

WILDERNESS SAR

SEARCH & RESCUE • MOUNTAIN, CAVE & WATER RESCUE • AIR-OPS



ISSUE
12



Cold-forged swivel eye is textile friendly & accommodates up to three carabiners

Swinging sideplate allows for midline rope attachment

Triple-action lock combines security with industry leading ergonomics

Symmetrical body streamlines rigging with prusiks

To create our new Apex Swivel Pulley, we combined 54 years of design and manufacturing knowledge with an uncompromising program of innovation, prototyping and user feedback.

The result is unmatched security and deceptively simple operation. This robust, American-made pulley will give you the confidence to complete your operation, no matter how complex the challenge.



HAND BUILT IN THE NORTHWEST

SPECIFICATIONS APEX 1.5 Single Swivel Pulley

Model #:	NFPA165120
Material:	Aluminum, Stainless Steel
Finish:	Anodized, Blue/Grey
Dimensions:	5.8" x 2.9"
Weight:	10.8oz (306g)
MBS:	38kN
WLL:	9.4kN
Rope size:	up to 13mm
Sheave Major Diameter:	2.0"
Sheave Tread Diameter:	1.5"
*NFPA-G Certified	

WILDERNESS SAR CONTENTS

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The Apex Direct is SMC's fresh approach to the conventional pulley. It's specifically designed to be used with soft attachments like prusiks, slings, and soft shackles. Used in this manner, the Apex Direct aligns the rope with the direction of the pull just like a swivel pulley does. It's compact and over 50% lighter than a comparable swivel pulley/locking carabiner combination. The Apex Direct is mid-line attachable and features one handed operation that utilizes a low-profile, patented, triple-action lock mechanism. This lock is operated by three distinct actions: pivot the lock button, depress it, then swing open the side plate. Simply closing the side plate re-engages the lock mechanism and solidly secures the rope. The operation is intuitive and ergonomic.

We featured the SMC Apex Swivel pulley on the cover of WSAR#9 but this time it's the new 'Spindle' version with an Impact-Block style bollard attachment at the top in place of the swivel and this allows direct attachment of rope or slings. A double-action push button (the b-shape in the middle) releases the front plate allowing it to swivels open and allow the working rope to be placed around the pulley sheave. It also allows an anchor sling/rope to be attached to that top pin or bollard. If you compare this to the original swivel version you can see how the back plate has simply been cut to mimic the front plate and remove the machined block that made up the swivel-mount.

SMC APEX DIRECT FEATURES/SPEC:

- Efficient sealed bearings
- PMP side plates – designed to be prusik minding
- Material: Aluminum, Stainless Steel
- Finish: Anodized, Blue/Grey
- Dimensions: 3.8" x 2.9"
- Weight: 7.3oz (208g)
- MBS: 38kN
- WLL: 9.5kN
- Rope size: up to 13mm
- Apex 1.5 Sheave Major Diameter: 2.0"
- Apex 1.5 Sheave Tread Diameter: 1.5"
- Sheave Material: Aluminum
- COST: \$89
- ORIGIN: MADE IN USA
- WEB: www.smcgear.com

SMC VECTOR SYSTEM

Also on show in the cover picture and behind this text is the VECTOR Edge management system otherwise known as a monopod. This also snuck onto the cover of issue 10 in use with the Linville Central Rescue Squad MRT and that cover better highlights the context in which this monopod can be used and the small footprint of the Vector though you have to take into account the guy and tie-back ropes when thinking about your working area. The main component is the aluminium tube which connects to a rigging plate at the head and, if required, one at the base. These permit any number of rigging, redirectional and anchor options to keep the monopod stable when loaded.

VECTOR SPEC:

Length: 37.74" (963mm)
Tube Diameter: 2" (51mm)
Rig Plate Diameter: 4.56" (116mm)
Materials: 6061 Aluminum and 7075 Aluminum
Weight: 3.04lbs. (1380g)
WLL as High Anchor: 1kN
WLL as High Directional: 2kN
COST: \$545

The Vector Edge and Load Management System has been designed and engineered as a light-weight, portable tool for use in industrial, mountain and urban rescue environments. When combined with high strength – low stretch cord, quality life-safety rope, lightweight pulleys and carabiners, the Vector provides rescuers with a versatile resource which can reduce risk and go virtually anywhere. This innovative monopod system is the result of a collaboration between SMC and our expert training partners. This combination of SMC's 50 years of experience in design, testing and manufacturing of technical rescue equipment and our partners' experience in training advanced rescue techniques throughout the world has created a 3lb. solution to challenging edge transition scenarios.



POWER ASCENDERS – FOR PROFESSIONALS.

ActSafe Power Ascenders are an ingenious combination of a high-capacity rope winch in a compact, lightweight and user-friendly design. They simply redefine the possibilities for working in vertical environments.

skylotec.com



ActSafe RCX

- developed for effortless and efficient rescue operations
- enables transport of loads or persons in hard-to-reach areas
- 0-24 m/minute at 250 kg, IP67 standard
- remote control up to 150 m



 **SKYLOTEC**

MUSTANG DOG PFD



[ED: This harness didn't make it into our recent GUIDE to RESCUE DOG PFDs. It is primarily aimed at pets (as most are) but coming from Mustang Survival, makers of professional water rescue safety equipment, you know it will be good and uses professional grade materials and manufacturing. Plus, we know that professional rescuers and handlers are using them. Harbor is the model in the above pic and she and owner Snookie rate it highly having dispensed with their original Kong model (as in-doggie Kong not Kong Italy the rope gear manufacturer!)]

The Mustang UNDERDOG FOAM FLOTATION PFD is a cape-style design with four adjustment points to ensure a secure fit on every dog. Constructed to support the pup's natural swim angle and provide maximum mobility, most of the buoyancy is under their neck and chest. USCG-approved fabrics, including durable Cordura on the belly and neck panels, make this an ideal choice for keeping your pet safe and comfortable on the water. 3D mesh on the back keeps things breathable and cool, and reflective panels enhance visibility in low light conditions. A reinforced carry-handle and leash attachment point makes the Underdog an excellent flotation device for the four-legged. FEATURES

- Cordura reinforcement on belly and neck add abrasion resistance
- 3D mesh on the back offers breathability
- Four points of adjustment for fitting different breeds
- Reinforced webbing carry handle is durable
- Attachment point for a leash
- Reflective panels for enhanced visibility in low light
- 5 sizes: fit and dog weight limits:

XS	30.5cm - 45.7cm	0.91kg - 5.44kg
S	45.7cm - 61cm	5.44kg - 10.9kg
M	61cm - 76.2cm	10.9kg - 27.2kg
L	68.6cm - 91.4cm	27.2kg - 40.8kg
XL	83.8cm - 112cm	40.8kg - 54.4kg
- Cost: \$70. (a lighter version costs \$60)

www.mustangsurvival.com

Rescue Sleds have been a great tool providing rescue teams with an alternative to moving a heavy RIB (rigid inflatable boat) or SIB (small inflatable boat), these traditional boats fitted with a transom, limit a teams capability in purely flat water rescue, due to the lack of self-bailing capability when not under power. The Mega Sled was built to fit the needs of teams looking for a lightweight boat that could keep occupants dry in dirty flood water, but also convert into a fully self-bailing boat in swift moving water.



WATER RESCUE SLED WITH A TRANSOM



Switching from self-bailing to non-bailing is done using the flexible Transom Flap, when in the upmost position the transom flap seals of the deck area, avoids the risk of occupants being contaminated with dirty water as they are brought to safety. Should the Mega Sled be deployed onto Swift Water, the Transom Flap is folded down, allowing any excess water to escape through the open back of the boat.

Wide tubes gives the Mega sled a large payload, also offering a stable platform that gives rescue users confidence when casualties are not familiar with leaning to avoid capsize concept. As with the WRS Sleds, the Mega Sled is fitted with the "Fusion Technology" Air deck, making a strong yet light hull, over the last 7 years of making Sleds we have shaved off a massive 10kg using the Fusion technology. Load tested D-Rings come with a stated Breaking load of 1000kg, this gives teams confidence when using the boat on tethered lines on strong current vectors, watch the WRS pull test video via our website to find our more.

www.wrsinternational.com

WINGMAN has landed

Harken's new WingMan applies new design and technology to achieve more from a compact personal mechanical advantage system. WingMan's innovative design makes it among the first offerings in this category to achieve internal progress capture mechanically within the unit rather than relying on prusiks to achieve that externally. WingMan combines a ratcheting sheave to stop the rope with a composite handle or wing that the operator can open and close under load for a well-modulated 'fine-tuned' release. Under a full load, even with the sheaves pulled completely together, the system can be released quite easily – with full control using one hand on the wing and the other tending the line.

The WingMan has a minimum overall length of just 8 inches which means more clearance under a tripod and more throw during a pick-off. The device is also ideal for creating adjustable directionals, work positioning and much more. It may be configured as a 4:1 or 5:1 mechanical advantage system. These revolutionary features, plus ball bearings within the sheaves that maximize efficiency for raising and lowering loads of up to 681 lbs, makes WingMan a simple tool you will always want at your side. Comes in an industrial-grade ballistic nylon carrying bag with locking buckle. The bag includes drawstring and drain grommets to separate unit and line for proper deployment and line drying.

CONSTRUCTION

The WingMan is a mechanical-advantage device for load lifting and releasing. It is used in a fall protection or work at height system. It is intended for work at height, access, and rescue use. It can be used for human suspension for up to a 3 kN load. The WingMan consists of two swivel pulleys and a manufacturer supplied rope. One pulley is a double with a becket to dead end the rope. The other pulley is a double with a ratchet and cammed sheave with a releasing handle allowing gradual release of the mechanical advantage system under load. The releasing handle is located at the operator end. Anodized aluminum is used throughout the pulleys. The handle is glass reinforced nylon. The rope is an 8 mm static polyester with a sewn termination and is not to be substituted. Pulleys have stainless steel axles and fasteners. The ratchet mechanism is stainless steel.

FEATURES

- Internal ratchet and sheaves engineered to maximize rope holding
- Eccentric progress capture = no prusiks
- 4:1 or 5:1 mechanical advantage (flip orientation to rig either way)
- Can be released smoothly under full load with one hand
- High efficiency ball bearing pulleys and audible progress capture
- Machined aluminum swivel connection points fit

- multiple connectors
- Compact, lightweight form factor with 8 inch compressed length
- 15 m (49 ft) 8mm low elongation HTP rope allows for 3.7 m (12 ft) system extension
- Comes in an industrial-grade ballistic nylon carrying bag with locking buckle

SPECIFICATIONS

Cost:	\$525
Max Rated Load:	3 kN (674 lbf)
Slip Load:	4 kN (900 lbf)
Min Breaking Strength:	45 kN (10,116 lbf)
Certifications	NFPA. EN12278.2007 UKCA

APPLICATIONS

A multitude of rigging solutions, including:

- Personal mechanical advantage
- Solo pick-off
- Knot passing
- Establishing dynamic fixed brakes
- Effortless load transfer
- Litter attendant position adjustment
- High-angle attendant tether
- High-angle litter scoops
- Pre-tensioned back-ties
- Redirect anchors
- Load-releasing hitch
- Tensioned guying
- Correcting equipment orientation under load

www.cmcrescue.com



ROPE & EQUIPMENT

FOR YOUR VERTICAL WORLD

11 MM EXTREME PRO™ (G) ROPE

MBS = 42.9 kN

UNICORE® TECHNOLOGY

SHEATH – 100% POLYESTER

CORE - 100% NYLON 6

NFPA 1983: 2017 (G)



PMIROPE.COM



PRODUCTS – ROPE STUFF

DMM'S DIRECTOR RANGE

www.rescuemagazines.com

[Ed: the swivel versions in this Director range together with all DMM swivels are currently subject to a RECALL which is a shame for such high quality items but once they get that sorted out and with 3 other models in this range without swivels, they are still worth highlighting. The Director series has 6 different types of eyes each with the option of 3 different gate-openings – screwgate, Kwiklock (double action) and Safelock (triple action).]

Director series are compact termination connectors designed to load in the strongest orientation. Ideal for lanyards, these lightweight, versatile and strong carabiners are easy to handle and can reduce the overall length of a system. They each have a textile friendly, configurable eye, an extra short gate, a generous curve in the loading area and healthy gate openings. All models feature:

- Compact, lightweight and versatile.
- Designed to ensure major axis loading.
- "Rhino horn" ensures device remains in loading area.
- Incorporates DMM's shortest gate.
- Low overall length well suited to restricted height scenarios.
- Compatible with existing range of DMM Linkit lightweight rigging components.
- Patented features.
- Hot forged and CNC machined.
- MBS (Major Axis) 26kN
- MBS (Gate Open) 9kN
- Gate Opening 16-17mm
- Certification EN362, 2004 A/T

YOKE

The Director Yoke has two termination versions – one for rope and one for webbing. It can be retro fitted onto pre-stitched or swaged lanyard components or used in conjunction with DMM Linkits to form super short connectable systems. When used in conjunction with the DMM Director Swivel Boss, it forms the ultimate swivelling, pivoting double connector.

- Dimensions 64 x 98mm
- Weight 68-76g
- Price £37-41, \$41-60, €35-45

CAPTIVE EYE

This shortest, lightest and cheapest version can be stitched, spliced or knotted into a lanyard or system according to the end use.

- Dimensions: 64-93mm
- Weight is 59-65g
- Cost is £25-29, \$35-45, €30-51

SWIVEL EYE

At the time of writing this model was subject to a recall! The Director Swivel Eye can be stitched, spliced or knotted into a system or lanyard or even connected to a DMM oval with a Prestin configuration aid to create a compact, swivelling double connector.

- Dimensions: 64-116mm
- Weight is 90-96g
- Cost is £59-63, \$65-87, €58-64

SWIVEL BOSS

Available with an integrated Bow or D shackle but as the time of writing this model was subject to a recall! Swivel Boss can be retro fitted onto pre-stitched or swaged lanyard components or used in conjunction with DMM Linkits to form super short connectable systems. When used in conjunction with the DMM Director Yoke, it forms the ultimate swivelling, pivoting double connector.

- Dimensions: 64-130mm
- Weight is 98-105g
- Cost is £25-29, \$-115, €78-90
- EN12275:2013 A/T

www.dmmwales.com



AZTEK | SYSTEM

- Switches from 4:1 to 5:1 with a change of direction.
- Color-coded prusiks are rope friendly and can be released under light tension.
- Use AZTEK for pick off, load release hitch, high-directional guylines, litter attendant tether, litter scoop, edge restraint and much more.
- AZTEK System length ranges from just 9" to over 13'.
- Features high-efficiency ball bearings and machined aluminum parts.

COLOR CODED



50' CORD LENGTH



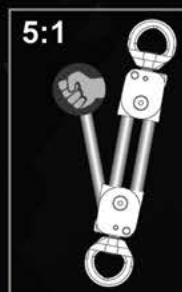
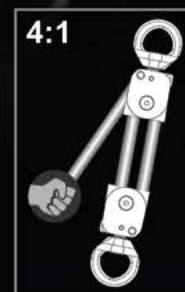
EDGE RESTRAINT



SWIVEL CONNECTION



LOW TENSION RELEASE



The AZTEK kit can be configured as a 4:1, 5:1 or 12:1 with the use of an additional pulley.

MIN LENGTH
9" (22.8cm)

< WIDE RANGE OF OPERATION >

MAX LENGTH
13' (4m)

AZTEK Kit includes:
AZTEK PULLEYS
6mm PRUSIKS (2)
50' 8mm STATIC CORD
44" 6mm PURCELL PRUSIK CORD
PRO OR STANDARD BAG

EDGE RESTRAINT



www.rescuemagazines.com

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Enhancing the overall safety of rescuers and those requiring rescue in mountainous and austere environments

SAR SAFETY

part6

FIRST AID in AUSTERE ENVIRONMENTS & WILDERNESS AREAS

By **Greg Toman**

Medical Assessment by US NPS Ranger

All volunteer and professional rescue organisations visited had an appointed medical director or advisor. The role of the medical advisor included developing procedures and protocols for pre-hospital care undertaken in a remote or wilderness environment, having taken into account the range of injuries / illness commonly encountered by the rescue team.

The medical advisor was also involved in defining the level of training required and would oversee the level of care provided. They had a detailed understanding of the environment and issues faced by the search and rescue group, as well as an understanding of rescue techniques / equipment used.

The minimum level of first aid training required of its rescue personnel by volunteer organisations was the Wilderness First Aid (40 hour) or equivalent. In many cases, volunteer organisations also had team members

with a higher level of first aid qualification ranging from Wilderness First Responder (80 hour) to Emergency Medical Services (EMS) to Paramedic, and even up to Medical Doctor.

The professional rescue organisations required first aid training starting at Wilderness First Responder (80 hour) or equivalent, through to EMS or Paramedic level. In many of the volunteer and professional rescue organisations, their medical director had included pain management protocols, advanced airway management and intravenous fluid therapy in the pre-hospital care capability. The pain management protocol varied from oral medication to intravenous medication.

The requirement for a minimum Wilderness First Aid or equivalent level of training as based on personnel operating in the 'front country' or 'backcountry'. Backcountry being considered a usually uninhabited area inaccessible by roads

or by regular public transport. Austere or mountainous rescue incidents by nature are considered to be in the backcountry or wilderness.

"Rescue crews are faced with a much different situation than an ambulance crew when it comes to rendering care to subjects of accidents, exposure or other medical emergencies. The typical setting for a mountain rescue mission is far different than 'on the street' type rescues."

In the late 1990's, the Mountain Rescue Council in the United Kingdom, commissioned the development of its own syllabus and certification for its members, based on the need for special equipment and the long protracted periods when the casualty was in the care of the rescuer. The result was the development of the **Casualty Care in Mountain Rescue** manual and certification process.

There are many inherent risks involved in mountain rescue, the most common being rockfall. This can occur due to the natural degradation of the mountain, strong winds, rain, downwash from helicopters, other people on the mountain and even the actions of rescuers. Injuries from being struck by a rock of any size can be significant.

Accessing a casualty using a ground-up approach or traversing (roped or unroped) presents a risk of falling with a range of consequences from minor injuries (cuts / abrasions) to major injuries (fractures, dislocations, penetration wounds, head injuries).

Environmental conditions and activities undertaken by rescuers can lead to temperature related illnesses (hypothermia and hyperthermia). Venomous snakes, spiders and insects pose a real risk to rescuers travelling through the bush or in the mountains.

It is often not appropriate for rescue teams to have front country medical personnel (i.e. paramedics) accompany them on technical rescues, unless they possess the same level of knowledge, skill, ability and fitness as members of the rescue team. Appropriate personal protective clothing and footwear are also required. Therefore, if medical assistance is required by a rescue team member it will be primarily the responsibility of the rescue team to provide this. If available, medical assistance may be provided via a rescue helicopter service.

A 2012 North America Research Project by Victorian Paramedic Kerryn Wratt on: *"Improving pre-hospital care in remote and wilderness environments of Victoria, Australia"* identified the specialist medical training, wilderness training, fit for purpose light-weight equipment and physical fitness required to "establish a paramedical team with the ability to safely enter a remote or wilderness environment for the purpose of providing clinical care to patients and other responders".

As for an injured rescuer, the mountain rescue team will be responsible for providing pre-hospital care for a casualty until medical personnel can access the casualty in-situ, or after the rescue team has transported the casualty to the medical personnel. As a member of a mountain rescue team, not having a sufficient level of knowledge and ability in first aid to provide the necessary pre-hospital care to a casualty can be detrimental for the casualty, and at the same time can cause unnecessary anxiety, stress and feeling of guilt for the rescuer.

PSYCHOLOGICAL FIRST AID & STRESS INJURIES

Highlighted throughout this research trip, was the acknowledgement of the heightened risk to mountain rescue personnel (and other emergency responders) to stress related injuries and illnesses. There was also acknowledgement that the 'old school mentality' of 'harden up or get out' is totally unacceptable, and that much more has to be done to address stress injury.

