that the original sliding layer is now exposed and may be ready for the next accumulation to slide on.

Processes that tend to destabilize:

In addition to the well known destabilizing effects that such general processes as wind loading, rapid snowfall deposition, heavy rain, etc. have on a snow pack, below is a review of some general processes with special attention to those affecting the Cascades and Olympics.

1. **Cold snow is less cohesive than warm snow.**
2. **Cold snow bonds more poorly to existing snow that does warm snow, whether it is in the pack or falls during a storm.**
3. **The more air space there is in a snow pack, the greater its instability.**
4. **Snowpack on northwest to east aspects tend to remain unstable much longer (sometimes well into the summer) than on other aspects.**
5. **Snow is an excellent insulator and the colder the snow, the greater it's insulating properties.**
6. **Storms that start cold** - Because our storms are almost always of marine origin, in the Cascades and Olympics snow storms most often start with colder air temperatures which then warm up as the storm progresses and moves onto land. There are two very important consequences of this pattern: (a)The colder the snow, the poorer the bond to the already existing pack, especially to a crust; (b) Heavier density snow is "automatically" deposited over lighter density snow. Storms that start cold have this built-in instability because heavier density material is deposited over lighter density material.
7. **Prevailing storm winds—windward, leeward and through passes:**
   a) **When the storm is still offshore....** Because most of our storms are low pressure systems most frequently coming from the southwest, slopes facing the southwest (termed "southwest aspect"), tend to be windward. Accordingly, wind crusts and wind slabs tend to develop on south and west aspects. Under these conditions, lee aspects, usually north to east, tend to develop cornices near ridge tops and snow pillows below. (Snow pillows are wonderfully soft, easily skied, pillow-shaped accumulations and drifts which tend to be extremely unstable and should be avoided.) However, because the low pressure centers are south or west of the Cascade crest, air from Eastern Washington simultaneously rushes westerly through the passes, forming wind crusts on north to east aspects and snow pillows and cornices on south to west aspects. Then, the whole picture reverses.
   b) **When the storm moves into Eastern Washington** – Since the storm is still a low pressure system although now on land and usually weaker, once it passes over the mountains the airflow reverses and with this reversal,

the snow deposition patterns change accordingly. Consequently, aspects which were originally subject to windward deposition patterns and processes now become subject to leeward patterns and processes. The most important structural consequences of this reversal is that during the course of a single storm, most aspects are loaded in complicated ways and in a variety of directions making hazard analysis more complicated, though not impossible. Because the storm has weakened and its source of moisture (the ocean) has been removed, there will be less deposition on south to west aspects.

8. **One or more wind shifts during a snowfall** - The more frequent the wind shifts and the gustier the winds, the greater the instability. Frequently changing winds tend to create thin, brittle crusts between relatively thin wind slabs, which when loaded, tend to fail easily. It is important to remember that every change in wind direction introduces a new layer which introduces a new bond—and these bonds are often very poor.
9. **Rapid warming** - Rapidly rising freezing and snow levels quickly destabilize the pack by creating heavier density snow on the surface and by introducing liquid water into the pack through rain and melting. It is not uncommon for avalanche hazard to become extreme under such conditions. Chinooks—The Chinook is a unique weather pattern to the Northwest (including Idaho and Montana). It is characterized by rapidly rising temperatures (often into the 60's in Seattle), very warm high velocity winds and heavy rain. Freezing levels often rise to 10,000' or more in the dead of winter. Needless to say, avalanche hazard can increase dramatically under these conditions.
10. **Snow showers** - Snow showers introduce a number of destabilizing factors into a snow pack. Although showers often have negligible effects on snow pack stability at the time, their effect is particularly noticeable when subsequent heavy snowfalls bury the snow grains they deposit. For example, showers may deposit several inches of graupel or hail in a matter of minutes on wind and rain crusts. Showers frequently leave snow layers with widely differing temperatures and densities. Also, showers are always accompanied by strong, gusty winds from a variety of directions. As noted above, strong changeable winds introduce thin, brittle wind crusts. Awareness of snow pack history will help you identify and evaluate the results of these showers
11. **Glide** - Glide is the gradual movement of most of the snow pack downhill. It is most easily identified by the presence of fracture lines running from rock outcrop to rock outcrop along the top of the slope and by parallel compression snow at the bottom of the slope. Glide is most frequently seen during the spring and it can signal the presence of liquid water in the pack. Slopes showing evidence of glide should be tested thoroughly, especially those experiencing bright, warm sunlight.

Three Important Stability Tests

Keeping in mind the above information on individual structures, bonding, granular type, and structural patterns to look for, we are now ready to evaluate a given snow pack. The various kinds of weaknesses in a snow pack tend to fail under different kinds of loads and the degree to which these loads are applied. Accordingly, it is important to learn those tests which most closely simulate the kinds of loads you will be placing on the pack. For example, if you plan to walk or ski diagonally uphill across a slope, or plunge-step down a slope, or do turns (and falls) down a slope, etc., you need to test the pack for the kinds of loads you will likely by placing on it by different actions. Unfortunately, there are no, or very few, reliable one-to-one relationships between the kinds of snow pack weaknesses and the loads they succumb to. The best we can do is suggest tests and results which imply differing degrees of stability for activities you plan for the slope. In this section, three such tests will be discussed very briefly. For a more detailed discussion of each, including diagrams, readers are encouraged to consult the book Snow Sense, in the appendix, as well as other texts mentioned there.

Shovel Shear Test

The shovel (or ski) shear test is one of the oldest techniques available for measuring the ease with which slabs slide, the thickness of the slab(s) and the primary sliding layer(s) in a pack. Using your knowledge of snow pack history, dig a pit about 4' wide and deep enough to reach the primary sliding surface (on occasion, this may be 10-15' in the Cascades and Olympics). Leave a protruding central column about the width of the shovel. Smooth the back wall and sides of the pit, making them vertical. Using a credit card or similar object on the back wall, draw it vertically downward identifying and marking all resistance. With your soft paint brush, further expose the layer boundaries. Measure and note the temperatures of each layer and investigate the granular structures of each layer, each crust and layer(s) immediately above each crust. Using a ski or string, cut across and isolate the back of the protruding column from the pack and insert your shovel or ski. Pry forward very gently at first, searching for the first signs of a slab sliding off the column. Increase the prying pressure until a slab fails. Then using the information you gained from the analysis of the back wall, define the structure(s) and grains that failed. This is the primary weak layer. Also note the "ease" with which the slab failed, consistent with the angle of repose of the slide. For example, a moderately easy failure on a 30 degree slope is likely to become an easy or very easy failure on a 45 degree slope. Correspondingly, an easy or very easy failure on a 30 degree slope is likely to become an extremely easy failure on a 45 degree slope. Continue prying and note subsequent failures and the ease with which they fail.

The ease with which subsequent slabs fail is indicative of the overall stability of the pack. By applying the same rating scale (e.g. “very easy”, “easy”, “moderate”, etc.), you will be able to judge whether other slabs are likely to be involved in a slide if, say, just the top one fails or if a loose snow release will act as a trigger.

If the shovel test results reveal an acceptably stable pack so far, you should plan to conduct either or both of the following tests. If you plan to ski downhill with turns (and falls) or plunge step diagonally downhill, the jump test is especially recommended. If you plan to ski, snowshoe or walk diagonally uphill, the shear block test is recommended. If you plan to ski-traverse, snowshoe or walk downhill, all three tests are recommended.

Jump Test

Using the same pit you dug for the shovel shear test (now minus the central pillar), make the pit about 6’ wide and dig farther back into the uphill slope leaving a new central column about 4’ wide. Cut the back of the pillar from the rest of the pack with a ski or string. After approaching the now detached column from above, carefully step onto the column. Flex your knees gently at first. If there are no failures, flex and/or jump harder and add additional jumpers. This test tends to emulate turning and falling skiers or plunge stepping climbers

Shear Block Test

Using the same pit (or by now, a new one), once again isolate a column about 4’ wide. Again after approaching from above the cut, step onto the isolated column with your skis on. While sliding back and forth and flexing your knees, emulate the undulating motion of the diagonal stride, or climbers or snowshoers traversing a slope uphill. Because cross country skis are narrow, they expeditiously cut through whatever cohesiveness the layers have as they stretch over convex slopes (tensile strength test). This test tends to simulate the cutting action of skiers and climbers on snow pack layers.

The Rating System

Successfully evaluating the degree of probability at which a given slope will fail under specific conditions of snow pack weakness and human activity is best described as “art”. Probably, the best way to become proficient in this art is to monitor the day’s ratings issued by the Northwest Avalanche Center, dig several pits that day and apply the tests. Another excellent way to learn this art is to take some professionally taught courses in avalanche hazard analysis. In general the rating system is as follows:

1. ***Extreme hazard***—releases are “certain”—The pack is so sensitive that the pit itself may collapse as you dig it; or merely inserting the shovel (for the shovel-shear test) causes immediate failure of the column. There are many spontaneous releases on surrounding slopes.
2. ***High hazard***—releases are “probable”—The pit can be successfully dug and the shovel or ski inserted. However, just easy prying causes one, or usually more layers to fail.
3. ***Moderate hazard***—releases are “possible”—It may take some effort to pry a layer loose, but it is not necessary to apply a lot of pressure.
4. ***Low hazard***—releases are “unlikely”—It may take a lot of pressure on a ski or shovel to pry a layer loose.

In review of this system, it is important to bear in mind that the “increment” between each of the four different levels of this system is not uniform—it is not a constant; it is not a metric. For example, the difference in pack sensitivity between an “extreme” rating and a “high” rating is much smaller than the difference between a “low” rating and a “moderate” rating. So, if you are planning to go touring on slopes that have a “low” rating in the morning but then increase to a “moderate” rating in the late morning/afternoon, your risk of being caught in an avalanche is much less than if you start out on “moderate” slopes which become “high” later in the day. This isn’t a science, yet—it is art.

Summary

Summarizing what we have said, below are some important patterns and layering sequences to look for in the Cascades and Olympics.

1. Heavy density snow over lighter density snow on a crust.
2. Light or heavy density snow over liquid water on a crust.
3. Rest of snow pack supported by graupel, hail or surface hoar on a crust.
4. Within a layer, multiple thin crusts (most likely wind).
5. Rest of the pack supported by very cold layer over a crust.
6. In a very cold pack, the presence of TG weakening.
7. In a cold pack near the ground, search for depth hoar (east side of the Cascades).
8. Bright, warm sunlight on any slope.
9. Spontaneous sloughs from trees and/or loose-snow slides.

Appendices

Places to view avalanches and resulting damage—Because it is difficult to comprehend the power, and to some extent, the majesty of avalanches, it is often instructive to witness them in action, as well as to view the resulting damage. Accordingly, you are encouraged to complete your understanding of avalanche hazard analysis by safely observing avalanches in action and in the summer, their destructive consequences. Please consider both of the following suggestions:

Active Avalanching—Winter Trips—Although there are several safe places to view active avalanching, the only one that is both safe and easily accessible to my knowledge is 1/2 mile east of the summit of Stevens Pass. There, from the warmth and safety of your vehicle, you may watch natural releases coming off of the north-side slopes. (In reality, both sides of the Pass present superb viewing areas, but parking in winter is limited and parking on the west side is often below avalanche paths and is **not recommended**.

Avalanche Damage—Summer Trips—There are two extraordinary, easily reached examples of recent avalanche damage in the Cascades. The **first** is at the end of the northern Alpental parking lot. Find the Maintenance shed and just uphill, look for large piles of trees lying akimbo. This was a slide on Mt. Snoqualmie in February, 1990. Note the diameter of the trees and the height above the ground at which many are broken off. This slide was airborne at this point. The **second** is even more interesting because you can traverse it twice, once near the bottom and once just above normal, mature timber line, on the Pacific Crest Trail. Take the new Crest trail north from Snoqualmie Pass parking lot. After a mile or so of walking through dense, mature (2-3' diameter trees). you will happen upon a swath of mangled timber, broken off 10-15' above the ground. Its starting zone lies just below Kendall Peak barely visible in the distance uphill. If you continue to switchback on the trail for another 3/4 mile you will pass just above the normal timberline for the area. Here, the peak and starting zone are clearly visible—and so is a long, brand new avalanche track. Very impressive! At both crossings, the slide was airborne some 10-15' above the ground, and it generated a wind blast that knocked down and de-branched a number of additional trees. This slide also released in February, 1990.

