# WILDERNESS SAR

MOUNTAIN, CAVE & WATER RESCUE
PARK RANGERS•HELI & DRONE OPS

ISSUE 14
www.rescuemagazines.com

A technical rescue solution including a STRATO VENT HI-VIZ helmet, DUO RL headlamp, FALCON MOUNTAIN harness, MINI TRAXION progress-capture pulley, SPIN L1 pulley, and ROLLER COASTER rope protector. www.petzl.com

# PETZL RESCUE SOLUTIONS

Every second counts in high-stakes situations — that's why technical rescue operations require skilled rescuers and the best equipment. It's also why rescuers train continually, as they're doing here on a via ferrata in Switzerland. They know that they can count on Petzl to provide high-performance tools.

PETZL®

Access the inaccessible®

# WILDERNESS SAR

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***ED:** After a brief pause in production while we continued to work on the* **BUYERSGUIDES** *series,* **WSAR** *is back. Our apologies for the delay but we did, as expected, take on a little too much at the same time with the three magazines and six* **BUYERSGUIDES**. *All three magazines are now 3x times a year instead of 4 and we have almost completed the fourth of six* **BUYERSGUIDES** *so we expect another few months with some delays in production then we'll be on top of everything.*



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*Cover & Images: Via ferrata night rescue training with the Guardia Civil in Spain.*



**Petzl FALCON Harness Series**- ***Precision, Comfort and Mobility***

*The Petzl FALCON harness series (FALCON, FALCON ASCENT, and FALCON MOUNTAIN) prioritise lightweight design, exceptional comfort during suspension, and maximum mobility and are designed to be part of a larger Petzl ecosystem, e.g. with the addition of TOP chest harness and other accessories.*

*They are the preferred choice for rescue professionals and anyone requiring a minimalist yet highly functional sit harness for prolonged periods of work or rescue in suspension.*

*Lightweight Construction: All FALCON harnesses are designed to be as light as possible without compromising strength, comfort or durability. This reduces fatigue during long workdays and improves agility.*

*Semi-Rigid, Slim Design: The waistbelt and leg loops are semi-rigid and slim, offering excellent support and comfort during suspension, while minimizing bulk. This allows for greater freedom of movement, essential for dynamic work positioning.*

*Breathable Padding: The contact areas feature breathable foam padding, ensuring comfort even in warm conditions and during extended periods in suspension.*

# Petzl's
## Professional Rescue Solutions

*Petzl is a world-renowned leader in work-at-height and rescue equipment, recognised for its commitment to safety, innovation, and ergonomic design. Their professional rescue solutions are not merely a collection of individual components but a comprehensive suite of integrated systems developed in collaboration with rescue professionals and designed to maximise efficiency, reliability and safety in demanding vertical environments.*

*The underlying philosophy - that equipment should be intuitive, highly efficient, and adaptable - solidifies Petzl's position as a top choice for technical rescue and wilderness SAR professionals worldwide.*

**Petzl Helmet & Lighting Solutions**

*With features like FLIP&FIT system, CENTERFIT, and replaceable comfort foam Petzl helmets ensure a stable, comfortable fit for a wide range of head sizes and shapes.*

*Petzl's professional headlamp range of PIXA, XENA, SWIFT RL and DUO RL are simple to integrate with either headband straps for easy use on and off a helmet or tool free mounting plates for the slots on VERTEX and STRATO helmets for a streamlined system. New in 2025 was the ARIA range with USB-C charging (pic-left is the 2-R)*




# ON THE COVER

**The Pillar of Control** - *Petzl hardware and ropes*
*Petzl's technical rescue solutions features an advanced range of which provide the crucial control needed for raising, lowering, and managing rescue loads.*

*REEVE Carriage Pulley: This specialized pulley is designed to simplify and streamline the setup of highline rescue systems. Its integrated rigging plate and compact design saves critical time during rigging.*

*MAESTRO: A flagship descender for technical rescue. Its design incorporates an integrated progress-capture pulley, allowing for seamless transition between lowering and hauling, which is critical in rescue scenarios involving two-person loads or complex rigging. The MAESTRO is engineered for heavy loads (up to 280kg, depending on the model and rope compatibility) and is a foundational device for Rope Systems.*

*I'D (S, L, and EVAC pictured here) feature an anti-panic function and an AUTO-LOCK system, simplifying operations and improving control during accompanied descent rescues or standard lowering.*


*JAG Rescue Kit: A key solution for a quick victim pick-off, this ready-to-use kit is built around the JAG system, a haul kit with a 4:1 mechanical advantage that allows rescuers to quickly release a suspended victim and initiate lowering*

*EXO AP HOOK: A personal escape system designed primarily for high-rise fire and urban environments. It allows an individual to quickly anchor and perform a self-evacuation.*

*BEAM 11mm Rope is designed for rescue professionals. Its diameter provides a solid grip and great strength. The specific rope construction limits compression and low elongation provides superior efficiency and comfort when handling heavy loads*

## Team Wendy®

# EXFIL® Maritime Rescuer

### for everything from swiftwater and boat crew to SCUBA

[ED: *Team Wendy have been busy in the last year or so expanding their range of rescue helmets to include this water rescue version and others including a SAR helmet with military style rails etc. for use of night vision and other handy military aids without the cost and weight of ballistic protection. See Charlotte's article on page 16 to see the SAR applicable range and our BUYERS GUIDES to see Team Wendy's full climbing, SAR and Water rescue options}*

Purpose-built for water rescue operations and commonly worn by AST rescue swimmers, the EXFIL® Maritime Rescuer helmet delivers uncompromising performance in wet environments. Its advanced liner system features water-resistant, quick-drying materials and sealed Zorbium® pads to reduce weight and absorb blunt impacts—backed by years of TBI prevention research. A sport-style chin strap ensures a low-profile, secure fit that won't interfere with SCBA use, while mission-ready features keep rescuers safe, seen, and fully equipped for marine response.

Also available: EXFIL® Rescuer with EXFIL® Air Fit™ Liner System with Zorbium® foam technology. Equipped with the Exfil Maritime Liner System featuring water-resistant, quick-drying materials and sealed Zorbium® pads for lightweight comfort in wet conditions, all while delivering advanced impact protection backed by years of TBI prevention research.

- Machined aluminum shroud designed to handle helmet lights for hands-free lighting, night vision and thermal imaging products
- Lightweight, impact-modified polycarbonate shell with signature EXFIL® geometry, delivering a secure, comfortable fit
- Velcro pattern designed for top led lights or IR strobes, attachments and patches.
- CAM FIT™ retention system handmade in Cleveland, Ohio featuring our signature BOA® fit integration with micro-adjustable dial
- Sport-style chin strap offers a sleek, low-profile fit that won't interfere with SCBA use.
- Available in red and yellow, these helmets ensure rescuers remain easily identifiable in marine environments supporting safety, coordination, and response time on the water.
- Rails compatible with all Exfil accessories including face shields, visors, Peltor™ adapters and more

**www.teamwendy.com**


## OMEGA PACIFIC's light & versatile ONYX Pulley carabiner

[*ED: Although this can be used in all areas of rope-work, its limitations are such that it's ideally suited to non-deviation applications in water rescue. Rapid clipping to a throwline to create an inline MA system makes hauling a casualty,/swimmer/boat a lot easier*]

**The *ONYX* from *OMEGA PACIFIC* is a newly designed carabiner with an integrated pulley, featuring a true HMS style frame that allows for faster and easier connection of the carabiner to a wide variety of objects, as well as a widened sheave that helps ensure the rope stays in place. The Onyx is not designed to replace a pulley in every rigging application.**

**ACCEPTABLE USES: The Onyx should ONLY be used in the following configurations**

- **Redirection Pulley in Rapid Ascent and Descent (RAD) configurations.**
- **Traveling Pulley for Mechanical Advantage Systems to be used towards the load, ahead of a suitable progress capture device for the raising system.**
- **Change of direction behind the system's main progress capture**

**UNACCEPTABLE USES: This is NOT an exhaustive list**

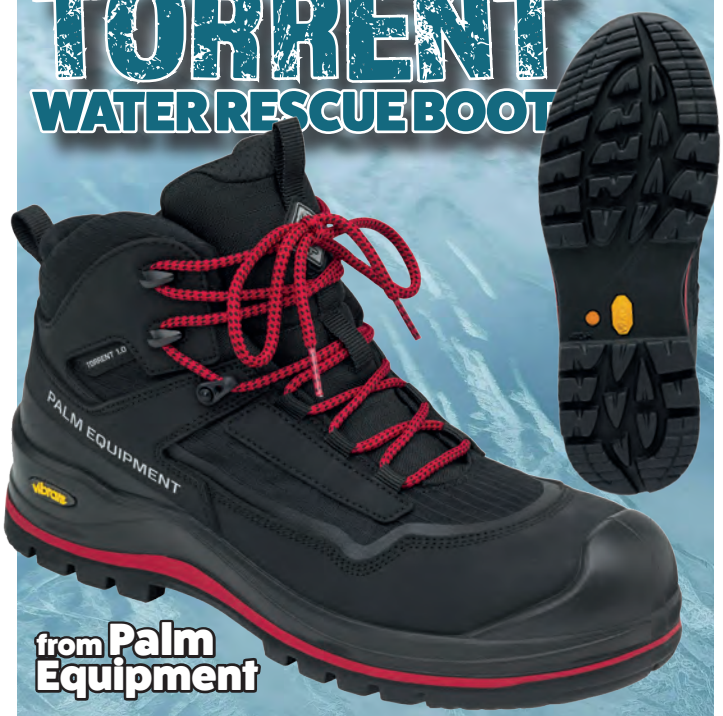
- **Used as an Elevated Change of Direction**
- **Highline/skate block applications**
- **As a connector for a climbing system**
- **Terminating a rope onto the bottom of the frame**
- **All uses not strictly outlined in the acceptable uses section**

**Weight: 4.9 oz**
**Rope Size: 7 – 13 mm**
**WLL: 4 kN**
**Major Axis Strength: 20 kN**
**Minor Axis Strength: 8 kN**
**Open Gate Strength: 7 kN**
**COST: $32/£25/€28**
**www.rocknrescue.com**

*NB:Products are included in 'PRODUCS' is for readers' interest and does not imply endorsement by WSAR magazine except where stated in an EDitor's note. Prices in £$€ are a currency conversion only.*

NEW

# TORRENT WATER RESCUE BOOT




from Palm Equipment

Uncompromising rescue boots engineered to meet the toughest demands and certified to EN ISO 20345:2022+A1:2024. Its *Vibram Groundwork* sole, direct-attached for maximum durability, delivers superior grip, stability, and resistance to heat, hydrocarbons, and corrosive substances. A fibreglass toe-cap and puncture-resistant midsole provide full protective assurance without excess weight. Designed for use with drysuits, the gusseted tongue and reinforced pull tabs ensure quick donning and debris protection, while the ripstop nylon upper with protective rand withstands years of punishing environments. Built for resilience, safety, and performance, the Torrent sets a new benchmark in rescue footwear.

- S1 PS FO HRO HI SR SC – footwear safety level
- ISO accredited protective rescue boots – EN ISO 20345:2022+A1:2024
- Lightweight fibreglass toe-cap
- Impact and puncture proof midsole
- *Vibram Groundwork* direct attach sole for grip, rigidity and durability
- Acid, alkali, hydrocarbon and heat resistant sole (HRO HIFOSC certified)
- Rip-stop mesh upper
- Rand and anti-scuff toe
- Bellows gusset tongue for easy donning with drysuit socks and debris protection
- Criss-cross and speed hook lacing for fast, secure fit
- Reflective logo for enhanced visibility
- Sizes UK 6-13, US 7-14, EU 39-48
- Weight:1.5kg/3.4lb pair sz9
- Cost: £165/$186/€199

web: palmequipment.pro

# Side Scan Sonar

**The ideal tool to locate drowning victims and missing evidence**

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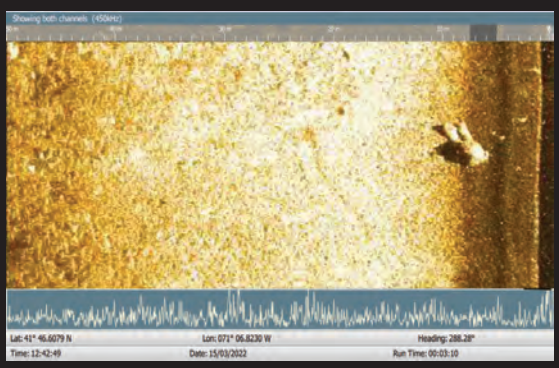
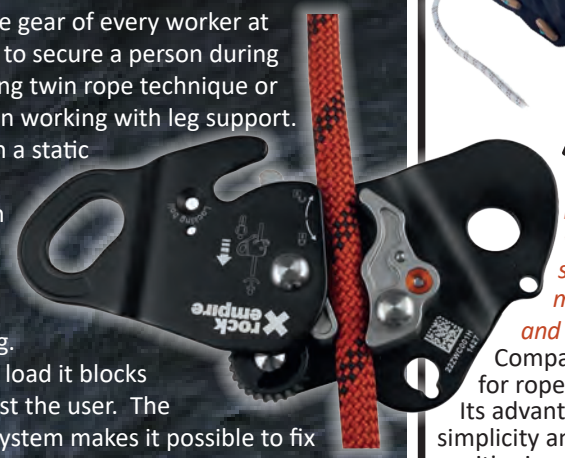


# ROCK EMPIRE MOBILE FALL ARRESTER


*[ED: Two from Czechia (Czech Republic) this issue, one new, the Jack fom Singing Rock and this one which has been out for around 3 years now so has bedded in nicely, functioning exactly as it should. We tend to wait for a track record on technical devices likely to take significant load because there have been so many recalls in the past decade from just about every top rescue manufacturer, not just the smaller outfits!]*

The CATCH mobile fall arrest device is an indispensable part of the gear of every worker at heights. The tool serves to secure a person during a rope ascent, when using twin rope technique or to secure someone when working with leg support. Appropriate for use with a static rope with a diameter of 10.5–11 mm. The design of the fall arrest device allows free movement along the rope while ascending or descending. During a sudden impact load it blocks immediately, safely arrest the user. The integrated adjustment system makes it possible to fix the arrester in the required position. The internal steel braking mechanism ensures state-of-the-art effectiveness, high durability of key components and therefore a very long product lifetime.




- Easy movement along the rope.
- Simple and safe installation.
- Steel braking mechanism for a higher device lifetime.
- Integrated position adjustment (ascending, positioning).
- Each Catch device has its own identification number in the production order. Perfect for record-keeping and monitoring of metal products during maintenance check-ups.
- Designed in EU.

Materials: Aluminium, Stainless steel

Norm: EN 12841:06/A rope: 10,5-11mm, max. 100 kg
EN 353-2:02 for use as a fall arrester

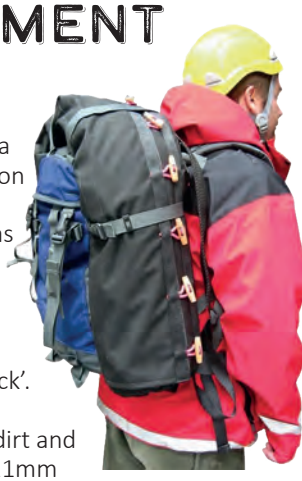
Weight: 234g / 8.25oz

Cost: **£114** / **$150** / €130

**www.rockempire.com**


# LYON EQUIPMENT RAPID-DEPLOYMENT ROPE WRAP

This 'tube' shaped wrap bag is made of Cordura can be moulded over the top of a rucksack and fastened on with existing accessory straps to keep the load as close to the back and as central as possible.



If carried on its own, integral padded shoulder straps and linking buckle transform the tube into a 'rucksack'. Taken off the back, the wrap bag can be opened fully to act as a rope mat to keep dirt and vegetation at bay. Takes 100m of 11mm rope. Cost £207 ($260/€245 currency conversion only)

**www.lyonequipment.com**

# SINGING ROCK NEW 'JACK' AUTO DESCENDER

*[ED: We don't see many new descenders in rescue (in stark contrast to Arb-work where we have seen 4 in the last year!] so this won't be the last time we mention the Jack in our magazines and expect a review in 2026.]*


Compact descender designed mainly for rope access and rescue operations. Its advantages are durability, maximum simplicity and intuitive operation for positioning, ascending and descending, lowering and belaying. The swivel-plate opens via the yellow button and the locking mechanism can be deactivated by pressing the cam (arrowed) so the rope can be pulled through without using the lever-handle allowing easier belaying of a lead climber or rescuer needing edge restraint, also easier for short rope ascents. The handle and locking mechanisms can be disassemble for cleaning if required. The Jack stays connected to the harness/anchor for rope insertion and no additional friction is required up to 200kg load. Contact components are stainless steel. The device can be screwed closed for semi-permanent rope installations. During rope installation, a new magnetic mechanism holds the cam open for easier loading.

- EN 12841-C: max. load 200 kg, with static rope 10-12mm
- EN 341-2A: max. load 150kg(max. descent 100m), with Singing Rock STATIC 11
- Operating temperature down to -30 °C
- EN 15151-1 type 6, with 9.3-11mm rope
- Weight 410 g (14.5 oz)
- Strength 15 kN
- Max. load 200 kg (see instructions)
- Cost inc VAT: £175 / $220 /€160

**www.singingrock.com**

# SKYLOTEC
## TILT STRETCHER RIG

The *Skylotec* ***ultraFLEX PRO*** transport suspension enables an easy change of sttrecher orientation from horizontal to vertical under load. The continuously adjustable inclination angles of the individual straps make flexible adjustment and setting during the rescue procedure as easy as possible even under load enabling negotiation of narrow openings. The right and left axis can also be adjusted under load. The entire length of the system can be shortened, allowing it to be used where space and height are limited. A mini pulley system is included to make remote angle changes possible, which can be used optionally.

Total Weight 2.8kg/6.16lb

Cost:€863 (£745/€926 currency conversion only)

www.skylotec.com

# KONG
## SPLIT STRETCHER BACK PACK

*[ED Although this new pack is intended for the Kong 911 Armour and Kong 911 Hive stretchers, it will fit many other split-stretcher models- check the measurements.]*

Convenient transport bag for 911 stretchers, re-inforced and winchable which allows ultra-fast stowage. It can be carried on the shoulder thanks to the comfortable padded shoulder straps. Equipped with customizable label for quick identification and Internal straps for fixing the stretcher.

Dimensions:
Height 100cm/39.3"
Width 60cm/23.6"
Depth 25cm/9.8"
Weight 2.5kg/5.5lbs

**www.kong.it**

# FLYING LIFEBUOY

*[ED: We include this item for reader interest, not as a recommendation because we are not familiar with manufacturer Didiok at all but China is the world leader in water rescue drone technology (aside form a handful of European and North American contenders) and this is an interesting variation on the usual drone theme.]*


The JX-6A Maritime Rescue Drone is designed to meet the specific needs of fire and emergency services. Its remote-controlled flight system allows rescuers to quickly deliver flotation devices to those in distress, even in areas inaccessible by boat. With 190N of buoyancy, the drone ensures strong buoyancy and stability, enabling it to provide immediate life support to those in distress. The JX-6A 's unique design allows for multiple takeoffs and landings on the water surface, solving the problem of an accurate 'first-shot' rescue adversely affected by environmental or positional constraints. Whether you are a coastguard, rescue association or an individual, the JX-6A Water Rescue Drone redefines the functionality of emergency rescue equipment.

**SPECIFICATIONS**

- UAS housing unit dims:935 x 935 x 121mm (+/- 10.5mm)
- Maximum pulling force of power unit: 3.0kg
- Li-ion battery power:22.2V / 7Ah
- Blade diameter 12 inches, pitch 4.5 inches
- Single-axis camera Single-axis travel range:+90˚ to -90˚, resolution 720P
- Flight controller communication distance:1.0km (water surface) / 10km (altitude 100m in the air), display:5 inch
- Take-off weight < 5kg

**PERFORMANCE**

- Max flight time: > 10 min
- Max flight speed: > 13 m/s
- Max flight altitude: 4200m
- Max pitch angle: 45˚
- Max descent speed: > 4 m/s
- Max rise speed: > 9 m/s
- Hovering accuracy: < 1.6m (GPS normal)
- Remote communication distance: > 1100 m
- The surface of the water provides buoyancy of 190N
- Device protection class IP68 Water depth 1.5 meters 1hr
- Temperature: -10˚C to 55˚C
- Applicable altitude: 0 - 4200 meters

**FEATURES**

Remote control with real-time power display
Remote control with on-board camera live view function
The device has one-touch takeoff and one-touch return functionsThe unit can withstand a maximum of force 6 winds and force 2 sea state for normal takeoff.
The device has a remote control signal loss autonomous return function

https://didiokmaking.com

# RUCPAC

## convert your HARD-CASE to BACKPACK

Transform your Peli or hard case into a versatile backpack with our innovative *RucPac Backpack Conversion Kit*! Enjoy the freedom and convenience of converting your *Peli case* into a backpack within seconds, providing you with unparalleled flexibility and ease of use - not just for drones!

