

General Rope Sports Manual



A part of the University of New South Wales Outdoors Club Training Series

Disclaimer – Information contained within this manual should not be taken as professional advice or education. Readers should seek professional education prior to practicing skills outlined within.



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0. About This Training Manual

Welcome to the UNSW Outdoors Club General Rope Sports Training Manual.

This resource has been made to serve as a reference for individuals undergoing ropework training with the UNSW Outdoors Club. While it offers insights and guidance, it is important to note that this manual does not replace the crucial hands-on training and experiences provided in our training sessions.

Rope sports are a rewarding outdoor activity that requires a unique set of skills and knowledge to navigate safely. Whether you're new to rope sports or seeking to enhance your existing abilities, this manual is designed to support your learning journey and help consolidate essential skills.

Inside, you'll find detailed instructions, techniques, safety protocols, and best practices curated by experienced canyoneers and climbers.

As you undertake rope work training with us, remember that safety is paramount. Always prioritize your well-being and the well-being of your fellow adventurers. Take the time to absorb the knowledge presented in this manual, but always practice skills in a safe environment first, under the supervision of an experienced guide. Never hesitate to seek guidance from our trip leaders or other trusted sources.

We hope this manual serves as a valuable companion on your outdoor journeys.

Happy adventuring,

- 2023/24 Exec Team

1. Introduction

1.1 What is Ropework?

Ropework is a term that encompasses all the skills, techniques and care of ropes and their related gear in outdoor rope sports, such as climbing, canyoning etc.

These can range from knots to care of personal gear and is the basis from which sport specific skills diverge.

2. Knots and Coils

2.1 Knots and Coils

Knot	Common Application	Notes
Figure Eight	Termination knot	
Figure Eight Rethreaded	Attaching to climbing rope Termination Knot	Check with the 10 rope test
Clove Hitch	Biner Blocks	
Barrel Knot	Personal safeties	Easy to mistake with the fatal death knot
Stopper Knot	Termination Knot	
Tape/Water Knot	Tying tape together	Always leave 30cm + tail on ends
Alpine Butterfly	Isolating core shot	
Double Fisherman's	Tying rope together	Always leave plenty of

		tail on ends
Flat Overhand (EDK)	Typing rope on pull cord together	Always leave plenty of tail (30cm+) and use a backup. Load this knot in all directions before use as it is known to fail at low loads.
Rope Coil	Storage of rope	Use shoulders to coil.
Rope Bag Stuffing	Temporary storage of rope	

3. Care of ropes

In rope sports, caring and inspection of ropes is vital to the safety of the group. Before and after every trip, ropes (and all other gear), should be inspected for damage, and discarded if found.

3.1 Construction of ropes

Modern climbing and abseiling ropes have a kernmantle construction.

The kern is the interior strands of the rope, where most of a rope's strength comes from.

The mantle (or sheath) is the exterior part of the rope which protects the kern from damage due to UV, dirt, chemicals, and water.

Older climbing and abseil ropes were commonly made from manilla, a natural fibre, and were of twisted strand construction.



3.2 Inspection of ropes

You should retire a rope when the sheath is overly fuzzy, the core is exposed, or when the rope is folded over itself it has no radius and can be pinched flat.



3.3 Inspection of ropes

The protection and care of ropes are crucial for longevity and safety, and as such the following rules should always be followed:

- Never step on a rope - This embeds dirt into the kern, cutting centre strands in use.
- Store in a dark, dry and room temperature environment - Heat, UV and moisture all destroy rope over time - (Don't place on the dashboard of a car, don't store in a shed, don't store near chemicals such as concrete, vinegar etc)

4. Types of ropes

4.1 Statics and Dynamics

	Dynamic	Static
Elongation	10-40%	<5%
Uses	Used for climbing, as the stretch can absorb energy in falls	Used for abseiling, caving and canyoning
Other info	Static ropes cannot be used for climbing (except for top rope soloing), as they impart significantly higher forces on the climber and belayer.	Static ropes are required to have a thin plastic strip inside containing information such as manufacturer, date, serial numbers, etc

	Commonly made of strong and durable polymers such as dyneema and Aramids to maintain an acceptable factor of safety, these ropes are lightweight and commonly only used on exploratory trips.
9-10mm	Canyoning and climbing ropes. These diameters are a sweet spot for their durability and weight and as such are commonly used for most commercial canyoning and climbing ropes
>10mm	Industrial, rescue or caving ropes Used for their high factors of safety and durability, these are used for rescue, rope access, and permanent caving abseil lines.