R2
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RESCUE DESCENDER

Rescue Descender

Rope 11mm diameter max.
Working load limit 140kg to 200kg
High efficiency one-way bearing
All metal construction

Distributed By
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READY (Green Zone)	REACTING (Yellow Zone)	INJURED (Orange Zone)	ILL (Red Zone)
Definition <ul style="list-style-type: none">- Adaptive coping and mastery- Optimal functioning- Wellness Features <ul style="list-style-type: none">- Well trained and prepared- Fit and focused- In control- Optimally effective- Behaving ethically- Having fun	Definition <ul style="list-style-type: none">- Mild and transient distress or loss of optimal functioning- Always goes away- Low risk for illness Features <ul style="list-style-type: none">- Irritable, angry- Anxious or depressed- Physically too pumped up or tired- Loss of complete self control- Poor focus- Poor sleep- Not having fun	Definition <ul style="list-style-type: none">- More severe and persistent distress or loss of function- Leaves a "scar"- Higher risk for illness Causes <ul style="list-style-type: none">- Life threat- Loss- Inner conflict- Wear and tear Features <ul style="list-style-type: none">- Panic or rage- Loss of control of body or mind- Can't sleep- Recurrent nightmares or bad memories- Persistent shame, guilt, or blame- Loss of moral values and beliefs	Definition <ul style="list-style-type: none">- Persistent and disabling distress or loss of function- Clinical mental disorders- Unhealed stress injuries Types <ul style="list-style-type: none">- PTSD- Depression- Anxiety- Substance abuse Features <ul style="list-style-type: none">- Symptoms and disability persist over many weeks- Symptoms and disability get worse over time
Unit Leader Responsibility	Individual, Peer, Family Responsibility		Caregiver Responsibility

US Marine Corps, "Combat and Operational Stress Control", Table 1-2

For most, the term 'safety' is interpreted as steps taken to ensure the physical well-being of a person. Rescue teams invest heavily in training and equipment, the development of systems and procedures with the underpinning aim of ensuring physical safety of the rescuer and casualty.

"A survey conducted in four American states in 2015, including over four thousand EMTs and paramedics, revealed that 87% of the responders had experienced critical stress, and that 37% of those had contemplated suicide with 6.6% having actually attempted to take their own life".
McGladrey, L. "Psychological First Aid and Stress Injuries", Chapter 10, Wilderness EMS (2018)

Claudine Ronay, the Family Liaison Officer and Critical Incident Stress Manager for Yosemite Search and Rescue, identified the work by Dr Patricia Watson and Laura McGladrey on 'Psychological First Aid and Stress Injuries' as having the most positive impact in this field throughout the US National Park Service. [See also Laura's co-authored article on the Psychological effects to rescuers of stress, trauma and Covid lockdowns in WILDERNESS SAR issue 8]

Yosemite Search and Rescue have recently been conducting educational sessions for their staff on stress injury and psychological first aid. These sessions look at the Combat and Operational Stress Continuum and the treatment principles of psychological first aid.

The Combat and Operational Stress Continuum Model recognises the entire spectrum of stress responses and outcomes, from adaptive coping and full readiness, to clinical mental disorders arising from stress and unhealed stress injuries.

As a rescuer, we should be aware of our current physical and mental state. We should be professional enough to risk assess our potential involvement in rescue operations and ensure that our safety and well-being is prioritised, along with that of the rescue team. The rescue team should be conducting the same risk assessment process for each member, and the team as a whole. If an injury, physical or psychological is identified, first aid treatment should be provided.

For the individual or the team to be able to effectively assess their psychological

state, both must have an awareness and understanding of potential stimuli for stress, the signs and symptoms of stress and the levels or types of stress injury. Stress injury may not only affect a rescuer's cognitive performance it may also affect their physical performance.

The Green 'Ready' Zone does not infer an absence of stress, rather it is an ability to integrate stress without significant distress or impairment in social or occupational functioning. Attributes and behaviours of a person operating in the Green Zone are:

- Remaining calm and focused
- Getting the job done
- Remaining in control physically, mentally and emotionally
- Behaving ethically and morally
- Getting sufficient sleep
- Exercising and staying fit

In the Yellow 'REACTING' Zone, rescuers would feel mild and temporary distress or loss of function due to stress. The distress or loss of function is resolved as soon as the stress stimuli has gone or the rescuer adapts to the stress and becomes accustomed to it. The following experiences and behaviours are characteristic of this Zone:

- Feeling anxious or fearful
- Cutting corners on the job
- Being short tempered, irritable or angry
- Having trouble sleeping
- Lack of motivation
- Keeping to oneself
- Being negative or pessimistic
- Diminished capacity for mental focus

In the Orange 'INJURED' Zone the rescuer has more severe and persistent forms of distress or loss of function that signals the presence of some kind of damage to the mind, brain or spirit. Symptoms that suggest a stress injury include:

- Losing control of one's body, emotions, or thinking
- Having difficulty falling asleep or staying asleep
- Waking up from recurrent, vivid nightmares
- Feeling persistent, intense guilt or shame

TAME THE BACKCOUNTRY

SAFER RESCUES WITH TERRA TAMER AND EQUALIZER



Terra Tamer-all terrain litter wheel has been tested in the most demanding environments. Rolling over rock, mud, snow and sand or tackling steep mountain inclines the Terra Tamer moves patient and extraction team quickly and safely. The titanium framework and fork system is the lightest all-purpose patient transport on the market. The fat tire and disc brake are designed for maximum rescuer control. Terra Tamer breaks down for transport, fits most rescue litters, and is prepared for the mission ahead.

Equalizer handles attach to all Cascade Professional and Advance Series litters. The unique 24-position system allows operators to quickly adjust handle positions for terrain changes or differences in operator height. Available in titanium or stainless steel, these handles are incredibly light and stow easily in a Tamer Transport Pack and ready to deliver a hand.



- Feeling attacks of panic or blind rage
- Losing the ability to remember, think rationally or maintain focus
- Losing confidence in previously held moral values
- Harbours serious suicidal thoughts

The Red 'ILL' Zone is the zone of diagnosable mental disorders. The most widely recognised stress illness is PTSD, with other common illnesses being depression disorders, anxiety disorders and substance abuse. Indicators of the presence of a stress illness are:

- Long lasting and disabling distress or impairment of normal functional
- Stress injury symptoms and impairments that do not improve over several weeks
- Stress injury symptoms and impairments that worsen over time
- Stress injury symptoms and impairments that return after seeming to resolve

Adapted from US Marine Corps, "Combat and Operational Stress Control", Chapter 1

Psychological first aid can be applied to anyone who has experienced a trauma. A trauma being when a stimulus overwhelms one's capacity to integrate it. In the context of mountain rescue that potentially means both the subject of the search and rescue, and members of the rescue team can benefit from psychological first aid.

SUMMARY OF THE TREATMENT PRINCIPLES FOR PSYCHOLOGICAL FIRST AID FOR THE PATIENT

1. Create a sense of safety by:
 - Mitigating the scene by reducing chaos and removing patients from perceived risk
 - Provide physical safety and use language of safety ... "now that you are safe"
2. Create calm by:
 - Calming yourself first and demonstrate calm
 - Work on the rescuer and patient breathing – bring it back to normal
 - Empathetic listening
 - Alleviate connected anxiety... "your partner is safe, now let's take care of you"
 - Emphasising the present, the

"Stress injuries, like physical injuries, can be recognised and mitigated, with practical and accessible tools. Fortunately, for the remote provider, these tools can be practiced and utilised in all remote settings".

McGladrey, L. "Wilderness EMS" (2018) Chapter 10

3. Create self and collective efficacy by:
 - Involving the person in problem-solving, self-care and rescue
 - Recognising and reminding people of existing strengths
4. Create connection by:
 - Building an on-scene relationship
 - Use patient and rescuer names
 - Helping people contact family, friends, loved ones
5. Create hope by:
 - Keep positive ... "we've got this"
 - Reflecting specific, accurate, positive facts and predictable, realistic steps
 - Be future oriented ... "distance and / or time to trailhead"
 - Personally maintaining and communicating hope

Adapted from "Wilderness EMS" (2018) Chapter 10, Table 10.2

Summary of methods for reducing Rescuer Stress Injury

- Minimise traumatic exposure

"Going out to rescues in the Orange and Red in the Stress Continuum is like going out with a known back injury and having to carry a heavy pack or stretcher. Over time you will get worse to the point that you will not be able to physically function"

Laura McGladrey, Psychological First Aid for Mountain Rescuers – Series 2 (podcast)

- Avoid unnecessary exposure
- Pause for changes from rescue to recovery, and provide a chance to opt out
- Potential for stress injury
 - Be aware of stress injury formation
 - Mode of Injury – overwhelmed, emotional connection, helplessness, error / guilt, isolation, near-miss, fatalities
- Signs and Symptoms
 - Be aware of the signs and symptoms for the various levels of stress injury ... Ready, Reacting, Injured, Ill

- Follow-up
 - On-site debrief
 - One-on-one peers / leadership
 - Incident support
- Ask for help
 - Peer and professional help

Source: RMRG Field Guide for Rescuer Stress Injury

The aim of this article is to highlight developments in remote / mountain rescue that can enhance the overall safety of the rescuer and those requiring rescue. This section is just that, an attempt to highlight the importance of Psychological First Aid and Stress injuries in mountain rescue. As a fellow rescuer, I would encourage you to take advantage of the following resources that are available online and to 'spread the word'.

- Responder Alliance – Education, Advocacy, Innovation, Support
<https://www.responderalliance.com/>
- Psychological First Aid for Mountain Rescuers: Episode 1 – Stress Injuries
https://www.youtube.com/watch?v=rnc5_RFUysg
- Psychological First Aid for Mountain Rescuers: Episode 2 – Principles in real Time
<https://www.youtube.com/watch?v=ZjtIA-INe1U>
- Psychological First Aid for Mountain Rescuers: Episode 3 – Sustaining Green
<https://www.youtube.com/watch?v=QF2JQ1l634I>
- Combat and Operational Stress Control, MCTP3-30E, US Marine Corps
<https://www.marines.mil/Portals/1/Publications/MCTP%203-30E%20Formerly%20MCRP%206-11C.pdf?ver=2017-09-28-081327-517>
- Mountain Rescue Association, LMS, Psychological First Aid – A discussion Course
<https://training.mra.org/>

Greg was awarded a Churchill Fellowship for this research in 2019. Two years on, some of the personnel mentioned may have changed post but most things remain unchanged. Greg is currently leading the development of the remote rescue capability for the Queensland Fire & Emergency Service in Australia. Outside of the Fire Service, Greg's background includes a Diploma in Outdoor Education, outdoor pursuits instructor (rock climbing and whitewater kayaking), rafting guide, and instruction in advanced swiftwater rescue and high angle rescue internationally.



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- 3- INSULATION: Wiggy's uses LAMILITE the most efficient insulation in the world for sleeping bags and cold weather clothing. Lamilite makes all other forms of insulation obsolete. Lamilite has shown that it is not affected by water. Even when the Lamilite gets wet, it retains it heat retention capability. This is especially important for SAR workers when they are on a mission if they encounter a rain situation. Sleep comfortably dry in a Wiggy bag.
- 4- Wiggy's bags are machine washable and dryable. We recommend this be done after any extended outing.
- 5- Wiggy's bags can be left in their stuff sacks for extended periods of time, [how long is not known].
- 6- Wiggy's bags can always be used as hypothermia bags if necessary.



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Side Opening for I.V.



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US NSN 6532014989681
Canadian NSN 6530219148698 (Orange)
Canadian NSN 6530219205924 (Green)

MAIN PIC: Mustang Survival's MRR130 raft made by specialist raft company Wing Inflatables. This is a craft specifically made for rescue from a swiftwater rafting origin unlike most of the UK models (like the MFC sled below which forms the basis of their fully enclosed raft) are much more 'work-boat' oriented and redesigned for rescue from that perspective. Unlike North America the UK doesn't have a huge swiftwater rafting community or indeed the vast lengths of whitewater rapids to support it. It does however, have masses of much narrower, fast moving channels that can and do become raging torrents in the blink of an eye during storms.

Inflatable NON POWERED

RAFTS

After covering the open-backed/stern sleds and rafts in TECHNICAL RESCUE#82 we've switched to WSAR for this one because non-powered rafts evolved with wilderness teams working true swiftwater on their patch. 'Evolved' is not the correct word because the craft in use are very close to the recreational models aside from reinforcements and extra handles and rings and it's more accurate to say that the open-ended sleds (as exemplified by the MFC model in the picture on the right) and Oceanid-style rafts (as shown in the ad far right) evolved out of these 'puffier' swiftwater-style rafts. While the majority of rescue agencies have moved towards the sled and Oceanid styles, there is still a big place for conventional rafts in a rescue inventory either because there are swiftwater risks in or near your response area or because they are used for casualty rescue and evacuation in the event of flooding. This is because rafts, with larger sponsons completely surrounding the deck, provide better protection for the raft occupants. We have only listed models that are marketed to or used by rescue agencies and that do not have an inherent ability to mount an outboard because those will be included in our GUIDE to Powered IRBs. However, those GUIDES will not include rafts and catarafts that can be *retrofitted* with a frame capable of mounting an engine – there would be just too many to mention. Back to the sponsons on swiftwater rafts and while they provide greater protection than open ended craft, they won't necessarily keep everyone bone-dry because many, especially if they have an I-beam rather than drop-thread or drop-stitch floor, are self baling which means that water can enter and drain through gaps around the union between the floor and the sponsons.

Any craft in this GUIDE not shown as self-bailing are better suited to slow moving flood or still water rather than swift or rough water. Indeed, *Safequip* in the UK actually call theirs an 'urban' evacuation raft indicating its true design purpose and while 'urban' is perhaps too limiting for some of the non-self-bailing models, particularly from UK companies, they are certainly designed for a different role to the North American models that can be dealing with epic whitewater conditions as well as general flooding.

One of the differences between true swiftwater and broader remit rescue is that hardcore whitewater rafts tend to have the softer and deeper I-beam inflatable floor but rescue tends more towards a drop-thread floor because it is generally tougher, thinner and more stable to work on bearing in mind that such craft tend to be used more in flood than whitewater.

These rafts are the same materials and construction as the platforms and sleds covered in TECHNICAL RESCUE GUIDES to INFLATABLE CRAFT ie. – incredibly robust welded PVC/TPU or *Hypalon*, often as a Double Wall Fabric (DWF) and drop stitched on the most robust part of these craft, the floor/hull. Polyurethane is rare but probably the most resilient material and welded is better than glued. All inflatables have pressure differentials due to heat increases that can test the seams if over-inflated and/or overloaded. Some, like *WRS* and *Rocky Mountain Rafts* offer drop-stitch or I-beam floors. Given the abuse these things get from ice, gravel, flooded wire fences and brick walls etc. some have extra reinforcing strips along the underside of sponsons like the *NRS* craft. Failing that, most craft come with a repair kit. As with most things in life, you

RAFT VS SMALL OPEN-STERN SLED/RAFT

- Both Self bail,
- Raft has more stability so better for bigger water,
- Raft with larger tubes is more forgiving so less training to keep upright,
- Raft has larger carrying capacity,
- Sled is lighter to carry in,
- Sled easier to self rescue after capsize,
- Sled easier to load victim from water into boat,
- Sled can be paddled solo so less rescuers at risk.

RAFT VS LARGER OPEN-STERN RAFT

- Raft heavier than equivalent open-stern version,
- Rafts offer more rear protection from falling out so more suitable for bigger or higher risk water where you don't want people falling out at all!
- Both offer good stability (raft would be slightly more stable due to added weight, but marginal),
- Open-Stern better for wading wide spread floods and getting on & off the boat,
- Raft are generally self-bailing so contaminated water will enter the raft through the floor. (This is a Flood Rescue Consideration),
- Open Stern Raft offers easier water victim access,
- Open-Stern easier to climb into after capsize.



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WATER RESCUE CRAFT



A CHECKLIST to BUYING AN APPROPRIATE RAFT

by Mike Croslin

In discussing boat handling in the rescue environment, the rescuer must first examine the types of boats to be utilized in river rescues and should closely examine the maneuvers those boats can perform in contrast to the total number of river rescue methods for which all river rescue boats are capable of.

Consider all of the pointers below in order to arrive at the most economically feasible and the most efficient type of rescue craft for your specific locality, type and number of incidents and ability to attain and maintain training for your craft in your conditions. It has been observed that manufacturers across the world have, in the past, marketed various kinds of craft as the "ultimate ** answer for river rescue. River teams and individuals should be cautious when considering such claims and perhaps consult other teams that may have similar conditions in their response area.

Generally there are 3 boats teams may have in their cache:

- River Rescue Boats, inflatable.
- IRB style with transom motorized.
- Cataraft IRB with transom. Motorized.

Motor-capable IRBs are the workhorse of flood and disaster response, flood evacuations, wide flooding areas with no road access, can ascend against the current to approach from downstream, bridge abutments, rocks, trees, can function in waves, strong currents and obstacles with expert training. Can be Zodiac/Avon style or catarafts. Full spectrum, rigid-hull rescue boats are too heavy to surf in choppy, stout currents and have limited capability in class3 and above or inside tree lines at flood stage. Crews must train for motor failure and must carry paddles to R2. Registered swiftwater teams generally have one or two IRBs or motorized catarafts/oar combos in cache in the USA and operators require extensive training annually to stay competent and build experience. Such craft are not useful in remote canyons or rocky, shallow rivers and have significant risk of engine failure, or swamping in big volume or steep gradient rivers. Excellent for wide, flood plain deployment and up to class 3. Again, a great flood evacuation workhorse.

Non-motorized, human powered inflatables

1. The self-bailing "basket" boats. A new variation on the commercial recreational market that have lashed in inflatable floors allowing immediate draining of water and enhanced performance downriver in up to class 5. Medium weight, 100-150lbs or more. Tube size varies depending upon CFS navigating, a Grand Canyon NPS boat will have larger tubes than a Yosemite cataraft based on size of waves, hydraulics etc. A USFS river patrol ranger would on the Tuolumne would run

get what you pay for, so consider the materials, construction warranty and pedigree of the manufacturer and craft before committing to a purchase. The *Mustang/Wing MRR130* model on the title page demonstrates the most obvious difference between a conventional 'whitewater' style raft and the open-ended sleds/rafts covered in TR82 like the yellow *MFC* sled- the sponsons extend all the way around the craft and because they are quite large the inner working space is more restricted in comparison to the uncluttered surface of a platform or narrow-sponson sled. It's clear that the specialist rescue rafts like the South African *ARK* range that have been developed from whitewater rafts rather than actually being a whitewater raft with extras, are much narrower. Most of the sleds designed to be used in fast moving water (as well as flooded urban streets and alleyways) were also narrow beamed and it seems that this



profile suits many rescue agencies since the *ARK* range for instance has been designed in conjunction with the Queensland Fire Service in Australia.

The shallow rake we see on sleds helps deal with waves but the higher rake we see on fully enclosed -size rafts like the *NRS* raft below, allows the craft to negotiate fast flowing water without having tons of water washing over the bow. The rake also allows the craft to be pushed up against obstacles such as mid-stream boulders and low-head dam/weir faces which can be more easily search or a stranded taken on board because high-rake craft 'bend' a little at the change of angle to provide an extra few inches of proximity to the target. In the absence of an opening in the bow (as per the *Oceanid*-style craft) with which to funnel an in-water casualty, the raked, solid bow is less inclined to smash an in-water casualty in the head as the two approach each other, possibly closing at speed in a high flow. Also notice that the larger-diameter tubes/sponsons on the whitewater-style rafts mean that the deck may be suspended clear of the water as it is in most catarafts which improves speed and manoeuvrability.

VALVES

All of these craft inflate through a valve which may only allow air flow inwards (inlet check valve) so you don't lose air pressure should the valve cap not be in place or the pump/cylinder hose come off during inflation. We have differentiated three types in our tables: Safety or Pressure Relief Valves, 1-Way, 2-Way and Dump valves but for this GUIDE they are mostly 2-Way and Pressure relief valves. **Pressure Relief Valves**

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SWIFT WATER RESCUE EMILY

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A CHECKLIST to BUYING AN APPROPRIATE RAFT cont.....

a SOTAR downriver or a Wing as a choice based on support for operations and loads carrying duty, but they are not the best in rescue mode that may require surfing under technical rope control.

2. Framed cataraft oar powered or a frameless cataraft R2 paddle. If you choose to train and expand boat operators skillsets beyond your local watersheds in the standard R2 paddle format, the frameless catarafts that have immediate rapid floor flush meet the essential high performance criteria in terms of weight, portability, speed, side stability, to both perform as a rescue boat with R2 as a chase boat, or pickoff boat launched with experienced R2 paddlers that are capable of broaching, crossing powerful stout channels to pull victims into a soft protected compartment and exit downriver safely. Some teams use framed catarafts of various sizes, if they have the talent base to row. Many do and this is important on many technical rivers and they make excellent platforms, but they have frames and large oars, which prevent dynamic pickoffs safely and can be traumatic if flipped onto inexperienced passengers or victims... only an issue if experience is lacking.. So for lightness and speed of deployment and downriver chase boat and pickoff capability and maneuverability, the frameless catarafts are superior for rescue crews training in paddle power only... which is faster performance in these excellent maneuvering and forgiving boats.