The key features:

- Transform any hardcase into a backpack for instant versatility.
- Enjoy instant access to your belongings while keeping the backpack attached.
- Revel in comfort with a generously padded back, shoulder area, and a durable waist strap.
- Effortlessly wheel your hardcase while it stays securely attached to the backpack.
- Customize the fit with height-adjustable shoulder straps for users of all sizes.
- Swiftly detach and stow the backpack inside the hardcase.
- Experience added functionality with dual accessory D rings and a convenient zipped storage compartment.
- Tailor the design with modular assembly for detachable shoulder straps, a padded back, and a waist strap.
- Complete with standard RucPac hardcase straps, which can be removed and used on their own, for a seamless experience.
- Lock in confidence with dual weight bearing webbing straps securing to the top handle of the hardcase and additional Velcro™ on the back, offer reliable, non-invasive fitment.
- Unlock convenience with RucPac Pro, designed for every lifestyle

**Drone Pilots**: Effortlessly convert your hard case into a backpack, ensuring quick access for seamless drone operations.
Travellers: Travel hassle-free with universal compatibility and direct access to belongings, providing comfort for every adventure.
**Heavy Load Handlers**: Say goodbye to strain. RucPac Pro's ergonomic design transforms your hard case into a portable storage solution, making heavy loads a breeze.
Experience the convenience of RucPac Pro and redefine comfort in your journeys!
COST: RucPac Pro Hardcase Backpack Conversion£116 inc vat
* This is an accessory only, the case is not included.
** Price shown includes 20% tax and does not include shipping.

www.rucpac.com

# HONG KONG GFS (SAR) recognised for tricky rescue

On 8 November 2024, Hong Kong's Government Flying Service [akin to Maritime Coastguard Helicopter services] conducted a complex multi-aircraft search and rescue (SAR) operation in the South China Sea, southwest of Pratas Island. The operation [involving Helicopters Rescue 81, Rescue 68 & Coordination by Rescue 45] successfully rescued 7 of 12 personnel aboard a crane barge that had lost power and declared abandon ship. Ms Heidi Ho subsequently received three separate awards for her extraordinary courage and professionalism during a risky night search and rescue operation. Despite the life-threatening combination of darkness, high winds, violent seas and dangerous obstacles, she descended onto a drifting barge to rescue seven trapped seamen. Following their recovery, she provided vital medical care and reassurance until their safe return to base. Her courage, determination, and selfless commitment to saving lives embody the highest ideals of maritime SAR.

Aircrewoman Officer III, Ms. Heidi Ho Yuen-tung, was awarded Hong Kong SAR Government's ***Bronze Medal for Bravery*** plus the ***Outstanding Individual Contribution to Maritime SAR Operations*** Award, and the ***People's Choice*** Award at the International Maritime Rescue Federation (IMRF) Awards 2025.

# ABSTRACT- OFFICIAL REPORT

**INCIDENT TIME:** 1550 hours (8 November 2024)
**LOCATION**: North 20°20.7' East 116°09.2' (Southwest of Pratas Island, South China Sea)
**DISTANCE FROM HONG KONG**: Approximately 151.5 nautical miles from Waglan Island
**TARGET VESSEL:** Crane barge
**PERSONNEL AT RISK**: 12 individuals
**CIRCUMSTANCES**: The crane barge had experienced power failure and loss of propulsion, initiating an emergency abandon ship declaration. Two supporting tugboats had become attached to the barge's bow and stern in apparent stabilisation attempts, introducing significant complicating factors for rescue operations.

## ENVIRONMENTAL CONDITIONS

**En Route Weather**:
- Wind: 90° at 19 knots
- Visibility: 10 kilometers
- Significant weather: NIL

**On-Scene Weather**:
- Wind: 30° at 47 knots
- Visibility: 8 kilometers
- Significant weather: Showers
- Sea State: 6 meters (conditions developed during operation, with enroute conditions at 3m/~10ft)

Progressive weather deterioration during the operation required dynamic risk assessment and accelerated recovery timelines.


**Rescue 81 (Primary Recovery) Crew**:
- Captain: Burnet Shek
- Co-Pilot: Billy Cheung
- Winch-operator: Peter Ho
- Winchman 1: Heidi Ho
- Winchman 2: Alfred Tsang

**Direct Assets:**

| | |
|---|---|
| Rescue 81 (Primary Recovery) | Airbus H175 |
| Rescue 45 (Coordination) | Bombardier CL605B |
| Rescue 68 (Secondary Recovery) | Airbus H175 |

## SUPPORT INFRASTRUCTURE

**Fuel and Logistics Nodes**:
- Oil Rig LF 13-1: Initial fuel uplift and crew staging
- Oil Rig LF 15-1: Secondary refueling point during multi-phase recovery
- VHHH: GFS base operations and final delivery point

**Inter-Agency Support**:
- GFS Air Command and Control Centre (ACCC) for resourses support and coordination
- On-scene vessel: Provide situation updates
- Civilian oil rig facility staff: Refueling and logistics support
- HK Air Traffic Control (ATC) and HK Maritime Rescue Coordination Centre (MRCC): Strategic coordination

## OPERATIONAL PLANNING AND EXECUTION

**Mission Planning**

***Phase One - Preparation and Staging***:

**1.** Rescue 81 initial fuel uplift: 1,950 kg at VHHH
**2.** Transit to Oil Rig LF 13-1 for intermediate refueling
**3.** Fuel management strategy: Conservative uplift (300 kg) considering personnel recovery and max. all up weight
**4.** Crew coordination on bingo fuel limits: 1,100 kg established for direct return

***Phase Two - Recovery Operations***:

1. Rescue 81 arrives on scene
2. High-line deployment and personnel extraction
3. Oil rig refueling
4. Coordinated multi-aircraft recovery

## HIGH-LINE DEPLOYMENT AND PERSONNEL EXTRACTION:

1. Initial Deployment: 3 high-line packs combined with 35-pound deployment weight
2. First Attempt: Weight rejected by vessel motion (rolling left and right)
3. Second Attempt: Weight successfully lowered to deck following verbal guidance to the ship crew via loud hailer
4. Crew Coordination: Initial personnel hesitation overcome through Heidi's instruction and demonstration

**Recovery Method** - Double Strop Double Lift:

- Winchman Heidi deployed at 170 feet altitude to establish on-deck presence
- Subsequent recoveries executed using double strop method (2 personnel per lift cycle)
- Winchman Heidi remained on deck to provide physical and verbal guidance to distressed personnel
- Three successful dual-personnel lifts completed; final lift of winchman Heidi with one ship crew

All recovered ship crew successfully evacuated without fatality. However, the recovery required significant crew attention to manage panic response and physical coordination during high-line handling.

## OPERATIONAL CHALLENGES AND CRITICAL ISSUES

**Communications Challenges**

Ship Crew Communication Constraints:
During high-line deployment and personnel recovery operations, direct radio communication with distressed ship crew proved infeasible due to multiple compounding factors:

- Environmental Noise: Sea state of 6 meters generated continuous high-amplitude noise across deck areas, rendering handheld radio transmission and reception unreliable
- Crew Stress Response: Personnel abandoning ship and rushing to designated pickup areas exhibited heightened urgency and reduced attention to electronic communication devices
- Physical Accessibility: Ship crew members occupied with securing personal equipment and managing physical positioning could not simultaneously maintain radio discipline or receive complex technical instruction

**Loud Hailer and Workaround**:

To overcome these constraints, Rescue 81 utilised the aircraft-mounted loud hailer system to deliver real-time instruction and guidance directly to on-deck personnel:

- Initial High-Line Guidance: Loud hailer communication directed deck personnel to receive the initial high-line package and deployment weight, overcoming initial hesitation and rejection due to vessel motion
- Facilitate winchman deployment: Instructions were communicated via loud hailer to assist the safe deployment of winchman on the deck

**Situation Management**

On-Deck Challenges in Rough Sea State: The recovery significantly increased physical demand on the winchman, requiring sustained effort throughout the on-deck operations:

- Rough sea state and the position of the two tugboats: The winchman required deployment at 170 feet above deck level to maintain safe aircraft clearance.
- On-deck management: Upon successful landing on deck, the ship crew immediately rushed for the rescue strops. The winchman had to contain the situation and calm the ship crew down to ensure readiness before commencing the first recovery.
- Complex Environment: The combination of 6-m sea state, unpredictable vessel motion, and personnel stress management created a complex operational environment requiring expert crew resource management and physical endurance.

## COORDINATION AND INTER-AGENCY COLLABORATION

**Multi-Aircraft Coordination - Coordination Architecture**:

The operation successfully integrated three GFS rescue assets (Rescue 81, 45 & 68) with distinct operational roles:

- Rescue 45: On-Scene Commander - situational assessment, inter-agency liaison, aircraft conflict management
- Rescue 81: Primary Recovery Platform – ship crew recovery and initial evacuation
- Rescue 68: Secondary Recovery Platform - continued recovery following Rescue 81

## AIS-BASED TARGETING:

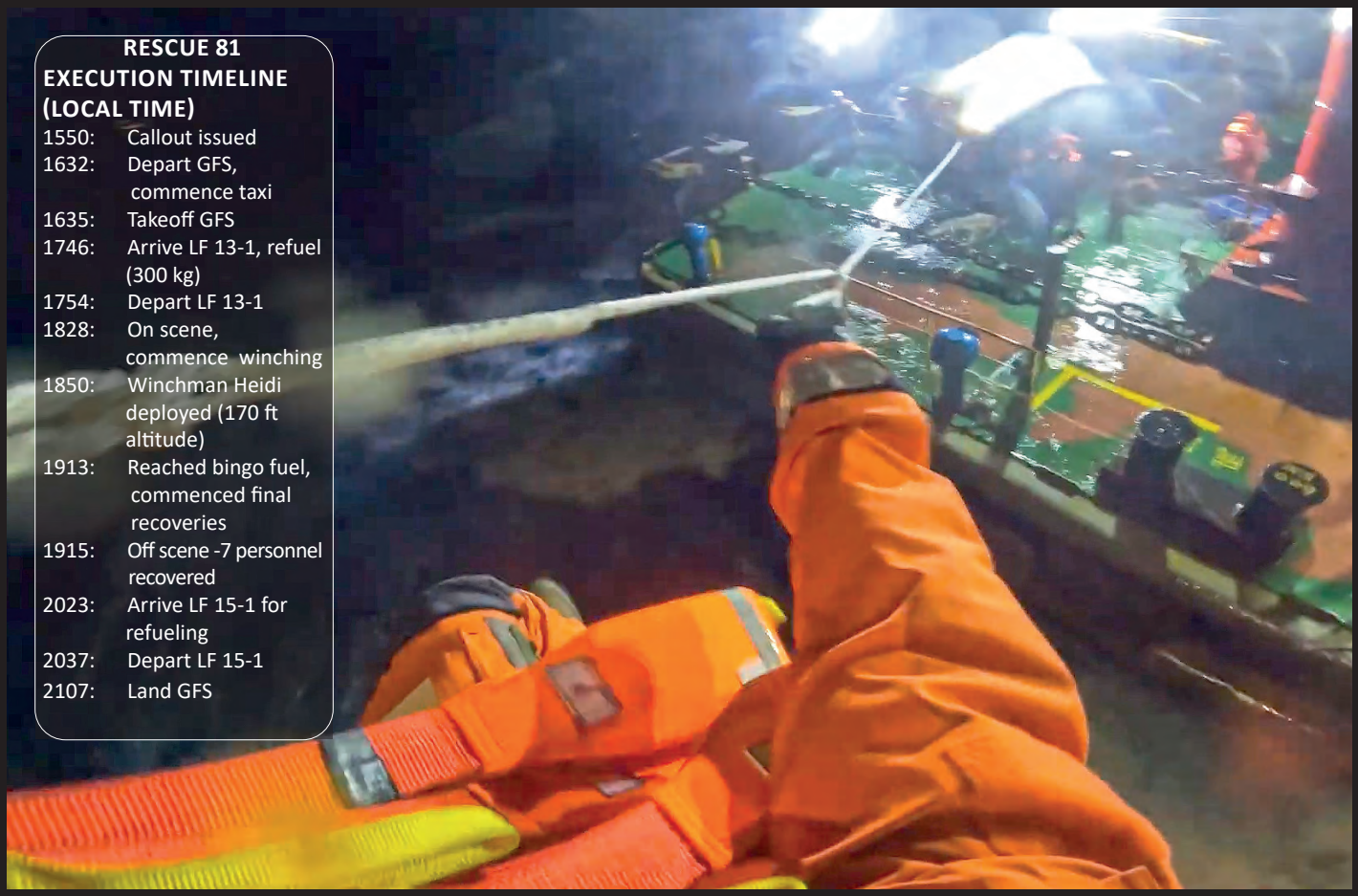
The vessel location was identified through Automated Identification System (AIS) data, enabling direct vector to scene without search maneuvers. This capability reduced on-scene search time and fuel consumption.

## INTER-AGENCY COORDINATION

Oil Rig Facility Coordination:

- LF 13-1: Provided hot fuel uplift, infrastructure for crew briefing, and logistics support without mission delay
- LF 15-1: Enabled secondary refueling option

On-scene Vessel Support providing real-time situational updates on distressed barge position and condition, frequency coordination for multi-party communications,
and risk assessment feedback regarding windfarm proximity (none indicated in the proximity)



**RESCUE 81 EXECUTION TIMELINE (LOCAL TIME)**

1550: Callout issued
1632: Depart GFS, commence taxi
1635: Takeoff GFS
1746: Arrive LF 13-1, refuel (300 kg)
1754: Depart LF 13-1
1828: On scene, commence winching
1850: Winchman Heidi deployed (170 ft altitude)
1913: Reached bingo fuel, commenced final recoveries
1915: Off scene -7 personnel recovered
2023: Arrive LF 15-1 for refueling
2037: Depart LF 15-1
2107: Land GFS

**MEDICAL EVACUATION**:
Coordination with GFS ACCC established ambulance response for 2 casualties, 1 with a minor laceration and 1 with hypothermia (likely from extended water exposure or stress)

**PERFORMANCE ANALYSIS OF RESCUE 81**
Personnel Recovered (Phase One) 7 of 12 (58.3%)
Fatality Rate 0 (%)
Major Injury Rate 0 (%)
R81 Sortie Duration 3 hrs 18 min
On-Scene Duration (R81) 47 minutes

**OPERATIONAL EFFICIENCY**:
The operation demonstrated effective resource utilisation and crew decision-making under constrained parameters:
- Zero fatalities despite complex scene hazards and equipment failure
- Successful initial recovery of 7 personnel under deteriorating weather
- Minimal scene search time through AIS targeting capability

**CONCLUSION**
The 8 November 2024 crane barge rescue operation represents a successful execution of complex multi-platform aviation emergency response in challenging environmental conditions. The operation achieved its primary objective—personnel evacuation—while maintaining zero fatalities and demonstrating effective inter-agency coordination.
Key contributing factors to success included:
- Experienced flight crews capable of dynamic decision-making under resource constraints
- Effective coordination architecture with dedicated frequency and clear role definition
- Integration of civilian support infrastructure and inter-agency partnerships
- Modern technology application (AIS targeting) reducing search time and resource expenditure
- Emphasis on personnel safety and conservative risk management despite time pressure

We extend our deepest appreciation to all teams involved in this operation. The success achieved is a testament to the collaborative spirit and dedication of every party, including air assets, logisics support from the oil rig, and the combined efforts of the GFS Air Command and Control Centre (ACCC), HK Air Traffic Control (ATC), and HK Maritime Rescue Coordination Centre (MRCC).

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# SAR COORDINATION

## The Most Neglected Component of Search and Rescue?

By **Matthew Mitchell**,
Founder and CEO, International Association of Search and Rescue Coordinators (IASARC)

Photo: Water Bomber in Southern Span Diarmuid Curran

*[ED: we've seen several new organisations form in the past few years to cater to specialist areas of rescue, technical rescue and USAR in particular, but IASARC is the first to tackle the often neglected (or polarised) area of inter-agency/ inter-team/ inter-service and even inter-country cooperation and coordination for any given Search & Rescue incident. A couple of our own editorial team have deemed the IASARC an interesting enough development to become actively involved. Some gain traction while others, despite laudable aims and well credentialed personnel, don't, so we'll be keen to see how it is received and how it develops. Larger scale operations involving multiple agencies from multiple countries tends to be maritime in nature with the article on Hong Kong's GFS rescue on the previous pages a fine example but the principles apply equally to virtually all areas of rescue albeit on a different scale and with differing operational requirements. Our title image is a case-in-point. On the face of it, a firefighting operation which this magazine doesn't even deal with. But this aircraft and its operating agency needs to coordinate with firefighting services on the ground, with SAR teams, Park Rangers and/or Law enforcement that may be in the area locating and evacuating residents/ workers/hikers etc., with utilities that may be impacted by the fire or by the aero operations or both, with regional air traffic controllers and with other aero-firefighting or fire-spotting assets involved with the same fire, with meteorological agency(s) for ongoing or impending weather situations and so it goes on. If any part of this operational chain is left out, injuries. fatalities or an even greater disaster can ensue. Coordination is key. This first article provides an excellent introduction whilst, elsewhere in this issue, an article on Ai integration provides insight into the depth of knowledge and intended scope of operation of the IASARC].*

It is the first to be overlooked by administrations and elected officials yet remains a single point of failure in most emergencies. It is the least robustly supported by government policy makers, yet case studies and investigations consistently reveal that this component is the most likely to fail. The public does not recognize it as a profession, yet it demands extraordinarily complex skills to perform competently. Legal and regulatory structures under-represent it, yet lives would not be saved without it. It is the coordination component of global, national, and regional search and rescue (SAR) systems.

The human tendency to focus on what is most overt is understandable. Psychologists call this 'salience bias', the predisposition to focus on the prominent, visible, or emotionally striking stimuli. Most would prefer to watch a movie about Ashton Kutcher jumping out of a helicopter than a movie about a 911 operations center or international rescue coordination center (RCC). We focus on the pointy end of the spear, rarely who is holding it [ED: despite the need to support operational personnel in the best way possible].

To develop and advance life-saving capability, we must set aside expected human biases and base decisions on facts and evidence. While we will always need improved rescue vessels, better aircraft sensors, and highly competent personnel in the field, coordination is the single most impactful factor in the life-saving industry that will yield the most substantial improvements in positive outcomes for the least cost. Governments have a moral duty to provide SAR services and ensure those services are well coordinated. International conventions establish the various aspects of that duty

and outline requirements and recommendations to assist governments in fulfilling their responsibilities. Unfortunately, compliance with these conventions and general performance in executing this moral duty remain alarmingly inconsistent. For example, during the 2023 national audits by the International Civil Aviation Organization (ICAO), compliance ranged from 81% at best down to only 6%. Even more concerning, 53% of the Caribbean states have no formal SAR services.
In a telling anecdote from a prominent SAR expert, they remarked, "what I have seen from visiting RCCs, [is that] 80% don't have trained SMCs [SAR Mission Coordinators] and don't have a training program." The situation is dire, even in developed nations.

A 2022 U.S. report revealed that a SAR service indicated, "Many SAR planners and SMCs do not have the appropriate knowledge or experience to adequately manage a response to a distress incident." Similarly, Canada's Quadrennial SAR Review urged that "[National SAR Program] partners must continue to improve coordination."

### Case Study: A Simple Error, A Life Lost

Having served as the Chief of Policy for SAR in the U.S. Coast Guard, I have reviewed hundreds of case studies and investigations. Out of these, I can think of only two incidents where the life-threatening failures were not within the coordination component. In one year alone, I tracked three cases where a simple inability to transcribe position information accurately impacted a life-saving outcome. Several clear signs of search planning errors were revealed, leading to response assets being sent to areas well outside the intended search area. In another four cases that year, distress indicators were outright dismissed due to misinterpretations, leading to unnecessary fatalities. The outright dismissal of clear details that, interpreted correctly, should have prompted a rescue response. If these errors had been prevented, lives could have been saved.

More and more those working in the field of search and rescue are coming to accept the need to focus more on this coordination component, but most are at a loss for the next steps. A typical answer is to improve training, yet to what end or defined level of competency? Another common suggestion is to require a specific career background, such as having served as an air traffic controller, before coordinating aeronautical SAR. Much work is also being considered in expanding or promoting existing international standards. And all of these may be pieces of the puzzle, but there seems to be an underlying and more fundamental issue at hand. Indeed, that macro challenge within SAR coordination is that the job itself is not yet fully professionalized.

### What Is a Profession?

Professionalization refers to an evolutionary process in which self-directed work is transformed over time into work that supports larger organizations and the public. Fields that successfully navigate this evolution are generally characterized by universal ethical standards, specialized knowledge and skill, prolonged training based on widely accepted criteria, and a corporate body of knowledge derived from theoretical and empirical research.

The watershed moment in a field's evolution is the development of a qualifying association – a body of that field's leading experts united to ensure professional conformity, improve the status of the members, and engage in research to advance the profession's corporate body of knowledge. The appearance of such an association is both essential and inevitable. Today, one cannot find a recognized profession that is not supported by at least one such association.

A cornerstone function of these associations is providing a path to validate that an individual practitioner has attained a particular level of knowledge and skill in that field, generally called certification. This process is a formal attestation by an independent body that a practitioner has achieved a level of competence that satisfies the underlying standards. It should be noted that certifications are distinct from the licenses issued by governmental authorities to grant legal authority to practice a highly regulated profession.

### The Evolution of SAR Coordination

Historically, the skills necessary to coordinate a response to a distress incident were attained on the job. Before robust coordinating shore stations, today termed Rescue Coordination Centers (RCC), the coordination of any response was primarily left to the senior official on the scene or near the incident. Communications technologies advanced, enabling responses to be coordinated over broader areas and amongst more responding units. Still, though, skill was attained through experience on the job.