Essential tools for digging snow pits:

- Thermometer - capable of reading -30 to +30 F
- Credit card - for identifying layers
- 1" soft paintbrush - for exposing layers
- Shovel - for digging pit and doing shovel-shear test
- Magnifying glass - to determine snow type

Important Professional Sources of Snowpack History

- Northwest Avalanche Center
  - http://www.nwac.us
  - 206-526-6677 (Washington) & 503-808-2400 (Northern Oregon)
- Mt. Rainier National Park
  - http://www.nps.gov/mora/planyourvisit/weather.htm
  - 360-569-2211
- Highway Pass Conditions
  - http://www.wsdot.com/traffic/passes/
  - 5-1-1 or 1-800-695-7623USFS


GUIDE SERVICE

Intermediate Lecture – Expedition Planning and Climbing Logistics

Date: Thursday**,** March 3rd
Time / Place: 7PM, Tacoma Program Center
Reading: FOTH VIII: 20
Additional Reference: *Climbing: Expedition Planning*

Learning Objectives:

- Provide information on the guidelines for planning a mountaineering trip or expedition.
- Explain what is required to make a climb successful.

Learning Outcomes:

- I have a basic understanding of the complexities associated with planning and undertaking an expedition style climb.
- I will work with a group to plan a hypothetical expedition

Climbing Preparation and Leading

by Bert Daniels, December 96

What does it take to make a climb successful? Following are some practices and concepts learned from good Mountaineers leaders, and from experience, on how to make a climb safe, satisfying, and a success, even if the planned summit is not reached. This is on how the leader and the team members work together to prepare for and do the climb and is not on the technical aspects of climbing itself.

The Tacoma Mountaineers Climb Leader's job is to combine technical skills, logistics, and people skills, and then to make sure it all works in a safe, enjoyable, environmentally conscious, and successful climb. Much of the leaders work takes place well before the day of the climb. When the planning for a climb starts with a known party of people, you mutually select a climb that is desired and within the abilities of the party. When starting with an 'open' or listed climb, the leader defines the climb and its requirements and then screens the prospective members to these criteria (training, critical skill capabilities, equipment, and commitment).

The leader starts by selecting the type of climb: mountaineering, rock, glacier, club, or snowshoe and the difficulty level wanted. Then the climb is selected within the leader's ability range and appropriate to the season from prior knowledge, listings, guidebooks, and fellow climbers. An assistant leader is selected, from volunteers with his/her full concurrence, as someone who can readily assume a full leadership role in case the leader is not available due to an emergency once the climb has started.

The leader then determines such things as:

- Climb duration and a start date (web listing will avoid conflicts with other parties).
- Party size, with both a minimum and a maximum that do not to exceed climbing code, Tacoma Branch guidelines, or route rationales.
- Individual member critical skill and capability requirements.
- Road route, distance, drive time, and trailhead parking space and toilet facilities.
- Approach route, distance, elevation gain, time and conditions.
- Base camp location, condition, and camping method, food and equipment requirements.
- Summating, ascent and decent, route(s), distance, elevation change, conditions, and time plus the individual and group climbing equipment requirements.
- Alternative or 'retreat' routes in the event that the ascent climb must be altered or the planned decent route cannot be down climbed by the party, e.g., another party close behind on a rock route.

The leader may customize an equipment check list from what was decided above for individual and group gear. Some leaders also write a short narrative on the planned climb, which is a nice helpful touch. All climb party members should be informed of the nature of the climb and what is expected of them so that they can better decide if this is a climb for them and to assist them in preparing for it.

On higher level climbs, the leader may do a similar but lower difficulty level climb with the prospective climb members whom he/she does not personally know as a screening technique for the major climb. On high exposure climbs, it is extremely important that all party members have RECENTLY worked up to or climbed at that level. Ability to take sustained high exposure is typically not just retained but must be maintained by climbing at that level.

At least a week before the climb, the leader contacts all selected participants, provides an equipment list, and explains the climb details in order to provide adequate time for members to acquire any additional gear and for their mental preparation for the climb. **This can be done at a 'pre-climb' meeting where other things are also discussed and finalized such as:**

- Introductions including assistant climb and rope leaders.
- The MOFA background of each party member for everyone's information and selection of the MOFA leader.
- Further re-evaluation of initial assessment of each member being up to the climb.
- Leave time and date, meeting time and place, car pooling arrangements, and any pre-trailhead meeting time and place such as at a ranger or registration station, carpool shuffling point, or restaurant.
- Long range weather forecast and weather related options.
- Verify each climber's individual equipment and determine, solicit, and assign who provides group gear. This may include club ropes, avalanche beacons, ice tools, etc.
- Tent and cooking partners and arrangements; with care for compatibility.
- Assure that the climbing team is equipped with members' food and clothing and means of personal protection to bivy one unplanned night and the following day in case of an emergency or an extra-long summit day.
- Emergency contact people and phone numbers, including local authority in climb area. Develop this into a list that is left with responsible people.

- Consider a brief explanation of The Climbing Code and of the "Minimum Impact" and "Leave No Trace" specifics for this climb that will be followed. Encourage toilet stop at restaurant, quick stop, or ranger station just before reaching the trailhead.
- As the departure date and time approach, the leader monitors the weather, the forecasts, and the reported avalanche conditions and checks with the assistant leader for any probable weather effect on the route and climbing conditions and then continues on schedule, makes tentative, delays, or cancels the climb as considered appropriate.
- On the way to the trailhead, the leader signs in at any registration or ranger station as required and obtains any available last minute information on the weather and route conditions, and the party size and planned routes of any other climbers in the area.

At the trailhead, the leader and assistant leader:

- Verify all climb members' dress, preparations and equipment.
- Determine if anyone has any recent medical problems or injuries that might be of a concern on the climb. The climb and MOFA leaders should also be aware of any specific medications that are needed by party members along with their dosage, method, and frequency of administration and assure that they are available.
- In conversation with each member, verify their commitment to the group and to the climb objectives. Are they UP for it?
- Verify that all group gear is present and distributed to all party members.
- Refuse to take anyone along they think is deficient enough in the above points to impact the success and safety of the climb.
- Encourage use of any toilet facilities there to minimize trailside use.
- When everyone is "booted up", form a circle and do introductions around, include identifying assistant, rope and MOFA leaders, describe the objectives of the day and the climb, remind everyone of their wilderness preservation responsibilities, and outline emergency procedures.
- The approach and then the base-camp location and procedures are done following the guidelines as described in Mountaineers courses and in FREEDOM OF THE HILLS VIII.
- Unless otherwise arranged, the leader should keep the climbing party reasonably together, within easy communication range, during the approach. This facilitates stops for rest breaks, clothing adjustments, toilet breaks, and equipment reallocations as needed to keep everyone feeling about the same.
- Note that the leader does not have to be at the front of the party, doing point, to lead except in the most challenging areas. It is usually more effective, and more pleasant, for the leader to move about the party observing and conversing with its members, while keeping a watchful eye toward the front, and allowing others to share point.
- Note also that a good leader typically does so by setting an example, asking for assistance, making suggestions, being understanding, and being receptive to suggestions of all party members. On an intermediate climb, all members often are of about the same capability, with the leader being the one having made the arrangements. But on any climb, when the situation gets tight, or in an emergency, the leader then LEADS with quick, clear, definite, experience based instructions, which must be taken as such.

After completing the approach to base camp, the leader:

- Provides guidance as necessary for tent locations and setups along with water source and cooking locations for setting up base camp in concurrence with safety, group cohesion, and wilderness preservation considerations.
- Assigns rope teams as necessary based on prior knowledge of individual climbers and on approach observations of climb member's strengths and weaknesses. It is recommended that the leader avoid assigning two highly "significant others" to the same rope. This is to minimize the social impact of the injury or the loss of a rope team and, especially in an emergency situation, to assure that all rope team members are equals.
- Establishes wake-up and departure times.
- Reviews readiness of equipment needed for the next day's summit bid and distributes group gear across the rope teams in as equal percentage of each climber's body weight as practical.
- Gives a brief description (pep talk) of the next day's climb. This may include a short hike to a lookout point where the route is more visible and better updated and described.
- Answers any last minute questions that may include refresher technical pointers and demonstrations.

On summit day, the leader:

- Establishes a turn-around time if the objective is not reachable in a safe timeframe for returning to base camp and, if needed, also for returning to the trailhead and home.

- Leads the summit bid and back to base-camp in the manner described in The Climbing Code and throughout Tacoma Mountaineers Courses and Freedom of the Hills VIII.
- Keeps the party together/in-sight-of-each-other for control and support purposes.
- Supported by the assistant leader, maintains continuous awareness of the team's progress and condition and of overall safety.
- If the summit appears non-reachable due to unacceptable route or safety conditions, speed/progress/time, weather, or climb member difficulties, and after discussions with assistant and rope leader(s) and the whole climbing party, the leader modifies the objective and/or aborts the climb and returns to base-camp.
- On climbs with especially long approach and/or summit days, the leader should have an open option or plan-on a second night in base-camp that follows the summit drive day.

From base-camp back to the trailhead, the leader:

- Makes sure that base-camp area is cleaner and as natural as it was when they first got there.
- Makes sure that everyone leaves base-camp together, or in prearranged subgroups each with a 'leader'. The leader assigns him/herself, or a strong climber or assistant leader, as necessary to do 'trail sweep' to keep the party reasonably together and to assure that there are no stragglers.
- Leads the climbing party back to the trailhead in a manner similar to their trip in.
- Checks out presence and condition of all returning climb members.
- Ensures that no climb members leave the trailhead until everyone is back.
- Makes sure that all vehicles start and go.

The leader signs back in as 'returned' at the registration or ranger site if required. When doing so, reports general route and climb conditions so that word can be passed along, and also reports problems with trail, route, litter, or hazards that need attention.

A climb is often wrapped up with a casual meal and conversation at a restaurant close to the trailhead. This is one of the things that holds us together and has been known to be the key to a 'successful' climb, especially one that didn't summit.

After the climb, return all ropes promptly after a thorough checkout and sign them in with notes on their condition including any leader-falls taken on them. Finally, the leader files a trip report in a timely manner, especially if there were any route, climb, or climb member episodes that need immediate attention. If there was an accident on the climb, all members should file a written incident report with the MOFA and climb leaders' reports being as complete as is practical.

Climb on!

LEADERSHIP SCENARIOS (FOCUSED ON LEADING BASIC CLIMBS)

I. Group Expectations of Leader

1. Planner/organized.
2. Competent.
3. Safety oriented.
4. Coach/teacher/host.
5. Resolves conflict.
6. Makes timely and well-reasoned decisions.

II. Scenarios dealing with the Leader's Decisions

Scenario 1. You are the leader of a basic climb of the Emmons Glacier. Party of 12. 4 teams of 3. You have 3 rope leaders and 8 students. Leave Shurman at 1:00 a.m. Mid-July – snow hard, crampons needed. Weather is clear but forecast is for rain starting during afternoon. At 12,500 feet 2 students can't go on. One has a bad blister from boots that are too small and the other is exhausted. Rest of party is feeling good and wants to continue. There are other climbers on route. What do you do?

Scenario 2. You are the leader of a group headed for the Sitkum Glacier on Glacier Peak. At trailhead a student discovers he has left his ice axe at home. You have an extra picket but not an ice axe. What do you do?

Scenario 3. You are the leader of a party of 6 climbing the Tooth. A student dislocates his shoulder near top of second pitch, but makes it to the big ledge at top of pitch. He says this happens to him on occasion and with his help and instruction you are able to reset the shoulder. However, student feels he should not climb anymore because he does not want to raise his arm and risk another dislocation. There is one pitch to go to the top and there is a double rope rappel to get down from where you are. Weather is clear and dry and you are on schedule. Rest of party wants to go on. Student says he'll be fine if you leave him and pick him up on the way down. He is sure that he can rappel with no problem. What do you do?