Because most teams lack the training to safely use a motorized or non-motorized inflatable at the scene of a significant flood or swiftwater event with rescuers on board it is essential that rope based control systems be learned and practiced with the best performing inflatable under shore control with ropes. If its an evac off a car roof in a flooded creek with slight gradient, and the channel has trees and wood galore within range of a short unexpected swim, this is a major event, for even the most experienced operators. These technical rope based systems we use are capable of placing a boat precisely where it is needed safely, with or without rescuers on board, and if you choose to use rescuers, whomever goes is a function of experience and strong swimmer status, not paper/scissors/rock. The rescuer on the boat is in charge of the controllers. He can feel the boat, and guide it better, and I hope at this point we can collectively agree that if he was trained well he or she would choose the lightest, most stable, self bailing platform to control from shore AND to navigate to safety should it be necessary. By my logic and experience this is the most important purchase decision a top tier team will make. It HAS to be the lightest but toughest, boat that is best across all formats of control and is fast under R-2 paddle for chase function safety as well, and in boat pickoff, broaching, grabbing victims into a central closed, self bailing compartment with instant drainage mesh, or lashed inflatable flooring..These criteria will insure best protection for rescuers and if delivering an empty evacuation boat in high risk flows, the best chance of bringing those trapped to safety. My best advice is to use a high performing design that is light, frameless

and self-bailing with a reputation for running class 4-5, then add handles and attachments to carry or hold onto into the interior, including foot braces. Make team members study R2 paddle techniques and practice regularly even if its just in a swimming pool,this alone is the minimal standard for R2 rescuers being sent, they must be drown-proofed and capable of navigating the boat to safety on their own. If a boat can be placed precisely and victims are capable of putting on a PFD, and exiting onto a stable platform, they should be allowed to do so, especially if competent control of the boat in an emergency exit is in question.

COMPARISONS AND CONTRASTS

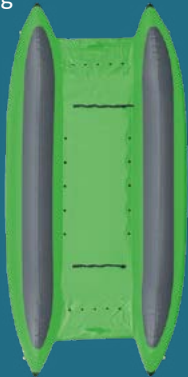
Once the river rescue team has discovered all of the various types of boats capable of performing river rescues, they then have to make some comparisons between the ability of these boats to perform in their local environment. The river rescue team first has to analyze and determine which kind of boat will be suitable for their particular situation. They must ask themselves the following questions:

1. Are you working in a flat river or waves, currents and rapids?
2. Is your river averaging fairly deep water or shallow areas?
3. Is you river wide or narrow?
4. What is the immediate access to the river.
5. Are there numerous boat launches or are you going to be forced to put their boat into the water through brush, walls, fences and other obstacles?
6. Are there a number of in-water hazards such as strainers, low head dams/weirs, class 3 or above rapids in your response area?
7. What is the ease or difficulty of operation of the type of rescue craft that you are choosing and how well can you train and maintain training of personnel?
8. What is the potential for flipping, broaching, or otherwise turning the boat over within the rescue environment?
9. What types of rescues are usually undertaken on your stretch of river?
10. Will the boat be used for other purposes besides rescue, aka dive platform, body recoveries?
11. Will the boat be suitable for deployment to other areas?
12. What is the available budget?
13. Which of the following rescue maneuvers will the boat be capable of:
 - Pick up rescuers in current
 - Pick up victims entrapped on top of rocks, houses, vehicles, caught in class 3 flood-stage water or higher
 - Effectively maneuver downstream to broach onto an object in order to pick up victims
 - Light enough to suspended on a rope rescue system in the middle of the river
 - Move upstream through class 3 water or better
 - Make effective crossing in current
 - Carry several victims, extremely stable

Mitch Sasser says...
A recent successful rescue from a mid-stream vehicle using a non-powered raft by the Santa Barbara Fire Dept with inflatable raft highlighted the need to ensure your craft is properly inflated, in the rush to deploy to a casualty in difficulties it is all too easy to cut corners leaving you open to swamping and buckling if the casualty numbers or conditions change during the rescue.

Self Bailers are the design to go with BUT.... for whitewater and fast flowing/rough water, the self bailing should be via holes all they way around the floor. Some designs only have drain holes punched through the floor material along both sides with the floor being glued to the outer tubes in these designs. I prefer a floor that is laced in and provides drainage 360 degrees around the boat. Without this you risk sudden weight change when taking on water flushing through the self bailing system and without drainage in the bow and/ or stern the water accumulation can cause overloading, snapping control lines or ripping lines out of rescuers grip. Having drain holes around the entire raft also helps in self rescue if a flip occurs. Naturally, the larger the tube diameter the more difficult it is to climb on top and right the raft again.

Those who have experience with flips and recovery will note the hand hold and grab options that a laced-in floor provides even at the bow and stern for the rescuer to quickly get up on top of the upside down boat. Some teams may be using pre-rigged flip lines to avoid having to climb up on top of the craft for correcting it. In summary, if the floor and tubes/sponsons are properly inflated with weight properly distributed and with full circumference self bailers, the boats will plane better. My choice in fast-moving water is a cataraft first option, then raft as a second option.



refers to its ability to purge air should you OVER-inflate. This can be the case particularly with compressed air cylinders so the safety valve will allow air to force its way out of the valve rather than bursting the seams of the craft. A **2-way** valve allows inflation and deflation. Some, like the *Leaffield* A/B/C and now D7 (pic below) and *Halkey-Roberts* valve, have a cap and then an interior sleeve that you rotate a quarter or half turn to alternate between inflate and deflate while others have a second screw-off collar beneath a non-return inflation section. When unscrewed, this allows air to exit freely. Deflation needs to be fast so that the craft can be rolled and stowed or moved ASAP ready for the next task so these 2-way valves are doubling as Dump or rapid air expulsion valves which tend not to be present on most sleds, boats and rafts. True dump valves, in the diving sense, can of course a be a push button affair but this is





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MARKET GUIDE

obviously not the case for inflatable craft where they are regular screw-top release if they are present at all. Bear in mind that most craft have more than one chamber so deflation can be a more time consuming process than inflation. Some raft have one-way baffles between chambers that means a single inflation point inflates all chambers which is much faster to inflate and deflate than inflating/deflating chambers one after the other – this is more the case with specialist rescue craft than it is with purist swiftwater rafts. Many craft have both sets of valves sometimes next to each other as with the *WRS* and sometimes separated as with *MFC* and *ARK* Craft where the inflate-deflate valves are located on the ends of each sponson and on the floor. Most valves are designed to use manual pumps and BA cylinders, but some are large enough to use a powered blower or even a vacuum cleaner in reverse. Professional battery blowers are an excellent idea because they have numerous other uses including cleaning/drying the craft. They are also unlikely to inflate beyond the pressure limit of the seams because they will struggle to push against over-pressure resistance. Basic dump valves can use large-bore pipe/hose inflation but air will escape while you try to screw the cap back on. *2Tinga's* accessory pack shown below, includes a repair kit

but also a pressure valve so that you can check the air pressure of your craft exactly and a very useful trigger-gun adapter for a BA line. This goes over the inflation valve and provides very precise start-stop during inflation rather than the more imprecise screwing/unscrewing of a cylinder valve.

LOAD CAPACITIES

Typical load capacities are similar to open-ended sleds at around 100kg/220lb per square metre on water (more on ice/mud) so for craft about a metre wide you can again gauge their capacity by the length – a 3m sled will take approximately 3 or 4 people. Bear in mind that some have a deeper floor; 6" drop thread instead of 4" or a deep I-beam – not as hard wearing as drop-thread/stitch but more comfortable and these provide greater capacity per floor area. More flotation-greater load capacity though you never want to load any of the 'softer' rafts close to their capacity unless your sponsons were fully cold-inflated as you will see folding at the seams or hull mid-points with uneven loading.

'LOAD-BEARING' EYES

Talking of which, virtually all designs have connection rings that vary in size and strength of attachment depending on their purpose. None have high strength LIFTING eyes (shown in previous GUIDES in this series) that enable the entire raft with casualty to be lifted vertically as is possible



with some sled models. In some cases, handles rather than rings can serve the same purposes. Most craft have medium-size/strength eyes attached via glued

and/or welded panels that can be used for towing or positioning (control lines) of the craft (shown as an orange number) and most have ancillary eyes that are intended for smaller loads such as connecting two craft or attaching equipment. The tow-strength eyes can also be used as tether points for holding position in flowing water.

Somewhere between load-bearing eyes/D-Rings and handles there is an advantage of having self-baling holes other than draining water out of the boat: the ability to pass webbing around the entire sponson via D-rings and handle so that the ring and handle simply stops lateral movement of the sling. The *NRS* raft in the pictures above has reinforced self-baling slots beneath 4 rings to provide a heavy lift capacity. All of the rings of the *NRS* craft are heavy duty but none of the rafts in this GUIDE are intended to be lifted while loaded via just the D-rings.

HANDLES

There are carry handles on all of these models (shown in orange in our tables), these are intended for transport and positioning while the craft is empty rather than for lifting stretcher style though that is possible with one or two of the narrower rafts with drop-stitch deck like the *ARK* and *NRS* models. Most rafts have bespoke handles as distinct from perimeter cord doubling as a handle. Some handles are flat tape, some have solid tubes of ergonomic rubber-like material. Inboard grab handles (shown in black in our tables) are mounted mid-sponson and are for holding onto in rough water.

GRAB/PERIMETER CORD/WEB

Present on most UK-manufactured raft because they tend to be more focused on rescue and with webbing on the US *CPI* model on the left (now discontinued pending an update) while the more conventional whitewater rafts from the US tend not to have grab cord as standard though they all have the rings and handles to configure your own cord. Cord or webbing is fastened at intervals to provide something to grab onto from the water or to

attach equipment to during the rescue mêlée. On longer models this can add a kg or more to the weight as it tends to be 7 to 10 mm in diameter for better grip and is heavier when wet.



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FLIPPING a CAPSIZED RAFT

This is a tab of webbing or a handle on the underside of the craft to enable it to be more easily righted should it capsize. This tends to be on the broader craft where the sponsons would be out of reach of rescuers in the water but it isn't actually present on many of these rafts as we expected. One craft, the *MRR130* has lengths of cord or webbing that extend the width of the craft and are stowed in pouches on the inside. In the event of a flip the web or cord is long enough to be passed around the sponson and pulled from the water to right the raft. Some like the Northern Diver models have a D-ring on the hull that can be clipped with cord or sling to help right it.

THWARTS/BOLSTERS/SEATS

The narrower raft can be paddled Canadian-style, knelt down but conventional, wider models are paddled from each side, usually while sitting on one of the soft, inflatable thwarts or bolsters that act as seats as well as increasing buoyancy. In some models, these are detachable and can be used as makeshift in-water buoyancy aids in the event of a person-overboard situation. The 'fatter' tubes on rafts enable paddlers/rescuers to wedge feet into the deck-union to gain purchase and help in maintaining balance and integrity within the raft.

At least one craft, the Wing Inflatable discussed on the next page has augmented the inflatable floor chamber with an additional 'flat' chamber for kneeling, this not only reinforces the deck it enhances comfort when paddling for long periods. Two of the craft in this GUIDE, the *ARK Croc-Rescue* (above) and the German *RTB1* have flat seating. The *Ark* has a vinyl strip which can also act as a forward restraint when leant against during kneeled paddling while the *RTB1* has wooden seats indicating tasking aimed at flood evacuation in slow-moving water rather than swiftwater or waves.



FOOT CUPS

A useful feature of some whitewater rafts that crosses over well into rescue rafts is the incorporation of low profile foot restrain cups attached to the deck.

These are a flap of material that will sit flat when not in use or with a person/kit sat on them. In some cases these might double as paddle stowage but the more overt models like the *NRS* above are large enough to insert a good portion of booted foot and help keep you in the boat in rough water as well as providing purchase from which to gain more paddling power going forwards and more reach when leaning back to help steering in strong current. Some thwarts also allow feet to be wedged beneath for extra purchase in rough water/waves.



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This IBS or *Inflatable Boat Small* model by *Wing Inflatables* deserves a separate mention because it has been specially developed as a 'toughened' craft with a much 'tighter' reinforced profile than the average 'pudgy' whitewater raft. It was intended as a 'training' craft and has been adopted by, amongst others, the US Navy Seals Basic Underwater Detonation School shown here putting its load capacity and wave break-out capabilities to the test. Despite its aim as a training craft, its toughened Polyurethane fabric makes this ideally suited to flood situations with hazardous obstacles, fencing and protruding concrete waiting to impale your craft. The yellow collar provides an obvious improvement in visibility of the craft as well as increased buoyancy and surface area on which to perch your butt-cheek.



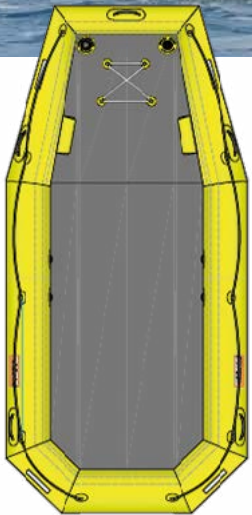
NON-STANDARD DESIGNS



Another design much favoured in the North America is the cataraft, a twin sponson hull, invariably 'pointed' at the ends and joined by a two or three transverse sponsons that, in a standard raft would be separately inflated thwarts or bolsters. Our own swiftwater rescue co-editor Mitch Sasser swears by them because of their manoevrability, speed and stability but they offer far less floor space so clearly not so much use in flood evacuations and very much a tool for the specialists. Nevertheless, in the right hands these are a potent swiftwater rescue craft. There aren't as many in this GUIDE as you might expect because many are equipped with a rigid transom to take a motor and will therefore be in the separate Powered Craft GUIDES. *Rapid Approach Rescue's* cataraft (above) can also be retrofitted for a motor with an aluminium frame costing around \$275 and is one of only two in this particular GUIDE but there are a number of comparable craft that would suit rescue agencies that are not currently used or marketed as such. This *RAR* model incorporates a reinforced

ramp on one end to ease hauling casualties on board – in this case up to 4 plus two rescuers.

MFC's RS8ER (right) is typical of some rescue-specific models that have been born out of rescue and not rafting. Theirs is basically the same as their sled (and platform) but with sponsons all around that are narrower than their swiftwater counterparts. They are not self-bailing and are intended for evacuation and searching on relatively flat water and slower moving flood water. Such craft are perfectly capable in faster moving water but without self bailing water coming in adds to the weight and discomfort so is best avoided. You can also see two inside pouches for throw cord or strobe etc and a tied-down panel to safely stow equipment or extra PPE. Some raft have internal paddle stowage points.




Finally a word about the *Mustang MRR130* model in the title picture which has been custom built by *Wing Inflatables* so you know it will be good. It's a dedicated rescue craft with enhanced features like ultra high visibility and more D-rings than you could possibly find uses for but it's one of only a handful that offers this range of rescue specificity in a true raft design.



A WRS raft being precisely manoeuvred and positioned for rescue in fast-moving water using a series of control lines from the banks to the higher-strength D-rings (and/or handles on some models)

KEY to TABLES.....

Any use, feature, accessory or component that is **inherent** in the product is shown as a **solid coloured square** ■■■■■
If it's an **OPTION** it is shown as an **outline square** □□□□□
A circle ● in the 'USE' columns indicates that this feature is only partially present and/or is OK for that purpose but not ideal.

ORIGIN: The 'manufacturer's country, not necessarily the country of manufacture, If we know it's made in a different country there will be a smaller inset flag eg. these three for Vietnam, South Africa and Taiwan 

COST: a rough guide only – **includes** local taxes/VAT. Varies with exchange rates, extra taxes etc. Unlike our other GUIDE in this issue, most companies here have given a rough price but in the current economic climate (2022) with so many factors affecting product costs, these prices may be subject to quite radical changes. We usually round up to the nearest Pound£/US Dollar\$/Euro€. We have started to quote a US\$figure in orange which is simply a currency conversion to give an idea of price, it is not the selling price in the US which may have import duties etc. to add.

LOAD CAPACITY: Often quoted as a person load where 4 persons is roughly 750lb but a quite imprecise way to describe load. Most companies will quote a maximum figure which is much lower than its true capabilities especially if used on mud or ice. If you work on 100kg per square metre or 67.2 pounds per square foot you won't tax any of these models. *[Note that some don't give a load capacity or indeed air capacity or inflation time citing differences in user expertise, pumps etc. Since even a vague figure would be a useful guide to readers we have included some approximate Volume and Capacity figures for comparative purposes in italics].*

DIMENSIONS: Length by internal width by external width by depth/height from ground, but this does not include the kick of an angled bow or stern. Height is often the width of sponson tube as many floors are suspended rather than having the tube sat on top. The stored dimensions may be size of the bag rather than the rolled or folded sled but it's close enough.

AIR CAPACITY: The volume of air needed to fill the path to working pressure. This doesn't necessarily correlate to the dimensions (which are external measurements) and vary with different thicknesses of material, resistance, internal components and in particular, temperature. *Figures in italics are our own approximation and could be out by a few hundred Liters.*

MAX WORKING PRESSURE: the pressure at which the path is pumped up and workable, exceeding of which will purge via the safety valve or burst the seams! The base tends to be a higher pressure (avg 5-10psi) compared to the tubes at 2-4psi.

INFLATION TIME: The quickest time is via **compressed air** and where chambers are linked so can inflate from one valve. **CA** is 2-3 times quicker than **electric pump** which may be twice as fast as **hand/foot inflation**. All times are approximate and depend on the temp and how well the path has been packed/unrolled. Times in *italics* are our own estimate based on volume

MATERIALS: Mostly trade names which are variants of treated polyester, PVC and/or Polyurethane in a range of construction layering. Imperial figures showing oz is per square foot eg. 44 and 66oz materials.

CHAMBERS: The total number of separate inflation chambers including the floor. If the floor is NOT inflatable this will be indicated in the NOTES.



THWARTS or BOLSTERS are tubular seats, supports or partitions separately inflated and not included in the number of chambers figure above. Note that thwarts can increase the outside width of a raft by a few inches as it pushes out from the inside.

GRAB/LIFT HANDLES: **LIFT** Handles shown in **Orange** are on the sponsons and for lifting/shifting as well as holding onto. GRAB Handles are in-board and are to self-assisted boarding or for in-water swim propulsion.

FLIP TAB/HANDLE GRAB CORD/WEB FLIP tab or cord to help with righting a capsized craft. **GRAB CORD** is perimeter webbing or more commonly cord or lengths of cord for holding on to or attaching equipment and may be pre-installed or self-tied.

HD-TOW/LT DUTY EYES: metal D-rings and/or web straps and sometime hooks. LT DUTY eyes are D-Rings we described in previous GUIDES as 'Link; eyes which are used to clip in gear, connect rafts together or for threading grab lines etc. but some are easily strong enough for control lines and maybe towing but generally the LIGHT (LT) DUTY or connecting eyes are weaker than **TOWing** eyes. **HEAVY DUTY-TOW** eyes can be used for towing, positioning in high-flows and lifting the **EMPTY** craft if positioned appropriately. For any live-load lifting, these are best used with a sling passing through the side-mounted rings and beneath the hull of the raft but this would be a rare event because of the risk of buckling if not sufficiently supported along the hull/floor. Double check the manufacturer's definition of 'lift' when referring to rings and handles; most actually mean lifting an EMPTY craft into water, for instance off a dock, before starting the rescue.

PRESSURE RELIEF VALVE: (PRV) This safety, pressure relief or auto-purge valve allows excess air to vent as a result of over-inflation or an excessive compressive load. You may have initially inflated the craft to its limit and then have a temperature or load increase that could rupture the seams if air could not escape

1-WAY CHECK /2-WAY: A one way inlet valve that doesn't allow air to escape. A **2-way** valve is a joint inflation-deflation valve like the Leafield C7 and D7 valves. Usually requiring a twist or unscrewing of a top section to switch between inflation and deflation. A 'wrench' is often required (and supplied) in preference to being able to open by hand.