Beginning in November of 1945, the SAR Division of the newly formed ICAO started to work on what would become known as Annex 12, Search and Rescue. This Annex serves as the first authoritative international document establishing standards for SAR. States worldwide began refining and bolstering their national SAR systems, often creating specialized training for persons coordinating responses.

In June of 1966, the U.S. Coast Guard established the National Search and Rescue School in cooperation with the U.S. Air Force. The notice establishing this School explained, "Traditionally, on-the-job experience has been the only method of training Coast Guard personnel for duties involving search and rescue. In recognition of changing technology and methodology and to provide uniform training for conducting operations in this major mission area, a 4-week Search and Rescue School has been established…"

While the international convention established standards, a new field of scientific inquiry was emerging that would underlie all search planning, an integral component of SAR coordination. In 1946, the U.S. Navy's Operations Evaluation Group completed a classified report, A Theoretical Basis for Methods of Search and Screening. Although not the first effort to develop scientifically valid methodologies for search, it was the first to rigorously apply "engineering, physics, physiology, mathematics, and statistics" to address what it referred to as "the field involving the problems of search."

Once declassified, Search Theory, a science developed to aid the U.S. Navy in "the detection of the enemy," was quickly leveraged to save lives. A small but talented cohort of search theorists emerged within the world's SAR authorities, who became the torchbearers of the science and, ultimately, the genesis of all search planning methodologies today.

Throughout the later part of the 20th century, the science and policy aspects of SAR coordination continued to develop. The first computer-aided search planning systems were designed to replace manual methods. New advances in oceanography

permitted more accurate drift simulations. In 1999, the international conventions governing the Global SAR System were leveraged to create a single publication (albeit in three volumes) to establish standards and methodologies for maritime and aeronautical SAR, the IAMSAR Manual.

Thus, at the beginning of the 21st century, the global community was the benefactor of the evolution of a field, formerly without any standards, formal training, or an underlying science, to one on the verge of emerging as a recognized profession. Yet one thing remained missing.

## SAR Coordination: An Unfinished Profession?

While SAR coordination has evolved, it is not fully professionalized. Although robust standards exist for individuals and organizations involved in SAR coordination, like those within the IAMSAR Manual, they are inconsistently applied, even in the most advanced nations. Unlike other critical professions, SAR coordination lacks an independent certifying body, i.e., association, to uphold accepted standards, advocate for the profession writ large, and build its corporate body of knowledge. This gap in professionalization directly impacts SAR effectiveness worldwide.

## The Mission of the International Association of Search and Rescue Coordinators

The International Association of Search and Rescue Coordinators (IASARC) was founded to promote the continued professionalization of SAR Coordination. This international professional association comprises leading experts united in the shared mission to Advance the Profession of SAR Coordination through challenging professional certifications, advocacy for improved law and regulation, and scientific advancement.

Certification. Skills and their certification have become a global currency. Organizations, from governmental authorities to nonprofits, excel only when they employ and promote skilled individuals. Certification processes validate that an individual has attained high expertise in a given field. They build credibility through independent third-party knowledge, skills, and abilities assessments. In short, they demonstrate competence.

To date, there are no independent certifying bodies within SAR coordination. Competence is assessed only through internal qualification processes that often vary widely from one region to another. Certifications are widely recognized and respected within a broad range of industries, whereas internal qualifications, those unique to only a specific organization, are often not. IASARC provides a standardized and equitable means of demonstrating competence in the lifesaving profession of SAR coordination, bringing value to individuals, governments, the global community, and various industries.

Professional conformity is a cornerstone of any profession. Members' proficiency is based on specific, identifiable skills, attitudes, and a corporate body of knowledge. Competence is validated through independent review and testing, a certification process. IASARC's principal objective is establishing certification requirements and processes for key positions within SAR coordination and to align terminology with the IAMSAR Manual and its founding conventions.

Unlike traditional internal qualification processes, IASARC certifications offer a standardized, globally recognized means of demonstrating SAR coordination competence. Organizations, from government agencies to nonprofits, excel only when they employ skilled individuals. Certification ensures that expertise is recognized, transferable, and respected. A council of the profession's leading experts establishes uniform minimum requirements to be demonstrated to attain a professional certification. The initial certifications cover the positions of SAR Manager, SAR Mission Coordinator (aeronautical, maritime, and land specialties), On-Scene Coordinator, and SAR Dispatcher. IASARC has adopted four distinct categories of requirements for each certification: knowledge, experience, training, and contributions to the profession.

Advocacy. Another critical aspect of any professional organization is the need to improve the support afforded to and prestige of its members. Like many industries, saving lives is guided by convention, regulation, plans, and policies. However, these documents are often developed without due regard for the coordination component of SAR. The advocacy silo of IASARC will collaborate with government decision-makers and educate political leadership to identify areas of improvement to strengthen SAR systems around the world.

Advancement. Beyond certification and advocacy, IASARC will play a critical role in advancing the scientific fields that contribute to the life-saving mission, offering a venue to exchange and collaborate on the scientific aspects of the evolving profession. For example, the science of Search Theory, which underlies the entire SAR enterprise, is advanced almost exclusively within governmental institutions, hindering scientific advancement and potential collaboration when data is not immediately shared with academia and other thought communities. IASARC will catalyze vital partners, such as manufacturers of navigation systems and sensor platforms, who often need to be made aware of developments in such sciences as Search Theory and thus cannot fully leverage their potential. Independent scientific collaboration and coordination with industry leaders will ensure that SAR professionals have access to capabilities designed to maximize the effectiveness and efficiency of the SAR mission.

## The Future of SAR Coordination

SAR coordination is at a crossroads. We can continue to operate in an inconsistent, underrecognized framework, or we can elevate SAR coordination into a fully professionalized, scientifically advanced discipline. The choice is clear.

IASARC envisions a world where every life in distress that can be saved is saved. Saving lives is a moral duty transcending national borders, politics, governments, and industries. Responding to incidents where people are in distress requires expert coordination by exceptionally skilled professionals leveraging the most advanced technological capabilities to achieve this mission.

Unlike many other endeavors, saving lives in distress cannot be truly quantified. Life is of infinite value; therefore, the enterprise that seeks to save life must advance and improve infinitely. We must act now. No matter the degree of excellence that a nation's SAR system may demonstrate, the ability to render aid to persons in distress in all environments requires SAR professionals to be ever vigilant, and the organizations that enable them ever to improve their SAR systems: Amplio Infinite - Improve Infinitely.

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# A Beginners Guide to.....

# Helmets

## Design, Manufacture & Function



by **Charlotte Ina Sterland**


**The Kask Quantum is a multi-role helmet now certified for water rescue**

'I usually wear a helmet' is a common post-accident quote from climbers and cyclists alike.

Why do we use helmets? How do they protect us when climbing? Why do so many day to day industrial users not wear them, let alone professional climbers whose lives are protected daily by their existence? Is it comfort factors? Is it a lack of really thinking through accident potential, or is it pure stubbornness? Some free-climbers will tell you that they adversely affect the absolute concentration and 'zen-like' mind-set necessary to face death on faces hundreds of feet high - and besides, at that height - what good is a helmet? Well, it may not do much in the event of such extreme falls but it will ALWAYS protect from falling debris from above and whether you're a novice or world renowned climber these things are out of your control. And while saving the head from high speed impact in a fall from height or from a moving vehicle may be the obvious protective measure afforded by helmets it's the much more common low-speed bumps and impacts and protection from falling objects that are the real bread & butter of helmet protection.

Helmets evolved in warfare to protect from arrows and bullets, but a stone falling from high up could have just as damaging an impact. Ski and bike helmets are designed for impact at speed, while climbing helmets are made to protect from rock impacts as well as falls, but there are similarities between the two, while some hybrid helmets are designed for all of these possibilities and more - the *Kask Quantum* above can protect swiftwater rescuers from head impact to rocks and boulders when swimming or being carried by fast-moving water. *Kask Quantum* is a multi-role helmet like the iconic *Gallet F2* and its later evolutions, which also protects from fire/extreme heat.

### Helmet Function

The majority of injuries in climbing activities are due to falling objects like tree branches or rocks, or slipping and injuring a head on something like a ledge. Rock falls are common, can be deadly, and are one of the most important hazards to assess a site for when climbing. These injuries require both protection from direct object hit and absorption of impact energy.

### History of Helmets: Military Design Helmets

Armour is designed to capture projectiles and extract and disperse energy without undue damage to armour or wearer. Comfort and 'wearability' are key to armour being worn when needed. Fire fighting helmets have long necks for protecting the back from fire hazards, while ballistic helmets protect the head from low speed projectiles like bullets and bomb fragments.

According to research, 25% of 'projectile hits' are on the head, despite the head and neck only being around 12% of the body area. This is because the head is used for surveillance and thus exposed in combat operations.[1]

The early standard 'M1' helmet, entered service for the US Army in 1941 replacing the Brodie style helmet used in

WW1 and updated to a mk2 for use by British and commonwealth forces throughout the Second World War). The *M1* (above left) provided greater protection but was seen as cumbersome at around 1.2kg/2.85lb a third heavier than the *Brodie* but in a 'one size fits all,' format and, unlike the *Brodie,* didn't allow easy use of walkie-talkie radios. Consequently, helmets were often not worn and there were frequent injuries from ballistic-related impacts. Nevertheless you can see how the *M1* morphed into modern rescue helmets while, ironically, the latest military helmets from *Team Wendy* (top-right) have moved back towards the high cut of the *Brodie*.


## Head Injury

A serious head injury is loosely defined as one which causes an artery or vein to burst and to start bleeding in the brain. The most dangerous place to hit your head is thought to be on either side, just above your ears.

Impact can cause damage to the brain, either due to movement of the brain within the skull, a concussion, or more serious damage. The impact can be either static or dynamic; both are dangerous. A good helmet needs to protect fragile areas from impact; most use, in essence, a simple mechanism to protect the head; a foam spacer which is attached to the head, with a hard shell on top.

Injury generally occurs either due to 'projectile perforation' or helmet deformation and consequent 'blunt trauma.'

A blow to the head can fall into one of four groups: Scalp damage, skull fracture, brain injury and neck injury, or a combination of these.[2]

Head injuries are often classified as follows: (i) skull fracture, (ii) focal brain injuries, and (iii) diffuse brain injuries. Scalp damage is generally not given the same level of seriousness as brain injury or skull fracture. Neck injury is also low on the scale compared with brain injury and skull fracture. Brain injury is most serious, and is given particular importance when considering the protective effect of the helmet under direct impact.[3] [4]

Years ago, it was postulated that brain damage was due to rotational acceleration forces.[5] The cause was thought to be rotational movement of the head on impact at an angle. Movement is translated to the brain and can cause it to collide with the dural compartment, which may have a rough surface (especially at the orbital and temporal areas). At these sites, shear strains develop, causing brain confusion and tearing of blood vessels. Brain damage can also occur as a result of translational cavitation (bubble formation) because of the short-duration reduction in intra cranial pressure. This led directly to development of MIPS systems, particularly in skiing helmets but cropping up in other high-speed impact helmets.

## Helmet Design

The 'Head Injury Criterion (HIC)' describes that the end can withstand a high acceleration for a short time. HIC must be less than 1000; this is widely used in car safety testing, as well as in helmet evaluation. Helmets should be able to absorb energy and keep force experienced by the head within acceptable limits. They should resist penetration and distribute force over the shell on impact. The surface area must reduce tangential acceleration on impact and minimise friction, as well as withstand repeated blows or crushes, covering all impact locations. Lines should have 1.5' thickness in case of deformation and should withstand sun damage, humidity and extreme heat conditions. They also need a 'retention' system or strap which holds the helmet on the head. The main features should be the shell, the comfort foam and the strap.

Generally between 5-10mm thick, helmet thickness is determined by the penetration test: Made of injection moulded thermoplastic or pressure moulded resin, they are reinforced

*Nothing exemplifies the range and the subtlety of design for different applications better than **Team Wendy**. In this Helmet selection, which are only five of their 7 rescue models plus a military/tactical non-ballistic model (or Bump-hats as many people call them (see definition below)). Top left are the **Maritime Water Rescue** model next to the **EXFIL Rescuer** model. On the face of it exactly the same but in order to meet the water rescue standards the inner lining on the* Water Rescue *version must be quick draining and not hold water. The shell itself needs drain holes both to release water and to release air if under water. The yellow helmet in the middle is the **Adventurer**, a clean-shell model with an EPS inner shell instead of a floating cradle, indeed, unlike traditional mountaineer helmets, all of these **Team Wendy** models have moved away from a floating cradle which has a distinct gap between the top of the head and the shell that used to be considered essential to pass the top-impact tests. The white helmet is the **Exfil SAR Tactical** which is the same shell as the **Exfil SAR/Backcountry** model but has heavier duty front and rail mounts for heavy NVG and TIC cameras etc. and a liner that stabilises that heavy stuff a bit better but is therefore not so suited to water rescue as the standard Exfil SAR . Far right in red is the **M216 Ski Helmet** with openable vents and full thermal ear covers but with enhanced hearing ability built in.*

## BUMP HELMET

A bump helmet is specialized headgear designed to protect the wearer's head against blunt force impact, minor falls, and flying debris. A bump helmet is specialized headgear designed to protect the wearer's head against blunt force impact, minor falls, and flying debris. Unlike ballistic helmets, which offer protection against bullets and shrapnel, bump helmets are primarily intended for non-combat situations with a low risk of direct enemy fire. They can also be used in lieu of ballistic helmets during training exercises – saving wear and tear on a more expensive ballistic helmet while offering the same type of wear and interoperability for users.

**Team Wendy** definition

with ballistic resistance fibres. Energy is absorbed on impact, while the amount of energy absorbed by foam depends on; impact site, (more is absorbed on double curves like the crown), material and thickness of shell, as well as the shape of the impacting object.

More rigid shells have a more spread out impact, with lower peak force, while newer helmets use thinner plastic for less weight with more ventilation and stronger materials.

'Brittle' shells are used more for short term uses like pole-vaulting, cycling, skiing, motor sports, combat operations. Once the shell on these is damaged, the helmet's whole structural integrity is in question, so it's best to replace the helmet.

Ductile helmets deform more on impact. Softer shells made from PET take pressure more centrally as they have a continued force on impact. Motorcycle helmets have to consider both high velocity impact and multiple diffuse blows.

Comfort foam is made of open cell polyurethane, or PVC or polyethylene. When used with foam liner; open cell foam, rather than a rigid foam liner can deform to the shape of the head without exerting too great a pressure on the head.

Deformation in the padding is key. Sound and heat are released on any impact additionally heat is released as deformation occurs. The right foam cushioning here is vital. The best type depends on the kind of impact velocity. A good firm fit is also key for functioning well.

### Attachment to Head

A web 'harness' keeps the helmet on the head. It has various 'comfort' options including sweatband material and many have removable elements that can be washed or replaced. Chin straps and their associated webbing cradle are so strong that they will hold a worker/climber suspended if snagged with strangulation or garotting is a possibility. There are two different types of chin strap buckle - one that will hold in a high speed impact and one that will breakaway in the event of becoming snagged as with many work rather than climbing tasks. Some offer interchangeable chin straps to cater to both requirements. Most helmets have a means to attach accessories such as ear defenders and visors - usually called a Euro-fitting but generically similar whether it is Europe, Asia-Pacific or North

America. More specialist rails and mounts mentioned opposite in the *Team Wendy* section are becoming more common on WSAR as well as tactical helmets because of the need to use night vision (NVG) and thermal imaging (TIC). For some applications, including operating around electrical arcing risks, a different shell and standard needs to be used with no vents and a break-away chinstrap - in Europe this is covered by Standard EN397 for high performance industrial helmets and more recently by the enhanced standard EN 14052:2012. Neither meets all of the climbing-related requirements of EN12492 that covers the majority of SAR operations involving technical ropes.

## Testing

EN and ANSI tests for different helmets require a range of test parameters including **penetration of a sharp and a blunt object** from the top, front and sides. The helmet should be able to resist a penetrating impact and distribute the force over the area of the shell. The helmet surface area, most often spherical in shape and smooth, must be able to reduce a tangential acceleration due to impact and minimise friction upon impact. It must be able to take repeated blows and cover all possible impact locations over the head area.[6] Testing for chin strap breakage mentioned earlier, involves subjecting a chin strap to increasing force rather than an impact force and measuring the maximum value at breakage. Some manufacturers like *Kask*, now colour-code their chin strap buckles to more easily differentiate EN12492 (mountaineering) from EN397 (industrial) helmets

**Shock absorption** is a measure of the maximum force transmitted by the helmet to the head during a falling striker impact, with a certain assumed kinetic energy. A falling climber, industrial crane work and SAR helicopter slung-load-handling operations can expose the head to severe **side-impact** and resulting **lateral compressive forces**. EN12492 mountaineering helmets meet this but only 'LD' additional testing/certification on EN397 helmets meets this requirement.

## Helmet inspections

A helmet should be removed from service if the shell has an impact that marks the shell or renders the user in need of medical attention (or an HIA analysis). Retired helmets need to be removed from site or destroyed lest they accidentally find their way back into service! Adhere to a regular, rigorous inspection regime.

RFID/NFC tracking systems are a worthwhile investment for larger teams because they can track individual items of similar looking kit and tell you when they are up for renewal even if they appear to be in good condition. Unseen dangers, especially UV and chemical damage not to mention warranty or insurance issues will determine the life of your helmet.

**References**
(1) Carey et all (1)
(2) Khalil and Hubbard, 1977
(3) Voo et al. 1994
(4) Hume et al., 1995
(5) Bandak, 1997; Glaister, 1997
(6) Salvaterra 2006

# Extended (Unscheduled) Stays During Remote Rescues

## & how 'hasty' teams can cope with limited resources

by **Roland Curll** NSW Police Rescue - Australia

Roland is a 22 year veteran of Police Rescue in NSW Australia responsible for rope rescue, extrication, SAR, trauma-care and swiftwater rescue in the Illawarra region south of Sydney. This huge region incorporates Wollongong, Shellharbour, Port Kembla and Kiama with significant coastal cliffs plus the Upper Nepean river basin with remote bush, forest, canyons and waterways.

The nature of a mountain rescue or a wilderness search and rescue operation means that the casualty or casualties are in remote, difficult to access areas. That means, once this person has been found there are decisions to be made on the speed and method of extraction based on weather, assets, distance/time from safety, daylight hours remaining and of course the medical condition and the equipment levels of the attending team. Of all the possible scenarios that could take place, there are five that stand out as making the rescue more or less challenging depending on whether the initial response is a fully kitted rescue team or a lightly equipped 'hasty' team. On reaching the casualty/patient.....:

1) The patient appears to have no physical injuries and can walk out with the team. No additional equipment or physical effort required by the team.

2) The patient is non-ambulatory with injuries significant enough to require immediate and ongoing treatment during the rescue. This rescue effort would normally involve calling for a helicopter which could either land on a suitable makeshift pad or hover and winch or short haul the patient and a rescuer. This would only require the team to take care of the patient for a short period of time whilst waiting for the helicopter. This could also include the team carrying the patient only a short distance to a substantial location for a winch operation.

3) As 2 except that the helicopter is unable to attend until morning or not at all due to weather, nightfall or operational commitments A fully equipped team contingent with stretcher/wheel, extra medical equipment, team welfare supplies and sufficient personnel will arrive in time to take over evacuation and/or overnighting efforts releasing or supporting the hasty team.

4) As 3 except the main, primary equipment contingent of the team is unable to reach the hasty team until the next morning and the hasty team need to overnight with extended treatment of the patient using limited equipment and resources.

5)The final scenario of interest involves the main contingent being unable to assist at all in a timely fashion and the hasty team is required to perform the rescue-evacuation with only the equipment they already have with them.

This is by no means exhaustive list of possible scenarios and some teams may well say that they only ever attend an incident as a fully equipped team rather than sending out a hasty team. But this list should still encourage a rescue team to consider what they would be able to achieve with only small personal packs in terms of treating and protecting the patient from the elements and possibly onwards evacuation/ moving/carrying

of the patient. Training in your own environment with the bare minimum will highlight what can and can't be achieved if things go wrong and only a limited number of personnel reach the casualty.

## ENVIRONMENTAL PROTECTION

Protecting the patient from the elements may be temporary allowing only for initial treatment and packaging or it may be protracted in the case of overnighting. The initial concern is protection from wind, rain/sleet/snow. This is allied to preventing hypothermia but could equally be hyperthermia with overheating of both the patient and hard-working rescuers a concern.
Managing hypothermic patients in remote environments has additional difficulties beyond what is encountered in more controlled settings. The first and most obvious challenge is the environment itself. In wilderness areas, responders are often dealing with extreme weather conditions, rugged terrain, and limited resources. Another significant challenge is the physical condition of the casualty. Hypothermia does not only occur in cold environments; trauma victims, for example, are at high risk due to blood loss and the subsequent reduction in the body's ability to generate heat. Wilderness rescuers may not have the luxury of attending the immediate incident scene in a vehicle with all the heavy equipment that this offers. Walking and/or climbing long distances means that each team member is carrying a limited amount of kit in comparison to an urban or road accessible rescue effort - all will carry a small personal pack with many doubling up with larger team equipment like stretchers, medical equipment and provisions. Hasty teams will have the least equipment - their primary goal is to locate the casualty as quickly as possible and they must therefore travel light and fast. Hypothermia can usually be treated with lighter components (albeit temporarily) but hyperthermia may end up being an even bigger problem because it requires water for both casualty and rescuers and lack of it, could create even more casualties than you started with. Water is heavy - see our article on filtering at the end of this article)

## THE IMPORTANCE OF PREVENTING HEAT LOSS AND PROVIDING HEAT

The body loses heat through radiation, convection, conduction, and evaporation. In a remote environment, these processes are exacerbated by wind, wet conditions, cold ground and injury. Using insulating materials like sleeping bags, *Blizzard* Bags, or even makeshift shelters can be crucial. For instance, reflective *Mylar* blankets (or space blankets) are often used to reflect body heat back towards the casualty, while *Blizzard* Bags provide multiple layers of insulation that are significantly more effective than standard *Mylar* blankets. However, insulation alone is not enough for trauma patients or those who are severely hypothermic. In such cases, ***active warming*** is essential. Similarly, for hyperthermia, hydration may not be enough and active cooling is the only option for reducing a dangerously high body temperature.