Scenario 4. You are the assistant leader of a climb on Mt. Washington and Mt. Ellinor. You have 6 students. It snowed 5 inches the night before, but it is a clear, sunny day. You are successful in climbing Washington, but on the traverse to Ellinor you notice that the snow is balling up and those little pinwheels are rolling down the slopes. At the base of the long slope on the east side of Ellinor you raise with the leader the possibility that the slope might avalanche. The leader brushes you off, saying that the slope looks good to him. Is there anything else you can do?

Scenario 5. You are leading a basic climb of the Tooth in mid-September, a week before Basic course graduation. There are six members in your party. The assistant leaders are new to leading on rock and they lead carefully, but slowly. A couple of the students are somewhat tentative and they, too, are very slow. You arrive at the summit late in the day and you notice that the weather is changing fast. Just as the last rope team is approaching the summit, it begins to rain hard. By the time you finish three rappels back to where you started it is dark. It is still raining with a few snowflakes mixed in. You put on headlamps and start to down-climb 30 degree rock that is quite slick. You decide to rappel this portion in order to avoid an accident. You also run a fixed line across the steep slope back to the exit pass because the climbers' path is so slippery.

You finally make it into the basin on the other side of the pass and encounter thick fog. You follow compass bearings across the basin in order to find the climbers' trail that will take you 600 feet down to the basin below. At this point three of the headlamps are no longer working.

You are not sure if you can follow the trail down because it is steep, slippery, and easy to lose in the dark and the fog. Plus you have only three headlamps. You consider spending the night but you know that the party members don't have a lot of overnight gear and it looks like it will rain/snow all night. An assistant leader thinks the party should belay or rappel down the slope staying as close to the trail as you can. The other assistant leader claims to know another route down farther to the south which he recalls is not as steep.

It is now midnight. What do you do? What are some of the things you could have done to avoid this problem?

Intermediate Lecture—Climbing Leadership and Response to Emergency

Date: Thursday, March 17th
Time / Place: 7PM, Tacoma Program Center
Reading: FOTH VIII 21, 22, and 23
Additional Reference:

Learning Objectives:

- Detail the steps to take in order to deal successfully with an emergency situation.
- Identify, teach, and practice a broad range of hard and soft leadership skills.

Learning Outcomes:

- I can explain and describe the steps involved in planning, organizing, and leading a Mountaineers trip.
- I know how to effectively manage an emergency situation according to Mountaineers standards.
- I will identify the skills, qualities, and leadership soft skills that I think will make a good Mountaineers climb leader and apply them to a mock climb scenario.

Rock & Ice Lead Climbing Module

The lead climbing module consists of a series of lectures and field trips intended to prepare the student for the rigors of lead climbing on both rock and steep snow / ice. Focus is on building competence in skills such as rock anchor creation, gear placement, snow anchors, and ice technique with safety as the key concern. The end result is a base of skills from which students may launch their future climbing career.

Intermediate Lecture – Leading on Rock

Date:	Thursday, March 31st
Time / Place:	6:30PM, Tacoma Program Center
Reading:	FOTH VIII: 12, 13, 14, & Appendix A *Long and Gaines:* Climbing Anchors, 2nd edition
Additional Reference:	*Long:* How to Rock Climb! *American Alpine Club:* Accidents in North American Mountaineering *Ilgner*: The Rock Warriors Way *Gaines:* Rappelling http://www.cascadeclimbers.com http://www.rockclimbing.com http://www.mountainproject.com http://www.climbing.com/skill

Learning Objectives:

- Describe the elements of a SRENE anchor.
- Differentiate between well-placed vs poorly placed pieces of protection.
- Understand the importance of planning and route finding when leading a rock pitch.

Learning Outcomes:

- I will practice placing my passive pro and explain to my partner how I know the placements are solid.
- I will build an anchor and explain how I know it meets the SRENE criteria.

Expectations

Students are expected to have a positive and outgoing attitude that will enable a constructive and safe learning environment.

Lectures

Read all materials including this module ahead of time in order to understand course expectations and the material to be learned. No test will be given at the lecture; although, a rating sheet will be passed out and will be used at the subsequent field trip to assess all climbers and provide the club leadership with appropriate feedback to make skill and leadership assessments

The lecture is designed to provide students with an overview of leading on rock and will cover basic topics that address protection placement, anchor building, team planning, leading, and overall climb considerations. Students get a chance to see first-hand what they have read in the course texts. Limited examples of most of these topics will be demonstrated or shown and therefore it is up to the student to be attentive and ask questions as needed.

Field Trip

This is a two day trip that focuses on preparing the student to perform a competent rock lead on Class 5.4 rock or higher and then, if prepared, the student can perform a rock lead. Generally, the first day concentrates on practicing the elements of lead rock climbing while the second day is dedicated to performing the actual rock lead or to continue to practice if the student is not prepared to perform a rock lead. The objective of this event is for the student to come prepared to practice and perform a competent rock lead. If a rock lead is inappropriate, then the objective will be to provide the student with additional learning opportunities that prepare themselves to competently perform a rock lead on Class 5.4 or higher. Successful completion of this field trip is required before credit may be received for basic rock climb rope leads and participation in scheduled intermediate rock climbs.

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Objectives

To provide an overview and examples of the rock climbing "climbing system" and to better prepare each student with resources to learn the following climbing system components:

- Protection placement
- Establishing and setting appropriate anchors
- Planning and coordinating a lead and an overall climb
- Being safe and a good leader

Preparation

Read all required materials. No test will be given at the lecture; although, a rating sheet will be passed out and will be used at the subsequent field trip to assess all climbers and provide the club leadership with appropriate feedback to make skill and leadership assessments

Students get a chance to see first-hand what they have read in the course texts. Limited examples of most of these topics will be demonstrated or shown and therefore it is up to the student to be attentive and ask questions as needed.

Key Topics

- Gear (basics, miscellaneous, slings, and active/passive pro)
- Gear Management (basics, gear management, and sharing gear)
- Pro placement (natural features and pro placement)
- Anchor Building (SRENE, strategy, angles, equalizing, samples)
- Leading (planning, coordinating, belaying, switching leads, judgment)

Reference Materials

The organization of this module does not provide detailed information or instruction. Instead, this module outlines and guides the student by showing them the reading resources, the different events (lecture and field trip), and expectations or rating feedback. The student is assumed to be responsible in disciplining themselves in studying the referenced material, asking questions, and practicing the techniques in appropriate settings.

The Rock I lecture will provide a forum to provide the student with additional information or will repeat information shown in the course texts. In addition, the lecture will give the students a chance to ask questions and prepare for the field trip that follows.

Prepare for the lecture and the field trip in advance. By doing this, you will be safer, learn more, and have a lot more fun.

Miscellaneous Tidbits

1. **Mark your equipment -** to prevent mix up with the various partners you may combine gear with when you climb.
2. **Different colored perlon -** When you purchase perlon to fit various nuts, it is a good idea to use different colored perlon for each and every nut you may have slung on your sling. The practical reason behind this is so you may quickly determine, by color, where the appropriate nut is on your rack when you are in a situation which only gives you the time to see the top of your sling. If many different nut sizes are slung in the same color, you will have to waste more time to reach down and sift through the metal blobs to come up with the right one. In other words, since we are always concerned with time and energy conservation, memorize the nut size by the color of the sling.
3. **Biners holding your gear** - First of all, when you carry your gear you want to be able to remove the piece from your sling as quickly and easily as possible. Either have all the 'biners with the gate-opening facing up and out (for those who use their thumbs to remove it), or facing up and in (for those who use their index finger to remove it). Whichever you prefer, before starting a lead, make sure all of the gates are facing the way you prefer. Remember, anything that will save you time and energy will help.
4. **How many pieces per 'biner should hang from the sling?** - Usually put one piece on each 'biner. However, to prevent you from having too wide and bulky an array of gear hanging off your shoulder, I try to put many of the mid-size to small size nuts off of one 'biner. You may want to put two or three of the same size stoppers, for example, off of the same 'biner. It'll save you space and allow you to equalize the weight of your other gear on to your other shoulder or harness sling. On the other hand, if after looking up the pitch you determine that you will need a certain size nut higher up on the route, then rather than have this particular nut share space with other nuts on the same 'biner, pre-arrange that particular nut on its own 'biner to save you the time used to isolate it when you get

to that spot to place it. This is true with any nut really, try to scope out the cracks above you in order to double up on those ‘biners those nuts you will likely use and singularly hang nuts you know you will use. In any case, with the small wired stoppers, I almost always put three to four similar sizes on the same ‘biner regardless, since they take up little space.

5. **Order on your gear sling** - To visually make it quicker and easier to spot the appropriate piece you may want to use, it is best to hang the largest nuts towards the back of your gear sling while the smallest wired nuts should hang from the front. If you have it the other way around you will find the smaller nuts buried out of sight beneath the larger nuts and cause you to waste more of your precious time to fish them out of the mess when you need to find them.
6. **Free ‘biners** - Where to hang free ‘biners varies from climber to climber. These are the extra loose ‘biners you will need to clip into runners when adding length to your piece of protection, to use on fixed protection such as bolts or pitons, to use at belay stations, to rappel with, to use on nuts taken from a shared gear ‘biners on your rack, to use as beer bottle openers, etc. When you hang these babies, it is a good idea to link them in no more than a three link chain. Anything longer will make them more difficult to remove. I prefer to hang them in a two length chain with the two lower ‘biners hanging from the topmost link (remember, gates up and facing the easiest way to remove). Methods:
   a) Hang them from your shoulder gear sling in front of the smallest nuts.
   b) Hang them all from a single runner draped across the opposite shoulder from your rack (to balance the weight).
   c) Hang them all from your harness gear sling.
   d) Hang some in any or all of the above ways to disperse them around for easier reach with any hand, plus, it is a good idea to put at least one free ‘biner on each of the runners draped over your shoulder since you will need a ‘biner on the runner anyway when you use it to lengthen your piece of protection. Likewise, if you are doing a pitch with lots of bolts and other fixed pieces, it is even a better idea to put two free ‘biners on each runner or quick draw runner for faster use (and fewer reaching sequences) when clipping to those bolts or pitons (since you will always need two ‘biners for every sling when used on a bolt or fixed piton).

Lead Preparation -- before you set your foot on the rock at the base of the route

1. Select and organize your rack in accordance to what the route description tells you and after looking up the pitch at the crack sizes and number of fixed pieces you see.
2. Uncoil the rope not by just laying it down in its storage coiled state (this will likely cause a “birds nest” when the leader is part way up his lead), but by feeding the rope out in a pile so that the leader will be able to begin his lead from the top of the pile. Do this on every pitch, even if the ledge you may be on is very small. I have seen too many situations where the belayer has to call up to the leader to tell him to stop for a minute in order to untangle the rope. This will put the leader in a very serious predicament if he is right in the middle of a crux move or is not in a place where he or she can rest.
3. After tying in to your harness, check your partner’s knots and make sure they are safe.
4. Talk to your partner of your plan, where you think the route goes, etc. Always communicate, even when you are up on the pitch (i.e. how much rope is left, when a crux move needs extra belayer attention).
5. Always have an excellent belay anchor, preferable omni-directional.
6. On multi-pitch climbs, it is a good idea to take along a guide description of the route and descent and a headlamp if you may not get off until late. Other items which are useful to take along on multi-pitch climbs are small windbreakers which fold up in their pockets to hang from, a small water bottle which can be hung from your harness, small fanny packs and tennis shoes for long descents.
7. Have a system of non-verbal commands for windy days or wandering routes. After using the verbal signals (grunts) with my partner before taking off from our belay ledge, we have a system developed so that the belayer will not take me (the leader) off belay until he feels three gargantuan tugs from the rope by me. When he feels those three tugs, not only can he take me off belay, he can also remove his belay anchors and begin climbing. To make this system work safely depends, of course, when I decide to make those three tugs (one gargantuan tug could inadvertently mean I have fallen and not to take me off belay). Therefore, before I give those three tugs, (1) I must first have reached my belay ledge, (2) I must already have placed my belay anchors, (3) I must already have clipped myself in and anchored myself off, (4) I must already have pulled up all the slack in the rope (the second man, by the way, has never taken me off belay), and (5) I must already have set the rope through my belay device in my harness. Then, and only then, am I ready for him to climb and ready to give him the three tugs. I will be off belay and anchored, the second man will not have to yell “up rope”, the second man will be “on belay” (so he can remove his anchors), and the second man can climb.