ACC = ACCESSORIES

CARRY BAG: All of these come with a carry or storage bag but one or two like the WRS can have an enhanced 'pro' bag. **PADDLES** – self explanatory!

WARRANTY: Not really an accessory! Shown as manufacturer's warranty but fabric warranty may be separate and approx 5yrs. Shown in YEARS and usually subject to conditions. Some raft suppliers have shorter warranty for commercial users as distinct from recreational users. This is aimed at commercial rafting using rafts day in day out and shouldn't really apply to rescue – worth asking for a retail warranty.

SELF BAILING: any water that enters the raft will drain away through holes or gaps in the floor or between the floor and the tubes/sponsons.

VIZ =VISUAL ATTRIBUTES

CUSTOM: Customised Team/Service/Dept decals or printing

REFLECTIVE: As standard ■, or as an option □

COLOUR: Primary colour of shell/frame with an outline secondary colour to indicate trim colour. The Catacraft above shows Rocky Mountain Rafts available range of rescue colours.

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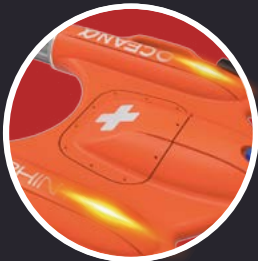


Dimension	119x85x20cm	Buoyancy	32kg
Weight	13kg	Floatability	150kg
Propulsion	Water-jet thruster	Max. Speed	13km/h(8mph)
Battery Life	30mins	Control Range	800m

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Remote Design



Highly Visible
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100% More
Buoyancy



Tangle and
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High-Speed
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Images NOT to Scale	MODEL	COMPANY	ORIGIN	COST inc tax / VAT	WEIGHT	LOAD CAPACITY	DIMENSIONS L x int/ext Wx H/D PACKED		approx. AIR CAPACITY INFLATION TIME (Hand) (Powered or CA)	MAX WORKING PRESSURE FLOOR/DECK	MATERIALS: TUBES/SPONSONS FLOOR/DECK	INFLATE												LOADING		VALVES		ACC		VIZ		NOTES	WWW.
												SELF-BAILING	CHAMBERS / THWARTS	MANUAL/POWER PUMP	GRAB/LIFT HANDLES	FLIP TAB / GRAB CORD	HD-TOW/ LT DUTY EYES	PRESSURE RELEASE	1-WAY / 2-WAY	CARRY BAG/ PADDLES	REPAIR KIT/ WARRANTY	REFLECTIVE/ CUSTOM	COLOUR OPTIONS										
	Croc Rescue CRR 375	ARK		£592 \$706 €662	23kg 50.6lb	170kg 375lb	375x33/105x36cm 148 x 13/41 x 14" 75 x 50 x 50cm 30 x 20 x 20"		600 L 21.2cuft 8-12mins	0.24-0.28BAR 3.5-4.5 Psi * BAR * Psi	1055g PVC closed-cell foam floor	■ *	2 2	□ □	2 6	■ -	6 4	- -	■ -	□ 3	■ 3	□ □	■ ■	■ ■			*No bolsters, seating is a but a PVC strip. *Floor is solid foam (not inflatable). *Via bailing sock which can be closed.	arkinflatables.com					
	Ark Angel ARR 420	ARK		£1424 \$1697 €1593	28kg 110lb	350kg 750lb	420 x 44/118 x 37cm 165 x 17/47 x 14.5" 95 x 50 x 50cm 37.4 x 20 x 20"		1200 L 42.4cuft 12-15mins	0.24-0.28BAR 3.5-4.5 Psi 0.55 BAR 8 Psi	1450g PVC 8cm/3" drop- thread deck	■	2 4	□ □	12 8	■ -	8 15	- -	■ -	□ 3	■ 3	□ □	■ ■	■ ■			60cm bow & stern kick. Additional rear PVC band seat.	arkinflatables.com					
	Nile KN365	ARK		£1797 \$2142 €2010	35kg 68.2lb	425kg 937lb	365x71/175x52cm 143 x 28/69 x 20.5" 98 x 56 x 50cm 38.6 x 22 x 20"		1648 L 58.2cuft 12-15mins	0.24-0.28BAR 3.5-4.5 Psi 0.17 BAR 2.5 Psi	1450g PVC I-beam deck	■	2 5	□ □	8 -	■ -	10 10	- -	■ -	□ 3	■ 3	□ □	■ ■	■ ■			70cm bow & stern kick	arkinflatables.com					
	Res-Q-Raft 400	CPI Rescue Products		N/A	50kg 44lb	950kg 2090lb	302x120/231x56cm 119 x 47/91 x 22" N/A		1900 L 67 cuft 4-10mins	N/A	32oz PVC. 40oz Evaloy- drop-thread deck	■	0 -	□ ■	- 10	■ -	14 6	- -	■ -	■ 1	□ □	■ □	■ ■	■ ■			This raft being updated or discontinued. Removable inflatable floor	cpiwaterresqproducts.com					
	430RR Rescue Raft	INMAR		£3000 \$3500* €3200	72.7kg 160lb	1023kg 2250lb	427x147/198x51cm 168 x 58/78 x 20" 140 x 84 x 61cm 55 x 33 x 24"		2400 L 85 cuft 10-15mins	0.16-0.2 BAR 2.8-3 Psi 0.6-0.7 BAR 9-10 Psi	1.2mm Hypertex, polyester, dual coated	■	2 5	□ ■	6 -	■ -	6 4	- -	■ -	6 3	1/ 3	□ ■	■ ■	■ ■			*Rescue Agencies=\$2995	inmarboats.com					
	Fat Boy	JPW inc		£4100 \$4444 €4300	32.7kg 72lb	455kg 1000lb	305 x 66/165 x 50cm 120 x 26/65 x 19.5" 100 x 86 x 60cm 40 x 34 x 24"		1600 L 56.5 cuft <15mins	0.17 BAR 2.5 Psi 0.17 BAR 2.5 Psi	32/42oz PVC coated Polyester drop-thread deck	■	2 8	□ ■	- 2	- -	4 -	- -	■ -	- -	5- 10	- -	■ ■	■ ■			10" bow kick. Removable drop-stitch floor. Foot thwarts. Rescue Celubra is power-capable so will be in the powered craft GUIDE	jpwinc.com					
	Rescue Raft RS8ER WR0212	MFC INTERNATIONAL		N/A	26kg 57.2lb	820kg 1804lb	350x134/190x56*cm 137 x 52.7/75 x 22" 88 x 50 x 33cm 35 x 19.7 x 13"		1815 L 64cuft 3mins	0.2 BAR 3.25 Psi 0.4 BAR 6 Psi	Hypalon TPU 12cm/5" drop- thread deck	NO	- 3	□ □	7 -	■ -	- 3	- -	■ -	2 -	2 -	□ ■	■ ■	■ ■			*Height is not tube diameter hence low volume Leafield Valves. Optional rear bolster and storage pockets	mfc-international.com					
	Rescue Raft RS10ER WR0214	MFC INTERNATIONAL		N/A	35kg 77lb	950kg 2090lb	400x134/190 x56*cm 158 x 75/91 x 22" 88 x 55 x 35cm 35 x 22 x 14"		2000 L 70.6cuft 3mins	0.2 BAR 3.25 Psi 0.4 BAR 6 Psi	Hypalon TPU 12cm/5" drop- thread deck	NO	- 3	□ □	4 -	■ -	- 3	- -	■ -	2 -	2 -	□ ■	■ ■	■ ■			*Height is not tube diameter hence low volume Leafield Valves. Optional rear bolster and storage pockets	mfc-international.com					
	MRR130	MUSTANG SURVIVAL (WING INFLATABLES)		N/A	50kg 110lb	909kg 2000lb	396 x 89/196 x 53cm 156 x 35/77 x 21" 96.5 x 114 x 125cm 38 x 45 x 49"		2350 L 83 cuft <2/>5mins	0.24 BAR 3.5Psi 0.31 BAR 4.5 Psi	33oz PU-coated Polyester. I-beam floor	■	2 5	□ □	- -	6 -	■ -	32 2* 16	- -	■ -	■ -	1 -	- -	■ ■	■ ■			Federal Aviation specification reflective panels 10" bow kick *2x3" Tow Eyes + 16x2" eyes. Flip cord/web housed in internal pouches	mustangsurvival.com				
	2.4m Raft	NORTHERN DIVER		£606 \$800 €700	25kg 55.1lb	400kg 882lb	240 x 60/130 x 35cm 94.5 x 23.6/55 x 14" 92 x 67 x 25cm 36.2 x 26.4 x 9.8"		692 L 24.4 cuft <1 - 3.8mins*	0.35 BAR 5Psi 0.7 BAR 10 Psi	1.2mm PVC 8cm/3" drop- thread DWF/PVC Floor	NO	- 3	□ ■	- 6	■ -	- -	- -	■ -	2 -	2 -	□ □	■ ■	■ ■			*Power pump to Hand Inflation time calculated at 50 pump strokes/min. NB the 2.7 and 3.3 raft are power-capable so will be in the powered craft GUIDE	ndiver-rescue.com					

NOTES: COST: Approx, INCLUDES local tax/VAT









USES/ FEATURES: ● = PARTIAL FEATURE and/or OK BUT NOT IDEAL

■ □ ■ = Option

N/A = info Not Available/not given

INFLATION TIME: Hand Pump/ Compressed Air

VALVES PRV=Pressure Relief Valve

Images NOT to Scale	MODEL	COMPANY	ORIGIN	approx COST inc tax / VAT	WEIGHT	LOAD CAPACITY	DIMENSIONS L x int/ext Wx H/D PACKED		approx. AIR CAPACITY INFLATION TIME (Hand) (Powered or CA)	MAX WORKING PRESSURE FLOOR/DECK	MATERIALS: TUBES/SPONSONS FLOOR/DECK													NOTES	WWW.	
												SELF-BAILING	INFLATE	CHAMBERS / THWARTS	MANUAL/POWERPUMP	GRAB/LIFT HANDLES	FLIP TAB / GRAB CORD	HD-TOW/ LT DUTY EYES	VALVES	1-WAY / 2-WAY	ACC	CARRY BAG/ PADDLES	REPAIR KIT/ WARRANTY			REFLECTIVE/ CUSTOM
	CBS6	NORTHERN DIVER		£1260 \$1600 €1550	62kg 136.7lb	700kg 1543lb	380 x 80/170 x 45cm 150x31.5/67x17.7" 120 x 60 x 40cm 47 x 24 x 16"		1753 L 62cuft 1-10mins*	0.35 BAR 5Psi 0.7 BAR 10 Psi	1.2mm PVC 8cm/3" drop-thread DWF/PVC Floor	NO	0 5	<input type="checkbox"/> <input checked="" type="checkbox"/>	8 -	<input checked="" type="checkbox"/> -	- 12	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -	2 -	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	UK DEFRA/Flood Approved * Power pump to Hand Inflation time calculated at 50 pump strokes/minute. NB the 2.7 and 3.3 raft are power-capable so will be in the next GUIDE	ndiver-rescue.com
	CBS8	NORTHERN DIVER		£1460 \$1850 €1750	70kg 154.3lb	900kg 1984lb	420x100/200x50cm 39.4 x 19.7" 135 x 68 x 45cm 53 x 27 x 18"		2397 L 85cuft 2-13mins*	0.35 BAR 5Psi 0.7 BAR 10 Psi	1.2mm PVC 8cm/3" drop-thread DWF/PVC Floor	NO	0 5	<input type="checkbox"/> <input checked="" type="checkbox"/>	8 -	<input checked="" type="checkbox"/> -	- 12	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -	2 -	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	UK DEFRA/Flood Approved * Power pump to Hand Inflation time calculated at 50 pump strokes/minute. NB the 2.7 and 3.3 raft are power-capable so will be in the next GUIDE	ndiver-rescue.com
	R120	NRS		£2550 \$3095 €3250	54.5kg 120lb	N/A	371 x 71/163 x 46cm 146 x 40/76 x 18" 114 x 66 x 38cm 45 x 26 x 15"		1600 L 56.5cuft 1- <5mins	0.28 BAR 4Psi 0.55- 0.7 BAR 8-10 Psi	2000D PVC 10cm/4" drop-thread deck	<input checked="" type="checkbox"/>	2 5	<input type="checkbox"/> <input checked="" type="checkbox"/>	6 6	- <input type="checkbox"/>	- 16	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -	<input type="checkbox"/> <input checked="" type="checkbox"/>	3 -	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Foot retention pouches on deck +3 toe-holds under each thwart. Armoured underside to sponsons & hull. Leafield C7 & D7 valves. * Height does not include 29" kick of the angled bow	nrs.com
	R130	NRS		£2800 \$3395 €3550	60.5kg 133lb	N/A	396 x 71/163 x 46cm 156 x 37/74 x 18" 125 x 66 x 10cm 49 x 26 x 14"		1800 L 63.6cuft 1- <6mins	0.28 BAR 4Psi 0.55- 0.7 BAR 8-10 Psi	2000D PVC 10cm/4" drop-thread deck	<input checked="" type="checkbox"/>	2 5	<input type="checkbox"/> <input checked="" type="checkbox"/>	8 6	- <input type="checkbox"/>	- 18	<input checked="" type="checkbox"/> -	<input checked="" type="checkbox"/> -	<input type="checkbox"/> <input checked="" type="checkbox"/>	3 -	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Foot retention pouches on deck +3 toe-holds under each thwart. Armoured underside to sponsons & hull. Leafield C7 & D7 valves. 30" bow kick	nrs.com

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REALISTIC

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




























TRAIN IN SAFETY AT THE NEWEST FACILITY IN THE USA



In an increasingly flood-prone world, swift water rescue training is critically important for first responders. specialized training can often be difficult and dangerous to arrange in natural outdoor settings.

In spring 2023, Fayetteville Technical Community College (FTCC), already known for its educational and training services to Fort Bragg, will open the only indoor swift water rescue training facility on the east coast of the United States.

An 88,000-gallon indoor tank allows for a variety of training scenarios, including different weather, water temperatures, obstacles, and rescue challenges, including simulated rescues at night. Located on FTCC's 30-acre state-of-the-art Fire & Rescue Training Complex on Tom Starling Road in Fayetteville, North Carolina.

Learn more <https://www.faytechcc.edu/swrtf>

Images NOT to Scale	MODEL	COMPANY	ORIGIN	approx COST inc tax / VAT	WEIGHT	LOAD CAPACITY	DIMENSIONS L x int/ext Wx H/D PACKED		approx. AIR CAPACITY INFLATION TIME (Hand) (Powered or CA)	MAX WORKING PRESSURE FLOOR/DECK	MATERIALS: TUBES/SPONSONS FLOOR/DECK	INFLATE												NOTES	WWW.
												SELF-BAILING	CHAMBERS / THWARTS	MANUAL/POWERPUMP	GRAB/LIFT HANDLES	FLIP TAB / GRAB CORD	HD-TOW/ LT DUTY EYES	PRESSURE RELEASE	1-WAY / 2-WAY	CARRY BAG/ PADDLES	REPAIR KIT/ WARRANTY	REFLECTIVE/ CUSTOM	COLOUR OPTIONS		
	R140	NRS		£3500 \$3695 €3850	76kg 167lb	N/A	430x109/221x56cm 169 x 43/87 x 22" 125 x 66 x 66cm 49 x 26 x 16"		2700 L 95cuft >2/ >15mins	0.28 BAR 4Psi 0.55- 0.7 BAR 8-10 Psi	2000D PVC 10cm/4" drop-thread deck		 3  5		 8  8						 3 			Foot retention pouches on deck +3 toe-holds under each thwart. Armoured underside to sponsons & hull. Leafield C7 & D7 valves. * Height does not include 30" kick of the angled bow	nrs.com
	Slice XL Cataraft	NRS/STAR		£1950 \$2195 €1766	30-36kg 66-79lb	900kg 1980lb	361 x 66/178x56cm 142 x 26/70x 22" 152 x 76cm 60 x 30"		2300 L 81cuft <2/ >10mins	0.2 BAR 3 Psi 0.55 BAR 8 Psi	44oz/1000D PVC 8cm/3" Drop-thread deck		 1*  5		 8 		 10 				 3/  5 	 	*1x detachable bolster + two integral, transverse bolsters/chambers. 2x Self-draining zipped compartments.+2 toe-holds under each thwart. Leafield C7 & D7 valves. 30" Bow/stern kick	nrs.com	
	Rescue Cat	RAPID APPROACH RESCUE		£2000 \$2150 €2100	34kg 75lb	900kg 1980lb	358 x 61/173 x 56cm 141 x 24/68 x 22" 115 x 81 x 66cm 45 x 32 x 16"		2250 L 79cuft <2/ >10mins	0.2 BAR 3 Psi 0.2 BAR 3 Psi	2000 Denier - 44 oz PVC 60oz Deck		 *  2		 6 		 4  10				 5 			*2 integrated transverse 'thwarts'. Transom frame available. Leafield D7 valves	rapidapproachrescue.com
	12'Rescue Raft Self bailing version SB120	ROCKY MOUNTAIN RAFTS		£2600 \$3150 €2750	54.5kg 120lb	>800kg >1760lb	366 x 66/158 x 46cm 144 x 26/62 x 18" 117 x 76 x 34cm 46 x 30 x 14"		1650 L 58cuft 1/ <5mins	0.17 BAR 2.5 Psi 0.14 BAR 2 Psi	44oz/3000 Denier Rockshield PVC. 66oz drop-stitch floor		 3  5		 6 		 12 				 2/  6 	 	Also 13 and 14' models. Leafield D7 valves. *Also non-'rescue' colours: green, grey, Blue, Torquoise, Beige, purple. Also Self-bailing with lace-in i-beam deck 27" Bow rise	rockymountainrafts.com	

NOTES: COST: Approx, INCLUDES local tax/VAT USES/ FEATURES: ● = PARTIAL FEATURE and/or OK BUT NOT IDEAL   = Option N/A = info Not Available/not given INFLATION TIME: Hand Pump/ Compressed Air VALVES PRV=Pressure Relief Valve