Providing external heat to the casualty can help the patient. This can be achieved using chemical heat blankets, hot water bottles, or even the warmth generated by a group shelter or Bothy Bag, where the combined body heat of several people can make a significant difference.

## HYPOTHERMIA RISKS BEYOND COLD ENVIRONMENTS

Trauma victims are highly susceptible to hypothermia regardless of the ambient temperature. This vulnerability arises because the body's ability to regulate its temperature can be severely compromised by factors such as blood loss, shock, and immobility.
For instance, a person who has suffered significant injuries in a fall may not be able to generate enough heat to maintain their core body temperature, especially if they are lying on cold ground or exposed to the elements. The loss of body heat is exacerbated by wet clothing, wind, and other environmental conditions, making it possible for hypothermia to set in even in relatively mild weather.

In the context of trauma, where blood loss is common, this reduction in heat generation can have severe consequences. The body's normal response to cold, which is shivering, requires energy and oxygen. However, in a trauma patient who is already hypovolemic (experiencing low blood volume due to blood loss), shivering can increase the demand for oxygen. This increased demand can lead to further complications, especially in patients with head injuries. This is why managing body temperature is a close second to stopping the bleeding in trauma care. The combination of trauma and hypothermia creates a complex situation for patients. Hypothermia is not just a complication but a critical threat that must be managed alongside other life-threatening injuries.

## PASSIVE REWARMING TECHNIQUES

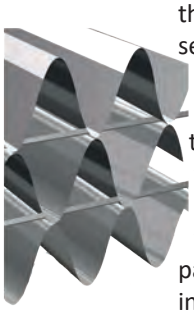
Passive rewarming is an important technique in managing hypothermia, particularly in remote environments where time to definitive care can be extremely protracted and resources are limited.

Insulation is important for passive rewarming because it helps trap heat. Material products like sleeping bags will be carried as individual kit and can be co-opted for patient care but there are also light specialist products like the ***Blizzard Blanket*** we'll discuss next and more comprehensive hypothermia wraps such as the ***Hyperthermia Prevention and Management Kit*** (the **HPMK**) by *North American Rescue Products* that can just about meet the needs of a hasty team member's pack. These materials work by reducing heat lost through radiation, convection, and conduction. To manage conductive heat loss, it's important to create a barrier between the casualty and the cold surface. This can be achieved by using insulated materials such as foam sleeping mats, which are designed to minimise heat transfer between the body and the ground. In the absence of specialised equipment, improvisation with available materials—such as using backpacks, clothing, or even foliage—can provide some degree of insulation. The effectiveness of insulation in passive rewarming depends on the quality and

type of material used, as well as how well it can be applied to the casualty's situation.

## BLIZZARD BAGS & HPMK

Even specialist super-small/super-light sleeping bags offer more substantial insulation than *Mylar* blankets and much greater durability. Wool blankets are heavy and can retain heat even when wet, but they are bulky, difficult to carry, and not specifically designed for emergency situations. Similarly, traditional sleeping bags provide good insulation but are usually too cumbersome to be practical in rescue operations, where weight, size, and ease of deployment are critical considerations. One of the key features of the ***Blizzard Bag*** is its multi-layered *Reflexcell*™ material (right) which not only reflects body heat but also traps warm air and prevents its escape. *Blizzard Bags* are also remarkably lightweight and compact, making them easy to carry and deploy in the field. A typical *Blizzard* Bag weighs significantly less than a traditional sleeping bag and can be compressed into a small package, making it ideal for situations where space and weight are important. Another major benefit of the Blizzard Bag is its ease of use. The bag is designed to be quickly and efficiently deployed, with full-length Velcro closures and drawcords at the top and bottom to secure the casualty inside. This bag has features that ensure practicality, such as side access slots for easy medical intervention and the ability to combine with other heat sources like chemical warming blankets for active rewarming. The HPMK bag differs in being more contoured towards a full hood/head cover and having a 10-hour self-heating liner. It too is just about small enough for a hasty team member's pack at only 17cm/6.75" by 27cm/10.5" and weighing 1.6kg/ 3 lb 8 oz. Despite their lightweight nature, *Blizzard Bags* and the *HPMK* bag are incredibly durable, capable of withstanding harsh conditions and rough handling without compromising their insulating properties. The next step up from these lightweight bags are stretcher bags like *Thermarmour* that provide lift and shift handles as well as weather and thermal insulation but the weight and bulk are greater and it's a fine line between carrying this as a member of a hasty team and it being a full team kit item. We'll discuss these further in our section on conducting the rescue. Another option for a hasty team moving quickly to the casualty ahead of a better equipped main team, is to have casualty packaging that works in conjunction with the team's stretcher. Some offer a capsule married to their specific basket stretchers and most can be detached for separate transport though you need to check that the patient can be loaded separately; *Kong's 911 Canyon* capsule for instance, needs to be attached to the stretcher before the casualty is loaded.



## ACTIVE REWARMING

Unlike passive rewarming, which relies on the body's own heat production and insulation to retain warmth, active rewarming involves external heat sources to raise the casualty's core temperature. This approach is especially important in trauma care, where shivering and the effects of hypothermia can significantly worsen the patient's condition. There are warm (moist) air inhalers and blood warming devices that a primary rescue team might carry but not a hasty team.


There are several lighter-weight methods of active rewarming that can be employed in the field. One of the most effective is the use of chemical heat blankets, such as the *Ready-Heat* blanket, which is a stand-alone version of the *HPMK*'s liner providing provide sustained warmth for several hours. These blankets generate heat through an exothermic reaction and can be placed on (but not directly on the skin) or around the casualty, providing a consistent heat source that helps to raise the body's core temperature. The Ready-Heat Blanket can warm up to about 38 degrees Celsius within 10 to 15 minutes, and then last for about 8 hours. They are most effective when used in conjunction with other insulating materials, such as a *Blizzard Bag* or layers of clothing, which help to distribute the heat evenly and prevent thermal injury.

Another method involves the use of hot water bottles placed strategically around the body in areas such as the groin, armpits, and chest. These bottles should be wrapped in fabric or placed in socks before being applied to the skin to prevent burns. This method is particularly useful in remote environments where access to more sophisticated rewarming equipment may be limited. The popular *Nalgene* water bottle filled with hot water works great. The problem with this is that the water needs to be boiled first to produce heat, and this could be the water that was designated for drinking – meaning more water needs to be carried unless you are adjacent a water source. Active

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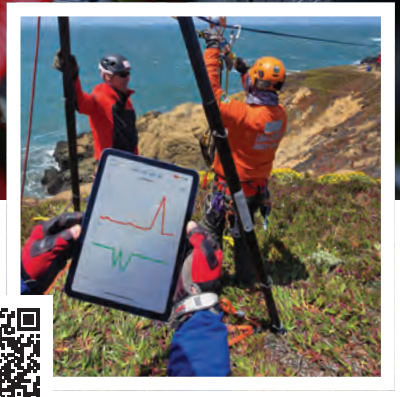

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rewarming is now the standard of care in both civilian and military trauma settings. Prompt application of active warming techniques can stabilise a patient's condition, prevent the onset of more severe hypothermia, and buy crucial time until evacuation to a medical facility can be achieved.

## GROUP SHELTERS AND BOTHY BAGS

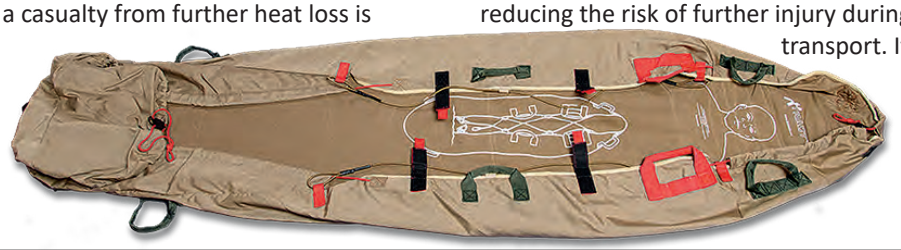
Group shelters, most often in the form of a bothy bag, are an invaluable tool in the fight against hypothermia in outdoor settings. These portable, lightweight shelters are designed to be quickly deployed, providing an immediate barrier against wind, rain, and cold. Framed tents require you to carry poles but in its simplest form may be a tarpaulin sheet that provides a tented roof using string or sticks to provide the pitch (see p30) . Bothy bags are much smaller and lighter than framed tents, effectively a giant plastic bag that works by trapping the heat generated by the people inside, creating a micro-environment that is significantly warmer than the outside air. A lightweight bothy bag is a lifesaver for patient and rescuer alike and is easily carried in a personal kit. Erected in seconds, the collective body heat of multiple occupants helps to raise the temperature inside the shelter, reducing the rate of heat loss from a hypothermic casualty. This is especially effective in windy or wet conditions, where convective and evaporative heat loss can rapidly cool a person down.


By providing a warm, sheltered space, Bothy Bags can prevent further heat loss and advance the process of rewarming the casualty that may already have commenced and at the very least not cause further decline. There are now many of these things aimed at mountaineers and expeditions including *Life-Systems* which has a range of



bothies from 1 to 6-person and two *Ultralight* versions almost half the weight but I use the *Summit Supalite* bothy bag (right) and it's incredibly light, packing down to size of a small loaf of bread. It even has corner loops so you can use it with poles. At the 'luxury' end of shelters, there are now mini inflatable shelters like the UK *Rigloo* and Ireland's *Safeshel* with *Rigloo*'s packing to a large daypack and these are again too large to be considered a personal item. They have the disadvantage of being much heavier than a single skin bothy and need to be inflated but they do offer outstanding protection and versatlity with the ability to open sides to gain access to any part of the patient.

absence of a full rescue team with basket stretchers and all terrain wheels etc., a full evacuation. This would need to be carried with lightweight equipment. We mentioned the *Thermarmour* earlier (left) as a hypolthermia protection but it also has handles and a tow strap for short distance transport. Another option for a true lightweight stretcher system that does not take up too much space in the pack is the *Xtract SR (below)* . The Xtract SR Tactical Stretcher, which can be used by military or search and rescue teams, provides crucial support in situations where traditional stretchers might be impractical or insufficient. It too, is invaluable in hypothermia management, where the need to transport and protect a casualty from further heat loss is important. It can be configured in multiple ways depending on the requirements of the situation. The core fabric stretcher itself weighs about a kilogram, making it lightweight and easy to carry, but it is very strong, with a maximum load capacity of 300 kg. The material of these stretcher are resistant to abrasion and tearing, which is vital when operating in rugged terrains such as mountains, or forests. The stretcher also minimises any movement of the casualty when being moved, which avoids secondary injuries due to the cocoon-like structure created by the stretcher's drawcord system. This system allows the casualty to be securely enveloped, reducing the risk of further injury during transport. It



## CONDUCTING A RESCUE

Along with protecting the patient from the elements there may also be a need to move the patient, either to a safer, less exposed location or, in the

includes multiple carry handles and adjustable shoulder straps, enabling a variety of carrying methods, whether by hand or over the shoulders, which can enable the rescuers to be hands free if needed. The most appropriate carry method is based on the terrain and the casualty's condition. To maximise its effectiveness in hypothermia management, the *Xtract SR* should be used in conjunction with insulating materials such as Blizzard Bags or Mylar blankets. The casualty can be wrapped in these insulating layers before being secured in the stretcher. The drawcord system of the *Xtract SR* allows the insulating layers to be tightly secured around the casualty, creating an effective barrier against the cold. The design of this stretcher allows for the integration of a drag system. This is particularly useful in urban or combat environments where the casualty needs to be moved quickly over rough terrain or through debris.

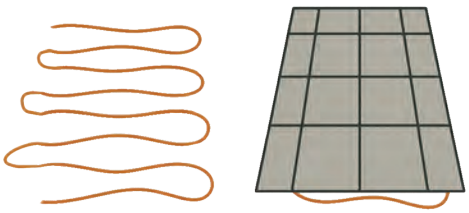
## THE HYPOTHERMIA BURRITO

Another skill for these situations is the Hypothermia Burrito or Hypo-Wrap which is used in wilderness and remote rescue scenarios to effectively insulate and protect a hypothermic casualty from further heat loss. This method involves wrapping the casualty in multiple layers of insulating materials, creating a thermal barrier that helps stabilise their core temperature.

To create a Hypothermia Burrito, a combination of standard rescue equipment and readily available items are used for improvising in the field. This includes rope, tarp, sleeping mat, and a sleeping bag or Blizzard Bag. You could also include a chemical heat blanket or hot water bottle. Ski poles or trekking poles could also be used for rigidity.

The Hypothermia Burrito is made by laying out the rope in a zig-zag fashion on the ground. Place the ski-poles on each side if you choose to use them. Place a tarp over the top, then the sleeping mat and then the unzipped sleeping bag on top with the casualty then laid inside. You could also add the chemical heat blanket or hot water bottle.

The tarp is then wrapped around the patient (like a burrito), and the rope is used to hold everything together. A



dynamic climbing rope seems to work best for this . The zig-zag pattern that was originally made with the rope leaves loops out both sides of the patient. The loops are then joined in the middle in a criss-cross fashion. Now you have your patient secure in the Hypothermia Burrito, made with equipment that is usually carried when hiking or climbing. This technique provides multiple layers of insulation, and the secure wrapping provides comprehensive protection against heat loss. The use of a tarp and sleeping mat protects the casualty from the cold ground and wind, while the sleeping bag or Blizzard Bag retains body heat. Incorporating chemical heat blankets into the burrito provides active warming. The rope wrapping provides a stable and secure package, making it easier to carry the casualty if necessary. The addition of poles or skis either side of the patient (sat on top of the rope 'zig-zag' can further enhance the stability, allowing for safer transport over rough terrain. The materials required for the Hypothermia Burrito are often part of standard outdoor gear, and the method can be easily improvised with available resources. This makes it an accessible and practical solution in a wide range of scenarios.

## TARP SHELTER IN WILDERNESS CONDITIONS

A tarp shelter is one of the most versatile and essential tools for survival and emergency care in wilderness conditions. When properly deployed, a tarp can provide critical protection from the elements, create a micro-environment that conserves heat, and offer a safe space for an overnight stay. The *Superlight Tarp* from *DD Hammocks (pic right)* proved to be very lightweight and compact due to its ripstop nylon, with 3,000mm PU waterproof coating. It also comes with guy rope (which can be forgotten) and some very lightweight tent pegs (also a bonus). The first step with setting up a tarp is selecting an appropriate site and this is just as effective in an alpine snowfield using ski-poles, snow/ice walls and boulders as it is in forest and scrubland. One of the most effective setups for emergency overnight stays is the A-frame shelter because it helps reflect body heat back to you. But in a situation where a medic would need to be checking on the casualty frequently, accessing under an A-frame may prove difficult. In which case a raised A-frame as shown on the left or a lean-to style will make it easier for the medic to frequently check on the casualty. This is also particularly effective at blocking wind. This setup allows for a fire to be built in front of the open side of the shelter, which can provide additional warmth and protection, but care must be taken to ensure it is far enough away to avoid igniting the tarp. Reflective surfaces inside the shelter, such as a *Mylar* blanket hung on the inner wall opposite the fire, can help to bounce heat back towards the casualty, creating a warmer environment.

Maintaining heat within the tarp shelter is critical for the casualty's survival, especially in cold or wet conditions. In addition to providing insulation from the ground, it is important to use additional layers of protection to retain body heat. Wrapping the casualty in a sleeping bag, Mylar blanket, or Blizzard Bag before placing them in the shelter can significantly improve their chances of staying warm.

## OVERNIGHT STAYS IN THE WILDERNESS

When a patient is involved, particularly in a remote or wilderness environment, the decision to stay overnight is not made lightly. It must be based on a thorough evaluation of the situation, with the

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priority always being the safety and well-being of the patient. This includes ensuring their comfort, addressing any immediate medical needs, and preparing for potential long-term exposure with limited resources. The decision to stay overnight in the wilderness with a patient is often dictated by a combination of factors, including the patient's condition, environmental conditions, and the feasibility of evacuation. The first and most critical step is assessing the patient's medical status. If the patient's condition is stable and they can be moved safely, the priority should be to evacuate them to a more secure location as soon as possible. However, if the patient is severely injured, hypothermic, or otherwise in a condition that makes movement dangerous, it may be necessary to set up an overnight shelter and wait for help. Conversely, you may decide that the risk of the patient expiring is greater than the risks in evacuating.

Environmental factors such as weather, daylight, and terrain also play a crucial role in this decision. If nightfall is approaching, the terrain is difficult to navigate, or severe weather is imminent, it may be safer to stay put and wait for daylight or better conditions rather than risking further injury or getting lost. Once the decision to stay overnight has been made, the immediate priority shifts to ensuring the patient's safety and comfort. This begins with setting up a suitable shelter to protect them from the elements. The next step is to focus on the patient's warmth.

When staying overnight with a patient in the wilderness, it's crucial to plan for the possibility of long-term exposure, especially if rescue efforts are delayed. Having this equipment for the casualty is important, but the rescue team or elements that have been tasked to stay with the casualty will need their own 'survival' equipment which should be part a major part of the pack they carried with them as hasty team members (albeit a smaller and lighter pack than a regular team member may have carried. It may be discussed that those returning to base could leave some of their own kit but that might expose them to difficulties if they get injured or stuck on the return journey.

Supplementary equipment for cold environments must be carefully selected to address the specific challenges of managing hypothermia and trauma in the field. A well-equipped medic bag with essential items, a mix of disposable and durable gear, and innovative tools can significantly enhance the effectiveness of rescue operations, ensuring that casualties are kept warm, safe, and stable until they can be evacuated to more comprehensive medical care. From an initial search and subsequent site and hazards scouting point of view, **a small drone has become indispensable** for many teams and these are now 'small' enough for use by a 'first-strike' hasty team. Preparation is the cornerstone of success in any rescue operation, but it is particularly crucial in cold and very hot environments where the risks are amplified by harsh conditions. The ability to respond effectively to emergencies in these settings hinges on thorough preparation, which includes not only having the right equipment but also possessing the knowledge and skills to use it under pressure.

**Training is critical**. Rescue teams need to be well-versed in cold and hot weather survival techniques (depending on the nature of your patch and the season) , hypo/ hyperthermia management, and the use of specialised equipment. Regular training exercises that simulate real-world conditions are essential for building the confidence and competence needed to perform effectively when the stakes are high.

In addition to training, **meticulous planning i**s essential. This includes having personal 'go' packs that can keep you in the field on an overnighter but not so well equipped that you can't carry some ancillary items necessary for the rescue like hypothermia shelter, access equipment and medical supplies. Not all teams use a hasty team system where a fast-moving, lightly equipped sub-team goes out ahead of main team. Some operational areas wouldn't necessarily warrant this, particularly if your patch is quite small but for very large distances and trickier terrain or rescue requirements it can take

some time to assemble the necessary personnel and equipment for a major rescue. All rescue teams should be prepared to adapt their strategies on the fly, because weather conditions can become extreme in a very short space of time. Extremes of cold, hot or wet can not only affect you as individual rescuers they can radically change the environment you're in and adversely affect speed of operation, access to helicopter or vehicular evacuation, access to the casualty and planned egress routes. Most of all they can affect the length of time of the operation and make an extended stay a distinct possibility.

# Carrying Water Filters in the field

by Roland Curll NSW Police Rescue - Australia


When Search and Rescue Teams respond in remote areas it is common practice to carry a sufficient amount of water to stay hydrated and effectively complete the rescue task without becoming a dehydration liability. But teams can often be caught out in the wilderness for longer than expected, and end up using more water than anticipated. This is why teams carry purification options to make use of any viable water source and make it safe to drink. With the ability to purify water on-site, teams are less dependent on supply drops or having to return to base for replenishment, which can be critical in time-sensitive rescue operations if it's even possible. It also means that team members are less likely to try to endure dehydration for longer than they should and becoming an added medical problem.

Some teams respond to the same area frequently and members of that team will have local knowledge about water sources and the level of 'contamination' and how well it responds to purification methods. The problem with even known clean water sources is that they can become very 'unclean' upstream with no obvious changes downstream - wilderness water should ALWAYS be viewed as suspect and run through decontamination measures before drinking. This also allows teams to travel lighter without the literal ton of water that might otherwise be needed to sustain a ten or twenty-person team in the field.