Energy Saving Techniques

1. Don't waste time while setting nuts; practice eyeballing the crack from below to determine the nut size before starting up from your last resting stance. This will enable you to get the proper nut out from your other gear in order to have it at the ready when you finally get to that crack above you.
2. Learn to use your feet! Save your hand and arm strength only for those portions of the pitch where you absolutely need them. One of the problems with beginners to intermediates is their lack of trust in their feet and their excessive reliance on their arms. Try to keep your weight directly over your feet no matter what angle of rock you are on. If you just spent $100 on a fancy pair of rock shoes, learn to use them. You'll be surprised what they will hold on.
3. When on slabs, smear your rock shoes while keeping your heel low. This will give you more surface area of the rock shoe to adhere to the rock and will take the strain off of your calf muscles. Envision how you would walk up a steep sidewalk in Seattle. Your heel is always low and you use as little calf muscle as possible.
4. When standing on a small but lateral foothold, try to stand sideways on the entire length of your rock shoe or on your heel in order to take the strain off of your calf muscle.
5. When resting or when stopping at a stance for a longer period in order to set a nut, always try to rest with locked joints. In other words, keep your weighted leg straight not bent. Use your bones to carry or hold your weight, not your muscles to maintain it. A bent leg will cause you to put strain on both your calf and thigh muscles and will shorten your reach when you want to reach a handhold or try to place a high nut. It is wasted energy you can't afford to lose. This technique also works when you have to hang from a handhold or hand jam. Hang with a straight arm with your legs crouched up if need be in order to save strength.
6. A very important technique point is to have proper weight and body positioning. Your center of gravity is in your hips and buttocks so always try to keep your hips (most of your weight) over the weighted foot. This is true with both low angle slab climbing and vertical climbing. Leaning forward and pushing your hips and center of gravity past your weighted foot (i.e. when trying to reach too high of a hand hold on slab routes) will get you off balance and will pick your heel up and cause it to slip off of its hold. Likewise, if your butt is hanging out too far (which sometimes may be hereditary), this will usually require you to use an unnecessary hand hold to prevent you from falling backwards. Remember, by using proper weighting and hip positioning, you will be able to better use your feet to walk up routes rather than pull yourself up routes.
7. When leading, you may be at the last resting point before some crux move. This is the ideal spot to look up, eyeball the crack, take out the proper sized nut, prepare it with 'biner and sling, move up one or two moves to place it and clip the rope through, and then back down to the same resting stance to rest before you go for it in one fell swoop. Keep in mind that the middle of a straining crux move is probably not the best time to fish through your gear for a certain nut. You may not have the time to do it or to place it safely. Remember, nut placements take time. Try to place them when you can rest or pre-plan the placement in advance and have it at the ready before you get to that difficult resting area.

Using Your Feet

1. Walk up climbs, don't pull yourself up them. Walking up with your feet is primary and using your arms and hands is secondary. Arm use alone should only be done when there are absolutely no foot holds. Even then, by leaning out on your arms, you can smear your feet on a blank wall to help your balance and even to take some of the weight from your arms. Every little bit helps.
2. LOOK DOWN for foot holds even though your tendency is to look for hand holds. Hand holds should be secondary and be used only to assist your feet. Learn how to spot edges, scoops in the rock, rough spots, etc. This may require you to bend down and look at the rock near your knees (i.e. intermediate short steps) at many different angles before you spot the right foot holds which will give you the sequence to walk up.
3. Try to take the short intermediary steps, rather than the one huge step to the bucket. It will save you needed energy later on. The more you do this the faster you will improve.

General

Learn to route-find competently. Always take a guide book to the base of routes so you know exactly where to start, or take a photocopy of the route description and descent in your pocket for multi-pitch climbs. And finally, until you get more proficient at it, use the observation skills of your partner to determine where the route goes. Two heads are better than one (well, sometimes). Look for areas where the lichen has been rubbed clean by rock shoes. Most of the time chalk marks tell you where the route goes, though at other times they just tell you where someone else went off route. When you see moss under your feet or sand on the rock, it is a good indication that you are off route. Back off as soon as possible. In other words,

to be a competent route finder, learn to read all of the signs available to you and don't just look in your close proximity; follow the rock and signs up as far as your eye can see. Be ahead of the game. Don't let the clean rock in front of you shock you later on, take the time to look left and right. Routes do not always go straight up.

Starting Your Lead

8. When you start any lead, whether it is off the ground or off of a ledge, it is a good idea to place a solid nut within the first 5 to 10 feet from the belayer. This will prevent you from a grounder fall on a first pitch and will prevent you from hitting a ledge on a multi-pitch lead. It will also take much of the load off of the belay anchor and spread it out between the two of you in a fall.
9. Generally speaking, when climbing any pitch, it is also a safe practice to place a good solid piece just before a difficult move and immediately after the move is accomplished (even though it may seem easier to go without the second piece—for reasons why, see section 3, Protecting the Second).
10. Runner use. When the piece of protection is anything other than a bolt or fixed pin, always place a runner on it to lengthen it. This is crucial to keeping your nut in the rock or to prevent your friend from walking permanently up and away from you. Without this extra piece of sling on the nut, the upward movement of your climbing rope will rub upwards on the 'biner held by the piece, causing that piece to pull upwards with it. This is especially true when the route takes angles and makes traverses. As a result, many of your nuts will pull up and simply fall out (Not good). This is a very common error with beginning leaders who are concerned that the extra sling on the nut will increase the length of their possible fall by two to three feet (it will). However, it is better to fall an extra two to three feet than an extra 20 to 30 feet due to a nut being pulled out (which they will do very easily). Remember, leading does have risks, and you cannot eliminate all of them, you simply want to reduce them as much as possible. The use of slings also prevents excessive rope drag on zig-zaggy pitches; they can be used to maneuver the leading rope away from sharp rock ledges which can cut the rope; and they can be used to keep the rope up and off of loose terrain so as to prevent the rope from kicking up loose rocks down on your partner.
11. When placing a nut which is slung by perlon, try to place the nut so that the "double grapevine" or "fisherman's" knot is facing out. This will allow the nut to rest in a more vertical position by allowing the inner part of the perlon to fall into the crack below the piece.
12. When placing any 'biner on a piece you have just set, ALWAYS clip the 'biner with gate up and in, then flip it over (upside down) so that the 'biner is hanging from the sling with its gate down and out. I can't stress the importance of this in terms of time and energy conservation. The reason for doing this is to enable you to reach down for the climbing rope, pull it up into a bend, place the loop of the bend against the down and outward facing gate of the 'biner so that you can just push it in and let it drop into the crook of the 'biner. If the gate is up and out, and if you are already 100 feet up, you will find the weight of the rope very difficult to finger-manipulate it up and over the top of the gate to get it into the 'biner. It can wreak havoc on your forearm strength. Flipping the 'biner down and out can also prevent the 'biner from opening up against the rock inadvertently during a fall. This clipping of the 'biner in and flipping it upside down should definitely be learned and become second nature.
13. Try to set your nuts to take outward and directional pulls. This is not because a fall will pull it outward, though it will somewhat, but it is primarily to prevent the nuts from falling out from the rope drag as you climb up.
14. Don't over-place nuts or friends. It will waste time for the second man trying to get them out and you may lose your investment. If you can't get a solid placement any other way, however, jam that baby in, your body is worth more than the expense to get another piece.
15. On shaky nut placements or with nut placements which cannot take much outward pull or with nut placements which could fall permanently deeper, give the nut a quick yank to set the thing. Your second man will simply have to deal with it with his nut pick.
16. Be innovative. Use your slings around horns or pinched boulders, use natural chockstones, trees and chicken heads, and learn to use all sides of your various nuts, not just the regular narrow sides
17. Don't pass up easier placements lower down if you will have poorer placements higher up. This comes back to the idea of always looking up the route not just for route-finding purposes but to scope out the cracks ahead of you for upcoming nut placements.
18. Try not to use too many of a certain size of nut lower down on a pitch since you may need that size again higher up. For example, on one of the higher pitches of a Leavenworth route called "Outer Space", there is a pitch which is comprised of a single 165 foot crack which is almost constantly 2 inches in width. If you used up all of your 2 inch pieces low on the pitch, you may not be able to place anything for 40 to 50 feet higher up. Instead, look up the pitch beforehand to figure out this problem and as you proceed up try to use as many non 2 inch pieces lower as possible.
19. Try to place protection in places where you can rest if possible since it will take you time. If you know in advance that higher up there will not be any resting places and you will need to rest to set a piece, then possibly eyeball

the crack above you for the proper nut size, prepare that nut on your rack for easy access or sometimes place the nut in your teeth with sling and 'biner already attached so that you can simply get to that spot and without reaching down, set the nut and clip in the rope.

20. When placing a nut in preparation for a strenuous or difficult move, try not to place the nut in the only place in the crack that your hand or fingers will fit. You'll either make the move that much harder or you will find that you may not be able to do it at all.
21. Though it is not fun to think about, plan for falls (i.e. where you might swing to or what you might hit on the way down). For example, if you are 38 feet above your belay ledge and you last nut is 20 feet below you, you will, by the law of gravity, take a 40 foot fall before the rope stops you. However, the ledge will stop you 2 feet short of your cushy rope arrest, thus creating a grounder fall hundreds of feet from the real ground.
22. Learn to place hexes and stoppers skillfully whenever possible and try not to become over reliant on the "no-brainer" SLCDs. Friends and other SLCDs are still an excellent protection device, but you should use them when a crack won't take a safe nut or when you need to place something safe in a hurry. Be well rounded with all types of equipment.

Protecting The Second Man While Leading

1. Always lead with the second man in mind. He or she may not be as technically skilled as the leader so when you make traverses on leads, remember that the second man will be leading the pitch (in reverse) from the opposite end. This means that you will especially want to try to envision how the second man will fall at any section of the traverse. The safest method is to place a nut for yourself (the leader) immediately before a difficult portion of a traverse and, more importantly, place a nut immediately after that difficult portion for the second man. Therefore, when the second man climbs up and removes the nut you placed before the difficult section, he will now have a close nut immediately after it to protect him if he should fall in the middle of that crux. You will keep many friends that way and the crowd below will cheer.
2. On easy traverses get into the habit of placing occasional nuts along the way, not only for the protection of the second man, but because falls on traverses can batter you or your second much more than vertical falls.

Falling[1]

There is an art to falling safely or within control. You usually have a choice to fall like a train wreck, bouncing and scraping everything as you go down, or you can fall semi-gracefully and come away with barely a scratch. Control and aim may not be possible on longer falls, pendulum falls or falls which catch you completely by surprise, but shorter falls or falls which you know are coming can be managed within safe margins. To begin with, imagine you are bouldering 5 feet off the ground and you know you are about to fall. Depending upon the steepness of the rock, you instinctively push your upper body away from the rock far enough to keep your body clear of the rock as you go down to the bottom. The same principle occurs when you are top roping a route. If you know you are about to fall, you push away so as not to scrape the rock before the rope stops you. In addition, you will also spread your feet apart and up as if you were in a more vertical rappelling position so that when you come back in contact with the rock, your feet will prevent you from kissing your face against the rock.

These same principles work with leader falls. If you know you are about to fall (i.e. the "grip" seizes you and you have that uncontrollable urge to wet your pants), you will already have an idea where your last nut is below you and how far you will fall. At this point, don't try to make that last desperate reach for the imaginary bucket. It will only cause a fall that will take your entire front side with you. Instead, try to first look down to determine how far you will fall and what obstacles may be met on the way down. If the rope is positioned wrong, it could flip you over on the way down, causing serious injury if you're not wary of this.