Static ropes are ideal for abseiling as they reduce rope abrasion on edges due to bouncing, yet in climbing sports it is acceptable to abseil on dynamic ropes as it is impractical to carry both a climbing and abseil rope.

4.2 Rope Diameter

Ropes come in numerous diameters specialized for their use cases, and as a rule the thinner a rope, the weaker and more susceptible to damage and abrasion it will be. Thicker ropes will hence have a longer lifespan, be safer to use and can hold a larger load.

Diameter	Application
2-5mm	Accessory cord, used for non-load bearing applications
6-8mm	Prussik cords, used for prussiking, third hands, or quad anchors. Can be load bearing if doubled but require constant inspection for damage.
8-9mm	Specialised canyoning or abseil ropes.

5. General cliff safety

5.1 Communication

Efficient and clear communication is crucial. [To pass the maximum information clearly As a result](#), it is best to [attempt to](#) communicate verbally [first](#), [then](#) hand signals [then and finally by](#) whistles, [this particularly helps](#) to avoid [sending-passing](#) the wrong information.

Calls and Whistles

Common calls are as follows.

Call	Description
"On Rope"	Descender has rope threaded through
"Abseil when ready"	Used to tell an abseiler they have a bottom belay
"Abseiling"	Used to tell people on the bottom of a pitch that you are abseiling
"Off rope"	You are at the bottom of a pitch, and you have come off the rope
"On belay"	Used to tell the abseiler they have a bottom belay
"Lower"	Lower someone on abseil using a releasable system
"Raise"	Convert abseil line to hauling and raise the abseil line
"Stop"	Stop lowering, raising or any other action
"Rock! Rock! Rock!"	Falling rock object. Don't look up and take cover if possible. Note: always say rock no matter the object.

Whistle calls can commonly replace the above calls in situations where it is too noisy for verbal communication. As whistle calls and hand signals are different in

different parts of the world, it is best to discuss these before canyoning with a new party.

Call	Description
One whistle	"Stop"
Two whistles	"Ok", "Yes"
Three whistles	"Lower"
Four whistles	"Raise"
Continuous whistle blasts	"Emergency"

Two whistles can also be used to replace the abseiling calls such as "Abseiling", "On belay" and "Off rope".

5.2 Cliff safety

Below are general rules to stay safe near cliff edges.

- Don't dislodge loose rocks.
- Stay 2 body lengths back from edge unless asked to approach by anchor manager.
- Always clip in a form of safety if there is the option.
- Always wear a helmet near a cliff edge



6. Required Skillset

6.1 General Skills

- Run a trip brief, including acknowledgement of country, asking about medical conditions, gear checks, and expected obstacles and outline of the days activities
- Log trip intentions, assign safety contacts and report safety incidents through the club
- Plan a trip and know when to call off a trip (weather, time, etc.)
- Identify when to prevent a participant from participating due to safety concerns
- Demonstrate navigation skills required for trips (GPS, topos, trip notes)
- Practice and enforce general cliff safety, including being connected to safety within two body lengths distance from the cliff edge, helmet use, and calls such as “rock” and “rope”
- Identify common mistakes in relation to participant harnesses, helmets and knots, including correct sizing of harness and helmets, wrong knots, and not double threading buckles
- Demonstrate and inspect knots including Figure Eight, Figure Eight rethreaded, Figure Eight on a bight
- Demonstrate and inspect a Munter Hitch and Clove Hitch
- Demonstrate and inspect a Stopper Knot and Barrel Knot
- Demonstrate and inspect a Double Fisherman’s Bend, Tape/Water Knot, and European Death Knot
- Demonstrate and inspect an Alpine Butterfly and its use on isolating a section of rope
- Understand the kernmantle construction of a rope.
- Identify static and dynamic ropes, and when to use each
- Coil a rope with an alpine and girth finish
- Explain the uses of different rope diameters (Accessory, prussik, climbing, canyoning and caving ropes)
- Identify unsafe/safe ropes with the pinch test, observing excessive sheath abrasion, and by seeing the core
- Practice the maintenance and storage of ropes including not standing on ropes and storing in temperature controlled, dry, dark, and non-chemical environments