**Even wilderness water should ALWAYS be viewed as suspect**

Water sources will include permanent rivers, lakes, and streams a well as seasonal ponds, puddles and brooks/tributaries. Treatment helps remove pathogens such as bacteria, protozoa, and viruses as well as larger parasites and solids.

Which type of treatment method you use will depend on a number of factors. The water needs to be treated in a way that removes the pathogens that causes human symptoms for water-borne illnesses. Which means that you do *not* need to sterilise.

**Sterilising** is the term for removing all life forms in the water including bacteria, viruses, and spores. This is more common in medical settings and is not necessary to make water safe to drink.

**Disinfecting** means to remove pathogens. It reduces the level of microbial contamination to a level that is deemed safe by public health standards. This can be done with chemicals like chlorine, by boiling water, or by using a UV light.

**Purifying** means to remove all contaminants from the water, creating a high standard of drinking water. This can involve multiple steps in the same 'purification' system such as both chemical treatment and filtration. This will also remove the bad taste and bad odour so that the water is more palatable.

The following are problem water contaminants:

**Bacteria**

- Escherichia coli (E. coli) - Often found in water contaminated with faecal matter, it can cause severe stomach cramps, diarrhea, and vomiting.
- Salmonella - Can lead to salmonellosis, causing symptoms like diarrhea, fever, and abdominal cramps.
- Campylobacter - Another bacteria that can cause gastrointestinal illness and diarrhoea.
- Leptospira - Causes leptospirosis, which can lead to kidney damage, meningitis, liver failure, and respiratory distress.

**Viruses**

- **Norovirus** - Highly contagious and causes gastroenteritis with symptoms like nausea, vomiting, and diarrhoea.
- **Hepatitis A** - A liver disease that can cause symptoms ranging from mild illness to severe liver damage.
- **Rotavirus** - Common cause of severe diarrhoea and dehydration in children.

- **Enterovirus** - Can lead to a range of illnesses, from mild respiratory symptoms to severe conditions like meningitis.

**Protozoa**

- **Giardia lamblia** - Causes giardiasis, leading to symptoms like diarrhoea, gas, and stomach cramps.
- **Cryptosporidium** - Known for causing cryptosporidiosis, which results in watery diarrhoea.
- **Entamoeba histolytica** - Causes amoebiasis, leading to diarrhoea, stomach pain, and sometimes more severe forms of disease.

**Additional Concerns**

- **Cyanobacteria** (blue-green algae) - Not typically a concern for direct infection but can produce toxins harmful to humans and animals if ingested.
- **Chemical contaminants and heavy metals** can also be present, depending on the location and nearby industrial or agricultural activities but remember that virtually nowhere is too remote for illegal dumping! Common risks include lead, arsenic, chromium



## WATER SOURCES

Treating water so that it is safe to drink starts with locating the water. Water that is flowing in sunlight is the best water that requires a minimal amount of treatment. Ensure there is no human or animal waste in the water and as far as possible that there are no obvious potential problems upstream. Unfortunately, in the 'modern' era, you can't even trust an actual water treatment plant not to be contaminating the waterways. A study by the *Water Keeper Alliance* in the USA in 2022 found that 80% of US waterways were contaminated by 'forever-chemcials' and in 2025 another study found that 98% of the US waterways tested were similarly contaminated. This doesn't even take into account sewage contamination from the utility companies actually meant to treat it but which routinely discharge into waterways when 'heavy rainfall' overwhelms their treatment systems. This mainly concerns more urban areas but the previously pristine wilderness lakes in the UK's Lake District feed many streams that subsequently run through remote areas and this occurs the world over. Don't trust any standing or flowing water to be readily drinkable.
Fresh rainwater is a good source of water provided it is not running off plants or other items that may introduce contaminants.

## PERSONAL FILTERS

There are a number of large capacity water filtration systems used more by UAR and disaster response teams. Wilderness teams using personal packs tend to be more self-sufficient and there are many excellent portable filters that rescuers can use, and in some cases, have been using for several decades like the market leading Swiss *Katadyne*. This and the equally venerable *MSR* filters have a manual pump-action that draws water through a short hose placed into a water source that may be difficult to gather into a bottle. Water is pumped through the filter, and into a bottle or container. Another market leader, *Lifestraw,* uses draw-through bottle like the Sawyer Squeeze we'll look at shortly but it also has a larger capacity gravity-feed bag/bladder that runs through a filter as and when you need it - these bladder systems take up minimal space in your pack until needed and can provide greater capacity than personal bottles.

## PRE-FILTER/SIEVING

Treating water begins with removal of solids by filtering, seiving or screening with a fine mesh or cloth. This can also be achieved, or better achieved in the case of the finest particles, using a chemical floccuculant which combines fine particles into clumps large enough to be sieved or screened and is particularly useful for cloudy, stirred up water and removing harmless algae but remember that simply allowing the water to sit for a while will result in heavier particles sinking.

## BOIL

The best method for killing all pathogens is by boiling the water. The *Jetboil* (pic top-right) is great for carrying in a pack for quickly boiling water, hence the name '*Jet*'. It is an all-in-one stove system designed for backpacking. To properly kill all the pathogens the water needs to be at a rolling boil for at least a minute. This boiling time can vary based on altitude. At 2000m altitude above sea level, the water needs to be at a rolling boil for about 3 minutes. Even though boiling water is the best method for killing pathogens, the problem is, that in order to be able to drink the water it needs to be cooled first. If your team happens to operate in a desert- environment where it is 40 degrees Celsius, this means that once the water has finally 'cooled' enough to drink it might still be 40 degrees!


## MICRO-FILTERS

Filtering is the most common way for treating water in the field, but it is only good for removing bacteria. Some viruses cannot be removed by filtering. But some filters can remove viruses if the pore size is small enough or if the water is also treated with chemicals or ultraviolet light.

The *Sawyer Squeeze* (pics top) is a filter system that can be used to drink the water straight away. 'Suspect' water is collected in a standard plastic water bottle found in any supermarket, and the *Sawyer Squeeze* is attached to the top of the water bottle. This filter claims to remove 99.99999% of all bacteria like E. coli, cholera, and salmonella. The filter also claims to remove 99.99999% of all protozoa like cryptosporidium and giardia.


On the left is the *Grayl Geopress*, another filter which allows you to drink the water straight away. The water is gathered in the outer cup/ container and then the filter section is pushed down, kind of like a coffee French-press .

Filters are good for water sources without human or animal waste in it. They are quick to filter the water which is good for when you need to keep moving. The downside to filters is that they can clog up and the filter needs to be cleaned out to remove all the sediment from time to time to keep it in working order.

## Chemicals

Next in the purification ladder are chemicals in liquid, table or granule forms such as the market leading *Aquamira* tablets which is chlorine di-oxide. There are many different chemicals used for this type of water treatment. Chemicals can be quite selective in what they will treat so pay attenntion to the specifics in their small-print. The traditional chemical iodine is not used so much these days because it can cause thyroid problems it's not recommended for pregnant women and some even have an iodine allergy. The problem with chemical purification is that it needs time to work. they are the easiest option but can take from half an hour to multiple hours depending on quantity, temperature, level of contamination and type of chemical. Some leave a taste which can be mitigated or even removed by some filters in the water. The *Water Decon Kit* from *Cana Provisions* is a small combination kit that fits in a pocket. It has generic purifying tablets and compressed towelettes which can be held over your water container for screening or pre-filtering of the contaminated water. There are also alcoholic wipes for sterilising, and some anti-diarrhoeal tablets in case you drank some contaminated water before you got a chance to purify it properly.

## ULTRAVIOLET (UV) LIGHT

Ultraviolet light prevents bacteria and viruses from reproducing, but it is not as effective for viruses as it is with bacteria. UV-C light disrupts the DNA and RNA of the pathogens. This is done without altering the taste, odour, or chemical composition of the water. The *Steripen* (below) is a UV water purifier that destroys bacteria, viruses, and protozoa (such as Cryptosporidium or Giardia). The suspect water is gathered into your bottle and with the Steripen dipped in, takes about 48 seconds to work. Water treated by UV should be a dark bottle because, paradoxically, exposing the water to sunlight for an extended period can cause the bacteria and viruses to reactivate and start reproducing again. They also require batteries and have electronic components, meaning they need a power source. The UV bulb needs to be kept clean and protected from damage via rough handling, impacts and dropping. When using a UV light, the contaminated water needs to be relatively clear to be effective because the particles can shield the microorganisms from the UV light so a pre-screen/filter is required.

## CONCLUSIONS

The very best purification is a combination of filtering, boiling, chemical treatment and/or UV light. Teams should have at least two of these options within their ranks if not as a team-measure. The unique demands of search and rescue require teams to stay hydrated in order to remain alert and maintain high levels of physical and mental stamina. Always follow the instructions for the specific product you are using because no one filter will treat ALL contaminants that might lead to you becoming incapacitated and a possible liability for your team or the casualty(ies) you were originally sent to help.

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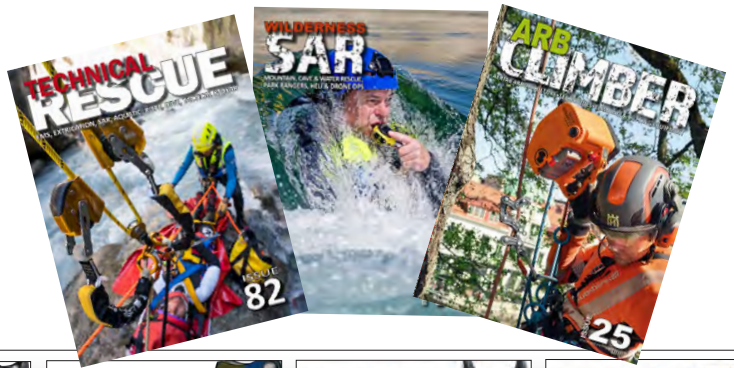


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# WATER RESCUE THROW BAGS

## WITH FLOATING ROPE

Most throwbags are designed to be floating throw-weights that deploy a floating rope as they fly and when they reach their intended target in the water, can be easily grabbed and subsequently towed back to shore/safety by the rescuer. It's a fine line between a professional water rescue throwbag and a sports throwbag - they're designed to be lifesaving tools for canoeists/kayakers in particular but for our purposes, to whittle down the myriad of choices, we've gone for companies that manufacture products for professional rescue services so you know they have a decent pedigree. We have therefore excluded a number of sports models and sports companies (with the exception of *Hiko)* that produce bags that might easily cross over into professional rescue like *Astral*, *HF, Kokotat, PeakUK, NoName* and *Water Element* but these will be in our updated version of this article in the **WATER RESCUE BUYERSGUIDE** which will then be continually updated with new models and no doubt increasing prices. While any throwbag can also be used to deploy a small diameter carrier line we have not included carrier-line-specific bags/kits.

Rope Diameters from 6 to 10mm in lengths from 15m/50feet to around 25m/80feet for general use but some will be considerably longer to allow for long downstream pendulums or ferry lines etc. and one, *RnR's Urban Micro* has 9m/30ft for close-quarter throws in congested areas. Some, which we'll mention later are designed like giant throwbags to carry throwlines up to 100m(often as a backpack) but these are for long ferry and downstream control etc. rather than throwing the actual bag. The thicker the rope, the easier it is to grip but it will also be heavier and cannot be thrown so far as a small diameter rope but don't forget that skilled operators will be 'placing' the bag in flow that will then run down to the desired target area. Whatever you choose, it is imperative that any new bag & rope combination are practiced with first on dry land to ascertain their performance in flight and how freely the chosen rope deploys from the bag and then in water to discern how they both function and feel when saturated. Such rope will float for a considerable time but some will lose a degree of flotation the longer they are in the water and you may find some creeping towards neutral buoyancy. The combination of bag and rope is therefore quite important and most companies only offer their bags ready filled with a rope that they have decided provides best fill, flight and recovery characteristics. However, virtually all will seel you just the bag if want it. We have a separate guide to Water Rescue ropes including throwlines in our **WATER RESCUE BUYERSGUIDE**.



### THROW-TECHNIQUE

Unless you're bypassing a physical throw by using a line-launcher or a drone to carry the rope/flotation-aid out to the casualty (both very valid options), you'll be flinging these things out with grace and accuracy. This will either be underarm or overarm whilst keeping firm hold of the shore-end of the rope. An underarm action grasping the cuff/collar like the *Yak* bag in the top picture or holding a handle like the

# WATER RESCUE THROWBAGS

*Force 6* on the right and then uses a vertical pendulum sling-action which can also be a more horizontal side-arm throw. Those with a sporting background can get greater distance and/or accuracy with an overarm cricket or baseball throwing action but to the uninitiated these can be too aggressive - you don't want to hit the casualty in the face with a 30mph missile and knock them unconscious. Some may use the more unconventional windmill or cricket bowling action if that gives them greater accuracy but the aim is to throw the bag *beyond* the casualty NOT fall short which can be the case with an underarm or 'windmill' throw with too much height. Plenty of practice in open areas to achieve maximum throw distance and in more congested areas with trees and bushes to test your accuracy will hone your throwing skills and get you used to the dangers of strong winds and gusts and wind direction before hitting the river.

In the *IONIC* picture below and the *Yak* and *WRS Int* pictures opposite you can see the cinched collar type of bag with an obvious drawcord/ toggle-cord or poppered webbing formed waist - you grasp the bag above that waist when throwing. *NRS below* and *the Force6 bag opposite* have a handle formed by connecting a *Fastex* buckle across from one side to the other. Another variation is *SRE (Northern Diver's) Pro* bag (right) which has a circular handle cut into the top cuff which otherwise holds itself open for repacking the rope. The *Force6* bags also have two finger-loops that help you hold open the bag while restuffing. Repacking water rescue rope can be an urgent requirement if you've missed with your first throw and there are no backup throwers or bags. In the picture bottom left, running the rope over your shoulder means it will drop vertically into the back while you juggle holding the bag open with pulling/pushing rope into the bag. However, with non-mesh bags it may be possible to simply scoop up half a bag of water and use that to provide weight for a re-throw that doesn't involve repacking the rope.


## THROWLINES

Throwlines may be braided in the larger diameters with a sheath and a core or hollowbraid in which the braided 'tube' of rope represents the whole diameters with no distinct core. Materials are either floating polyproylene which is otherwise a relatively weak fibre married to Dyneema or spectra in the more expensive ropes to add strength and restrict stretch but not too much because a degree of dynamic energy is vital in moving water operations. Some do use the more usual combinations of nylon or polyester for the sheath or core but these materials will sink unless there is also some form of polypropylene, polyolefin (neoprene) or polyethylene in the construction to provide floatation. Not all bags float when first purchased - some require a foam disc or similar adjunct to be added to the bag. Unlike water rescue ropes that are designed to be used with hardware like ascenders, pulleys and belay devices and will support a suspended bodyweight, throwlines are only dealing with the weight of a person or craft supported in water. Consequently the breaking load tend to range from 10 to 15kN rather than the 22 to 30kN of a typical abseil/ rappel rope. BUt some can do both and we show ropes capable of being used with camming hardware with a black diamond♦ **Don't forget that rope deteriorates from the moment you start using it so knots reduce the strength and wear & tear may half your viable loading within a couple of years**.


## WAISTBELTS

QRS or Quick Release Belts are a common accessory if you are not attaching the bag directly to your pfd. Some throwbags have an integrated quick release belt or a detachable bag that comes with the bag like the *SRE/NDiver* and *Yak* bags (above) shown as a solid green square ■ in our tables but most have an optional belt in their range shown as a green outline square□. *WRS, NRS, WWTC* etc. have more expansive waist belts that provide a quick release housing for a separate throwbag - they're designed to fit their own bags obviously but this is a very fast and convenient way to swap out different rope lengths or rope strengths

## BAG FEATURES

Aside from differing rope diameter and length, throwbags tend to be HD Nylon/Cordura or the smoother, lighter denier ripstop nylon or Packcloth and incorporate some of the following:

1) **HIGH VISIBILITY,** many with reflective bands some are even luminous so that they can more easily be seen in flight and in the water in full sun and low (or no) light. SOLAS is the current gold-standard with marine-grade, high reflectivity even when wet.

2) **A HANDLE/LOOP, GRAB-STRAP** or a **CINCHED COLLAR** on the top for rescuers to carry and throw the bag, **We have not counted the rope tied through the base as a 'handle'** even though the bag cab be carried and thrown via this loop as long as the rope is tied off (as it should be). separate rescuers 'handle' may be a closed loop, webbing joined by a buckle so that it can also be used to stow the bag by clipping to your pfd or watercraft or it may be a circular cut-out in the top cuff like the aforementioned SRE Pro bag.

3) **A ROPE EYE with sewn reinforcement or a plastic/metal grommet** in the base through which the end of the rope is threaded and tied off with a handhold loop. Some grommets/eyes are mounted on the side so that the bag can stand on its base and some may have double eyes to create a rope loop without a bulky stopper knot on the outside as with the *Ionic* model on the right.

4) **TOP CLOSURE** to keep the rope in the bag. Mostly a drawcord with toggle which you slacken off to allow easy release and repacking of the rope into the bag but some may be velcro and even a zip though not in our selection. Some will have the additional webbing 'handle' with fastex-buckle-style closure which can clip through the throw-rope loop to stop it reeling out accidentally.

5) **CLEAR LENGTH MARKING**. This can be colour-coding of bags within teams but it is best to have clear visual numbers to indicate the rope length unless all of your bags are the same!

6) **FAST DRAINING**. While extra water weight can assist with throw distance, it is, for the most part, more desirable to have rope drain out of the bag rapidly so that can dry quickly post-operational use. Some bags have a full mesh outer, most have large eyes but these can be mostly occluded by the rope itself being passed through to provide a grab-loop. The slightly more open weave on some, even if it's not immediately apparent, will also be more conducive to water draining out of the bag although this can be 'mitigated' by the use of a shiny inner surface coating or material that aids the fast exit of the rope from the bag.

**OTHER FEATURES**:

**LASH TABS** on some to customise attachment options either to the bag or of the bag to a belt/larger bag/PFD etc. The SRE bag below has a water-activayed LED attached to its lash tab. Some nags may have a lightweight **CLIP** for attaching to a PFD, boat gunwale etc.

**LIGHTING ATTACHMENT.** Any form of lighting can be attached to most bags by some means but there are a few specific measures of which chemical light sticks are the commonest**.** Many bags have elastic loops, as on the *Ionic* model right and the *Force6* title shot. *North Water*'s Pro wedge bags show a lightstick inside the bag but visible through the mesh - so it's certain not to fall off. One range - the *MARSARS Second Chance* bag has a version with a waterproof LED embedded in the base which seems like a good idea but hasn't really been adopted elsewhere although SRE has the optional V3 FlexiLight (Left). Incidentally, in case you thought we had lost *MARSARS*, it is now owned by *RPI inc*.

**SPECIALS**

*SRE* (*Northern Diver*'s rescue range) have some much larger throwline bags; we could have mentioned virtually any water proof backpack or roll-top bag in this context but these are specifically designed to carry and deploy water rescue throwline but not by throwing the actual bag, though you undoubtedly could if push came to shove! **We have not included this type of bag** in this article but they are in the **WATER RESCUE BUYERSGUIDE** version**.** The bag pictured on the right carries 100m/320ft of rope and they have others housing 200m/660ft, and 60m/196ft.


The *MARSARS Second Chance* bag (above) and one of the *RQ3* bags, includes a floating ball that is intended to provide an immediate weighted re-throw option should the first attempt fail or fall short. Like the water-filled bag technique, this means you can rethrow without restuffing the bag.


Not all bags are simply bags of rope. At least one is an active rescue measure because it supplies a lightweight, self-inflating 'collar' to the casualty offering 80Newtons/18lbs of positive floatation in addition to the means for a tow back to safety. *QUICKCOLLAR PRO* was mentioned in our swiftwater rescue article in WSAR13 but has only recently become a commercially available product. We have seen inflatable products before, including a cinching collar but this is the first to properly integrate a suitably sized floatation collar with a floating rope and throwbag as a complete package.

## IN THE FOLLOWING TABLES:.....

**COST**: Approximate. Includes local taxes, generally rounded up to the nearest Pound£, US Dollar$ or Euro€ £$€=currency conversions only - no duty/shipping etc

**ORIGIN**: country of the company selling the item, not necessarily the same as the place it is made which is shown as an inset flag where we know.

**ROPE CAPACITY**: Throw bags are mostly relatively small and defined by the length of rope they can hold. This will obviously vary with the diameter if you opt for a smaller of larger diameter than that supplied or intended.

**ROPE DIAMETER (& Type)** The intended rope diameter as defined by the length of rope it will house. If the bag comes with a rope the materials will be shown as PA for Nylon, PES for polyester and PP for Polypropylene with the sheath in black and the core in burnt orange. **Knots will decrease load figures**.

**WEIGHT:** empty with no rope or including rope for the majority of models that are only available with the supplied rope

**DIMENSIONS**: Height and width, maybe depth front-to-back if the bag is not a cylindrical shape. These figures are for the body of the bag and do not include extraneous handles and loops

**FLOTATION ■ :** Integral foam or similar to keep the empty bag afloat. Those without integral flotation may have a foam disc added or the bag's material will have just enough flotation to stay visible because it will always have at least a short section of rope tied into it.

**RING/EYE**INSIDE**:** Attachment points for the rope end or webbing etc. on the outiside or inside in grey. **CHEM-EYE ■** an elastic loop(s) intended for attaching a chem-stick marker light.