When the fall does come, push yourself back into a more vertical rappelling position to keep you away from the rock and let the rope, not the rock, try to stop you. How far you push yourself out, however, depends greatly upon the omni-directional nature of the nut you had placed below you. With poorly placed nuts below, you may not have the option of trying to stay away from the rock on the way down. In addition, depending upon the distance of your last nut and the steepness of the rock, you may either gradually push yourself out and walk, half run, the couple of feet before the rope catches you, or for longer falls, actually push yourself out in the air (like bouldering falls) to clear the entire rock in order to reach the stopping point of the rope before you come back in contact with the rock. It is an inexact art and you can only estimate in the short time you have to do it.

On pendulum falls (traverse leads), which are the hardest to plan how to fall, try either to run sideways towards the stopping point (short pendulums), or more difficult yet, push yourself out in the air at an angle as close as you can to the

[1] An easy way to remember this concept: "Make an X and check your sex." Crude, but simple. [-eds.]

stopping point to take out as much of the swing as possible. Good luck. At any rate, by trying these methods and practicing solid nut placements, it may save you the agony of dealing with numerous cuts, bruises, sprains and broken bones.

Finally, if you are going to learn to fall like a pro, it is well worth it to perfect a blood curdling scream. It'll do wonders for the confidence levels of those climbers near you and it's a real attention getter.

1. It is the crucial duty of the last man down the rappel rope to rappel in such a direction and angle so as to see that the ropes do not lie where they may jam when they are pulled through.
2. Use backup anchors on rappels unless you are certain it is a bomber anchor. On existing anchors with older slings, it is a good idea to add one of your own for safety. Use your oldest one so that you can purge your gear of the older items first. If you have to leave one of your neat expensive pieces, leave it if it is the means of ensuring a safe anchor. Gear is less expensive than hospital bills.
3. In an emergency when your rope gets hung up above you on the pull, you can possibly belay a leader up the rappel route from the other end of the slack you did manage to retrieve, or , if it gets to this point, send a leader up the stuck end of the rope with a Prusik sling hooked to his harness (sliding it up as he goes), setting nuts as any normal lead while the belayer has the rope anchored on the bottom to his belay device should the jammed rope above decide to release its grip and give the "grip" back to you.
4. Down-climbing is another alternative method of descent. If this is done, belay the inexperienced person down first asking him to set protection for the last man when he down climbs last. The nuts should be place just below each difficult section.

Physics of Falling

Probably one of the most confusing issues for those of us who are mathematically impaired are the actual forces involved in a fall. The concept is easy: The fall factor is merely the ratio between the length of a fall and the amount of rope available to absorb it.

The UIAA drop test is based on a theoretical, worst-case scenario—a hard fall on a short piece of rope with a static anchor. In real climbing, a number of factors help mitigate the force: friction in the system, slip through the belay device and an upward pull on the belayer.

The term "impact force" gets thrown around a lot but, without clarification, it has no meaning. When referring to dynamic ropes, the impact force most commonly discussed (and measured by the UIAA) is that sustained by the climber. The belayer, however, sustains an impact force as well. That force starts out equal to that of the leader's but, by the time it hits the belayer, it is reduced by friction in the system.

Assuming one piece of protection has been placed prior to the fall, the force on the belayer will be much less than the force on the climber. Testing has shown that a rope that makes a 180-degree bend over a carbiner "edge" yields an average tension ratio of only 52 percent. (The belayer feels half the impact force the climber does.) This is why a light person can hold a heavy climber on a top rope.

As always, however, there's a catch. Friction reduces the efficient length of rope that absorbs the shock, because the entire length of rope that's out is no longer taking the full force of the fall. The result is that the actual fall factor decreases more slowly than the theoretical fall factor. For example, if you are 100 feet out and fall 20 feet, the (theoretical) frictionless fall factor would be .20; the actual fall factor is .58.

As mentioned earlier, UIAA uses an 80-kilogram (176-pound) weight to determine forces in its test drop—the weight of the "average" climber. But what about everyone else? Maximum impact force is proportional to the square root of the climber's weight. All other factors being equal, a computer model shows that, for a factor .5 fall on 20 meters of rope, a 60-kilogram (132-pound) climber will feel about 3.4 kiloNewtons, an 80-kilogram climber will feel 4 kiloNewtons and a 100-kilogram (220-pound) climber will feel 4.5 kiloNewtons. On the same length of rope, if the climber takes a screamer with a fall factor of 1.5, the 60-kilogram leader will feel 5.4 kiloNewtons, the 80-kilogram leader will feel 6.2 kiloNewtons, and the big boy packs a wallop of 7 kiloNewtons.

The type of belay device you use also has a significant effect on impact forces. Tests have shown that a figure 8 (used in the rappel configuration, not the dangerous "sport mode") creates about 1.5 kiloNewtons of braking force, giving a very soft catch. Slot-type devices (Sticht plates, ATCs, Pyramids and some figure 8s made for belaying through the small hole) can resist loads of about 2 kiloNewtons while the Münter hitch (in its open configuration) holds about 3 kiloNewtons. With any of these belays, falls with impact loads below this threshold will be caught statically. As the load on the device increases, slipping occurs (possibly burning the belayer's hands) that makes the belay dynamic. However, if a Gri-gri (which slips at about 9 kiloNewtons) is used, the belay is essentially static even at high loads. This greatly increases the chances of gear ripping out.

Attaching the belay device to your harness, rather than to an anchor, dampens the impact load on both the climber and anchors. One test showed that forces are reduced from 15 to 30 percent, due to the belayer being pulled forward or even lifted into the air.

There is a widespread notion that the solid block used for testing generates more force on the rope than a human body would, supposedly because of the dynamics of the harness and bag of water (i.e. person). Recent tests by the Italian Alpine Club have shown that a climber only absorbs about 66 pounds of force during a factor-1 fall with heights up to 13 feet.

One serious consequence of rope stretch during short falls right off the ground is the high potential for decking. To prevent a ground fall when the leader slips while about to make the next clip, use the following guidelines. If the first anchor is 13 feet off the ground, the next cannot be more than 4.2 feet above that and the third no more than 7.2 feet above the second (no safety margin). If the first anchor is 16 feet off the ground, the next cannot be more than 6.2 feet above that and the third no more than 9.8 feet above the second (safety margin of 4 to 8 inches).

Constantly monitor the direction (usually angled) of the "climbing line" vs. "fall line" (usually straight down) and the distance between your current location, your last piece and the ground or ledge. Include rope stretch, belayer reaction time, slack in system, whether belayer can hear you say "falling", etc. You are not off-belay until you are firmly attached to the mountain. Then you can signal off belay. Have only one thing (rope, 'biner, piece, etc.) in your hand at a time. If you begin a step and then re-prioritize it to a later time, put away the first item before you handle the next one. If you drop a metal piece (e.g. 'biner, belay device, etc.) more than 10 feet and it hits rock, NEVER use it again—minute stress fractures have undoubtedly been introduced, weakening its internal structure.

Intermediate Field Trip - Rock Climbing 1

Date: Saturday April 9th & Sunday April 10th

Time / Place: 7:30AM, Murrin State Park, Squamish-Murrin Provincial Park, BC, Canada

Directions: Navigate to Squamish, BC. Going directly through Vancouver can add as much as an hour to the drive. It is recommended that you go around via US-543 to the border, then CA-15 and CA-1.

Prerequisites: Attend rock lecture

Learning Objectives:

- To learn and practice the following climbing system components:
    - Using your gear and gear management
    - Placing protection (all types)
    - Building SRENE anchors
    - Lead and climb planning
-

Learning Outcomes:

- To perform a competent lead climb with confidence on class 5.4 or higher.
- Competently set-up and perform a double rope rappel, while explaining the process.

Equipment: Required

Climbing Harness	Leader Tie-Off	Helmet
Belay Gloves	10 Essentials	6 Single Runners
2 Double Runners	Hardware Sling	Chock Pick
10 Carabiners	Overnight Car Camp Gear	Cordelette/Equalette
1 Rope per 2 Climbers	Basic rack (>10 pieces)	

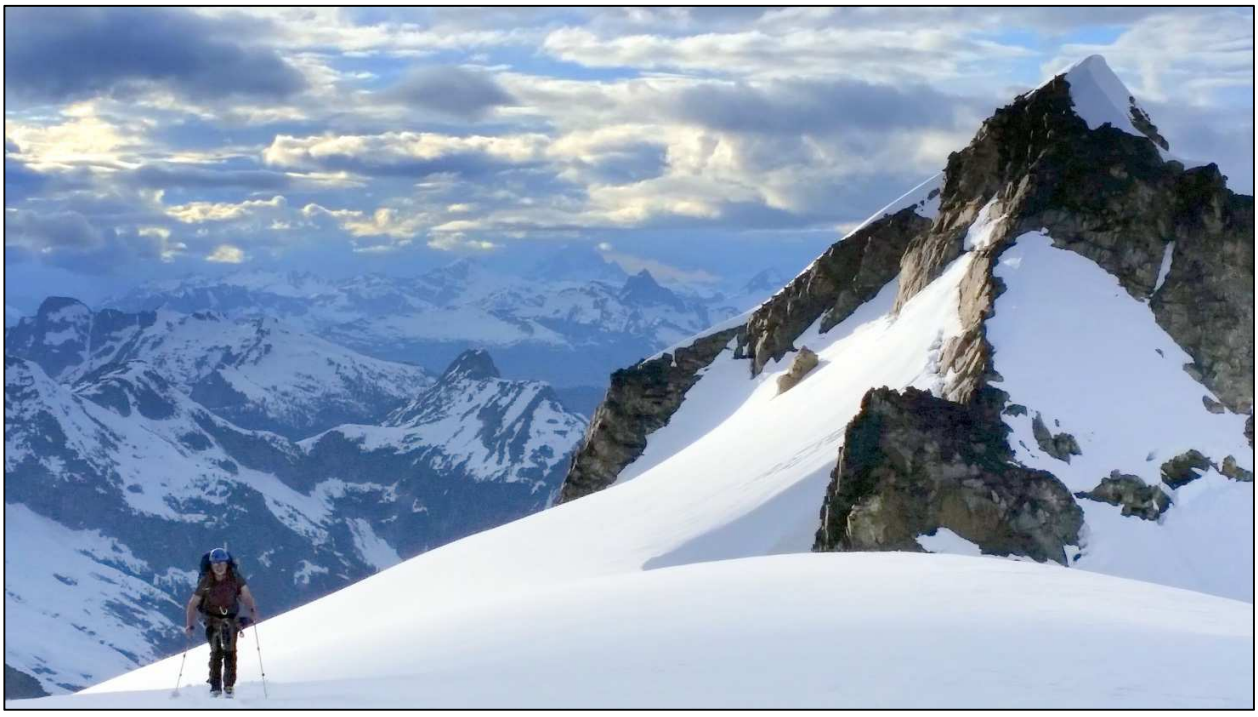
Optional Equipment:

Rock shoes	rappel ring	more passive pro
more runners	more carabiners	

Program:

1. Climbing Safety (helmets, check tie-ins).
2. Anchor placements (including oppositional and directional anchors for swinging leads).
3. Anchor tie-in (leader and follower).
4. Practice placing chocks and equalizing systems while on the ground.
5. Load protection placements with body weight.
6. Fall factor and early and frequent protection placements.
7. Use of slings to prevent rope drag and zipper effect.
8. Climbing logistics (racking and lead/follower role)
9. Anchoring and belaying at start of climb.
10. Leader/follower communication.
11. Cleaning and following the pitch.
12. Top-roped climbing (mock-lead) placing and cleaning protection.
13. Lead and clean at least one class 5 pitch.

Note: Successful completion of this field trip is required before credit may be received for basic rock climb rope leads and participation in scheduled intermediate rock climbs.