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												SELF-BAILING	CHAMBERS / THWARTS	MANUAL/ POWERPUMP	GRAB/ LIFT HANDLES	FLIP TAB / GRAB CORD	HD-TOW / LT DUTY EYES	PRESSURE RELEASE	1-WAY / 2-WAY	CARRY BAG / PADDLES	REPAIR KIT / WARRANTY			REFLECTIVE / CUSTOM	COLOUR OPTIONS	
	16'Rescue Raft drop-Stitch Deck SB1600	ROCKY MOUNTAIN RAFTS		£3300 \$3800 \$4550 €3550	88.6kg 195lb	>1350kg >3000lb	488x122/234x56cm 192 x 48/92 x 22" 152 x 76 x 41cm 60 x 30 x 16"		3200 L 113cuft >15mins	0.17 BAR 2.5 Psi 0.14 BAR 2 Psi	44oz/3000-denier RockShield PVC. 66oz PVC I-Beam lace-in floor	■	2-4 5	□	8 -	-	2-4 12-14	■	■	□	3/ 5	□	■	Also 13 and 14' models. Leafield D7 valves. Also non-'rescue' colours: Green, Grey, Blue, Torquoise, Beige, Purple. *Available as non-self bailing- drop-thread deck. 31" bow rise	rockymountainrafts.com	
	Phat Cat PC120	ROCKY MOUNTAIN RAFTS		£1500 \$1650 €1750	23-29kg 51-63lb	>180kg >400lb	358 x 56/173 x 58cm 141 x 22/68 x 23" 76 x 56 x 36cm 30 x 22 x 14"		2300 L 81cuft >10mins	0.17 BAR 2.5 Psi 0.14 BAR 2 Psi	44oz/2000-denier RockShield PVC. 66oz PVC floor	■	0* 2	□	-	-	12 8	■	■	□	3/ 6	□	■	*two integral, transverse bolsters/chambers. Leafield D7 valves. Also non-'rescue' colours: Green, Grey, Blue, Torquoise, Beige, Purple. Splash net & foot cups	rockymountainrafts.com	
	Ionic Urban Raft	SAFEQUIP		£3600 \$5040 €4320	35kg 77lb	1000kg 2200lb	320 x144/220 x 38cm 126 x 57/87 x 15" 100 x 70 x 45cm 39 x 27.6 x 18"		1550 L 54.7cuft <2/>10mins	0.2BAR 3 Psi 0.4BAR 6 Psi	'Orca' Hypalon. 15cm/6" drop- thread deck	NO	□	□	8 2	■	2 6	■	■	■	5	□	■	Leafield valves. 6" Deck. * Additional D-ring underneath the deck can provide flip tab. Previously available as a self-bailing white water version.	safequip.co.uk	
	WWR3700 SIT38040	SIT Ltd		N/A	37kg 81.4lb	300kg 660lb	370 x 85/175x45cm 46 x 33.5/69 x 18" 80 x 80 x 50cm 31.5 x 31.5 x 19.7"		1740 L 61.4cuft <1/<8m	0.2BAR 3 Psi 0.4BAR 6 Psi	Neoprene-coated Hypalon. 15cm/6" drop- thread deck	■	2 5	□	7 4	■	4 5	■	■	2	2	□	■	■	Leafield valves	sitltd.co.uk
	WWR4300 SIT38006	SIT Ltd		N/A	60kg 132lb	450kg 990lb	430 x 100/200 x 50cm 169 39.4/79x19.5" 90 x 90 x 50cm 35.4 x 35.4 x 19.7"		2480 L 87.6cuft >2/>10mins	0.2BAR 3 Psi 0.4BAR 6 Psi	Neoprene-coated Hypalon. 15cm/6" drop- thread deck	■	3 5-6	□	8 2	■	- 14	■	■	2	2	□	■	■	Larger WWR5000 also available. Leafield valves.	sitltd.co.uk
	RTB1 RTB1 SEB	SURVITEC/ DSB gmbH		£3995 \$5100 €4550	43kg 94.6lb	600kg 1320lb	300 x 40/120x40cm 118x15.8/47x15.8" 105 x 50 x 38cm 41.3 x 19.7 x 14"		1000 L 35.3cuft <1/<4m	0.2BAR 3 Psi 0.4BAR 6 Psi	Hypalon/Neoprene coated polyester. 15cm/6" drop- thread deck	NO	0* 4	□	0 0	■	4 8	■	■	2	4	□	■	■	* 2x Wooden seats SEB=quick inflation version with CA cylinder	survitecgroup.com
	IBS	WING INFLATABLES		\$13000	49kg 108lb	612kg 1350lb	366x79/165x43cm 144x31/65x17" 117 x 86 x 61cm 46 x 34 x 24"		1415 L 50cuft 3-10mins	0.31 BAR 4.5Psi 0.31 BAR 4.5 Psi	40oz Polyurethane. drop-thread deck	NO	2 6	□	- *	■	- -	■	■	□	5	□	■	*Perimeter cord acts as lift/grab handles	inflatablesolutions.com	
	3.6m Raft	WRS INTERNATIONAL	 	£3900 \$5000 €4366	55kg 122lb	700kg 1544lb	360x84/180x48cm 142x 33/71x18.9" 120 x 60 x 60cm 47.2 x 23.6 x 23.6"		1900 L 67cuft <2/>8min	0.3 BAR 3.6 Psi 0.1 BAR 1.5 Psi	PVC/PU. 15cm/6" I-Beam deck*	■	2 5	-	6 -	□	- 12	■	■	□	3	□	■	Leafield C7 7 A6 valves. *Available as non-self bailing with drop-thread deck.	wrsinternational.com	
	4m Raft	WRS INTERNATIONAL	 	£5210 \$6500 €5900	60kg 132lb	1000kg 2200lb	400x76/180x52cm 157.5x30/48x20.5" 100 x 100 x 60cm 39 x 39 x 23.6"		2200 L 78cuft <2/>10min	0.3 BAR 3.6 Psi 0.1 BAR 1.5 Psi	PVC/PU. 15cm/6" I-Beam deck	■	3 5	-	6 4	■	- 5	■	■	□	3	□	■	Leafield C7 7 A6 valves. 6 x Foot retaining cups/ loops.	wrsinternational.com	

NOTES: **COST:** Approx, INCLUDES local tax/VAT

USES/ FEATURES: ● = PARTIAL FEATURE and/or OK BUT NOT IDEAL

■ □ ■ = Option

N/A = info Not Available/not given

INFLATION TIME: Hand Pump/ Compressed Air

VALVES PRV=Pressure Relief Valve

LOST IN PARADISE

The Evolution of SAR in the Hawaiian Islands

by **Danyi Deats & SJ Gold**

SAR in the Hawaiian Islands is rapidly evolving and there are, to date, three organised teams: Maui SAR (MSAR), Oahu SAR (OSAR) and Kauai SAR (KSAR) plus the Search Technology Advisory Team (STAT). Untrained volunteers accomplished the most technologically sophisticated¹ search and rescue in Maui, Hawaii. This made world news² when a 35-year-old female went missing and the fire department cancelled its portion of the search³ after 72 hours. Over 1,000 volunteers then dropped everything to keep searching – finding her alive 17 days later in May, 2019. As a direct result of that unprecedented operation, experts from around the country gathered – Beachfront, amidst the gorgeous scenery of the lush green Kualoa Ranch (home of Jurassic Park) in Oahu by creating Hawaii's first Search And Rescue Convention⁴ – *Hawaii SAR CON*⁵

Tourists are drawn from all around the world to experience these local traditions, beautiful beaches and the lush tropical paradise. However, the islands pose a severe threat⁶ to adventurers and wanderers – both local and tourist – who brave its thick forests and deep blue oceans full of hidden dangers,⁷ such as treacherous terrain, flash floods, sharks and rip tides. Based on population, Hawaii ranks second in the nation for missing persons (tied with Oklahoma).⁸ Children and adults, men and women, often disappear and are never found. According to the *National Database for Missing and Unidentified Persons (NAMUS)*,⁹ there are approximately 600,000 people declared missing in the United States every year. The state of Hawaii currently has 233 of the 1.42 million Hawaiian residents missing which calculates to approximately 10 out of every 60,000. *NAMUS* shows data for all missing persons' cases which may include wilderness, ocean, run-aways, human trafficking and other criminal activity.¹⁰

In an effort to create awareness and to decrease the high statistics, Rosemarie Johnson, who was a volunteer in the 2019 Maui search (nicknamed 'Number Five'), co-produced the *Hawaii SAR CON* and *Community Safety Wilderness Survival* event. Johnson, an engineer and strategist for over 25 years, explained to those in attendance that "We live in a state that attracts over 10,000,000 tourists annually, spending over \$17 billion in 2019 and \$13 billion in 2021. This creates \$1 to 2 billion per year in tax revenue from that sector; yet, there are no prevention plans and an imprudent amount of public service announcements in place for those tourists. This results in a great burden being placed on the already lacking resources and manpower of both the police and fire departments on the islands."

"as a human being and a part of society, participating in search and rescue is the most meaningful thing you can do. It is 'pono' – doing what's right because it is the right thing to do – serving your community which helps find people, save lives and bring families back together."

MAIN PIC: One wrong step and paradise can become a living hell. SAR operations are sometimes not much better.



Above. Left & Opposite: Having an understanding and the skill set for high angle rescues is essential for search and rescue in Hawaii. Team members of OSAR are shown here off the cliffs on the eastern side of Oahu. Pics OSAR

Hawaii SAR CON Q&A special guest, Rick Stanton, one of the world's most accomplished cave-divers (recently portrayed in Oscar winners: 'Ron Howard's -Thirteen Lives' and 'Jimmy Chin's – The Rescue' about the Tham Luang cave rescue), also attested to the fact that "Resources and training are critical. Rescuers need to gain knowledge of proper skills so that they don't put the operation, themselves and others in danger." Rick is also a retired firefighter from the UK and attributed the success of the 2018 rescue to the fact that "the operation was fully funded by the Thai government."

Agreeing with Stanton, Johnson said, "this is far from the case in Hawaii. Without strategic, scalable interventions which include proper funding for prevention and training, we risk irreparable harm to the very resources that make Hawaii so exceptional." It was clear that she gained a wealth of knowledge collaborating with all the experts from around the country to make this event happen and had become an authority on these problems and solutions in Hawaii.

John Eller, the father of the hiker found in May 2019, retired from the technology sector. Motivated by his daughter's successful rescue, he saw the need to augment the capabilities to aid search and rescue in Hawaii. Mr. Eller founded the non-profit *Search Technology Advisory Team (STAT Hawaii)* in 2019 as his way to pay it forward to the community and to help other families find their loved ones.





"On May 8th, 2019, my daughter went for a run in the Makawao forest on Maui. When trying to get back, she lost her way, fractured her leg in the process and was stuck for the next 17 days. This became the catalyst for everything STAT has done since," said Mr. Eller. STAT's mission is to aid other Search And Rescue (SAR) efforts in Hawaii by working with SAR teams as well as with police and fire to help improve outcomes. STAT now provides tools and technology to assist in SAR efforts in Hawaii and across the country. STAT also engages community volunteers to pick up where the government agencies leave off.

"My wife and I were on vacation and we got notified about two days after our daughter went missing," Mr. Eller recounted. He then made contact with the Maui Police and Fire Departments, which had been searching for two to three days at that point and due to policy were discontinuing their search.

Eller continued, stating that, "Fortunately, we had good media coverage of the search which brought in many volunteers; some days as many as 150." He then went on to describe that there were struggles and the searchers faced dwindling hope, "but the community pulled through and we found my daughter."



Despite the unprecedented 2019 rescue, the amount of missing persons continues to grow with increased incidents of human trafficking on the rise. Most people, if not located in the first 48 hours, are never found. Does this sound unbelievable? Unfortunately, due to a lack of resources, it is true. In Hawaii, authorities only search for 72 hours maximum. Finding people requires government funding as search and rescue missions can cost over \$10,000 for just one day of searching. This goes to show the urgent need for allocation of additional SAR funding¹¹ and operational support. For example, the Thai Tham Luang cave rescue cost about \$9 million U.S. dollars¹², not including all of the volunteer support.

Chris Berquist, a *Hawaii SAR CON* speaker and co-founder of STAT was the novice incident commander of the 2019 historic amateur volunteer search. When asked about advice to give to a hiker, Berquist spoke with certainty: "I'd guess that this is probably a question I've been asked thousands of times, which is why STAT has branded and supplies a 'Get Found Kit.' The kit includes a small instruction card, Mylar blanket, glow stick, whistle and lighter inside a plastic bag that can collect rainwater."



Above/Opp Thick lush Hawaiian terrain is spectacular to look at though creates many challenges when searching as it is literally like trying to find a needle in a haystack. pics by Nimai Wong
Below: A person can easily take refuge and sustain with rainwater and plants in some parts of the Hawaiian islands for a long time – thus extended searches are required. pic by OSAR
Inset Opposite: The STAT 'Get Found Kit'. STAT is currently seeking a partner for U.S. distribution to increase the odds of finding those lost in the wilderness. pic by PONO Consulting





Above: Enthusiastic participants in the last Hawaii SAR CON show their excitement about coming together for this historic event. Pic by Hawaii SAR CON.
Below: Chris Berquist, John Eller, Rosemarie Johnson, Les Stroud.



Berquist did not stop there; he also recommended keeping essentials for hydration, nourishment, warmth, first aid and visibility, informing others of hiking plans and being prepared in case anything were to happen.

He continued rattling off the following list:

- Take a first aid class so that you can understand how to stabilize yourself if you have a bad twist or fall.
- Have a whistle on you because you can only scream for so long.
- Have some source of light with you other than your cell phone.
- Have appropriate clothing for when the temperature changes.
- Always let somebody know where you are supposed to be and when you are supposed to return.
- Do not trespass or go off trail because help will be a lot less accessible.

If you get lost:

- Find an open location.
- Make a giant SOS sign.
- Make noise using a whistle when it gets quiet.
- Create visible light or smoke with a fire.

World renowned wilderness survival expert, Les Stroud – 'Survivorman' (who was featured at *Hawaii SAR CON*) agreed, recommending: "Always take a kit with you. Preparation is key! It is every individual's responsibility and duty to be prepared when venturing out into the wild. The best chance of surviving is achieved before getting lost. Assumptions, ego and foolishness are not trustworthy guides."



Oahu SAR has a robust team and conducts trainings to certify new recruits on a regular basis. Shown here are some new recruits in training searching through mother nature's treacherous obstacle course. Pics by Oahu Search and Rescue





Above: Former special operations airborne ranger, third ranger battalion, seventy fifth rangers regiment, owner of Sting J Maui and Island Style Diving, Javier Cantellops, is shown here rappelling down a massive waterfall and vast foliage on 8th of the 17 day historic Maui search. Cantellops stated "I could feel the police and fire wind down on day 3 as their policy only allows 72 hours and that's what really motivated me, like, I've got to take over this whole thing. I have got to stay here, this isn't gonna be easy, this isn't gonna be resolved by [the Fire Dept]. They've got other things going on and they are about to wrap up. I remember feeling so frustrated that we couldn't find her and on day 16 everyone was in despair. I told John Eller that I just felt that every experience, class and certification has brought me here to find his daughter. And then, the miracle happened! We were in the helicopter, looked down and she just materialized! I have never felt such joy and overwhelming adrenaline in a single moment in my entire life." Pic by Javier Cantellops.

Main Pic: Hawaii's plentiful waterfalls are a magnet to tourists and adventurers but also the scenes of rescues for teams the world over. Pic by Robert Bridges IG@rjwandering



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WSAR Q&A

Hawaii SAR's spokesperson Rosemarie Johnson helps answer a WSAR third degree.....

WSAR: Why a SAR conference at this early stage in the life of HAWAII SAR?

HSAR: The purpose of the event was to create a platform to improve relationships and communications and bring together all of the state agencies and SAR teams. There is no state SAR coordinator who would normally track data, establish proper protocol and answer questions from the public or media. In Hawaii, every county island works independent of the other and there is a gross lack of resources for equipment, training and technology.

WSAR: What are the skills and equipment specific the SAR teams provide with regards to standard rope rescue systems, motorised vehicles, UAVs/water rescue drones, water rescue assets, etc?

HSAR: Hawaii's landscape presents unique challenges with its very rough and dangerous terrain so the use of technology helps keep people out of high-risk areas, and clear areas much more quickly. *Search Technology Advisory Team (STAT Hawaii) uses the "STAT METHOD" which combines technology, a proven methodology, volunteerism and education to decrease the statistics of Missing Persons in the wilderness. STAT is called upon at the families request, takes over where local authorities leave off and has a full array of SAR technology including:

- DJI Matrice 300 RTK – Most advanced drone available It is widely acknowledged that drones are the future of search and rescue.
- Quad camera, IR (FLIR), and Laser camera on drone H20T
- Image scanning software to automatically scan huge volumes of drone imagery to identify possible missing person
- Off grid communications and satellite searcher trackers
- Search planning and management SARTOPO mapping software
- Garmin Mini radios, GPS trackers, med kits, lights, cam lights, hiking sticks, etc.

WSAR: Do volcanoes require certain safety equipment/precautions or do the authorities limit your access during eruption/lava events?

HSAR: SAR teams have no access during eruption/lava events. Civil Air Patrol take the obvious precautions of not to fly in/near lava/smoke plumes. Some of the debris (Pele's hair) is too small to see in flight and can destroy engines.

Authorities which have access to eruption/lava events are USGS (U.S. Geological Survey) and National Park Service, US Coast Guard, Civil Air Patrol, and County Police. Usually the USGS (U.S. Geological Survey) and National Park Service will set up a temporary flight restriction and it's up to them on what aircraft are allowed to enter. On the ground, it could be multiple jurisdictions depending on

where the flow is. County Police may try to control access along with National Guard, but it can be a challenge depending on size.

Civil Air Patrol can be called upon to deploy manned and unmanned aircraft, ground teams, national radar analysis, and cell phone forensics teams which result in over 90% of finds in the US. Their ground team; assess and secure the scene, renders aid to survivors and prepare survivors for evacuation, do not disturb anything at the site except as necessary to render aid to survivors verify the identity of the aircraft, person, etc., advise the IC of the situation and request appropriate authorities be notified and retain aircraft or other resources in the area until certain they are not needed.

WSAR: What is the inter-Island structure of SAR in Hawaii and is there any standardised equipment PPE for certain teams/the entire Hawaiian SAR community or is it all approved personal gear etc.

HSAR: Most PPE for SAR teams is personal gear as they are all volunteers. Some grants have allowed for some teams to invest in standard equipment.

Each island/county Search And Rescue Team works independently of each other:

- **Maui Search And Rescue (MSAR)** is a volunteer organization dedicated to providing expert search & rescue assistance and community outreach education. They respond to call-outs from government agencies and family members of missing persons.
- **Oahu Search And Rescue (OSAR)** certifies to standards established by National Association for Search and Rescue (NASAR) and Mountain Rescue Association (MRA). OSAR provides standard and advanced rope rescue systems training and is dedicated to preventative education on Oahu.
- **Kauai Search And Rescue (KSAR)** specializes in canine rescue and certifies to standards established by organizations such as the National Association for Search and Rescue (NASAR). People are trained in visual tracking, compass, topographical map reading, first aid and CPR. The dogs are obedience-trained, and are trained to track based on either human scent discrimination or air scenting. Optionally, dog teams may be trained for human remains detection. KSAR only responds to callouts by the Kauai Police Department, Kauai Fire Department, and the Department of Land and Natural Resources. Once officially activated they work closely under their direction.

A future, more detailed article on HAWAII SAR will chart the progression of the fledgling service:

- Why data is required for SAR
- Why technology is important to SAR
- Creating a more robust Hawaii SAR
- Why do so many people go missing in Hawaii
- Hawaii Search and Rescue Resources
- Essentials of training in SAR

Stroud also stated that, "as a human being and a part of society, participating in search and rescue is the most meaningful thing you can do. It is 'pono' (Hawaiian word for doing what's right because it is the right thing to do) and serving your community which helps find people, save lives and bring families back together."

On the last day of the event, Number Five stated, "It's been incredible bringing all of the state agencies together for the first time. *Hawaii SAR CON* has created a platform – to build a foundation of relationships and communications – where agencies can work together more effectively and efficiently to save lives."¹³ Speaking through tears from the excitement at accomplishing this historic event, Number Five also said, "It was all very personal for me. I participated in a search three years ago, not aware or understanding the agency resource limitations at that time. And I thought to myself, 'What if that were me? Who would find me? Who would even look?' Hawaii is one of the few states in the nation with no State SAR Coordinator. There is a major lack of funded manpower for wilderness searches in Hawaii, so volunteers are essential. It is also one of few states that does not fund the training, tools or technology for the volunteer searchers, which is why *STAT* has proven invaluable to the Hawaiian volunteer search groups." In the end, the message was clear that in harmony with Hawaiian culture, be informed and practice pono¹⁴ through the new *SPs: Proper Preparation Promotes* (safety), *Prevents* (injury) and *Protects* (yourself, others and the aina¹⁵).

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TESTIMONIALS

THE HAWAII SAR CON WAS INVALUABLE!
IT SUCCESSFULLY BROUGHT TOGETHER STATEWIDE SAR
ORGANIZATIONS TO LEARN FROM INTERNATIONAL EXPERTS AND EACH
OTHER. IT IS AN IDEAL SETTING FOR GOVERNMENT, CIVILIAN AND
VOLUNTEER SAR ORGANIZATIONS TO COME TOGETHER IN AN
EDUCATIONAL AND COLLABORATIVE ENVIRONMENT TO IMPROVE THE
SAR SYSTEM.