**HANDLE ■** Not all have a handle, as previously mentioned the top of the bag may be cinched to create a 'skirt' of material to grasp for throwing. ■ A web strap with fastex-style buckles that works as a handle and a method of attachment to PFD etc.

**BELT ■** Some bags come with a quick-release waist belt or this will be an option □ . **BELT LOOP ■** obviously present on bags with a belt/ belt option but sewn loops that allow you to add your own web belt. Usually flush to the bag as distinct from a sewn eye intended as an outside carabiner/clip point.

**LASH TAB ■** A plastic, square panel with slots that enable you to insert webbing (with quick-release buckles) for securing the bag to PFD etc. or securing something to the bag.

**CLOSURE:** Mostly draw cord closures with a toggle but there are other options: Velcro (lower case velcro if unbranded), Press-stud/Popper, Zipped or Buckle. Sometimes the handle or attachment using Fastex plastic buckles (or lower case if unbranded) doubles as the bag closure. The bag needs to range from single-rope width to fully open for re-stuffing.

**BASE ROPE EYE/GROMMET ■** An eye in the base of the bag through which the rope is passed to be tied off. If there are two eyes, an external loop can be formed and the rope tied off inside the bag.

**REFLECTIVE:** light reflective trim to provide high visibility. SOLAS is marine grade.

**ROPE FOR USE WITH HARDWARE**: means that the rope is strong enough to be used in z-rigs, highlines etc. with pulleys and rope grabs etc.

**NSW Surf Life Saving Team using two Bigwater throwbags connected to each other to make a longer line to attach to a rescue raft for a tether system to control it.** ***Photo by Alan Carrette Big Water Safety Equipment***

**The Australasian Rescue Organisation hosted an Australian Water Rescue Challenge (AWRC) and Australian Boat Rescue Challenge (ABRC) which was held at the Penrith Whitewater Stadium (Near Sydney Australia) over Friday the 17th and Saturday the 18th of October 2025. Most of the Australian state swiftwater response teams attended and competed in a number of challenging swiftwater rescue scenarios using a mixture of crafts and rescue techniques.**

**Challenge results:**

| | |
|---|---|
| **1st place** | **Queensland Fire and Rescue** |
| **2nd place** | **New South Wales Fire and Rescue** |
| **3rd place** | **mixed NSW Police/NSW Fire and Rescue/NSW Surf Life Saving Team** |

# WATER RESCUE THROWBAGS


Photo by Alan Carrette Big Water Safety Equipment

**Images NOT to Scale**
£$€ any price in 'burnt-orange' is a **Currency conversion only**-exc shipping, duties,taxes etc.
Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | ALP DESIGN | ALP DESIGN | ASPLI SAFETY | BIGWATER |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Mini Chance+ 15<br>124R | Marmore + 15<br>010R | Throwbag 25<br>000801 | Compact 20<br>9F86FBE920 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £43 $55 €50 | £74 $94 €85 | £42 $56 €48 | £47 A$95 $62 €54 |
| ROPE CAPACITY | 15m/50' | 15.5m/51' | 25m/82' | 20m/66' |
| ROPE DIA TYPE if sold as set- sheath/core | 6mm ¼" PP ~3.9kN | 8mm 5/16" PP 5.5kN | 8mm 5/16" PP/PP DB 7.9kN | 8mm 5/16" PP/PP DB 7.5kN |
| WEIGHT with specified rope BAG ONLY | 246g 8.7oz | 578g 8.7oz | ~1.3g 2.9lb | 600g 1.32lb |
| DIMENSIONS | 11 x 10cm<br>4.3 x 3.9" | 65 x 22cm<br>25.5 x 8.6" | 50 x 10cm<br>19.7 x 3.9" | 20 x 10cm<br>7.9 x 4" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | --- | 1-- | --- | 1-- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - - | - | -- - | ----- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord | toggle-cord x2 | | toggle-cord x2 |
| BAG MATERIALS REFLECTIVE | PVC & Mesh | PVC/Cordura | nylon | nylon |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | | Waist belt pouch included | | |
| WEBSITE | alpdesign.it | alpdesign.it | aspli.com | bigwater.com.au |

**Images NOT to Scale**
£$€ any price in 'burnt-orange' is a **Currency conversion only**-exc shipping, duties,taxes etc.
Prices in GREEN are for the bag & Rope
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**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
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**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | BIGWATER | BIGWATER | BLUEWATER | BLUEWATER |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Large Waist 15-20<br>93B0134D | QR Waist 15-18<br>6E453347 | Throwbag ¼"Sm 15<br>598607 | Throwbag ⅜"Sm 15<br>598605 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £28 A$55 $36 €31 | £45 A$90 $58 €51 | £47 $66 €53 | £84 $110 €95 |
| ROPE CAPACITY | 20m/66' | 20m/66' | 15m/50' | 15m/50' |
| ROPE DIA TYPE if sold as set- sheath/core | 9m ⅜" | 9mm ⅜" | 6.5mm ¼" PP 4.4kN | 9.5mm ⅜" PA/Dyn 22kN |
| WEIGHT with specified rope BAG ONLY | 170g 6oz | 320g 11.3oz | 0.7kg 1.54lb | 680g 1.5lb |
| DIMENSIONS | 30 x 12cm<br>11.8 x 4.7" | 30 x 12cm<br>11.8 x 4.7" | 24.1 x 14cm<br>9.5 x 5.5" | 24.1 x 14cm<br>9.5 x 5.5" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | --* | --* | --- | --- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | -- -- | -- -- | - --- | - --- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord x2 | toggle-cord x2 | toggle-cord x2 | toggle-cord x2 |
| BAG MATERIALS REFLECTIVE | nylon SOLAS | nylon SOLAS | Cordura® nylon | Cordura® nylon |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | **BAG ONLY**<br>38mm web belt.<br>*Luminous strip | **BAG ONLY**<br>Quick-Release Waist instead of simple web belt.<br>*Luminous strip | *BW Suregrip* | ♦ NFPA *BW Suregrip* |
| WEBSITE | bigwater.com.au | bigwater.com.au | bluewaterropes.com | bluewaterropes.com |

# WATER RESCUE THROWBAGS

| BIGWATER |
|---|
| **Boat Rescue 20** |
| BB09CCB220 |
| £47 A$95 $62 €54 |
| 20m/66' |
| m 5⁄16" PP/PP DB 7.5kN |
| 650g 1.43lb |
| 26 x 11cm<br>10.2 x 4.3" |
| ■ -- |
| - ■ --- |
| toggle-cord ■ x2 |
| nylon ■ |
| |
| bigwater.com.au |

| BIGWATER |
|---|
| **Waist Rescue 20** |
| 0085247B20 |
| £50 A$100 $65 €56 |
| 20m/66' |
| 8mm 5⁄16" PP/PP DB 7.5kN |
| 670g 1.43lb |
| 26 x 11cm<br>10.2 x 4.3" |
| ■ -- |
| -- ■ -- |
| toggle-cord ■ x2 |
| nylon ■ |
| |
| bigwater.com.au |

| BIGWATER |
|---|
| **Large Waist 15-20** |
| 93B0134D20 |
| £51 A$103 $67 €58 |
| 20m/66' |
| 9m 3⁄8" PP 13kN |
| 850g 1.87lb |
| 30 x 12cm<br>11.8 x 4.7" |
| ■ --* |
| -- ■ -- |
| toggle-cord ■ x2 |
| nylon ■ SOLAS |
| NFPA-rope. 38mm web belt.<br>*Luminous strip |
| bigwater.com.au |

| BIGWATER |
|---|
| **QR Waist 15-20** |
| 6E4534720 |
| £68 A$138 $89 €78 |
| 20m/66' |
| 9mm 3⁄8" PP 13kN |
| 850g 1.87lb |
| 30 x 12cm<br>11.8 x 4.7" |
| ■ --* |
| -- ■ -- |
| toggle-cord ■ x2 |
| nylon ■ SOLAS |
| NFPA-rope. Quick-Release Waist instead of simple web belt. *Luminous strip |
| bigwater.com.au |

| BIGWATER |
|---|
| **Compact 20** |
| 9F86FBE9 |
| £23 A$45 $29 €26 |
| 20m/66' |
| 8mm 5⁄16" |
| 75g 2.65oz |
| 20 x 10cm<br>7.9 x 4" |
| ■ 1-- |
| ----- |
| **BAG ONLY** |
| bigwater.com.au |

| BIGWATER |
|---|
| **Boat Waist Rescue 20** |
| BB09CCB2 0085247B |
| £24 A$47 $31 €27 |
| 20m/66' |
| 8mm 5⁄16" |
| 100135g 3.54.76oz |
| 26 x 11cm<br>10.2 x 4.3" |
| ■ -- |
| -- ■ -- |
| toggle-cord ■ x2 |
| nylon ■ |
| **BAG ONLY**<br>Boat= as Waist except top handle rather than waist belt |
| bigwater.com.au |

| BLUEWATER |
|---|
| **hrowbag ¼"Lg 22** |
| 598607 |
| £62 $81 €70 |
| 22m/75' |
| 6.5mm ¼" PP 4.4kN |
| 1.1kg 2.5b |
| 33 x 16.5cm<br>13 x 6.5" |
| ■ -- ■ |
| ■ ■ - ■ - |
| toggle-cord ■ x2 |
| Cordura® nylon ■ |
| *BW Suregrip* |
| luewaterropes.com |

| BLUEWATER |
|---|
| **Throwbag ⅜"Lg 22** |
| 598607 |
| £107 $140 €121 |
| 22m/75' |
| 9.5mm ⅜" PA/Dyn 22kN |
| 1.1kg 2.5lb |
| 33 x 16.5cm<br>13 x 6.5" |
| ■ -- ■ |
| ■ ■ - ■ - |
| toggle-cord ■ x2 |
| Cordura® nylon ■ |
| ♦ NFPA *BW Suregrip* |
| bluewaterropes.com |

| CMC |
|---|
| **EZ-Stuff S 15** |
| 433574 |
| £108 $142 €122 |
| 15m/50' |
| 7.5mm 19⁄64" PP/Dyn 15kN |
| 567g 1.4lb |
| 22 x 15.2cm<br>8.5 x 6" |
| ■ --- |
| ■ ■ --- |
| toggled cord * |
| Cordura® nylon ■ |
| * side-mounted grommet<br>♦ *CMC NFPA Throwline*<br>3-Sigma MBS |
| cmcpro.com |

| CMC |
|---|
| **SRT Bag 15** |
| 291275 |
| £97 $127 €110 |
| 15m/50' |
| 9.5mm >3⁄8" PA/PP 13kN |
| 907g 2lb |
| 25 x 15.2cm<br>10 x 6" |
| ■ --- |
| ■ ■ --- |
| toggled cord ■ |
| Packcloth ■ |
| ♦ *CMC SRT Throwline*<br>3-Sigma MBS |
| cmcpro.com |

| CMC |
|---|
| **SRT Bag 23** |
| 291250 |
| £125 $165 €143 |
| 23m/75' |
| 9.5mm >3⁄8" PA/PP 13kN |
| 1.4kg 3.1lb |
| 33 x 18cm<br>13 x 7" |
| ■ --- |
| ■ ■ --- |
| toggled cord ■ |
| Packcloth ■ |
| ♦ *CMC SRT Throwline*<br>3-Sigma MBS |
| cmcpro.com |

| CMC |
|---|
| **SRT Bag 30** |
| 291100 |
| £158 $208 €180 |
| 30m/100' |
| 9.5mm >3⁄8" PA/PP 13kN |
| 1.7kg 3.74lb |
| 39 x 17cm<br>15.5 x 6.5" |
| ■ --- |
| ■ ■ --- |
| toggled cord ■ |
| PP Mesh ■ |
| ♦ *CMC SRT Throwline*<br>3-Sigma MBS |
| cmcpro.com |

**Images NOT to Scale**
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=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | CMC | CMC | CMC | CMC |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | NFPA Bag 15<br>291750 | NFPA Bag 23<br>291775 | Redi-Line Bag 15<br>291350 | Redi-Line Bag 23<br>291375 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £99 $130 €112 | £132 $173 €150 | £77 $102 €89 | £93 $122 €106 |
| ROPE CAPACITY | 15m/50' | 23m/75' | 15m/50' | 23m/75' |
| ROPE DIA TYPE if sold as set- sheath/core | 7.5mm 19/64" PP/Dyn 15kN | 7.5mm 19/64" PP/Dyn 15kN | 11mm 7/16" PP HB 10kN | 11mm 7/16" PP HB 10kN |
| WEIGHT with specified rope BAG ONLY | 539g 1.2lb | 765g 1.7lb | 822g 1.8oz | 1.2kg 2.64lb |
| DIMENSIONS | 20 x 15.2cm<br>8 x 6" | 25 x 15.2cm<br>10 x 6" | 25 x 15.2cm<br>10 x 6" | 33 x 18cm<br>13 x 7" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | - | - | - | - |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - | - | - | - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggled cord | toggled cord | toggled cord | toggled cord |
| BAG MATERIALS REFLECTIVE | Packcloth | Packcloth | Packcloth | Packcloth |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE<br>NOTES | *CMC NFPA Throwline*<br>3-Sigma MBS | *CMC NFPA Throwline*<br>3-Sigma MBS | *CMC Redi-Line* | *CMC Redi-Line* * |
| WEBSITE | cmcpro.com | cmcpro.com | cmcpro.com | cmcpro.com |

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**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs



| MANUFACTURER | FORCE 6 | FORCE 6 | FORCE 6 | FORCE 6 |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | K2 23<br>B150 & B140 | Compact 23<br>B10x | Standard 23<br>B120 & B130 | Pro NFPA 23<br>B125 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £39 $50 €45 | £49 $63 €56 | £58 $75 €67 | £124 $160 €141 |
| ROPE CAPACITY | 23m/75' | 23m/75' | 23m/75' | 23m/75' |
| ROPE DIA TYPE if sold as set- sheath/core | 9mm 3/8" PP 5.3kN | 6mm 1/4" PP 4.5kN | 9mm 3/8" PP 8.5kN | 9.5mm/3/8" PA/PP 14.6kN |
| WEIGHT with specified rope BAG ONLY | 966g 2.12lb | 482kg 17oz | 1.06kg 2.3lb | 1.1kg 2.45lb |
| DIMENSIONS | 33 x 15.2cm<br>13 x 6" | 25.4 x 14cm<br>10 x 5.5" | 30.5 x 20.3cm<br>12 x 8" | 30.5 x 20.3cm<br>12 x 8" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | 2- | - | - | - |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - - | - - | - - | - - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggled cord | toggled cord | toggled cord | toggled cord |
| BAG MATERIALS REFLECTIVE | 600D Polyester | 500D nylon | 500D nylon | 500D nylon/mesh |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE<br>NOTES | | Bag will rotate so lights are uppermost in water | Bag will rotate so lights are uppermost in water | *Sterling Grabline*<br>twin lightstick mounts.<br>Bag will rotate so lights are uppermost in water |
| WEBSITE | force6.com | force6.com | force6.com | force6.com |

# WATER RESCUE THROWBAGS

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| **CMC** | **CMC** | **CMC** | **CMC** | **FORCE 6** | **FORCE 6** |
| **EZ-Stuff S 15**<br>433574 | **Throw Bag S 15**<br>433135 | **Throw Bag M 23**<br>433150 | **Throw Bag L 30**<br>433175 | **Mini Dart 15**<br>B205 | **Dart 15**<br>B20x |
| £33 $43 €37 | £26 $34 €30 | £26 $35 €30 | £31 $41 €36 | £34 $44 €39 | £55 $70 €62 |
| 15m/50' | 15m/50' | 23m/75' | 30m/100' | 15m/70' | 21m/70' |
| 8mm ⅜" | 8mm 5⁄16" | 8mm 5⁄16" | 8mm 5⁄16" | 6mm ¼" PP 4.67kN | 6mm ¼" PP 4.67kN |
| 119g 4.2oz | 106g 3.7oz | 117g 4.3oz | 150g 5.3oz | 250g 8.8oz | 470g 1.04lb |
| 22 x 15.2cm<br>8.5 x 6" | 20 x 15.2cm<br>8 x 6" | 25 x 15.2cm<br>10 x 6" | 33 x 17cm<br>13 x 7" | 20.3 x 14cm<br>8 x 5.5" | 28 x 15.2 x 7.6cm<br>11 x 6 x 3" |
| ■ --- | ■ --- | ■ --- | ■ --- | ■ 1 -- | ■ 1 -- |
| ■ ■ --- | ■ ■ --- | ■ ■ --- | ■ ■ --- | - ■ - ■ - | - ■ - ■ - |
| toggled cord * | Velcro | Velcro | Velcro | Press-Stud + Zip ■ x2 | Press-Stud + Zip |
| Cordura® nylon ■ | Packcloth ■ | Packcloth ■ | Packcloth ■ | 600D nylon ■ | 600D nylon ■ |
| **BAG ONLY**<br>side-mounted grommet | **BAG ONLY** | **BAG ONLY** | **BAG ONLY** | Weight forward design makes Dart fly like a football | ■ Weight forward design makes Dart fly like a football |
| cmcpro.com | cmcpro.com | cmcpro.com | cmcpro.com | force6.com | force6.com |

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=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs



| MANUFACTURER | FOX 40 | FOX 40 | HIKO | HIKO |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Rescue Throwbag 15<br>7907-0102 | Rescue Throwbag 27<br>7909-0302 | Falcon 10<br>71601_ONE | Falcon 15<br>71611_ONE |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £14 $30 €26 | £20 $38 €33 | £53 $70 €58 | £58 $77 €64 |
| ROPE CAPACITY | 15m/50' | 27m/90' | 10m/33' | 15m/50' |
| ROPE DIA TYPE if sold as set- sheath/core | 9.5mm ⅜" PP/PP 3.2kN | 9.5mm ⅜" PP/PP 3.2kN | 8mm ⅜" PP/PP DB 8kN | 8mm ⅜" PP/PP DB 8kN |
| WEIGHT with specified rope BAG ONLY | 341g 12oz | 1kg 2.2lb | ~420g 0.9lb | ~520g 1.15lb |
| DIMENSIONS | ~25 x 10cm<br>~10 x 4" | ~27 x 12cm<br>~10.6 x 4.7" | ~16 x 10 x 6cm<br>6.3 x 4 x 2.5" | ~18 x 10 x 6.3cm<br>7 x 4 x 2.5" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ -- | ■ -- | ■ 12- | ■ 12- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | ■ ---- | ■ ■ □ ■ - | --□■- | --□■- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggled cord ■ | toggled cord ■ x2 | Web/fastex ■ x2 | Web/fastex ■ x2 |
| BAG MATERIALS REFLECTIVE | Nylon | Nylon ■ | Cordura ■ | Cordura ■ |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | | | Bespoke optional Waist Belt can be connected via rope loop and top-eye | Bespoke optional Waist Belt can be connected via rope loop and top-eye |
| WEBSITE | fox40world.com | fox40world.com | hikosport.com | hikosport.com |

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= Option
**HANDLE**= ADDITIONAL to rope loop
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**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs



| MANUFACTURER | HIKO | HIKO | HIKO | HIKO |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Eagle 20<br>71521_ONE | Eagle 25<br>71531_ONE | Cone 15<br>77400 | Cone 20<br>77500 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £71 $94 €78 | £72 $95 €84 | £42 $55 €46 | £49 $65 €54 |
| ROPE CAPACITY | 20m/65' | 25m/82' | 15m/50' | 20m/65' |
| ROPE DIA TYPE if sold as set- sheath/core | 10mm >⅜" PP DB 10kN | 10mm >⅜" PP DB 10kN | 8mm 5/16" PP 8kN | 8mm 5/16" PP 8kN |
| WEIGHT with specified rope BAG ONLY | ~810kg 1.8lb | ~1.1kg 2.4lb | ~512g 1.1lb | ~600g 1.32lb |
| DIMENSIONS | 26 x 14 x 8cm<br>10.2 x 5.5 x 3.1" | 29 x 14 x 8cm<br>11.4 x 5.5 x 3.1" | 26 x 11cm<br>10.2 x 4.3" | 34 x 12cm<br>13.3 x 4.7" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ 12- | ■ 12- | ■ -- | ■ -- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | --□■- | --□■- | --□■- | --□■- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | Web/fastex ■ x2 | Web/fastex ■ x2 | toggle-cord ■ | toggle-cord ■ |
| BAG MATERIALS REFLECTIVE | Cordura ■ | Cordura ■ | Cordura ■ | Cordura ■ |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | Bespoke optional Waist Belt can be connected via rope loop and top-eye | Cone shaped top for easier restuffing | Cone shaped top for easier restuffing. Eyes for clipping connector through bag & rope loop | Cone shaped top for easier restuffing. Eyes for clipping connector through bag & rope loop |
| WEBSITE | hikosport.com | hikosport.com | hikosport.com | hikosport.com |