Intermediate Lecture - Advanced Leading on Rock

Date: Thursday, April 14th
Time / Place: 7PM, Tacoma Program Center
Reading: FOTH VIII: 13, 14, & 24
Fasulo, David: Self Rescue
Additional Reference: How-to Video: Using the ATC Guide

Learning Objectives:

- Review the technical skills required to lead rock: proper use of protection, rope management, belaying the second.
- Discuss planning, routefinding, communication and other skills critical for leading a rock pitch successfully.

Learning Outcomes:

- I will practice skills required to swap lead, including organizing gear and stacking ropes while at a "hanging belay".
- I will practice placing active protection and describe what makes a stellar cam placement.

Multi-Pitch Belaying Techniques

When climbing multi-pitch routes, you will constantly need to set up fast, safe belays on small to non-existent ledges. Though your basic belaying and anchoring techniques will still apply, there are a couple of additional suggestions and ideas which may help:

1. On ledges or semi-hanging to hanging belays I find the use of the "clove hitch" knot to clip into your anchors indispensable. It's fully adjustable nature always provides you with a taut anchor. It will also prevent you from using up all your extra slings, 'biners and other gear on the anchor when the leader will need those same pieces of equipment for the next pitch. The knot is relatively easy to untie, you can use it to fix ropes and even rappel from (with backup anchors) and it is very simple to learn and use.
2. Try not to let your climbing rope hang off of the ledge when you are belaying a leader on a multi-pitch climb. If you do, the leader may find himself midway up the next pitch and some loop in the rope, well below the belayer, may get stuck in a crack. You'll then be in a serious pickle unless the leader happens to be in a safe place to anchor himself off. I have seen this happen twice. Once I was able to swing over to the other party's rope to unclog it from the crack, and the other time the leader was right in the middle of the crux pitch when the rope beneath his belayer wedged in a crack. This prevented the belayer from feeding out any more rope. As a result, the leader ran out of poop (not being able to climb up or down) and had quite a lengthy fall. As a tip, try flaking the rope across your anchor tie-in.
3. When you finish a lead and reach a ledge, try not to use up all of one size nut to make your belay anchor. The leader of the next pitch may need at least one nut in that size range.
4. When belaying from a ledge on a multi-pitch climb, always face the direction a fall would pull you. Whether you are belaying the leader or the second man, it is much more comfortable and safer to create an upward direction pull in the event of a fall. In other words, you want to let your body weight do a lot of the work in arresting the fall, not just the anchor. To set this up, face into the rock towards your multiple belay anchor (which should be placed at least shoulder length or higher while you are standing and facing the rock), place a free 'biner from one of your highest and most solid backup anchors (or place a separate anchor specifically for this "directional/pulley" 'biner), clip your leader or second man while facing into the rock towards that high directional placement. Whether you stop a leader fall or a second fall, the pull will always be upward and inward (i.e., toward the directional anchor). It also makes a leader tie-off very easy to manage.
5. Place belay anchors high. You never want to have the level of your locking 'biner on your harness to be higher than your primary anchors. This may create an outward pull on your anchor which, in the absence of an omni-directional anchor, is a "no-no".
6. Once your anchors are set high, tie yourself off to each and every anchor with a clove hitch (generally the first clove hitch from your harness is the highest of the multiple anchors, then work down the anchor chain with the remaining clove hitches and rope), then face in towards the rock and lean back on the anchors (the weight will be on the upper most anchor) to make the stance easier on your feet (i.e., if the ledge is small and uncomfortable to stand on).
7. Before starting each lead, even if it is off of a ledge, still prepare the rope by dispensing it into a pile which has the leaders end feeding off the top.
8. Provided that the party is of equal skill and/or the pitch to be lead is within the leader's limits, switching off leads will always make the system work much faster.

Belaying from the Anchor / Direct Belay

Many climbers in the U.S., once they have established a hanging anchor after climbing a pitch, belay their second climber through a device attached to their harness. This is known as an indirect belay since the force of a fall of the second climber passes through the belayer and then on to the anchor. It's becoming widely accepted that placing the belay point directly to the anchor rather than placing it on the belayer is the preferred method of belaying a second climber (see discussion in Freedom of the Hills VIII, Chapter 10, page 179: Belay Position and Stance). This is known as "belaying from the anchor" or "direct belay". Belaying from the anchor requires the use of either the Münter hitch or a specialized auto locking belay device such as the Black Diamond ATC-Guide or the Petzl Reverso. This discussion will illustrate direct belaying with the ATC-Guide. Refer to parts of the ATC-Guide setup in Figure A.

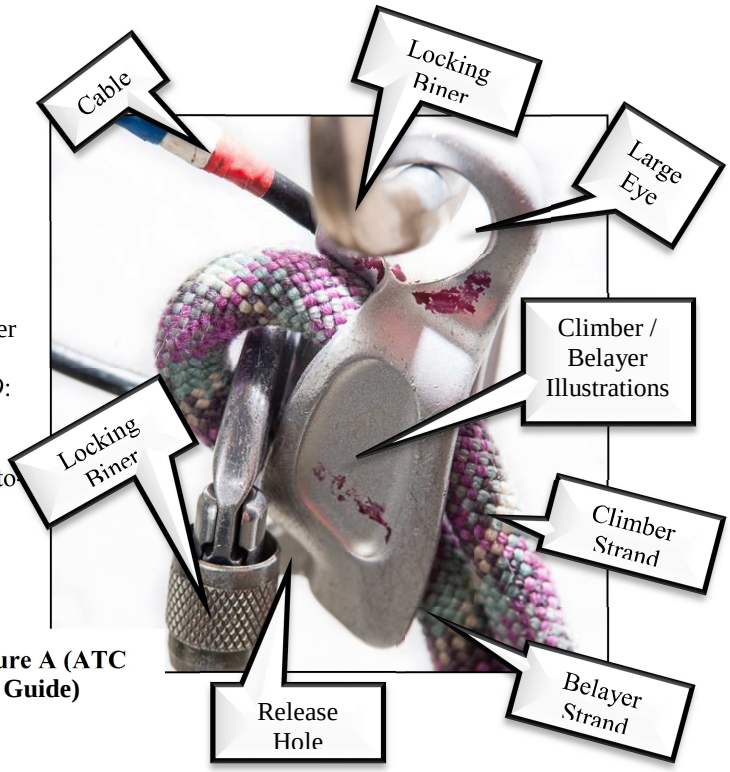


Figure A (ATC Guide)

Set Up and Belay:

1. Clip the large metal eye of the ATC-Guide into the power point of the anchor with a locking carabiner (Fig 1). Setting the device about shoulder level may help prevent belayer fatigue.

2. Insert a loop of the climbing rope through the ATC-Guide opening (Fig 2). Keep the climber-strand of the rope on the top of the loop, closest to the large eye as shown in Figure A (note the Illustration on device showing belayer and climber).

3. Clip a locking carabiner through the loop of rope and the ATC-Guide's cable (Fig 3) and lock the carabiner's gate. For a smooth belay, use a rounded, wide radius locking carabiner.

Figure 1

Figure 2

Figure 3

4. To belay the seconding climber, use your brake hand (closest to the toothed side of the ATC-Guide) to pull the slack on the belayer-strand, while you feed the climber-strand of the rope into the ATC-Guide with the other hand.

5. The ATC-Guide will automatically lock if the climber falls – the pressure on the climber-strand will squeeze the belayer-strand into the teeth of the device.

Lowering the Climber: If the climber needs to be lowered, the ATC-Guide must be repositioned to get the rope unseated from the device's teeth.

1. Girth-hitch a narrow single sling or loop of cord in the ATC-Guide's small release hole, at the end opposite the large eye (Fig 4). This is the small hole aimed toward the climber.

2. Thread the sling through a carabiner (can be non-locking) on the shelf of the anchor and redirect the sling back to the belayer – this provides leverage to pull on and reposition the ATC-Guide (Fig 5).

3. Before releasing the direct belay, create a backup belay by tying a Münter hitch in the belayer strand and securing it to your harness with a locking carabiner. Set your brake hand to lock off the Münter hitch, and then pull on the sling to reposition the angle of the ATC-Guide and release the load (Fig 6). Gear manufacturers' instructions show a lower like in figure 5 without the extra Münter hitch. If using this method, keep a firm grip on the brake hand before releasing the load.

Figure 4

Figure 5

Figure 6

Running Belay (Simul-Climbing)

The running belay, also known as simul-climbing, is a useful option when a team is climbing together over relatively easy terrain but is still roped together. Roped climbing teams normally consist of only two people. To establish a running belay, the lead climber clips the rope in to rock protection that he or she places at appropriate intervals. At least two pieces of protection should be in place, clipped in to the rope between the leader and the follower at all times. The follower climbs simultaneously removing the protection as he passes. The process is the same when down-climbing.

The decision to simul-climb should be made carefully, weighing the potential risks and benefits for the given party and the specific situation. Important factors to consider include the skill and comfort level of the climbing party, the degree of time pressure experienced during the climb, the likelihood of falling, and the degree of exposure or consequences of falling in the given situation.

The lead climber should be sensitive to the skill level of the follower and ready to set up an anchored belay if the follower needs that degree of security. An anchored belay would be established if the lead climber runs out of protection while simul-climbing, so that the follower can either transfer gear back to the leader or can switch leads and continue the running belay.

Intermediate Lecture – Emergency Self Help

Date: Thursday, April 21st
Time / Place: 7PM, Tacoma Program Center
Reading: *Fasulo, David:* Self Rescue ISBN-13: 978-0762755332
Additional Reference:

Learning Objectives:

- Discuss decision making and critical thinking skills with regard to rescue situations
- Review of knots, hitches and technical rescue techniques as described in *Fasulo*

Learning Outcomes:

- I can demonstrate various types of hitches and load-releasables used for rescue.
- I can successfully demonstrate rescue techniques with a partner

A – Lecture Topics:

Field Trip Logistics – 5-10 mins

- Camping
- Gear: helmet, harness, boots, parabiner with belay device, personal anchor, cordelette, perlon slings, webbing slings (sewn or tied), locking biners, regular biners, extra slings, Fasulo2 (2011)

Rescue perspective (10-15 mins)

- Should we vs. can we rescue
- Subjective pressures you will face
- When things go wrong, slow down
- Plan – Check – Execute – don't rush into a system
- Rescues from others take time… at least hours and possibly days
- Can we v. should we – evaluate carefully

Fasulo's ACBs (5 mins)

- Assessment – patient, terrain (real ledges, technical ledges), confidence in technical skills
- Course of Action – descend, ascend, stabilize/shelter in place
- Belay – direct belay from anchor, redirected belay, harness belay

Technical Skills – knots, rappels, assisting or rescuing second, rescuing leader as time permits

- Knots – building blocks for self rescue (30 mins)
    - Friction hitches – Klemheist (F2 pg 47), autoblock, penberthy (F2 pg 48), plus prusik and Bachman
    - Load-releasable – Mariner (F2 pg 37), munter-slipped half hitch (F2 pg 35), device slipped half hitch (F2 pg 90)
- Three methods of belaying – advantages and disadvantages of each (30 mins)
    - Belay off harness toward climber while anchored behind you (basic course method)
    - Redirected belay off harness toward anchor – increases fall load on anchor, facilitates rescue
    - Belay from anchor – special device needed for hands-free, facilitates rescue
- Demo, Rescuing the Second from a Direct Belay (Fasulo2 160-1 but on terrain) (30 mins)
    - Belay set up with locking biner
        - 3:1 haul for stuck follower (short ascend) – prusik, biner (F2 pg 166)
        - Unloading a direct belay (short descent to ledge) – skinny sling, over high biner, munter hitch belay backup (F2 pg 95 with munter not autoblock; BD video)
    - Catastrophe knot – Figure 8 loop
    - Switch to biners at anchor and shift device to harness
    - Transition to counterweight rappel with extended rappel (F2 pg 161), autoblock
    - Descend to climber and use prusik on second's rope
    - Mention "technical ledge" if no real one; Technical Ledge = friction + load releasable