HAWAII SAR CON HAD A MAJOR, POSITIVE IMPACT ON THE
HAWAII STATE SAR SYSTEM BY BRINGING TOGETHER GOVERNMENT,
CIVILIAN AND VOLUNTEER SAR ORGANIZATIONS TO DISCUSS
IMMEDIATE AND LONG TERM IMPROVEMENTS WHICH WILL
INEVITABLY SAVE LIVES.
~ KEVIN COOPER
SAR OPERATIONS
U.S. COAST GUARD

THE HAWAII SAR CON WAS A GREAT EVENT. IT
ALLOWED ME TO COLLABORATE WITH STAT,
SEVERAL SEARCH AND RESCUE TEAMS, THE US
COAST GUARD, AIR NATIONAL GUARD AND
HONOLULU EMERGENCY DISPATCHERS. IT IS
UNLIKELY THAT I WOULD HAVE MADE CONTACT
WITH ANY OF THESE ORGANIZATIONS WITHOUT AN
EVENT LIKE THIS. IT IS HELPING US TO
COORDINATE SAR ACTIVITIES FOR FUTURE
EVENTS.
~ COLONEL STACY HARUGUCHI
CIVIL AIR PATROL

THE HAWAII SAR CON WAS
ALOT OF VALUE, WELL-PLANNED AND WELL
EXECUTED. THE VARIETY OF PRESENTERS WERE
AWESOME!
IT WAS AN AWESOME EXPERIENCE, A GREAT WAY
TO NETWORK AND MEET LIKE-MINDED PEOPLE!
I WAS SO INSPIRED AND
WOULD DEFINITELY RECOMMEND TO ANYONE
AFFILIATED IN ANY FORM OR FASHION WITH
SEARCH AND RESCUE.
~ GREGG PRATT
RETIRED FBI

THE HAWAII SAR CON IS VERY BENEFICIAL
TO THE GROWING OPERATIONS IN HAWAII. AS A
LAW ENFORCEMENT OFFICER, HAVING A VARIETY OF
DIFFERENT FOLKS AT THE EVENT WAS GREAT. NOT
ONLY LAW ENFORCEMENT BUT ALSO FIRE
DEPARTMENT, COAST GUARD AND CIVILIANS WHO
WORK IN SAR. I THINK THE MANY DIFFERENT
ANGLES THEY ALL COME FROM AND PERSPECTIVES
GREATLY HELPS HAWAII GROW TO A PLACE IT NEEDS
TO BE.
~ SGT EDWARD STANKOS
SPECIAL OPERATIONS SUPERVISOR
STATE OF HAWAII'S SHERIFF'S DEPARTMENT

THE KNOWLEDGE AND
INFORMATION TAUGHT
FROM THE EXPERTS OF
THEIR RESPECTIVE FIELDS
WAS INVALUABLE.
THE NETWORKING AND
COMMUNICATION WITH
THE DIFFERENT SAR
AGENCIES IN THE STATE
WAS ENCOURAGING,
INSPIRING AND HELPFUL
TO SERVING THE
COMMUNITY BETTER.
~ JOSHUA DUKES
MAUI
FIRE DEPARTMENT

THE HAWAII SAR CON IS
GROUNDBREAKING BRINGING ALL
THE DIFFERENT COUNTY
AGENCIES AND SAR TEAMS
TOGETHER.
~ SHAY COOK
K9-CARDA, ALTO, TSAR, YODOGS,
FEMA OAKLAND TF44

THE ENERGY AND
ENTHUSIASM FROM THE
ORGANIZERS, PRESENTERS AND
ATTENDEES WAS EXCELLENT.
IT WAS A GREAT NETWORKING
OPPORTUNITY. THE HAWAII SAR
CON IS A GREAT START TO
BRINGING THE VOLUNTEERS AND
AGENCIES TOGETHER.
~ JEREMIAH HULL
HAWAII
POLICE DEPARTMENT

I THOUGHT HAWAII SAR
CON WAS GREAT TO HAVE ALL OF THE
WONDERFUL NETWORKING
OPPORTUNITIES WITH ALL THE OTHER
ORGANIZATIONS ON THE ISLAND AND
FROM THE MAINLAND THAT
ATTENDED.
~ ETHAN PEARSON POMERANT'S
PRESIDENT
OAHU SEARCH AND RESCUE

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WIGGYS SUPER LIGHT

Sleeping Bag

by Ade Scott



This bag is not reviewed as a mountaineering or hiking expeditions bag where miniaturisation and weightlessness are paramount despite the comparisons we might make, but as a first responder bag whether that be land SAR teams (mountain, cave or lowland), USAR/Disaster response (which is a little outside of the scope of this particular magazine), coastguard or military. I have to confess that only one of our UK team was familiar with Wiggys and the rest of us assumed it was a camping/hiking brand so we were hesitant to review them until one or two of our US and even an Australian colleague who knew the brand assured us that they were most definitely worth a review. The Wiggys name is familiar to some in rescue because they make a hypothermia (casualty packaging) bag and we included details of this in EMAG#48. A common theme seemed to be... excellent bags but pretty big and heavy. We'll see.

The first thing that struck us on receipt of the bag was the appearance of quality – if fur coats were still legal this would be a full-length ermine coat rather than a delicate mink stole. The second thing to strike us was how noticeably robust this thing looks and feels and indeed, is, especially for a 0°F/-20°C bag. From it's chunky #10 YKK zip to its seamless polyester cover, it just looks and feels rugged. The third thing to strike us was the name.... *Super Light*... really? Its all relative I suppose but at over 2kg/4.5lb I'm going to go with this one being mid-weight at best. My 35 year-old 3 season/zero degrees Jack Wolfskin weighs a kilo/2lb. That's light and if you buy a modern down or

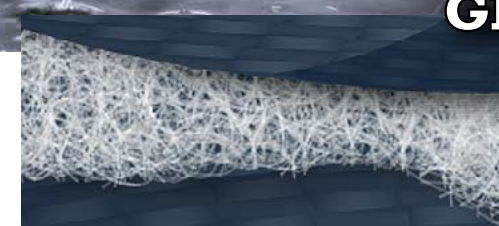
synthetic you are looking at even less at sub 500g/1lb, so this would be a better definition of 'Super Light' but to achieve true light weight you need lightweight fabrics, lightweight filling and lightweight zips – perhaps *Tough-Mid-Weight* would have been a better name. But as I mentioned, it's all relative and if you look at Wiggys' range they have an *Antarctic* bag rated down to a whopping -60 to -80°F/-51 to -62°C that weighs about 6lb/2.7kg. The next bag down is their *Ultima Thule* rated down to -60°F weighing 5lb so the *Super Light*'s 4lb is appropriately named within the Wiggys range. As we'll see, weight and miniaturisation is the domain of high altitude mountaineers and long-range expeditions on-foot, not so much of an issue for some emergency services able to access in a vehicle or the US NPS' venerable mules or the other type of Mule (4x4 ATV). But right off the bat, rescuers wouldn't want to walk in any distance with a bag this bulky while the base military market probably doesn't care so much. However, the military mainstay for these bags tells you that it is a bombproof all-rounder.

After 40+ years of mountaineering and rescue and sleeping rough (not as a homeless person I hasten to add) and having once owned a couple of mountaineering shops I considered myself pretty well up on sleeping bags. These days, not so much because we've tended to concentrate on shiny metal, hard plastic stuff and things with batteries. We all use them of course but I don't take so much notice of construction and new developments as long as they're doing their job of keeping me warm. And actually, many don't (that's what happens when you start getting old!) As it turns out, not much has changed. There are new 'fabrics' brought out every season to big fanfare and some technical sounding name with some numbers or an X in it but until we unlock some alien technology they all seem to be failing to reinvent the wheel from 30 or so years ago. Back then, our bags of choice were from the likes of *Berghaus*, *Rab*, *C.A.M.P.*, *SnugFit*, *Mountain Equipment* and the *North Face*

before they turned into a fashion brand. All were from the mountaineering sector and most used duck or goose down depending on price and were also big into insulated mountain jackets which is basically a sleeping bag with arms. These days the mountain sector still seems to be dominated by *Rab*, *North Face* and *Mountain Equipment* along with *Patagonia* and *SnugFit* which shows fantastic longevity while others are brands we're less familiar with including *Western Mountaineering*, *Agnes*, *Sea-to-Summit*, *Nemo* and *Wiggys*. So we don't see Wiggys in mountaineering terms. That's going to be the big difference here, the Wiggys bags are not lightweight mountain bags, they're not going to be used for alpine-style ascents in the Himalayas or a walk to the Poles. They are instead, in it for the long haul and are going to appeal more to the various services in need of rugged reliability in all situations where you cannot afford to have a torn, non-functioning bag. A no-nonsense bag if ever there was one – of course, the same is absolutely true of high altitude mountaineers who could die if their bag were to fail them but lightweight is the name of the game and they'd need another Sherpa to carry a bag of this type. A good example of where this bag, in fact this entire range of bags would excel is in the USAR/disaster response to the Turkish earthquake where overseas teams needed to be self sufficient in terms of tents and bags in a sub-zero environment and a whole world of concrete, glass and metal that conspires to tear your bag. That is not an environment where you want to be concerned about keeping your silky, light taffeta-like outer from tearing every time you roll over. Not that teams aren't prepared with decent shelter and ground mats. etc but you never know. It's a bit like the old adage about never getting into a boat unless you're prepared to swim back, never go to a disaster zone unless you're prepared to sleep rough – except, sleeping outside in one of these Wiggys bags is not exactly sleeping rough. Before we get onto performance we'll look how it's put together.

CONSTRUCTION

In some ways, these bags are like their owner/inventor Jerry Wigatow: big, brash, American and, as his competitors would probably say, highly opinionated. Jerry is a man who doesn't mince his words about competitors' products and we often see this in the rescue sector with the mad-professor/inventor-retailers always railing against everyone else because there's was, is and always will be the best. Until it's not, then it's time to shut up. Usually such claims are overtaken by technological advances so we don't have to take them out the back and shoot them, they see the evidence for themselves and when it eventually sinks in they're not so vocal. In Jerry's case however he might still have a point and some time yet to run with this. We really don't see any revolutionary developments that make modern sleeping bags any better than their counterparts from the last century other than some thermal efficiency improvements per size of bag but even that is debatable when durability and a cost-benefit analysis is taken into account. These Wiggys' bags are unquestionably old-school but, like white t-shirts and denim jeans they're as fashionable and/or functional now as they were when first introduced and unlikely to be superseded anytime soon unless we can



get access to that alien technology I mentioned.

Wiggys bags use *Climashield* (pic left) manufactured by *Harvest*

Consumer Insulation, LLC. in Tennessee and they pretty much have just the one product so you can't say that they ever take their eye of the ball, distracted by other products in their range. *Climashield* is a chaotic nest or web made from what is effectively a single polyester fibre, albeit several miles long. I'm not sure that I could tell the difference between this and the original Polarguard (or was it Hollowfibre) materials? They produce it as huge flat sheets of material several mm thick. Inside it's a random honeycomb of holes and strong polyester pillars and frames that means it traps air well and acts like a spring when compressed, a spring without a memory, which is very important when your sleeping bag needs to be squashed into a compression bag for transport/storage. Wiggys' takes this *Climashield* as a single sheet, siliconises the fibres to make it hydrophobic and hot glues it to a 30D liner to produce the finished 'Lamilite' fabric – presumably a play on 'Laminate' because it adds a sandwiched 70 denier woven nylon layer which is also siliconised on the inside for water repellency. That's something you notice about these bags – no visible stitching. Down bags in particular need to be stitched or baffled to stop the insulation migrating and this necessarily means that there are numerous lines of compression that cannot possibly have the same degree of insulation as the fattest, mid-baffle bulge. Products like sleeping bags (and indeed jackets) with what is effectively no-stitch construction, remain thermally efficient and have less water ingress weak-points – that's not a subjective comment on brands of sleeping bags or jackets, it's simple physics. It is of course, overcome in quality products by offsetting the baffles, clearly, stitching that ran directly from the front to the back wouldn't be a great idea.

The *Super Light* bag is therefore, quite literally a bag rather than a series of stitched together panels. It has a single sheet outer encompassing a Lamilite insulation sheet which starts at the zip-line, has a line of stitching at the side which has a small fold presumably to negate a cold-spot and then continues unimpeded to the other side of the zip. The inner lining is similarly a one-piece bag of material with a slit where the zip is inserted. As you would expect, the zip has a full length baffle to protect against the intrusion of cold air through the zip, this is 4 inches/10cm wide, an inch and a half (3.8cm) deep in it's 'flattened' state but these proportions transform for most of its length as a more rounded shape.

One thing that does surprise us is the lack of a neck baffle. They don't appear to be used in any of Wiggys' range. Usually, bags rated this low would extend that zip baffle around the 'neck' to stop a draft entering the face opening. We're not wholly convinced but from a purely personal, subjective point of view, it turned out that the thickness and 'malleable' nature of the lining meant that when the collar section was cinched up with

GEAR REVIEW

the integral cord and toggle there wasn't much draft getting in. Our comparison table opposite is simply to give an idea of where these *Wiggys* bags sit in relation to some leading models but one thing we haven't listed here is comparisons at the extreme end with the -60 *Wiggys Antarctic* bag going up against something like the -60 *Snowy Owl* by *Feathered Friends* which is a similar family run outfit to *Wiggys* but on the opposite coast and using goose down.

ZIPS

Our particular bag does not have the 'breakaway' zip that *Wiggys* used to put on their bags. This feature allowed you to run the zipper right up to the top as usual but there was an over-run of a couple of teeth on one side that means you can give the zipper a small tug and it will detach from the shorter side with the result that the zip uncouples down its entire length as you pull it apart (it doesn't simply fall apart because the teeth are so chunky). You might think, well that's not useful, my broken zipper does that all the time. Yeah, that's the problem, cheap-ass flimsy zips are the bane of our lives and breaking through the zipped length having rolled over in the night generally means its a terminal problem. With the break-away zip, not only is the sheer quality and chunkiness unlikely to jump teeth, if it does, you just run the zipper up to the top, unzip all the way down and reattach the zip at the bottom. However, while some of you long-time *Wiggys* bag users will have this feature, ours does not. It does however, still offer being zipped open from the bottom and/or top although to be fair to other sleeping bags, most will do this to allow you to vent the feet. What they might not do so well is withstand a ton of abuse because they're not as robust as this big, confidence inspiring #10 YKK zip. One our tests was to try to break out of the bag from the inside to perhaps mimic a larger body adopting the foetal position with knees out. OK, it was only an idea to test the strength of the zip not a recommendation of how to use a sleeping bag. Anyway, our supermarket summer-weight special separated straight away, our traditional mid-quality 2-season bag took a bit more force before bursting in the middle of the zip and our *Wiggys* never budged. If we had more money we would have tried the same thing with our 4 season LaFuma but, not only are we cheap, we need that bag for the outdoor cold/wet comparisons.



IN ACTION

These bags have a lifetime warranty for clumping and cold spots but I'm not sure that this would be a no-questions asked warranty – I suspect if you come up against Jerry, he'll be grilling you on how you dared to say that his product was under par in any way. For most of the Summer and Autumn this bag had been so warm it was generally better to sleep on top than in it – that's why you can never really get a one-bag fits all. Summer weight bags are always lighter and thinner and winter bags are always larger and puffier. That's why Wiggy's best option is their dual bag system where a summer-weight bag attaches inside a heavier weight bag to cover all seasons. Our bag was rarely compressed into its elongated bag (there is a regular, more rounded sack available) it takes a few minutes and results in huge sausage about 2ft long, shown in the table opposite, and stows on the rucksack a bit like a roll mat. We found, that because it was always laying around, readily to hand, it was always being used – had it been put in a cupboard in its compressed state it would only have been used during scheduled review sessions, this way it has been dragged and thrown from pillar to post most days, often complained about for being in the way and then gratefully received to add comfort to colder nights outdoors, in the vehicles or even indoors when household heating bills suddenly sky-rocketed and we were all scared into thinking that leaving the alarm clock switched on would bankrupt us. This continued all through winter in lower temperatures but still no complaints because it had been a fairly mild winter apart from a couple of spells further north at around -12C. This didn't tax its abilities or give us anything negative to report other than its sheer bulk. Camping out in cold but dry conditions certainly didn't highlight any cold spots but we do take issue with *Wiggys* contention that a neck baffle is unnecessary – it hadn't been necessary purely because the *Super Light* generally kept us so warm that some colder air in from the top was welcome air-conditioning. Would that be the case in really low temperatures? We previously mentioned that when you draw-cord the shoulder/neck in, the bag's generous dimensions and 'laminated' inner,

more or less follows the contours of your body to become its own neck baffle but how about when its cold and windy? Finally some inclement weather worth testing the bag in – storm front with heavy rain and high winds was about to sweep in and butt up against a cold front straight from the Arctic turning all that rain into freezing sleet and then snow and we were going to be at ground zero of that little weather drama so it was time to don just a pair of underpants and a t-shirt, put down a very thin 3mm ground barrier and sleep out under the stars.... or, in this case, pouring rain, then freezing rain, then heavy snow and not that lovely dry, powdery snow of high altitudes and high Arctic regions but some bone-chilling wet, cold and heavy snow with 'flakes' so large and moist you could hear them hitting the bag as if they were fat-rain drops. Which is exactly what they had been for the previous 3 hours before it transitioned into snow. Good choice number 1 was getting an XL bag that allowed the hood to be folded just under the bag opening like an envelope so that rain ran over and off rather than inside or in your face if sleeping in the classic face-just-poking-out position. It's a mummy bag which some will say can be restrictive but this one has a generous circle of material at the feet, like the bottom of a bottle, and there are no concerns of restriction, even our size 13/14 footed guinea pig using the bag in the Autumn remained eminently comfortable. Now, in conditions that would be entirely unfair for most bags, the extra air space around the feet remained warm even with no socks on. The temperature didn't get below -3°C/26°F but with a stiff wind and heavy rain and then sleet driving into our completely exposed position the open air was absolutely bitter. I began to get complacent about not using my Thermarest and settling for just the hard-floor barrier because I was really snug and warm and with my trusty ear-buds blasting out soothing tunes from my temperature and weather monitoring smart-phone and helping blot out the noise of rain I was asleep for the last hour of a three hour rain extravaganza. I awoke to a wider opening at the head and a helluva draught that I quickly closed as much as possible before realising that I could feel wet around my knee and feet. The zip had migrated to meet the ground and was seeping some freezing water. A quick readjustment of the thick zip baffle soon cushioned my foot and knee and with snow now falling 'thickly' I got back to some sleep. Sometime in

Brand	WIGGYS	RAB	EXPED	NORTH FACE
Model	Super Light	Ascent 1100	Waterbloc Pro	Cat's Meow (L)
Insulation	Polyester/ Nylon sheet	Duck Down	Goose Down	Recycled Synthetic
Outer Fabric	70D Nylon	30D Pertex	20D Ripstop Nylon	20D Nylon
Inner Fabric	70D Nylon	20D Nylon	15D Ripstop Nylon	20D Nylon
Max Weight	1.8kg/4.5lb	1.8kg/4.5lb	1.34kg/2.9lb	1.4kg/
Max Length	230cm/90"	230cm/ 90"	230cm/90"	200cm/90"
Max Girth	173cm/68"	160cm/63"	159cm/63"	163cm/64"
Pack Size	66 x 24cm 26 x 9"	45 x 26cm 17.7 x 10.2"	27x17cm 10.6 x 6.7"	51 x 28cm 20 x 11"
Water Resist	✓ ✓ ✓	✓	✓ ✓	✓
Zip	Chunky#10YKK	mid-YKK	fine-YKK	mid-YKK
TEMP C F	-20° 0°	-25° -13°	-13° 9°	-7° 20°
COST	£300/\$300/€320	£330/\$410/€420	£790/\$980/€860	£180/\$190/€200

GEAR REVIEW

the night the snow turned back to sleet before again turning back to snow and blanketing everything in a heavy, wet layer of white. Meanwhile, back in the bag, all was still amazingly warm and dry. Or was it? It was warm but there was now definite water ingress part way down the bag and in the foot – the end of the bag, where the zip is sewn in, was sat in a pool of water – we're pretty sure even *Wiggys* don't claim this bag can be used under water, perhaps we should have gone with the deeper *ThermaRest*! It was definitely better not to move once a good, draught free position had been achieved. I made the mistake of trying to look out once and all hell was let loose as freezing water flooded inside from the top of the bag. Some reviewers had said that you dry off inside the bag as it wicks moisture out through the inner lining. Not, I suspect, when you're in your pants and a wet cotton t-shirt and a cold wind forcing its way in through the top. You would normally stay clothed under these conditions and use spare clothing to

baffle drafts and stave off any water ingress (not that you should get much more than condensation when you're in a tent or bivvy). Even so, this was uncomfortable and far from cosy for the last few hours but survivable, more clothes and we may even have got back to 'cosy'.

CONCLUSIONS

Value for money is subjective but if the definition is that you get quite a lot for your money and it performs more or less as described then the *Super Light* is indeed, a great bag for the money. This robust but bulky bag can be stuffed into a long compression sack like ours or a more conventional basketball shape but it does loft back up remarkably quickly and anecdotally, will regain most of its loft even if stowed for years. Bear in mind that ours is longer and wider than most as a 2XL. Ours was used so much it never had time to rest in a compressed state for long! This bag is not quite watertight, (highly water resistant would be a better description) and is not meant to be a stand-alone bivvy so after 3 hours of heavy rain followed by more hours of slushy snow I reckon this bag has passed a rigorous test with flying colours. Did I mention it comes with a pillow? Nice touch but don't try and stuff that into your compression bag as well- it doesn't squash much..... Dear *Super Light*... you're not even close to being light let alone 'super light' and you take ages to stuff into that compression sack but you cope well with being chucked into the washing machine and dried and you are reassuringly robust, with a zip that never dies and waterproof to such an impressive degree that you're a bag I definitely want in a crisis.