# WATER RESCUE THROWBAGS

| HIKO |
|---|
| **Hawk 10** 71301_ONE |
| £56 $74 €62 |
| 10m/33' |
| 0mm >⅜" PP HB 10kN |
| ~530g 1.2lb |
| 20 x 12 x 7cm 7.8 x 4.7 x 2.75" |
| 12- |
| - - - |
| Web/fastex x2 |
| Cordura |
| spoke optional Waist Belt an be connected via rope loop and top-eye |
| hikosport.com |

| HIKO |
|---|
| **Hawk 15** 71311_ONE |
| £62 $82 €68 |
| 15m/50' |
| 10mm >⅜" PP HB 10kN |
| ~580g 1.3lb |
| 24 x 12 x 7cm 9.4 x 4.7 x 2.75" |
| 12- |
| - - - |
| Web/fastex x2 |
| Cordura |
| Bespoke optional Waist Belt can be connected via rope loop and top-eye |
| hikosport.com |

| HIKO |
|---|
| **Hawk 20** 71321_ONE |
| £67 $88 €74 |
| 20m/65' |
| 10mm >⅜" PP HB 00kN |
| ~620g 1.4lb |
| 26 x 14 x 8cm 10.2 x 5.5 x 3.1" |
| 12- |
| - - - |
| Web/fastex x2 |
| Cordura |
| Belt not included |
| hikosport.com |

| HIKO |
|---|
| **Hawk 25** 71331_ONE |
| £72 $95 €80 |
| 25m/82' |
| 10mm >⅜" PP HB 10kN |
| ~750g 1.65lb |
| 29 x 14 x 8cm 11.4 x 5.5 x 3.1" |
| 12- |
| - - - |
| Web/fastex x2 |
| Cordura |
| Bespoke optional Waist Belt can be connected via rope loop and top-eye |
| hikosport.com |

| HIKO |
|---|
| **Eagle 10** 71501_ONE |
| £60 $79 €66 |
| 10m/33' |
| 10mm >⅜" PP DB 10kN |
| ~550g 1.1lb |
| 20 x 12 x 7cm 7.8 x 4.7 x 2.75" |
| 12- |
| - - - |
| Web/fastex x2 |
| Cordura |
| Bespoke optional Waist Belt can be connected via rope loop and top-eye |
| hikosport.com |

| HIKO |
|---|
| **Eagle 15** 71511_ONE |
| £65 $86 €72 |
| 15m/50' |
| 10mm >⅜" PP DB 10kN |
| ~600g 1.3lb |
| 24 x 12 x 7cm 9.4 x 4.7 x 2.75" |
| 12- |
| - - - |
| Web/fastex x2 |
| Cordura |
| Bespoke optional Waist Belt can be connected via rope loop and top-eye |
| hikosport.com |

| HIKO |
|---|
| **Cone 15** 77200 |
| £52 $69 €57 |
| 15m/50' |
| 10mm >⅜" PP 10kN |
| ~685g 1.51lb |
| 26 x 11cm 10.2 x 4.3" |
| - - - |
| - - - |
| toggle-cord |
| Cordura |
| one shaped top for easier stuffing. Eyes for clipping onnector through bag & rope loop |
| hikosport.com |

| HIKO |
|---|
| **Cone 20** 77300 |
| £59 $78 €65 |
| 20m/65' |
| 10mm >⅜" PP 10kN |
| ~800g 1.76lb |
| 34 x 12cm 13.3 x 4.7" |
| - - - |
| - - - |
| toggle-cord |
| Cordura |
| Cone shaped top for easier restuffing. Eyes for clipping connector through bag & rope loop |
| hikosport.com |

| HIKO |
|---|
| **Throw 10** 77602 |
| £32 $42 €35 |
| 10m/33' |
| 8mm ⅜" PP 8kN |
| ~400g 14oz |
| ~17 x 10cm 6.7 x 4" |
| - - - |
| - - - |
| toggle-cord |
| Cordura |
| Cone shaped top for easier restuffing |
| hikosport.com |

| HIKO |
|---|
| **Throw 15** 73400 |
| £36 $48 €40 |
| 15m/50' |
| 8mm ⅜" PP 8kN |
| ~500g 1.1lb |
| ~19 x 11cm 7.5 x 4.3" |
| - - - |
| - - - |
| toggle-cord |
| Cordura |
| Cone shaped top for easier restuffing |
| hikosport.com |

| HIKO |
|---|
| **Throw 20** 73400 |
| £42 $55 €46 |
| 20m/65' |
| 8mm ⅜" PP 8kN |
| ~600g 1.30lb |
| ~21 x 11cm 6.3 x 4.3" |
| - - - |
| - - - |
| toggle-cord |
| Cordura |
| Cone shaped top for easier restuffing |
| hikosport.com |

| HIKO |
|---|
| **Throw 25** 73400 |
| £49 $65 €54 |
| 25m/82' |
| 8mm ⅜" PP 8kN |
| 1.1kg 2.4lb |
| ~22 x 11cm 8.7 x 4.3" |
| - - - |
| - - - |
| toggle-cord |
| Cordura |
| Cone shaped top for easier restuffing |
| hikosport.com |

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**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs



| | | | | |
|---|---|---|---|---|
| **MANUFACTURER** | **HIKO** | **HIKO** | **HIKO** | **IONIC RESCUE** |
| **MODEL** size (metres) **VARIANT** | **Waist 15** 73400 | **Waist 20** 73400 | **Proof 20** 73400 | **Throwline 15** SAF62001 |
| **ORIGIN** | | | | |
| **COST** (inc Tax/VAT) **BAG ONLY** (in black) Currency conversion only **inc ROPE** (in green) | £73 $95 €81 | £82 $108 €91 | £51 $67 €56 | £35 $46 €40 |
| **ROPE CAPACITY** | 15m/50' | 20m/65' | 20m/66' | 15m/50' |
| **ROPE DIA TYPE** if sold as set- sheath/core | 10mm >⅜" PP 10kN | 10mm >⅜" PP 10kN | 10mm >⅜" PP 10kN | 10mm >⅜" PP 10kN |
| **WEIGHT** with specified rope **BAG ONLY** | ~1.3kg 2.9lb | ~1.5kg 3.3lb | ~950g 2.1lb | 700g 1.54lb |
| **DIMENSIONS** | ~25 x 10 cm<br>10 x 4" | ~25 x 10 cm<br>10 x 4" | ~30 x 12cm<br>11.8 x 4.7" | ~27 x 11cm<br>10.6 x 4.3" |
| **FLOTATION RING/EYE** INSIDE **CHEM-EYE** | ■ -- - | ■ -- - | ■ -- - | ■ -- □ |
| **HANDLE/FASTEX BELT BELT LOOP LASH TAB** | - ■ □ ■ - | - ■ □ ■ - | - - □ ■ - | - - □ ■ - |
| **CLOSURE BASE ROPE EYE(S)/GROMMET(S)** | toggle-cord ■ x2 | toggle-cord ■ x2 | toggle-cord ■ x2 | toggle-cord ■ x2 |
| **BAG MATERIALS REFLECTIVE** | Cordura ■ | Cordura ■ | Cordura ■ | 600D nylon ■ |
| **OTHER BAG COLOURS**<br>**USE ROPE WITH CAM-HARDWARE** ♦<br>**NOTES** | Cone shaped top for easier restuffing | Cone shaped top for easier restuffing | Cone shaped top for easier restuffing | - |
| **WEBSITE** | hikosport.com | hikosport.com | hikosport.com | ionicrescue.com |

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**HMPE/PE**= High Modulus Polyethylene / Dyneema
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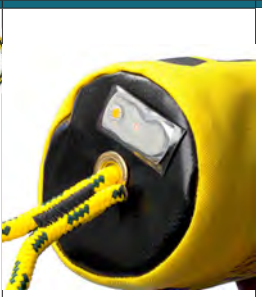
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs


| | | | | |
|---|---|---|---|---|
| **MANUFACTURER** | **KENT SAFETY** | **KENT SAFETY** | **LEHMAR/MARSARS** | **LEHMAR/MARSARS** |
| **MODEL** size (metres) **VARIANT** | **Rescue Throwbag 22** 152800-300-075-13 | **Rescue Throwbag 30** 152800-300-100-13 | **2nd Chance LED 15** B50 B50L | **2nd Chance LED 22** B75 B75L |
| **ORIGIN** | | | | |
| **COST** (inc Tax/VAT) **BAG ONLY** (in black) Currency conversion only **inc ROPE** (in green) | £49 $65 €56 | £53 $70 €60 | £53 $70 €60 | £95 $125 €108 |
| **ROPE CAPACITY** | 22m/75' | 30m/100' | 15m/50' | 22m/75' |
| **ROPE DIA TYPE** if sold as set- sheath/core | 9mm ⅜" PP 5kN | 9mm ⅜" PP 5kN | 9.5mm PP 8.1kN | 9.5mm³ /₈" PP 8.1kN |
| **WEIGHT** with specified rope **BAG ONLY** | 910g 2lb | 1.2kg 2.6lb | 1.1kg 2.42b | 1.3kg 2.86lb |
| **DIMENSIONS** | 28 x 12.7cm<br>11 x 5" | 34.3 x 14cm<br>13.5 x 5" | 29 x 14.2cm<br>11.4 x 5.6" | 36 x 14.2cm<br>11.4 x 5.6" |
| **FLOTATION RING/EYE** INSIDE **CHEM-EYE** | ■ -- □ | ■ -- □ | ■ -- □ | ■ -- □ |
| **HANDLE/FASTEX BELT BELT LOOP LASH TAB** | ■ ■ --- | ■ ■ --- | ■ ---- | ■ ---- |
| **CLOSURE BASE ROPE EYE(S)/GROMMET(S)** | toggled cord ■ | toggled cord ■ | toggled cord ■ | toggled cord ■ |
| **BAG MATERIALS REFLECTIVE** | 600D coated Poly ■ | 600D coated Poly ■ | Nylon - | Nylon - |
| **OTHER BAG COLOURS**<br>**USE ROPE WITH CAM-HARDWARE** ♦<br>**NOTES** | | | Includes a 'Wiffle' ball to enable a second throw without repacking the rope.<br>LED=embedded 200hr light | Includes a 'Wiffle' ball to enable a second throw without repacking the rope.<br>LED=embedded 200hr light |
| **WEBSITE** | kentsafetyproducts.com | kentsafetyproducts.com | lehmar.de marsars.com | lehmar.de marsars.com |

# WATER RESCUE THROWBAGS

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| IONIC RESCUE | IONIC RESCUE | IONIC RESCUE | IONIC RESCUE | IONIC RESCUE | KENT SAFETY |
| Throwline 15<br>SAF62031 | Throwline 18<br>SAF62026 | Throwline 20<br>SAF62001 | Throwline 22<br>SAF62032 | Throwline 25<br>SAF62035 | Rescue Throwbag 15<br>152800-300-050-13 |
| £35 $46 €40 | £28 $37 €32 | £39 $51 €44 | £55 $72 €63 | £43 $57 €49 | £46 $60 €52 |
| 15m/50' | 18m/60' | 20m/65' | 22m/75' | 25m/82' | 15m/50' |
| mm >⅜ PP Dyneema 20kN | 10mm >⅜" PP 10kN | 10mm >⅜" PP 10kN | 10mm >⅜ PP Dyneema 20kN | 10mm >⅜" PP 10kN | 9mm ⅜" PP 5kN |
| 500g 1.1lb | 600g 1.3lb | 900g 2lb | 1.4kg 3.1lb | 1.1kg 2.42lb | 730g 1.6lb |
| ~27 x 11cm<br>10.6 x 4.3" | ~35 x 11cm<br>13.8 x 4.3" | ~35x 11cm<br>13.8 x 4.3" | ~38 x 11cm<br>15 x 4.3" | ~38 x 11cm<br>15 x 4.3" | 24.1 x 12.7cm<br>9.5 x 5" |
| toggle-cord | toggle-cord x2 | toggle-cord x2 | toggle-cord x2 | toggle-cord x2 | toggled cord |
| 600D nylon | 600D nylon | 600D nylon | 600D nylon | 600D nylon | 600D coated Poly |
| NFPA rope/kit | - | - | NFPA rope/kit | - | |
| ionicrescue.com | ionicrescue.com | ionicrescue.com | ionicrescue.com | ionicrescue.com | kentsafetyproducts.com |

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| HMAR/MARSARS | LEHMAR/MARSARS | MUSTANG | MUSTANG | NORTH WATER | NORTH WATER |
| d Chance LED 27<br>B90 B90L | 2nd Chance LED 33<br>B110 B110L | Pro ThrowBag 23<br>MRD175 | Std ThrowBag 23<br>MRD075 | Micro 15<br>10TB-99x | Regulation 15<br>10TB-36x |
| £103 $135 €117 | £110 $145 €125 | £72 $95 €80 | £55 $74 €63 | £29 $38 €32 | £38 $50 €44 |
| 27m/90' | 33m/110' | 23m/75' | 23m/75' | 15m/50' | 15m/50' |
| .5mm ⅜" PP 8.1kN | 9.5mm ⅜" PP 8.1kN | 9.5mm ⅜" PP/PA 9.1kN | 9mm ⅜" PP 8.6kN | 6mm/¼" PP 3.6kN | 6mm/¼" PP 3.6kN |
| ~1.45kg 3.2lb | ~1.6kg 3.5lb | ~1kg 2.2lb | ~800g 1.76lb | 60g 300g 2.1oz | 60g 400g 2.1oz |
| 29 x 14.2cm<br>11.4 x 5.6" | 29 x 14.2cm<br>11.4 x 5.6" | 28 x 14cm<br>11 x 5.5" | 35 x 13 x 13cm<br>13.8 x 5.1 x 5.1" | 20 x 14 x 15cm<br>8 x 5.5 x 2" | 24 x 15 x 6.3cm<br>9.5 x 6 x 2.5" |
| toggled cord | toggled cord | toggle-cord | toggle-cord | toggle-cord +web x2 | toggle-cord+web x2 |
| Nylon - | Nylon - | Cordura® nylon - | Cordura® nylon | 420/500D r-s nylon & mesh | 420/500D rip-stop nylon |
| ncludes a 'Wiffle' ball to<br>ble a second throw with-<br>ut repacking the rope.<br>D=embedded 200hr light | Includes a 'Wiffle' ball to enable a second throw without repacking the rope.<br>LED=embedded 200hr light (pic shown) | Accepts APALS mini strobe in bag | Prices for both Mustang bags seem to vary markedly - often only listed on US sites | fastex-style clip doubles as a pealess whistle | fastex-style clip doubles as a pealess whistle.<br>Rope Red or yellow |
| mar.de marsars.com | lehmar.de marsars.com | mustangsurvival.com | mustangsurvival.com | northwater.com | northwater.com |

**Images NOT to Scale**
£$€ any price in 'burnt-orange' is a **Currency conversion only**-exc shipping, duties,taxes etc.
Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | NORTH WATER | NORTH WATER | NORTH WATER | NORTH WATER |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Wedge 800 sm 21<br>10TB-30a | Wedge 1800 Lg 21<br>10TB-16 | Wedge 2350 sm 18<br>10TB-30aa | Wedge 2350 Lg 30<br>10TB-16b |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £52 $68 €58 | £74 $98 €83 | £98 $129 €111 | £138 $183 €157 |
| ROPE CAPACITY | 21m/70' | 21m/70' | 18m/60' | 30.2m/100' |
| ROPE DIA TYPE if sold as set- sheath/core | 6mm/¼" PP 3.6kN | 9mm/⅜" PP 8kN | 6mm/¼" PP/Spectra 10kN | 6mm/¼" PES/HMPE 10kN |
| WEIGHT with specified rope BAG ONLY | 80g 500g 2.8oz | 100g 900g 3.5oz | 80g 500g 2.8oz | 100g 900g 3.5oz |
| DIMENSIONS | 26 x 15 x 6.3cm<br>10.25 x 6 x 2.5" | 32 x 18 x 6.4cm<br>12.5 x 7 x 2.5" | 26 x 15 x 6.33cm<br>10.25 x 6 x 2.5" | 32 x 18 x 6.4cm<br>12.5 x 7 x 2.5" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ - - | ■ - - | ■ - - | ■ - - |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - ■ - ■ - | - ■ - ■ - | - ■ □ ■ - | - ■ □ ■ - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord +web ■ | toggle-cord +web ■ | toggle-cord +web ■ | toggle-cord +web ■ |
| BAG MATERIALS REFLECTIVE | 420/500D rip-stop nylon | 420/500D rip-stop nylon | 420/500D rip-stop nylon | 420/500D rip-stop nylon |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | ■<br>fastex-style clip doubles as a pealess whistle | ■<br>fastex-style clip doubles as a pealess whistle | ■<br>fastex-style clip doubles as a pealess whistle.<br>Spectra A= PP sheath & PES/ Spectra core | ■<br>fastex-style clip doubles as a pealess whistle. Spectra-X= Polyester/HMPE mix |
| WEBSITE | northwater.com | northwater.com | northwater.com | northwater.com |

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= Option
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**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | NORTH WATER | NORTH WATER | NORTH WATER | NRS |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Pro 2200sm 21<br>10TB- 87 | Pro 2200 lg 35<br>10TB-89 | Pro 4400 lg 35<br>10TB-88 | Wedge 16<br>45105.xx |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £80 $107 €91 | £127 $167 €145 | £108 $144 €123 | £50 $65 €56 |
| ROPE CAPACITY | 23m/75' | 35m/115' | 35m/115' | 16.75m/55' |
| ROPE DIA TYPE if sold as set- sheath/core | 6mm/¼" PP/HMPE 10kN | 6mm/¼" PP/HMPE 10kN | 9mm/⅜" PP/Spectra 20kN | 6mm/¼" PP 4.2kN |
| WEIGHT with specified rope BAG ONLY | 660g 1.5lb | 1kg 2.2lb | 1.1kg 2.4lb | 410g 15oz |
| DIMENSIONS | 26.7 x 14 x 10cm<br>10.5 x 5.5 x 4" | 34.3 x18 x 11.4cm<br>13.5 x 7 x 4.5" | 34.3 x18 x 11.4cm<br>13.5 x 7 x 4.5" | 23 x 14cm<br>9 x 5.5" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ - - ■ | ■ - - ■ | ■ - - ■ | ■ - - - |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | ■ ■ - ■ - | ■ ■ - ■ - | ■ ■ - ■ - | - ■ - - - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord +web ■ x2 | toggle-cord +web ■ | toggle-cord +web ■ | toggle-cord +web ■ x2 |
| BAG MATERIALS REFLECTIVE | 420/500D r-s nylon & mesh ■ | 420/500D r-s nylon & mesh ■ | 420/500D r-s nylon & mesh ■ | Cordura® nylon ■ |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | ■<br>fastex-style clip doubles as a pealess whistle.<br>Spectra A= PP sheath & PES/ Spectra core | ■<br>fastex-style clip doubles as a pealess whistle.<br>Spectra A= PP sheath & PES/ Spectra core | ■<br>fastex-style clip doubles as a pealess whistle.<br>Spectra A= PP sheath & PES/ Spectra core | ■<br>Flat profile |
| WEBSITE | northwater.com | northwater.com | northwater.com | nrs.com |

# WATER RESCUE THROWBAGS

| | | | | | |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **NORTH WATER** | **NORTH WATER** | **NORTH WATER** | **NORTH WATER** | **NORTH WATER** | **NORTH WATER** |
| **Wedge 3350 Lg 18**<br>10TB-16c | **Pro 800sm 23**<br>10TB-85 | **Pro 1800lg 23**<br>10TB-86 | **Pro 2350sm 23**<br>10TB- 90 | **Pro 2350lg 35**<br>10TB- 92 | **Pro 3350lg 21**<br>10TB- 91 |
| £133 $175 €151 | £55 $74 €63 | £74 $99 €85 | £140 $175 €150 | £159 $213 €182 | £148 $198 €169 |
| 18.3m/60' | 23m/75' | 23m/75' | 23m/75' | 35m/115' | 23m/75' |
| mm/¼" PES/HMPE 10kN | 6mm/¼" PP 3.5kN | 9mm/⅜" PP 8kN | 6mm/¼" PES/HMPE 10kN | 6mm/¼" PES/HMPE 10kN | 9mm/⅜" PES/HMPE16kN |
| 100g 900g 3.5oz | 665g 1.5lb | 1kg 2.2lb | 700g 1.54lb | 1.1kg 2.4lb | 1.1kg 2.4lb |
| 32 x 18 x 6.4cm<br>12.5 x 7 x 2.5" | 26.7 x 14 x 10cm<br>10.5 x 5.5 x 4" | 34.3 x 18 x 11.4cm<br>13.5 x 7 x 4.5" | 26.7 x 14 x 10cm<br>10.5 x 5.5 x 4" | 34.3 x 18 x 11.4cm<br>13.5 x 7 x 4.5" | 34.3 x 18 x 11.4cm<br>13.5 x 7 x 4.5" |
| toggle-cord +web x2 | toggle-cord +web x2 | toggle-cord +web x2 | toggle-cord +web x2 | toggle-cord +web x2 | toggle-cord +web x2 |
| 420/500D rip-stop nylon | 420/500D r-s nylon & mesh | 420/500D r-s nylon & mesh | 420/500D r-s nylon & mesh | 420/500D r-s nylon & mesh | 420/500D r-s nylon & mesh |
| tex-style clip doubles as a ealess whistle. Spectra-X= Polyester/HMPE mix | fastex-style clip doubles as a pealess whistle | fastex-style clip doubles as a pealess whistle | fastex-style clip doubles as a pealess whistle. Spectra-X= Polyester/HMPE mix | fastex-style clip doubles as a pealess whistle.Spectra-X= Polyester/HMPE mix | fastex-style clip doubles as a pealess whistle.Spectra-X= Polyester/HMPE mix |
| northwater.com | northwater.com | northwater.com | northwater.com | northwater.com | northwater.com |

| | | |
|---|---|---|
|  |  |  |
| **NRS** | **NRS** | **NRS** |
| **Guardian Wedge Waist 16** 45107.02 | **Pro Guardian Wedge Waist 16** 45108.02 | **Compact 21**<br>45100.xx |
| £76 $100 €100 | £106 $140 €125 | £53 $70 €70 |
| 16.75m/55' | 16.75m/55' | 21m/70' |
| 6mm/¼" PP 4.2kN | 6mm/¼" PP/Spectra 11.1kN | 6mm/¼" PP 4.2kN |
| 590g 1.3lb | 630g 1.4lb | 540g 1.15lb |
| 25.4 x 14cm<br>10 x 5.5" | 24 x 14cm<br>9.5 x 5.5" | 25.4 x 12.7cm<br>10 x 5" |
| toggle-cord x2 | toggle-cord x2 | toggle-cord +web |
| Cordura® nylon | Cordura® nylon | Cordura® nylon |
| edge-bag integrated into a waist pack. | Wedge-bag integrated into a waist pack. Stronger '*Ultraline*' rope and enhanced reflective panels | |
| nrs.com | nrs.com | nrs.com |