Field Trip Skills

- Rappels - Bruce's Boulder
    - Extended devices – halved cordelette, single sling, benefits (F2 pg 24)
    - Saddle bags (ropes get caught on throws)
    - Stacked (pre-rigged) students with extended rappel (Fasulo2 page 107)
    - Assisted rappel with cordelette (Fasulo2 page 108) – carabiner brake adds friction
- Rescuing Second from Direct Belay using Terrain (Fasulo2 pg 8-9, 160-1) – Barney's Rubble
    - Belay from anchor with locking biner
    - 3:1 haul for stuck follower (short ascend) – prusik, biner (F2 pg 166)
    - Unloading a direct belay (short descent to ledge) – skinny sling, munter hitch belay backup
    - Catastrophe knot – Figure 8 loop
    - Switch to biners at anchor and shift device to harness with extended rappel, autoblock
    - Counterweight rappel, remove catastrophe, descend, use prusik above second, descend – do as part of rescuing second
    - Set up independent anchor, belay to rescued party

- Rescuing Second using Redirected Belay and Terrain or Technical Ledge (Fasulo2 pg 168-9) – Barney's Rubble
    - Set up Redirected belay
    - Get to hands free (slipped half hitch, Fasulo 2 pg 90, or mule) and catastrophe knot (Figure 8 onto harness)
    - Use technical ledge [friction hitch (options: prusik, klemheist) and load releasable hitch (options: mariner or munter slipped half hitch)] and load second's weight onto anchor by releasing hands-free side
    - Clip two reversed biners to anchor or use locker if already the redirected biner; clip rope
    - Use extended rappel with autoblock and remove all slack
    - Release technical ledge [friction hitch load releasable], personal anchor, and catastrophe knot
    - Counterweight rappel
    - Discuss harness belay options – pretty close to redirected belay rescue system
- (Optional, as time permits) Leader Rescue – Fixed Line, Existing Pro (Fasulo2 189-90) – Bruce's Boulder
    - Evaluate situation and choose a method – lower to your location? Lower to a ledge? Ascend?
    - Option: Counter-weight ascending with prusik and grigri or belay device/autoblock (F2 pg 188) plus figure 8 catastrophe knot adjusted as you go
    - If leader can function, leader fixes line onto pro below top piece with prusik/leader tie off and second ascends using prusik and belay device/autoblock with figure 8 catastrophe knot adjusted as you go (F2 pg 190)
    - Climb fixed line?

Intermediate Field Trip - Rock Climbing II

Date: Saturday, April 30th
Time / Place: 8AM, Leavenworth 8 Mile Campground Group Site
Prerequisites: Successful completion of Intermediate Rock 1 Field Trip; Rock 2 and Self-Help lectures

Learning Objectives:

- Practice the fundamentals of multi-pitch climbing and belaying on 5th class rock to include anchor setup, hanging belays and alpine rappels.

Learning Outcomes:

- I will practice skills required to swap lead, including organizing gear and stacking ropes while at a "hanging belay".
- I will practice placing active protection and describe what makes a stellar cam placement.

Equipment:

Climbing Harness	Leader Tie-Off	Helmet
ATC Guide	Gloves	8-12 Stoppers, Hexes, Tricams
10 Essential Systems	10 Single Runners	3 Double Runners
Chock Pick	10 Carabiners	1 Rope per 2 Climbers
Cordelette/Equalette	Hardware Sling (regular sling will suffice)	
Overnight Car Camp Gear	1 piñata per group	

Equipment: Recommended

more rock protection more runners more carabiners
rock shoes

Program:

1. Demonstrate swinging leads.
2. Practice swinging leads.
3. Accomplish a multi-pitch climb.
4. Discuss alpine rappels.

Intermediate Field Trip – Emergency Self-Help

Date: Sunday, May 1st
Time / Place: 8AM, Leavenworth 8 Mile Campground Group Site
Prerequisites: Attend self-help lecture

Learning Objectives:

- Expose students to the methods of treating and transporting injured climbers on technical terrain.
- Stress methods that small climbing parties can use to handle emergency situations without outside help.
- Learn how to adequately assess wild anchors for soundness.

Learning Outcomes:

- I will practice simulated self-help accident and emergency transportation situations through the use of friction hitches and belay techniques.
- I have the technical rope skills required to effectively implement a small party rescue.

Equipment: Required

Climbing Harness	Leader Tie-Off
Helmet	10 Essentials
6 Single Runners	1 Double Runner
Hardware Sling	Chock Pick
Belay Gloves	Prusik Slings
10 Carabiners	Cordelette/Equalette

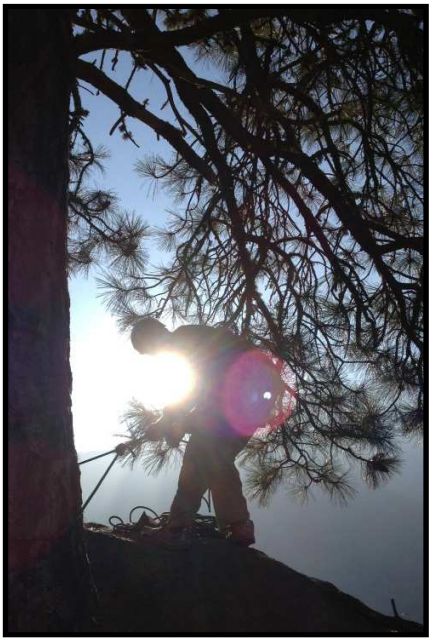
8-12 Stoppers and Hexentrics of Various Sizes
1 Rope per 2 Climbers

Equipment: Recommended

Rock shoes	rappel ring
more chocks	more runners
more carabiners.	

Program:

1. Escaping the belay.
2. Passing the knot while lowering, rappelling or ascending.
3. Assisted or counterweight rappels.
4. Practice using wild (natural) anchors safely.
5. Practice proper lowering techniques for an injured party member.



Intermediate Lecture - Hard Snow / Introduction to Ice Climbing 1

Date: Thursday, July 21st
Time / Place: 7PM, Tacoma Program Center
Reading: *FOTH VIII:* 17, 18
Additional Reference: Luebben: How to Ice Climb ISBN-13: 978-1560447603
Gadd: Ice & Mixed Climbing: Modern Technique
Lowe: Ice World ISBN-13: 978-0898864465
http://willgadd.com/a-simple-fix-frontpoints-and-tibialis-anterior/

Learning Objectives:

- Review movement skills and protective systems used for steep snow.
- Watch demonstration of Z x C pulley crevasse rescue technique

Learning Outcomes:

- I will be able to identify different types of crampon techniques used on hard snow and ice.
- I will be able to identify various ice tool techniques for ascending steep snow and ice pitches.
- I will describe the use of ice axes and pickets used for building anchors for steep snow climbing.
- I will identify the components of the Z x C crevasse rescue.

The Kiwi Coil

The "Kiwi Coil" is commonly used for glacier travel and any other time that the entire length of the rope is not in use while you are traveling roped up. This technique is now taught in the Basic Climbing Course, but included here for reference.

Start by tying into the end of the rope with a figure 8, just as you normally would for climbing. Then, start coiling the rope over your neck and around your hand with your palm facing down as in figure 1. Continue coiling up the rope until you have taken in the desired amount (figure 2). This will often be about 12 coils, but it depends entirely on the specific situation.

Figure 1

Figure 2

Next, take the coils over the shoulder opposite the hand you were just coiling around (figure 3).The free end of the rope should come down from behind that shoulder. Take this free rope end into that hand (figure 4).

Figure 3

Figure 4

Now begins the tie off. Make a bight in the free end and pass it through your belay loop (figure 5). Pull it through with your other hand. Pull out roughly 18" to 24" (figure 6).

Figure 5

Figure 6

Figure 7

Figure 8

This tie-off is referred to as the "Napoleon" because you now reach through the coils at your chest (like Napoleon does with his hand in his jacket) and grab the bight with this hand (figure 7). Now, draw the bight back through the chest coils to the other side (figure 8).

Figure 9

Figure 10

Take the bight and wrap it under the rope leading to your partner (figure 9). Continue wrapping it around this strand and then make an over hand knot with the bight upon itself (figure 10). It is important that the knot is finished with the end leading away from you.

Figure 11

Finally, clip this end of the bight back into a locking carabiner on your harness (figure 11). Make sure that everything is tight and you're ready to go!

Two Person Crevasse Rescue Method

Following is a description of a crevasse rescue method known as the Z x C ("Z by C") System. This system is designed for a two-person rope team, where one person performs the entire rescue operation.

Two-person rope teams are not encouraged and are in fact, by Mountaineers code, discouraged. Three-person rope teams are considered safer and the preferred method when traveling across glaciers. However, in the event that you find yourself in the position where two people *are* on one rope, it is essential that both know how to perform the rescue.

Minimum Equipment Required:

1 Rope
Seat harness with locking carabiner
2 Rescue pulleys
6 Carabiners (4 locking)
Texas prusiks
Leader Tie-off
Short sling
Chest harness with carabiner *
Pack sling
Ice axe
2 addition short prusik slings
2 double runners
2 Pickets with sling and carabiner *

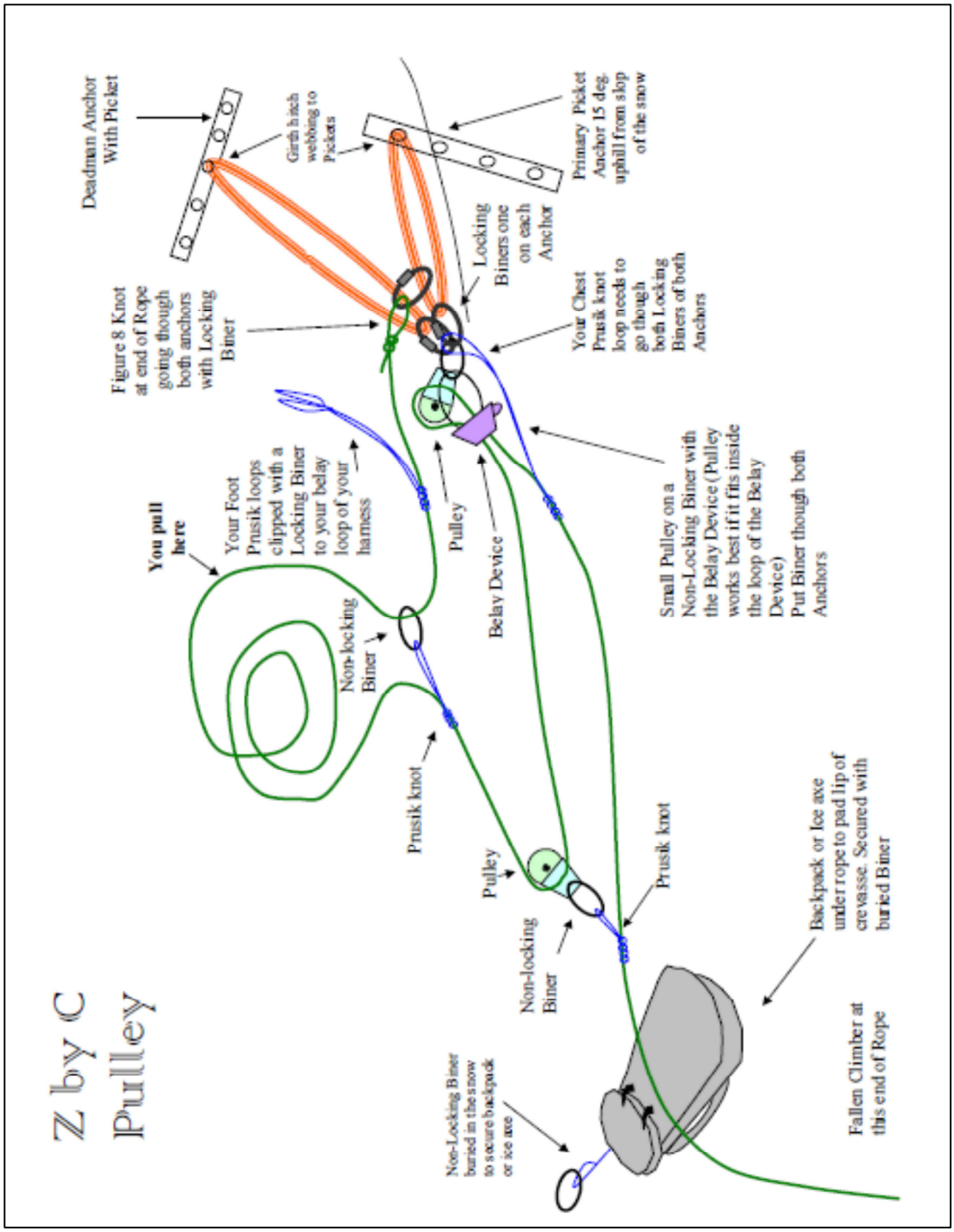
* chest harness will not be used if Kiwi Coil is used