4D POLE



NFC READY



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Dual Standard both EN1077/ASTMF2040 & EN12492
+ Ski-Patrol meeting or equivalent to EN1077/ASTMF2040
+ Ski-Touring as determined by the manufacturer but meeting only EN12492

TITLE SHOT & Right: Team Wendy is well known in rescue with one of the best all-around models available but it's Exfil SAR is only peripherally used for ski-mountaineering. Instead it's the ski-dedicated M216 Backcountry that leads the way for ski Patrolters.
 Pic Opposite Top-Right: Typical of any number of Ski-only models used by Ski-Patrol rather than Mountain Rescue is this Grid Spherical by Giro. This version has been updated and all-red is not in the new colour-range but it's unlikely that it was ever designed for rescuers, they simply chose it as a good off-the-shelf design. Interestingly, Giro offer an 'Asian' fit for some of their models implying a need for smaller proportions.



This GUIDE caters to two different rescue disciplines with differing needs but operating in similar environments, mountain rescue and ski-patrol. The first requires climbing certification and lighter weight models for any vertical elements of their rescue but also skiing as a means of getting to and from an incident. This can involve cross-country and 'low-speed' skiing but it's a fine line between higher speeds on a steeper slope and high-speed downhill skiing. Ski Patrol tend to be resort-based catering mostly to injuries to skiers and slope-users engaged in exactly this kind of higher speed downhill skiing. However, access is a lot different with ski-lifts and buses to get you back to the top so more emphasis on warmth and protection in a pure ski helmet than in keeping things light and well ventilated which means they can be too hot and heavy for climbing. Ski helmets are also a little different in terms of risk, because they are catering more to the wearer impacting an obstacle at high-speed than to having a rock drop on them so perhaps closer to cycling/motorcycling/snow-mobiling than climbing. Nevertheless mountaineering will be a requirement for many teams in addition to the ski-capability so we have included most of the key dual standard helmets (dual meaning climbing and skiing standards) but they seem to come and go fairly quickly indicating a high degree of 'fashion' in the ski industry?

IT'S ALL ABOUT THE STANDARDS

This GUIDE covers helmets that meet the dual standards of EN12492 for climbing plus EN1077 or ASTM F2040/CSA Z263.1 ski-standards. We have also included helmets meeting *only* the ski standards if they are used by or sold to Ski-Patrol or similar rescue agencies – clearly there are any number of other excellent ski helmets from the companies included here and those that are not included like Bolle, Cebe, Oakley, Relax etc. Many ski patrolters can choose their own helmet so you will find far more in the field than we have included here. We have also included a handful of climbing helmets meeting only the climbing standard but are specifically listed by the manufacturer as suitable for **Ski-Touring** or **Ski-Mountaineering**. Some could meet ski-standards for class B were their ventilation holes a bit smaller but they might also face more rigorous impact tests. Such helmets include the Petzl Meteor and Scirocco, Rock Helmets Morpheus and Skyline+, Ski-Trab Attiva and Tendon Orbix all of which are suitable for low-speed ski-touring as a means of transport rather than high speed, downhill skiing. We will discuss the specifics of ski-standards shortly but for detailed discussion of the climbing/mountaineering standards and multi-role rescue helmets please refer to WSAR issue#11 and Technical Rescue#82. There is no specific discussion of peripheral standards here that could be useful to rescuers like ski-mobiling but we have included this in the columns along with cycling (bike in the tables) simply because it sometimes represents a third standard adherence for some helmets. Finally we have included some ski helmets that have 'Rescue' in the name – this not because they are aimed at rescuers but because they have features that make

location and rescue easier. This means that they are also useful helmets for rescue team members but it is admittedly more of an excuse to include helmets with extra safety features which makes life easier for rescuers. More on the various extra safety features (NFID chips, RECCO, enhanced hearing and integral comms) shortly.

There are 4 main standards that cover Ski or more accurately Snow helmets – EN1077 A and B in Europe, ASTM F2040 and SNELL RS-98 in the US and CSA Z263.1 in Canada. Of these we really only need be concerned with EN1077 and ASTM F2040 but SNELL and CSA deserve mention because SNELL in particular is actually a superior standard in terms of its more rigorous requirements – whether you believe that the parameters it tests to are warranted is contentious and the vast majority, if not all in the rescue sector do not have the SNELL RS-98 sticker. CSA is the Canadian standard and more or less follows the European EN1077 testing with two key differences:

- 1) it lacks the penetration test requirements of EN1077 where a 3kg 'projectile' is dropped from either 75cm (for sub class A) or 37.5cm (for sub-class B). SNELL requires an even more rigorous 100cm. Instead CSA simply requires that a 15mm wide piece of wood **not** be able to penetrate through a ventilation hole so they either need to be small enough to stop a stick etc. entering in the first place or have partial occlusion or baffling beneath the shell (such as the inner liner) offsetting the direction of anything likely to impale through a vent hole.
- 2) CSA requires third party testing which neither EN1077 or ASTM F2040 do and is a little unusual in our industry. Self-certification means the manufacturer can simply stamp EN1077 or ASTM F2040 on their product with no guarantee other than their word, that the helmet has actually been tested or that it actually passed those tests. Win for CSA Z263.1 we reckon.

Of the main two standards, EN1077 requires a helmet to impart no more than 250G (Newtons) of force to the head from a 1.5m drop height whereas ASTM (and SNELL) uses a 2m and 1.6m drop height allowing 300G (rather than 200G) but the US standards have a more diverse range of tests and weights on different parts of the shell. ASTM opted not to test for penetration because they couldn't originally find any examples of injury through penetrative trauma! Within EN1077 the A and B sub-classes are basically related to inclusion of fixed ear protection for A and detachable or no protection (but generally greater hearing ability) for B. Class A also requires greater penetration resistance using double the drop height at 75cm/30" (rather than 38cm/15" for class B). EN1077 requires tests to be carried out following temperature exposures to 20C (room temp) and 48 hours at 70C. Additionally ski helmets are not permitted to have a rigid chin-cup that we sometimes



Above: The Salomon Patrol Pro is unique in this selection as a Ski-Helmet designed specifically for rescue as distinct from some which are rescue helmets that are also suitable for skiing having met the required EN1077 standard. The Pro has a full glass-fibre shell using aramid as its immensely tough reinforcement. Most rescuers go for modified ski helmets which are lighter and better ventilated but this model is the workhorse for those that choose to use it.



get on climbing and military helmets. Also distinct from climbing helmets, is a requirement for unimpeded peripheral vision within an angle of 105° each side or when looking up at 25° and down at an angle of 45°.

DESIGN

One of the best known all-rounders in the rescue sector is the *Team Wendy's EXFIL SAR* but while it is used for 'ski-tour' by some, it lacks the ski certification of its compatriot the M216 (pic right) which is used extensively by Ski Patrol. It is the only helmet in our GUIDE to come with a helmet mounted light, a Princeton-Tec LED light (pic above). There are many, many more models that could be used by Ski-Patrol than we have shown but the fact that *Salomon* for instance actually has two models with 'Patrol' in their names made it easier for us to choose. Some of the dual certified helmets more closely resemble ski design like this Austrian *Dynafit* (pic right) and have head band fastening points but unlike generic rescue helmets these aren't generally intended for headlamps, although they will serve this purpose admirably, they are for goggles. Because these fit neatly into the engineered recess in the shell above the eyes that is intended to accommodate the anti-fogging design of modern goggles, they have no need of a front bracket or fastener although side clips would still be useful to stop it riding up when not in use. This can be a downside for rescuers working at night where a headlamp is essential. *Team Wendy* and some other multi-role helmets overcome this by having dedicated front brackets or rails for side-mounting. This also highlights another niche advantage of rail-equipped helmets – the ability to mount night-vision as in the image below.



Cutaway ears typical of climbing-based dual certification models is great for improved hearing but not so good when it comes to the skiing part of your mission when stopping wind-chill factor 'minus a lot' from adversely affecting the viability of your ears and scraping your ears off when sliding down a slope take precedence over hearing. The lightest helmet is *Grivel's Duetto* at only 215g/6.7oz which is also the only soft shell we've seen in any of our helmet GUIDES being entirely composed of expanded Polypropylene (EPP).

SAFETY FEATURES

While ski-patrol and mountain rescue, indeed all rescue agencies, have high visibility clothing many ski-patrollers use black helmets, but

of course – a black helmet on white snow is a high-contrast 'colour' and stands out well on snow fields. There are many red helmets and some orange but you see very few of the high-vis yellow, red and greens we see in pure climbing helmets. Some safety features are probably of more use to those being rescued than the rescuers but are nevertheless useful features that a number of the key manufactures can offer. The *POC Obex* family of helmets for instance includes the *BC MIPS* version above with.....

- **MIPS** we discussed this feature in depth in issue 11. it is another Swedish invention providing anti-rotational 'plates' inside the shell that rotate with the direction of impact thus reducing the load taken by the head. *Atomic* have their own version called *AMID*.
- **NFID Chips** including Medical Assistance. There are now a number of embedded chip apps like Swedish system *twiCeme*® which provide medical and associated data on the wearer when rescuer's use their smart-phone to read the chip (so DO NOT SWAP HELMETS!) There are also SOS systems like *Atomic's CTD* that transmit an alarm when they register a significant impact.
- **RECCO** Reflectors are either add-on or embedded 'transponders' that can be detected by rescue teams with the necessary receiver. Some helmets have incorporated it but you can also buy a strip that can be attached to your helmet, rucksack etc. Not the same as a full avalanche transponder but much cheaper and useful nonetheless.
- **Integral Comms**. The majority of ski helmets have an ear section that insulates from cold but some can integrate a radio system for hands free use.

IN THE FOLLOWING TABLES:.....

Any squares ■■■ with a blue outline other than the COLOURS column refer to a variant model. A black, blue or orange outlined white square □ indicates an OPTION
ORIGIN: The main flag refers to the manufacturer's home country, this may not be where the helmet is made. If we know, we show an inset flag. The figures in this Guide are verified by the manufacturer but you often see different spec on some supplier websites and for rebadged models. No idea why!

COST: Recommended Retail Price. Often sold for less so rough guide only – varies due to exchange rates, taxes etc. and we usually round the price up. In the UK, helmets have no VAT when purchased for personal use.

WEIGHT: for the helmet MINUS any accessories.



STANDARDS:

EN12492/UIAA 106 Climbing/Mountaineering: Impact tests are performed at the front, rear and sides of the helmet as well as two drop tests using a sharply-pointed weight (conical striker) on different points around the shell. Climbing helmets also require ventilation as greater than 4cm² of the shell area. Chin strap retention should be **greater than 50kg** loading for 2 minutes.
EN1077 A & B /ASTMF2040/CSA Z263.1 – Alpine Skiing and Snowboarding: The helmet has to be lightweight and can't significantly impede the user's hearing or field of vision. Drop (impact) tests are conducted at room temperature, in cold temperatures and with artificial UV aging. Class A helmets can't have detachable ear covers since the ears are required to be protected at all times with a greater protective coverage area and higher penetration resistance (ski racing). Class B helmets have more ventilation, less protective coverage and lower impact resistance hence listed for ski-touring rather than speed skiing even though many will be used for both activities.

MATERIALS: PP=Polypropylene (for the outer shell and some components). EPS=Expanded Polystyrene (especially for the shell liner). EPP=Expanded Polypropylene (especially for the crown insert). ABS= Acrylonitrile Butadiene Styrene (thermoplastic polymer) for the outer shell.

USES: as indicated by the manufacturer

CLIMBING: we have not differentiated the various climbing disciplines as we did in the last issues, instead we have one column CLIMBING to indicate adherence to EN12492 with a high-strength chin strap that does not break apart at less than

50kg loading (as distinct from EN397 industrial helmet standard requiring the chin strap to separate at >25kg in the event of being 'hung-up').

SKI TOUR: refers to the suitability of the helmet for cross-country and 'low-angle' skiing normally allied with its ability to be used as a mountaineering helmet. Such helmets are not suitable for skiing at speed eg. steep downhill or race skiing.

SPEED SKIING: all regular ski helmets are designed to protect the wearer in the event of a fall or impact as a result of skiing at speed. Such helmets can also be used for ski-touring (low-speed ski travel) but can be too heavy and/or too hot.

E+HEARING: The ability to hear. Cutaway helmets get a black square ■, occluded, full ear pads get nothing and pads with hearing enhancement like mesh or slots get a black circle ● = OK but never as good for hearing as no obstruction at all.

ADJUST VENTS: All of these helmets have obvious air holes (vents) in the shells shown as a black square ■, some can be adjusted so get an extra orange square and some have only minimal opening especially on dedicated ski helmets required to have smaller holes that do not allow ingress of twigs and debris. **ADJUST VENTS** means that vents can be manually closed to restrict heat loss and water/snow ingress

CLIPS BRACKETS where **BRACKETS** refers to **either an elastic retainer or a solid bracket** at the front/rear of the helmet to attach a headlamp or goggles and **CLIPS** are smaller retainers around the sides for the headband of goggles/headlamp.








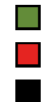



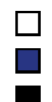



































COLOURS different colour options are shown as the main colour with trim or secondary colours shown in the box outline.

HEX

Durable fully ventilated helmet

Climbing
Via ferrata
Rope parks

www.singingrock.com

images <u>NOT</u> to scale		MODEL Variant NB: 'Rescue' in the product name implies enhanced safety not that it is specifically aimed at rescuers	COMPANY	ORIGIN	approx COST inc Tax	WEIGHT	SIZES	CONSTRUCTION SHELL INNER		STANDARDS			USES				SKI SAFETY				FEATURES				HEAD		CHIN	COLOURS	NOTES	WEBSITE
										SKI EN1077 A/B	SKI ASTM F2040	BIKE/SNOWMOB	EN12492 UIAA *	CLIMBING	SKI-TOUR	SPEED SKI	RESCUE SPECIFIC	MIPS/AMID	RECCO NFID CHIP	DETACHABLE PADS	+ HEARING	INTEGRAL COMMS	VENTS ADJUST	DECALS REFLECT	VISOR GOOGLES	CLIPS BRACKETS	SLIDE COG ADJUST			
		Backland Backland CTD Backland UL Backland ULCTD	ATOMIC		£130-280 \$260-360 €240-332	340-464g 12.4-16.4oz	3 sizes 51-63cm	HYBRID ABS/EPP EPS Nylon																		UL=Ultralight. CTD has SOS shock-sensing transmitter. *2 of the 3 elastic retainers are intended for goggles. CTD models =Wht or Black only	atomic.com			
		Xplorer Xplorer Rescue	CAIRNS		£130 \$160 €140	480g 1.1lb	4 sizes 54-65cm	HYBRID ABS/EPP EPS Nylon																		*Chin strap buckle is cam-lever style. Available as Xplorer without MIPS and safety features for €99	cairn-sport.com			
		Eclipse Rescue	CAIRNS		£120 \$150 €130	490g 1.1lb	3 sizes 54-61cm 21.3-24"	IN-MOLD ABS/EPP EPS Nylon																			cairn-sport.com			
		Centaure Rescue	CAIRNS		£75 \$100 €80	410g 14.5oz	3 sizes 54-61cm 21.3-24"	IN-MOLD ABS/EPP EPS Nylon																			cairn-sport.com			
		Voyager	C.A.M.P.		£120 \$140 €130	465-475g 1lb	2 sizes 54-62cm 21.3-24.44"	HARD SHELL HYBRID ABS/Polycarbonate EPS Nylon																			camp.it			
		Speed Comp	C.A.M.P.		£105 \$120 €120	350g 12.4oz	1 size 54-60cm 21.3-23.6"	IN-MOLD Polycarbonate EPS Nylon																			camp.it			
		GAMS Outdoor	CASCO		£119 \$135 €118	500g 1.1lb	3 sizes 50-63cm 20.7-24.8"	HARD SHELL HYBRID Polycarbonate EPS Nylon/HDPE																		*EN1385 Whitewater EN1078 Cycling Nomex/Winter liner option	casco-shop.eu			
		TLT	DYNAFIT		£140 \$160 €140	380-392g 13.4-13.8oz	2 sizes 54-61cm 21.3-24"	IN-MOLD Polycarbonate/EPS EPS Polyster/Nylon																		* the 'visor' is a removable deflector above the goggles not an optical visor.	dynafit.com			
		DNA	DYNAFIT		£140 \$175 €154	300g 10.6oz	1 size 56-62cm 22-24.4"	IN-MOLD Polycarbonate/EPS EPS Polyster/Nylon																		*Magnetic buckle. NB: We previously listed Dynafit as Swiss but that is another subsidiary of Italian owner Oberalp.	dynafit.com			
		Radical	DYNAFIT		£120 \$140 €130	230g 8.1oz	1 size 56-62cm 22-24.4"	IN-MOLD Polycarbonate/EPS EPS Polyster/Nylon																		*Magnetic buckle.	dynafit.com			
		Range MIPS	GIRO		£270 \$250 €250	538g 1.2lb	3 sizes 52 62.5cm 20.5-24.5"	HARD SHELL HYBRID ABS EPP Nylon																		Multi-directional fit adjustment Front-POV camera mount Fidlock magnetic buckle.	giro.com			
		Duetto	GRIVEL		£130 \$170 €140	215g 7.6oz	1 size 53-60cm 20.9-23.6"	SOFT SHELL EPP none Polyester/Nylon																			grivel.com			

NOTES: N/A = info Not Available/not given

COST: Approx. Inc local tax/VAT

VENTS:  = closeable  = minimal openings

USES:  or  = OK BUT NOT IDEAL  in +HEARING= Improved hearing via mesh/slots but not as good as no ear pads at all.  = OPTION







































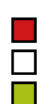



images NOT to scale		MODEL Variant NB: 'Rescue' in the product name implies enhanced safety not that it is specifically aimed at rescuers	COMPANY	ORIGIN	approx COST inc Tax	WEIGHT	SIZES	CONSTRUCTION SHELL INNER		STANDARDS			USES			SKI SAFETY			FEATURES			HEAD		CHIN	COLOURS	NOTES	WEBSITE																																																																																																																																																																																																																																																																																																																																									
										SKI EN1077 A/B	SKI ASTM F2040	BIKE/SNOWMOB	EN12492 UIAA *	CLIMBING	SKI-TOUR	SPEED SKI	RESCUE SPECIFIC	MIPS	RECCO NFID CHIP	DETACHABLE PADS	+ HEARING	INTEGRAL COMMS	VENTS ADJUST	DECALS REFLECT				VISOR GOOGLES	CLIPS BRACKETS	SLIDE COG ADJUST	REPLACE PADDING	PADDED CHIN	CLICK-RELEASE																																																																																																																																																																																																																																																																																																																																			
		Peak Peak twiCEme® Peak LT	JULBO		£175 \$205 €190 £190 \$230 €210	360*-410g 12.7-14.5oz	1-2-4 sizes 52-62cm 20.5-24.4"	IN-MOLD Polycarbonate/EPS EPS																																																																																																																																																																																																																																																																																																																																																												

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


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										SKI EN1077 A/B	SKI ASTM F2040	BIKE/SNOWMOB	EN12492 UIAA *	CLIMBING	SKI-TOUR	SPEED SKI	RESCUE SPECIFIC	MIPS	RECCO NFID CHIP	DETACH/EAR PADS	+ HEARING	INTEGRAL COMMS	VENTS ADJUST	DECALS REFLECT	VISOR GOOGLES	CLIPS BRACKETS	SLIDE COG ADJUST	REPLACE PADDING			
		MTN Lab	SALOMON		£170 \$200 €180	400g 14.1oz	3 sizes 53-62cm 20.9-24.4"	IN-MOLD Polycarbonate EPS																				salomon.com			
		MTN Patrol	SALOMON		£170 \$200 €180	400g 14.1oz	3 sizes 53-62cm 20.9-24.4"	IN-MOLD Polycarbonate EPS																				salomon.com			
		Patrol Pro	SALOMON		£250 \$305 €280	600g 1.3 lb	6 sizes 53-62cm 20.9-24.4"	HARD SHELL Aramid/Glass Fibre EPS																		Snowmobile= CE EN 13781	salomon.com				
		Couloir II Mountain	SCOTT		£170 \$190 €180	350g 12.3oz	3 sizes 51-61cm 20-24"	IN-MOLD Polycarbonate EPS/PC																				scott-sports.com			
		Attiva	SKI TRAB		£122 \$130 €120	210g 7.4oz	2 sizes 52-62cm 20.5-24.4"	IN-MOLD Polycarbonate/EPS EPS																			skitrab.com				
		Aero	SKI TRAB		£145 \$165 €150	290g 10.3oz	2 sizes 52-62cm 20.5-24.4"	IN-MOLD Polycarbonate/EPS EPS																			skitrab.com				
		Summit MIPS	SMITH		£202 \$230 €230	400-448g 14-16oz	4 sizes 51-67cm 20-26.3"	HYBRID ABS Koroyd																		Koroyd 'crumple' zones. Recessed rucksack attachment loops. 'Cog'= BOA system	smithoptics.com				
		Ascender Ascender MIPS	SWEET PROTECTION		£150 \$190 €220 \$220 €160 €200	400g 14.1oz 430g 15.2oz	3 sizes 53-61cm 20.9-24"	IN-MOLD Polycarbonate/ABS EPS																			sweetprotection.com				
		M216 Back Country M216	TEAM WENDY		£245 \$340* €250	580-690g 1.27-1.52lb	3 sizes 53-63cm 20.9-24.8"	HYBRID ABS/PC Co-Polymer EPS																		Back Country has military style rail options and comes with an LED light. *Buckle is a magnetic clip 'cog'=BOA system	teamwendy.com				
		EXFIL SAR Back Country Tactical	TEAM WENDY		£245 \$221* \$341 €250	630g 1.59lb 720g 1.27lb	1 size 53-63cm 20.9-24.8"	HARD SHELL HYBRID Lexan PC Co-polymer EPS																		* Add \$48 for rails. Weight is without rails.'cog'=BOA system *Buckle is a magnetic clip requires \$12 adapter *ACH combat blunt impact. *BS/EN1385 Whitewater	teamwendy.com				
		Orbix	TENDON (LANEX)		£60 \$75 €62	240g 8.5oz	1 size 54-62cm 21.3-24.4"	IN-MOLD Polycarbonate EPS																			mytendon.com				
		P8000 Tower/Tour	UVEX		£145 \$180 €160	360g 12.7oz	1 size 59-65cm 23.2-25.6"	IN-MOLD Polycarbonate/ABS EPS																			uvex-sports.com				

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NEBO LUXSTREM SL100 SERIES

Long-Range torch/flashlight

A One mile Beam.....?

The 1760 yards version shown on the right is the imperial version of our 1600metre model and how many yards are there in a mile? Yep. However, our metric 1600 is 9metres short of a mile so it should more accurately be called the 1609.34 but we won't hold that against them. This is one of four (current) models in the same format – an angle head torch with an inclined handle terminated with a magnetised base which also houses the rechargeable battery pack, lanyard eye and charging point. This base is heavy enough to act as a stand without the leaning head forcing it to keel over. We see a lot of marketing for this that appears to imply that your average camper, walker or beach-goer might want to buy it. They may well do and from Nebo's point of view they'll sell far more to campers, hunters and general outdoors-people than they will to rescuers but maybe they shouldn't. It turns out that these lights do send out a helluva beam and it's a tight, penetrating beam that will happily blind any driver, pilot or ship's captain that is unfortunate enough to be on the receiving end. In reality, this isn't a laser beam so there is no question of damaging anything other than your night vision once you get a few hundred yards away. We were initially only able to positively verify a distance of 1km or 0.6 of a mile because we were using it at sea. It's true that our guinea pig on a headland around 3.2 miles away could see the beam but he could also see the light from my iPhone so that's not saying much. The wizardry is in us, as the shiners of the light, being able to see and identify an object in the beam and in this respect we could certainly see craft and white lobster-pot marker buoys well beyond the channel marker buoy that we knew was 1km away but couldn't say how much further they were. While it's surprisingly difficult to accurately gauge distance out to sea, it was easier to dump our guinea pig at Point A and drive



precisely one mile before then trying to spot him having moved laterally to his drop position and stood still with a pair of sunglasses on to limit the eye damage from the beam, this was before we realised that it wasn't a laser beam. Incidentally, that large

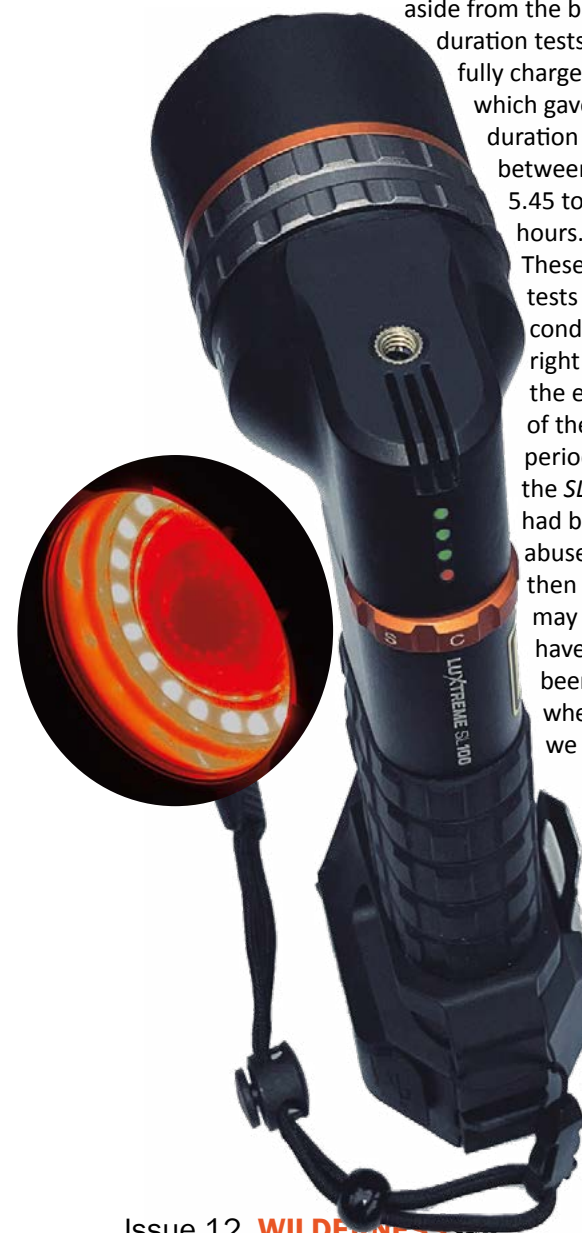
silver cog-style ring on the head/

bezel looks like it should be rotated to do something but the beam cannot be altered in terms of focusing and that double cog doesn't actually do anything but act as a grippy surface by which to hold the SL100 by the head. The body is anodised alloy throughout with a rubber grip surface towards the bottom of the 'handle'.

The 1760/1600 does a bit more than simply shine a helluva bright beam a helluva distance. It also has a broad, short range flood, a combination spot/flood and a red flood; it does not have a strobe, or SOS function. The rubberised and textured

button on the front is pressed once to activate then the copper-coloured cog you see near the top of the handle at the back of the lamp head is rotated one click to 'O' for 'off', a further click to 'F' for flood, the next click to 'S' for Spot and then once more to 'C' for combined Spot & Flood. If you leave the cog on 'S' for spot that glaring beam will come on as soon as you press the button on the front. To get the red flood you keep the front button depressed regardless of which cog setting it is on. The white 'laser' beam is emitted by an 'excited Phosphor Module' or LEP while the flood and red light are provided by white/red COB LEDs. In the red image below you can see how the white/red flood LEDs surround the central laser dome. Over the page are performance figures provided by NEBO and might be surprised to hear that we generally the same if not better duration on all of the three modes – it always seemed to come up about 3% more so we really can't complain about that and recovery between uses seemed be particularly good because every time we went to use it and expected it to be flat, it performed admirably, in fact I don't think we ever ran it down during actual use

aside from the battery duration tests from fully charged which gave a duration of between 5.45 to 6.20 hours. These tests were conducted right at the end of the test period so the SL100 had been abused by then and may not have even been new when we got



it. Apparently a yachting magazine had been reviewing it but it looked pretty new to us – they must have been on one of those billionaire super-yachts that's really clean and sits 15metres up from the actual water.

LIGHT OUTPUT TESTS

Regular readers will know that we have always use Lux at 5m/16.4ft rather than Lumen for comparative purposes and to better highlight just how bright the beam appears. For reference average daylight can range from 10,000 on a dull day to 100,000 for a bright sunny day and full moonlight is around 0.35-0.5 Lux (never seen anything close to the 1 Lux that Wikipedia mentions?). We persevere with this because we have readings back to 1995 so in the interests of continuity here's how the NEBO SL100 1760/1600 fared and how that compares directly to one of our regular but nonetheless high quality torches/flashlights in this case the Unilite PS H10R (now H11R)



Point A and drive

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GEAR REVIEW

which was reviewed in TR#70. The initial reading was a massive 17,000 Lux at 5m stabilising within a minute or so to around 15,000. This compares to our *Unilite* at 370Lux at 5m (it was around 440 Lux when new). A key difference is that the *SL100* decreases by over 50 Lux per minute for the first few minutes whereas the *Unilite* remains fairly constant. The *SL100* is clearly better if used in short bursts and the Spot-Flood combi is surprisingly good with an equally high initial Lux reading around 16000 stabilising at 13000. As a combination it also has the flood element widening the visible light area in the near-distance but the combination setting was unreadable at 1mile. When you consider that this mode has a duration of over 10 hours (ours started flashing at 10h31 and went out at 11h08) which is longer than the spot alone that is a useful light option and after 10 hours we still got 1200 Lux at 5m and could shine a usable beam well over 100metres/109yds. That is excellent. The *Unilite* is a bright light, we use it a lot, together with our trusty *Peli* handhelds and *Petzl* headlamps but you can see that the *SL100* is a whopping 46 times brighter at close range when first switched on. Remember though, that close quarter searching is definitely NOT what that main beam is for unless you're using it as a weapon. Instead the flood mode (white) provides 29 Lux which is closer to the *Unilite*'s third and lowest beam setting at 25 Lux. At 5metres the *SL100* beam is only around 21cm/8" wide while the main part of the *Unilite* beam is well over a metre/3.3ft wide. We then measured the beam intensity of the *SL100* Spot at 40 metres/130feet and got 240 Lux which is as good as many a high quality light at 5m. However, this is with a narrow beam only a couple of feet wide with swift drop-off at the peripheries. The *Unilite* is more typical of a high-end light and came out at around 6 Lux at 40m/131ft but was still 5 Lux across a 3m/9.8ft diameter before dropping off rapidly to 1 Lux at 4m/13ft diameter. (When we first had the *Unilite* it gave 15 Lux at 100ft/33m). The final test for the *SL100* only (because the *Unilite* wasn't registering much beyond 50m) was to use the car to measure as close to a mile as we could get in our area and see what readings we get..... At 1.1miles we got 3.4 Lux which was enough to read a map and the non-backlit LCD light meter we were using. That is a mightily impressive and useful beam on a relatively small handheld.

What does all this mean, well, there is no doubt that this is a specialist light but with excellent duration and a decent close-area flood plus a night-reading red light as well as that spectacular spotlight hand-held searchers have the ability to investigate distant nooks and crannies that the main vehicle or boat-based search light can't reach. While you should not be shining this in someone's face at close quarters you do not have to worry about bringing down a plane as it is simply a 'bright-enough' light at 1 mile not a laser beam.



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FEATURES

Before we leave this one a quick word about the 'ancillaries'. It has a magnetic base which is powerful enough to stay attached to a vertical sheet of steel through some hefty winds – the most we could generate was 51.5 miles-per hour (measured by anemometer) at point blank range and it wasn't budging. It will, however want to swing round with the head facing down indicating the weight distribution. The magnets are two coin-battery looking silver discs in the base which hinges open to allow access to, and replacement of, the rechargeable battery pack. There is a hefty belt clip which is different on our model shown here than the US version shown on the title page. It's an odd design because it doesn't actually spring back to grasp the belt as you might expect. Instead there is a clear

8mm gap which the 'clip' is too stiff to bridge ie. it's rigid and it ain't going anywhere. It also orients on your belt with the light-head facing down and forward. There is a tripod attachment screw-hole on the top of the head. Again a little odd because the light is mounted upside down but in fact, this works OK and you can easily grab the now well-presented handle to move the whole tripod assembly around. Further connection is possible via a sturdy little lanyard which can detach via clip from the tied on portion. The wrist loop is adjustable to lock firmly around your wrist. However, with the *SL100* weighing 668g on our scales or a pound and a half – this could leave a bit of a string burn!

The charging point is a universal C-type USB (which is good) and it's housed behind a rubber cover on a thin rubber connection. On another *NEBO* light we tested we tore that off on day one but this one seems to be more robust though we're still not fans – we've tended to look after this light rather more than we would normally because (unusually) we were giving this light back, so that rubber cover almost certainly wouldn't have withstood a normal level of abuse. It did OK in our drop-from-a -few-feet and drag-for-a-few-feet tests but we didn't submerge it to test that IP67 claim! You can get more 'normal' light intensities within this SL range from a quarter mile costing £5100 to a half and three-quarter mile to this one the SL100.

This is a great pro-quality light, as it should be for £300/\$350. It performs exactly as described and it's a real shame we're handing it back (not that they can sell it after the things we've done to it!).

Ropes That RESCUE

Knowledge is light in the rucksack and not easily left at home



2023 COURSES

See website for Equipment Lists and flyer

WORKSHOP or SEMINAR	STATE COUNTRY DATE & FLYER	TYPE	VENUES Classroom- Wilderness or Industrial	Req. Equip You will NEED	Duration Days	Physical exertion Easy 1 Hard 10	Prerequisites (if any), Program Liaison & Special Notes	Location & Sponsor See website for flyers	Tuition (Other non-RTR costs may apply)	RTR Lead Instructor(s)
Artificial High Directional Workshop	UT April 17-23, 2023	Arizona Vortex	Classroom Industrial & Wilderness	AHDW Equip List 7/22	Monday/Sunday 7 days	6 some hiking	No Prerequisite Prior rope rigging experience strongly recommended.	Utah USA Rock Evadica & South Dade Metro Fire See Utah Program Flyer	\$1,650	Reed Thorne-Steve Crandall
Offset-Highline Rescue Workshop	AZ May 6-12, 2023	General Team Rescue	Classroom Industrial & Wilderness	OHRW Equip list 7/22	Saturday/Friday 7 days	4	No Prerequisite Prior rope rigging experience strongly recommended	Arizona USA Town of Jerome See Jerome Fire INFO Flyer See general OHRW Flyer	\$1,550	Reed Thorne
Tree Rescue Workshop-Firefighter	CA June 10-16, 2023	Bottom Up Tree Rescue	Classroom & Wilderness ONLY	TRW-F Equip List 7/22	Saturday/Friday 7 days	10 tree climbing required	Prerequisite: Climbing Trees This program is specifically designed for responding tree emergency personnel in excellent fitness	California USA Nevada City See TRW-F Program Flyer	\$1,650	Keith Thorne & Reed Thorne
Structural-Tower Rescue Workshop	AZ June 24-30 2023	Bottom Up Tower Rescue	Classroom Industrial ONLY	STRW Equip List 7/22	Saturday/Friday 7 days	6 some climbing	Prerequisite: Climbing Steel Prior rope rigging experience recommended.	Arizona USA Town of Jerome See Jerome Fire INFO Flyer See STRW Program Flyer	\$1,550	Reed Thorne
Rope Access Systems INTENSIVE	AZ July 10-14 2023	Rope Access Systems & Frames	Classroom Industrial & Wilderness	General PPE Harness/ helmet,etc. AZTCK	Monday/Friday 5 days	1	Ideal for Firefighters wanting to learn rescue/vortex systems No Prerequisite Prior rope rigging experience strongly recommended	Arizona USA Town of Jerome See Jerome Fire INFO Flyer See RASI Program Flyer	\$1,250	Reed Thorne & Keith Thorne
Team Skills Rescue Workshop	AZ Aug 20-26 2023	General Team Rescue	Classroom Industrial and/or Wilderness	TSRW Equip list 7/22	Sunday/Saturday 7 days	4	No Prerequisite Prior rope rigging experience strongly recommended.	Arizona USA Town of Jerome See Jerome Fire INFO Flyer	\$1,550	Reed Thorne & Keith Thorne
Mountain Rescue Workshop	NY Sept 18-24, 2023	High Angle Mountain Rescue	Classroom & Wilderness ONLY	MRW Equip list	Monday/Sunday 7 days	7 some hiking	No Prerequisite Liaison: Andrew Bajardi Prior rope rigging experience strongly recommended.	New Paltz, New York Mohonk Preserve "Gunks" See Gunks Program Flyer	\$1,550 (50% off NY volunteer discounting available)	Reed Thorne
Rope Access Skills Workshop	AZ Oct 2-6 2023	Level 1/2/3 Rope Access	Classroom & Industrial ONLY	RASW Equip List 7/22	Monday/Friday 5 days	9	Prerequisites: RASW-1: No prerequisite RASW-2: RASW-1 required RASW-3: RASW-2 required or special permission	Arizona USA Town of Jerome See Jerome Fire INFO Flyer See RASW Program Flyer	\$1,250 Each	Keith Thorne & Reed Thorne
Artificial High Directional Workshop	AU October 21-27, 2023	Arizona VORTEX	Classroom Industrial & Wilderness	AHDW Equip List 7/22	Saturday/Friday 7 days	4	No Prerequisite Prior rope rigging experience strongly recommended.	Adelaide SOUTH AUSTRALIA Hosted by Fire & Rescue Australia Training	Contact HOST	Reed Thorne - Len Batley - Joel Graham
Advanced Skills Rescue Workshop	AU Oct 30-Nov 5, 2023	Advanced Highlines	Classroom & Wilderness	General Equip list	Monday/Sunday 7 days	8	Prerequisite: Must have completed one program: TSRW, OHRW, IRW, AHDW from RTR (PSRW/STRW do not qualify)	Mt. Arapiles VICTORIA, AUSTRALIA Hosted by Fire & Rescue Australia Training	Register with HOST and NOT with RTR	Reed Thorne
Tree Rescue Workshop-Firefighter	CA Nov 14-20, 2023	Bottom Up Tree Rescue	Classroom & Wilderness ONLY	TRW-F Equip List 7/22	Tuesday/Monday 7 days	10 tree climbing required	Prerequisite: Climbing Trees This program is specifically designed for responding tree emergency personnel in excellent fitness	California USA Nevada City See TRW-F Program Flyer	\$1,650	Keith Thorne & Reed Thorne
Tactical Wilderness Rescue Wkshp	AZ Dec 2-8, 2023	REMS-Rapid Deployment Mnt Rescue	Classroom & Wilderness ONLY	Equip List 7/22	Saturday/Friday 7 days	7 rough terrain inherent	No Prerequisite Concentrates on low and steep angle litter evacuations. Ideal for Rapid Extrication Module Support (REMS) Teams. Guest Instructor Dale Stewart, AHS Rescue	Arizona USA Town of Jerome See TWRW Program Flyer	\$1,550	Reed Thorne Guest Inst: Dale Stewart
Personal Skills Rescue Workshop	ON April 10-22, 2024	Solo-Semi Solo Rescue	Classroom Industrial & Wilderness	PSRW Equip List 7/22	Tuesday/Monday 7 days	9 A lot of "on rope" time	No Prerequisite Prior rope rigging experience strongly recommended. You must have a US passport or other to enter Canada for this program	Ontario, CANADA Niagara Falls Fire Dept. See Ontario Program Flyer See general PSRW Flyer	TBA	Reed Thorne
Artificial High Directional Workshop	ON April 24-30, 2024	Arizona VORTEX	Classroom Industrial & Wilderness	AHDW Equip List 7/22	Wed/Tuesday 7 days	4			TBA	Reed Thorne
Advanced Anchoring Analysis & Beyond the Barn Floor Seminars	MD Winter 2024	"Barn Floor" Physics & Adv. Riggging - Trigonometry Adv. Physics	Classroom and field testing - Classroom ONLY	See AAA BTBF flyer	7 days	1 Mental: 6-8 1 Mental: 10	Past RTR Alumni Only You should have a good background in mathematics in order to fully participate in this program	Maryland USA Contact Mike Green for location & logistics See AAA-BTBF Program Flyer	TBA	Mike Green & Reed Thorne

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