Procedure:

1. Stop the fall —**arres**t!! Keep in mind this is very difficult on a two-person rope team. Dig in!
2. Dig in your feet and bear as much of the load on them as possible. Set up initial anchor using picket.
3. Use the chest loop of your Texas Prusik to clip to the initial anchor. Slowly transfer the victim's weight onto the initial anchor, keeping a watchful eye on the anchor. Be ready to go back into self-arrest should the initial anchor fail.
4. Clip the foot loop of the Texas Prusik to your belay loop; remove the Kiwi coil. You are now anchored with a movable Prusik to the climbing rope. Take off your pack and secure it somewhere safe.
5. Set up the primary deadman anchor using a picket.
6. Begin setting up a modified Z-pulley. Since a Prusik is used in place of the self-tending Bachman, run the rope through the belay device then through the pulley to guard against the Prusik being pulled into the pulley. Clip the belay device/pulley to the anchor using a standard biner. Back up the rope with a Figure 8.
7. Prusik to lip of crevasse and talk to victim and assess their situation. Be sure to bring something to pad the lip, a pack, a thermal pad, whatever you have that will work.
8. Attach a pulley with a Prusik to the rope as close to the lip of the crevasse as possible, but be aware that you need extra rope length; about 3x the distance from the Z-pulley pull point to the anchor.
9. At this point you have completed a Z-pulley, giving a 3:1 purchase. Now you add the C-pulley to the Z-pulley pull point, to increase the purchase to 6:1.
10. Clove-hitch Z-pulley pull point to a biner.
11. Move to the anchor and clip your personal to the anchor. Untie from the rope, tie a figure 8 in the end of the rope and secure rope to anchor. Unclip your personal. You're still tied to the rope with the foot loop of your Texas Prusik.
12. Run loop from anchor through clove-hitched biner at "Z-pulley pull point".
13. Move to the anchor and untie the backup Figure 8 knot. Pull on the rope to haul up the victim. Pull, pull!!! You may have to reset the pulley systems several times, because for every 6 feet you pull the rope, the victim only moves 1 foot.
14. This is a slow process. **Do not give up**, The above instructions are guidelines so use what you have available in terms of both brains and equipment to make the procedure work.

Notes:

- Backup knot: tying a backup knot at the anchor every time you adjust the pulleys consumes time. The knot also uses up rope length, thereby shortens the distance the victim can be hauled with every pull. Given that the system is not backed up while setting the primary anchor, it might be acceptable to only tie a backup knot when first moving to the crevasse.
- Kiwi coil: 10 to 15 coils is a good number to start with. Practice will tell you how many coils you need to make your ZxC setup effective.
- Chest loop: make as short as practical to reduce the distance the rope slides back after each reset.


Z by C
Pulley
Deadman Anchor With Picket
Girth hitch webbing to Pickets
Primary Picket Anchor 15 deg. uphill from slop of the snow
Locking Biners one on each Anchor
Figure 8 Knot at end of Rope going though both anchors with Locking Biner
Your Chest Prusik knot loop needs to go though both Locking Biners of both Anchors
You pull here
Your Foot Prusik loops clipped with a Locking Biner to your belay loop of your harness
Pulley
Belay Device
Small Pulley on a Non-Locking Biner with the Belay Device (Pulley works best if it fits inside the loop of the Belay Device)
Put Biner though both Anchors
Non-locking Biner
Prusik knot
Pulley
Non-locking Biner
Prusik knot
Backpack or Ice axe under rope to pad lip of crevasse. Secured with buried Biner
Non-Locking Biner buried in the snow to secure backpack or ice axe
Fallen Climber at this end of Rope

Intermediate Field Trip – Hard Snow / Ice Climbing 1

Date: Saturday July30th & Sunday July 31st
Saturday August 6th & Sunday August 7th

Time / Place: 7AM, Mowich Lake Parking Lot

Directions: Merge onto WA-410 E toward Sumner/Yakima; at Buckley bend go straight and then take immediate right onto; make left onto WA-165; cross one lane bridge; pass road to Carbon River Ranger Station; becomes Forest Road 79 later turning into Mowich Lake Road.
Total Est. Time: 2 hours

Prerequisites: Attend Hard Snow/Intro to Ice Lecture

Learning Objectives:

- Practice placing and building anchors in hard snow.
- Practice and gain confidence with various crampon techniques.
- Demonstrate competence in ZxC crevasse rescue.

Learning Outcomes:

- I can construct and demonstrate the use of ZxC crevasse rescue system.
- I can safely ascend multiple pitches of steep snow.
- I will show competence with various cramponing techniques.

Equipment: Required

Climbing Harness	Leader Tie-Off	2 Double Runners
Helmet	10 Essentials	4 Locking Biners
12-Point Crampons	4 Single Runners	1 Rope per 2 Climbers
Belay Gloves	8 Carabiners	Overnight Gear
Ice Axe	Second Ice Tool	Belay Device
3 Ice Screws	3 Prusik Slings	2 Pickets
2 Rescue Pulleys	Chest Sling	Cordelette/Equalette

Program:

1. Belay anchors and running belays
2. Swinging leads on multi-pitch snow and ice slopes
3. Crampon techniques (French and German)
4. “Z” by “C” Crevasse rescue technique
5. Traversing steep slopes
6. Step kicking, plunge stepping on hard steep slopes
7. Rappelling and recovering rappel anchors on snow slopes
8. Practice placing ice and hard snow protection
9. Practice building anchor systems

Intermediate Lecture – Ice Climbing 2

Date: Thursday, August 4th
Time / Place: 7PM, Tacoma Program Center
Reading: *FOTH VIII:* 17, 18

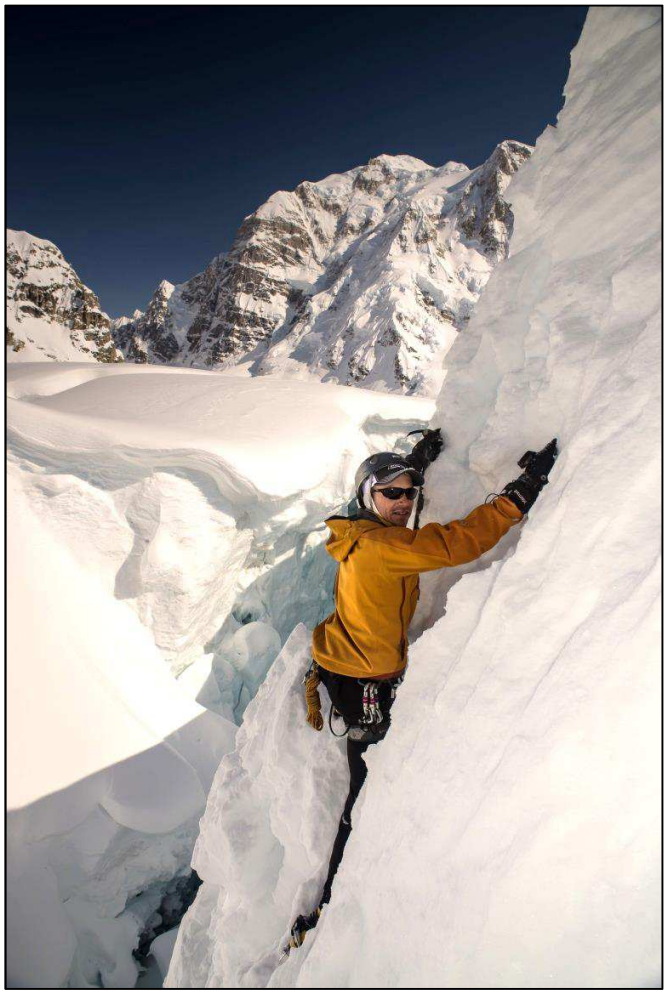
Additional Reference: Petzl -How to ice climb @ YouTube: http://www.youtube.com/watch?v=36dOEOFZW1k
Luebben: How to Ice Climb
Gadd: Ice & Mixed Climbing: Modern Technique
Lowe: Ice World

Learning Objectives:

- Discuss movement skills and protective systems used for steep ice climbing.

Learning Outcomes:

- I can identify and describe various ice axe and crampon techniques as well as various protection systems used in alpine ice climbing.



Intermediate Field Trip - Ice Climbing 2

Date: Saturday, August 13th & Sunday, August 14th
Saturday, August 20th & Sunday, August 21st

Time / Place: 7AM, Mt. Baker Heliotrope Trailhead

Directions: I-5 N.; take WA-542/Mt. Baker Hwy. at exit 255; turn right onto Forest Road 39.
Total Est. Time: 3 1/2 hours

Prerequisites: Attend ice lecture
Pass Hard Snow/Ice 1 Field Trip

Learning Objectives:

- Practice and demonstrate the fundamentals of ice climbing, belaying and rappelling on ice.

Learning Outcomes:

- I will demonstrate safe and efficient ice climbing technique while leading one pitch of low angle ice

Equipment:

Climbing Harness	Helmet	4 Locking Biners
10 Essentials	6 Single Runners	2 Double Runners
12-Point Crampons	10 Carabiners	Cordelette/Equalette
Ice Axe	Belay Gloves	Overnight Glacier Gear
3 Ice Screws	Prusik Slings	Rescue Pulley
Chest Sling	1 Rope per 2 Climbers	Set of two ice tools
Plastic or Full Shank Boots		

Program:

1. Chopping steps.
2. Anchor setup, including ice bollards.
3. French technique.
4. Placing ice screws.
5. Front Pointing.
6. Rappelling.
7. V-Thread
8. Leading and cleaning at least one ice pitch.

Bibliography

Books

American Alpine Club: Accidents in North American Mountaineering
Chouinard: Climbing Ice
Fasulo: Self-Rescue
Gadd: Ice & Mixed Climbing: Modern Technique
Houston & Cosley: Alpine Climbing: Techniques to Take You Higher
Ilgner : The Rock Warrior's Way: Mental Training for Climbers
LaChapelle: ABC of Avalanche Safety
Long & Gaines: Climbing Anchors, 2nd edition
Long: How to Rock Climb!
Loomis & Tyson: Climbing Self Rescue
Lowe: Ice World
Luebben: How to Ice Climb
Luebben: Rock Climbing Anchors
Martin & Krawarik*:* Washington Ice: A Climbing Guide
McClung & Schaerer: The Avalanche Handbook
Mountaineers: Freedom of the Hills, 8th edition
Tremper: Staying Alive in Avalanche Terrain

Web pages

http://mountrainierclimbing.blogspot.com/
http://washingtonclimbers.org/
http://wastateice.net/
http://willgadd.com/a-simple-fix-frontpoints-and-tibialis-anterior/
http://www.animatedknots.com/
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http://www.stephabegg.com/
Extended Rappell with Autoblock
Petzl -How to ice climb
Rock Warrior Way Blog
Washington Trails Association Best Outdoor Apps

Feedback

Course Feedback

Course feedback in terms of content, field trips, personnel, schedule, or for that matter any subject relating to Intermediate Climbing can be sent to the course chair, listed elsewhere in this manual. You are encouraged to ask question as they arise and provide immediate feedback where warranted, but you should provide a summary of your thoughts on the course no later than September 1st, 2016. Moreover, an online questionnaire will be made available via The Mountaineers website towards the end of the course, which you are strongly encouraged to fill out fairly and honestly, with the intent to improve and build upon the existing course structure.

Manual Feedback

Please send feedback on the manual to the manuals chair by September 1st, 2016. However, please feel free to send corrections / fixes, questions, and comments at any time, as questions arise.