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**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | NRS | NRS | NRS | NRS |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Pro Compact 21<br>45101.01.100 | Standard 22<br>45103.01.100 | Pro Rescue 22<br>45102.01.100 | Pro Rescue NFPA 22<br>45104.01.100 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £114 $150 €150 | £60 $78 €78 | £189 $250 €250 | £99 $130 €111 |
| ROPE CAPACITY | 21m/70' | 22.8m/75' | 22.8m/75' | 22.8m/75' |
| ROPE DIA TYPE if sold as set- sheath/core | 6mm/¼" PP/Spectra 11.1kN | 9mm/⅜" PP 8.45kN | 9mm/⅜" PP/Spectra 23.3kN | 9.5mm/⅜" PA/PP 14.6kN |
| WEIGHT with specified rope BAG ONLY | 545g 1.2lb | 970g 2.15b | 1.2kg 2.65lb | 1.2kg 2.7lb |
| DIMENSIONS | 23 x 12.7cm<br>9 x 5" | 30.5 x 15.2cm<br>12 x 6" | 34.3 x 15.2cm<br>13.5 x 6" | 35.6 x 15.2cm<br>14 x 6" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ -- | ■ -- ■ | ■ -- ■ | ■ -- ■ |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - ■ --- | - ■ --- | - ■ --- | *- □ -- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord +web ■ | toggle-cord +web ■ | toggle-cord +web ■ | toggle-cord +web ■ |
| BAG MATERIALS REFLECTIVE | Cordura® nylon ■ | Cordura® nylon ■ | Cordura® nylon ■ | Cordura® nylon ■ |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | ♦ *Sterling Ultraline*<br>enhanced reflective panels | ■ | ♦ *NRS Pro Throwline*<br>enhanced reflective panels | ♦ *Sterling Grabline*<br>enhanced reflective panels |
| WEBSITE | nrs.com | nrs.com | nrs.com | nrs.com |

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**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | PMI ROPE | PMI ROPE | PMI ROPE | PMI ROPE |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Econo Throwbag 15<br>KT36020 | Econo Throwbag 23<br>KT36024 | H2 Throwbag 15<br>KT36021 | H2 Throwbag 15<br>KT36023 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black)<br>Currency conversion only inc ROPE (in green) | £21 $27 €24 | £27 $35 €30 | £38 $50 €44 | £45 $59 €52 |
| ROPE CAPACITY | 15m/50' | 22.8m/75' | 15m/50' | 15m/50' |
| ROPE DIA TYPE if sold as set- sheath/core | 10mm/⅜" PP 8kN | 10mm/⅜" PP 8kN | 7mm/⅜" PP 8kN | 10mm/⅜" PP 16kN |
| WEIGHT with specified rope BAG ONLY | 590g 105g 1.3lb 3.7oz | 816g 105g 1.8lb 3.7oz | 789g 105g 1.7lb 3.7oz | 1kg 105g 2.31lb 3.7oz |
| DIMENSIONS | 33 x 15.2cm<br>13 x 6" | 33 x 15.2cm<br>13 x 6" | 33 x 15.2cm<br>13 x 6" | 33 x 15.2cm<br>13 x 6" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ -- ■ | ■ -- ■ | ■ -- ■ | ■ -- ■ |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | ■ ---- | ■ ---- | ■ ---- | ■ ---- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ |
| BAG MATERIALS REFLECTIVE | Light nylon ■ | Light nylon ■ | Light nylon ■ | Light nylon ■ |
| OTHER BAG COLOURS<br>USE ROPE WITH CAM-HARDWARE ♦<br>NOTES | Throwbag-only (no-rope) =<br>$20/£16/€18 | Throwbag-only (no-rope) =<br>$20/£16/€18 | ♦ *PMI H2 Rope*<br>Throwbag-only (no-rope) =<br>£16/$20/€18 | ♦ *PMI H2 Rope*<br>Throwbag-only (no-rope) =<br>£16/$20/€18 |
| WEBSITE | pmirope.com | pmirope.com | pmirope.com | pmirope.com |

| PALM EQUIPMENT | PALM EQUIPMENT | PALM EQUIPMENT |
|---|---|---|
| Pro Throwline 15 | Pro Throwline 20 | Pro Throwline 25 |
| oooo | oooo | oooo |
| £57 $75 €65 | £62 $81 €70 | £72 $95 €82 |
| 15m/50' | 20m/65' | 25m/82' |
| 11mm/7⁄16" PP 10kN | 11mm/7⁄16" PP 10kN | 11mm/7⁄16" PP 10kN |
| 875g 1.95lb | 1.16kg 2.55lb | 1.42kg 3.1lb |
| 40 x 12 x 10cm<br>15.7 x 4.7 x 4" | 44x 13 x 11cm<br>17.3 x 5.1 x 4.3" | 49 x 14 x 12cm<br>19.3 x 5.5 x 4.7" |
| 1 -- | 1 -- | 1 -- |
| *- -- | *- -- | *- -- |
| toggle-cord | toggle-cord | toggle-cord |
| 500D Cordura | 500D Cordura | 500D Cordura |
| *Web loop on base | *Web loop on base | *Web loop on base |
| palmequipment.pro | palmequipment.pro | palmequipment.pro |


| PMI ROPE | QUICK COLLAR | RLSS UK |
|---|---|---|
| H2 Throwbag 23 | QuickCollar Pro 22 | Pool Throwbag 12 |
| oooo | oooo | LE1168A |
| £60 $78 €68 | £206 $720 €235 | £24 $32 €28 |
| 22.8m/75' | 22m/75' | 12m/39' |
| 10mm/5⁄16" PP 16kN | 6mm ¼" PA/Spectra 8.9kN | 8mm 5⁄16" PP 7kN |
| .65kg 105g 3.6lb 3.7oz | <2.3kg <5lb | 370g 13oz |
| 33 x 15.2cm<br>13 x 6" | 30.4 x 15.2cm<br>12 x 6" | 21 x 11cm<br>8.3 x 4.3" |
| -- | -- | -- |
| ---- | - - | - |
| toggle-cord | Toggle-cord NO | toggle-cord |
| Light nylon | Cordura® nylon | Cordura® nylon |
| ♦ *PMI H2 Rope* Throwbag-only (no-rope) = £16/$20/€18 | 2x con-joined bags-1 for rope, 1 for collar & CO2 canister | Short range bag intended for pool lifeguards but applicale to open water too |
| pmirope.com | quickcollar.com | rlss.org.uk |

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**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | |
|---|---|---|---|---|---|
| MODEL size (metres) VARIANT | UMT/Urban Micro 9 ○○○○ | Economy 15 ○○○○ | Economy 21 ○○○○ | Economy 15 ○○○○ | Ec |
| ORIGIN | | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £46 $60 €52 | £41 $54 €47 | £50 $66 €57 | £00 $00 €00 | |
| ROPE CAPACITY | 9m/30' | 15m/50' | 21m/70' | 15m/50' | |
| ROPE DIA TYPE if sold as set- sheath/core | 6mm/¼" PP/Spectra 11.1kN | 8mm/⅜" PP 8.4kN | 9mm/⅜" PP 8.4kN | 8mm/⅜" | 8 |
| WEIGHT with specified rope BAG ONLY | 240g 8.5oz | 800g 1.7lb | 1.1kg 2.4lb | 60g 2.2oz | |
| DIMENSIONS | 12.7 x 15.24 x 10.16cm 5 x 6 x 4" | 25.4 x 17.8 cm 10 x 7" | 33 x 17.8 x 15.2cm 13 x 7 x 6" | 29.2 x 24.1cm 11.5 x 9.5" | 25 |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ - - - | ■ - - - | ■ - - - | - - - - | |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | ■ ■ - ■ - | - - - - - | - - - - - | - - - - - | |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | |
| BAG MATERIALS REFLECTIVE | | | | | |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE ♦ NOTES | ♦ *Sterling Ultraline* | | | NO-ROPE BAG ONLY | |
| WEBSITE | rocknrescue.com | rocknrescue.com | rocknrescue.com | rocknrescue.com | |

**Images NOT to Scale**
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Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | |
|---|---|---|---|---|---|
| MODEL size (metres) VARIANT | NFPA Trident Deluxe 22 ○○○○ | NFPA Trident Deluxe 22 ○○○○ | NFPA/Snagplate 22 ○○○○ | NFPA Technician 22 ○○○○ | |
| ORIGIN | | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £58 $76 €66 | £69 $91 €79 | £85 $112 €97 | £76 $100 €86 | |
| ROPE CAPACITY | 22m/75' | 22m/75' | 22m/75' | 22m/75' | |
| ROPE DIA TYPE if sold as set- sheath/core | 8mm/⅝" PP/PA 6.1kN | *9.5mm⅜" PP/PP 15.2kN | 9.5mm PA/PP 14.6kN | 9.5mm PA/PP 14.6kN | |
| WEIGHT with specified rope BAG ONLY | 800g 1.7lb | 1.2kg 2.6lb | 1.1kg 2.4lb | 1.2kg 2.6lb | |
| DIMENSIONS | 22.9 x 15.2 x 17.8cm 9 x 6 x 7" | 33 x 16.5 x 12.7cm 13 x 6.5 x 5" | 30.5 x 16.5 x 12.7cm 12 x 6 x 5.5" | 30.5 x 19 x 15.2cm 12 x 7.5 x 6" | |
| FLOTATION RING/EYE INSIDE CHEM-EYE | ■ - - - | ■ - - - | ■ - - - | ■ - - □ | |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | ■ ■ - ■ - | ■ ■ - ■ - | ■ - - - - | ■ ■ - ■ - | |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | |
| BAG MATERIALS REFLECTIVE | | | | | |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE ♦ NOTES | *Sterling Waterline* | *Sterling Waterline* (*listed as 10mm by RnR) Also available with 10 (9.5)mm Sterling Grabline | ♦ *Sterling Grabline* Removable plastic Snagplate for rope capture | ♦ *Sterling Grabline* | |
| WEBSITE | rocknrescue.com | rocknrescue.com | rocknrescue.com | rocknrescue.com | |

# WATER RESCUE THROWBAGS

| ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE | ROCKnRESCUE |
|---|---|---|---|---|---|
| onomy Trident 15 | Economy Trident 21 | Economy Trident 30 | NFPA Trident 15 | NFPA Trident 22 | NFPA Trident 30 |
| 0000 | 0000 | 0000 | 0000 | 0000 | 0000 |
| £41 $54 €47 | £52 $69 €60 | £41 $54 €47 | £49 $64 €55 | £65 $85 €74 | £80 $105 €91 |
| 15m/50' | 21m/70' | 30m/100' | 15m/50' | 22m/75' | 30m/100' |
| 8mm/ 5⁄16" PP 11.1kN | 8mm/ 5⁄16" PP 11.1kN | 8mm/ 5⁄16" PP 11.1kN | 10mm PA/PP 14.6kN | 10mm PA/PP 14.6kN | 10mm PA/PP 14.6kN |
| 800g 1.7lb | 820g 1.8lb | 1g 2.2lb | 800g 1.7lb | 1.1kg 2.5lb | 1.5kg 3.2lb |
| 5.4 x 15.24 x 12.7cm<br>10 x 6 x 5" | 30 x 17.8 x 12.7cm<br>12 x 7 x 5" | 33 x 16.5 x 12.7cm<br>13 x 6.5 x 5" | 28 x 17.8 x 12.7cm<br>11 x 7 x 5" | 34.3 x 19 x 12.7cm<br>13.5 x 7.5 x 6" | 33 x 22.9 x 15.24cm<br>13 x 9 x 6" |
| ■ --- | ■ --- | ■ --- | ■ --- | ■ --- | ■ --- |
| --- ■ - | --- ■ - | --- ■ - | ■ ---- | ■ ---- | ■ ---- |
| toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ |
| | | | | | |
| | | | ♦ *Sterling Grabline* | ♦ *Sterling Grabline* | ♦ *Sterling Grabline* |
| rocknrescue.com | rocknrescue.com | rocknrescue.com | rocknrescue.com | rocknrescue.com | rocknrescue.com |

| RQ3 | RQ3 | RQ3 | RQ3 | RQ3 | RQ3 |
|---|---|---|---|---|---|
| Mini 15<br>BG3116 | Mini 15<br>BG3141 | Standard 15<br>BG3118 | Standard 15<br>BG3123 | Standard 15<br>BG3122 | Second Chance 22<br>BG3144 |
| £24 $31 €27 | £57 $75 €65 | £28 $37 €32 | £43 $57 €49 | £80 $105 €91 | £67 $88 €76 |
| 15m/50' | 15m/50' | 15m/50' | 15m/50' | 15m/50' | 23m/75' |
| 6mm/¼" PP 5.4kN | 6mm/¼" PA/PP 11.1kN | 9mm/⅜" PP 8.4kN | 9.5mm/⅜" PA/PP 14.6kN | 9mm/⅜" Spectra/PP 23.3kN | 9.5mm/⅜" PA/PP 14.6kN |
| 363g 12.8oz | 363g 12.8oz | 818g 1.8lb | 818g 1.8lb | 818g 1.8lb | 1.36kg 3lb |
| 15.24 x 10cm<br>6 x 4" | 15.24 x 10cm<br>6 x 4" | 28 x 15.24cm<br>11 x 6" | 28 x 15.24cm<br>11 x 6" | 28 x 15.24cm<br>11 x 6" | 28 x 15.24cm<br>11 x 6" |
| ■ 1-- | ■ 1-- | ■ --- | ■ --- | ■ --- | ■ --- |
| - ■ - ■ - | - ■ - ■ - | - ■ - ■ - | - ■ - ■ - | ■ --- | - ■ - ■ - |
| toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ | toggle-cord ■ |
| UV Nylon | UV Nylon | UV Nylon | UV Nylon | UV Nylon | Nylon |
| *Sterling Grabline* | ♦ *Sterling Ultraline* | Throwbag-only (no-rope) = £17 $22 €19 | ♦ *Sterling Grabline*<br>Throwbag-only (no-rope) = £17 $22 €19 | ♦ *Sterling Ultraline*<br>Throwbag-only (no-rope) = £17 $22 €19 | ♦ *Sterling Grabline*<br>Throwbag-only (no-rope) = £17 $22 €19 |
| rescuesource.com | rescuesource.com | rescuesource.com | rescuesource.com | rescuesource.com | rescuesource.com |

**Images NOT to Scale**
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Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs





| MANUFACTURER | RQ3 | RQ3 | RQ3 | SKED |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Standard 22 BG3137 | Standard 15 BG3124 | Standard 15 BG3136 | Standard 15 SK-1002 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £38 $50 €43 | £60 $79 €68 | £112 $148 €128 | £56 $74 €64 |
| ROPE CAPACITY | 23m/75' | 23m/75' | 23m/75' | 15m/50' |
| ROPE DIA TYPE if sold as set- sheath/core | 9mm/⅜" PP 8.4kN | 9.5mm/⅜" PA/PP 14.6kN | 9mm/⅜" Spectra/PP 23.3kN | 7mm/⅜" |
| WEIGHT with specified rope BAG ONLY | 1kg 2.3lb | 1kg 2.3lb | 1kg 2.3lb | 910g 2lb |
| DIMENSIONS | 28 x 15.24cm 11 x 6" | 28 x 15.24cm 11 x 6" | 28 x 15.24cm 11 x 6" | n/a |
| FLOTATION RING/EYE INSIDE CHEM-EYE | --- | --- | --- | 1 -- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - - - | - - - | - - - | -- - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord | toggle-cord | toggle-cord | toggle-cord |
| BAG MATERIALS REFLECTIVE | Nylon | Nylon | Nylon | Cordura® |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE ♦ NOTES | Throwbag-only (no-rope) = £17 $22 €19 | ♦ *Sterling Grabline* Throwbag-only (no-rope) = £17 $22 €19 | ♦ *Sterling Ultraline* Throwbag-only (no-rope) = £17 $22 €19 | ♦ *PMI Water Rescue* |
| WEBSITE | rescuesource.com | rescuesource.com | rescuesource.com | skedco.com |

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Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | SOLGEAR | SOLGEAR | SOLGEAR | SOLGEAR |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | SureGrip Bag 23 oooo | SureGrip Bag 15 oooo | SureGrip Bag 18 oooo | SureGrip Bag 23 oooo |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £87 $114 €99 | £73 $96 €83 | £83 $109 €95 | £98 $129 €112 |
| ROPE CAPACITY | 23m/75' | 15m/50' | 18m/60' | 23m/75' |
| ROPE DIA TYPE if sold as set- sheath/core | 6.5mm¼" PP/Dynma10kN | 8.2mm⅜" PP/Dynma14.2kN | 8.2mm⅜" PP/Dynma14.2kN | 8.2mm⅜" PP/Dynma14.2kN |
| WEIGHT with specified rope BAG ONLY | 545g / 1.2lb | 727g / 1.6lb | 818g / 1.8lb | 910g / 2lb |
| DIMENSIONS | 17.8 x 12.7cm 7 x 5" | 22.8 x 12.7cm 9 x 5" | 30.5 x 12.7cm 12 x 5" | 26.7 x 12.7cm 10.5 x 5" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | --- | --- | --- | --- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - | - | - | - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | | | | |
| BAG MATERIALS REFLECTIVE | Polyester mesh | Polyester mesh | Polyester mesh | Polyester mesh |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE ♦ NOTES | *BW SureGrip* | NFPA ♦ *BW SureGrip* | NFPA ♦ *BW SureGrip* | NFPA ♦ *BW SureGrip* |
| WEBSITE | solgear.com | solgear.com | solgear.com | solgear.com |

# WATER RESCUE THROWBAGS


| SKED | SOLGEAR | SOLGEAR | SOLGEAR | SOLGEAR | SOLGEAR |
|---|---|---|---|---|---|
| Standard 22<br>SK-1001 | Waist Belt Throwbag 18<br>oooo | Throwbag 23<br>oooo | Grabline Bag 15<br>- | Grabline bag 23<br>- | SureGrip Bag 15<br>- |
| £74 $98 €84 | £133 $175 €151 | £71 $94 €81 | £71 $95 €82 | £94 $124 €107 | £71 $94 €81 |
| 22m/70' | 18m/60' | 23m/75' | 15m/50' | 23m/75' | 15m/50' |
| 7mm/⅜" | 8.2mm⅜" PP/Dynma14.2kN | 8mm/⅝" PP/PA 7.1kN | 9.5mm⅜" PP/PP-PA 14.6kN | 9.5mm⅜" PP/PP-PA 14.6kN | 6.5mm¼" PP/Dynma10kN |
| 1.4kg 3lb | 1.1kg / 2.4lb | 635g / 1.4lb | 910g / 2lb | 1.2kg / 2.6lb | 362g / 12.8oz |
| n/a | 28 x 12.7 x 10cm<br>11 x 5 x 4" | 26.7 x12.7cm<br>10.5 x 5" | 26.7 x 12.7cm<br>10.5 x 5" | 25.4 x 15.2cm<br>10 x 6" | 15.2 x 12.7cm<br>6 x 5" |
| 1 -- | -- | -- | -- | -- | -- |
| -- - | - | - | - | - | - |
| toggle-cord | Web/velcro/fastex x2 | toggle-cord x2 | Web/velcro/fastex x2 | Web/velcro/fastex x2 | |
| Cordura® | Cordura® nylon | Polyester mesh | Polyester mesh | Polyester mesh | Polyester mesh |
| ◆ *PMI Water Rescue* | Throwbag slots inside waist belt -not sold separately. NFPA ◆ *BW SureGrip* | *Sterling Waterline* | NFPA *Sterling Grabline* rope | NFPA *Sterling Grabline* rope | *BW SureGrip* |
| skedco.com | solgear.com | solgear.com | solgear.com | solgear.com | solgear.com |

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= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | SRE (NDIVER) | SRE (NDIVER) | SRE (NDIVER) | SRE (NDIVER) |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | ThrowBag 23 PROTHROWBAGRL-15 | ThrowBag 20 PROTHROWBAGRL-20 | ThrowBag 25 PROTHROWBAGRL-25 | ThrowBag 30 PROTHROWBAGRL-30 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £35 $46 €40 | £39 $51 €44 | £42 $58 €48 | £44 $58 €48 |
| ROPE CAPACITY | 15m/50' | 20m/65' | 25m/82' | 30m/98' |
| ROPE DIA TYPE if sold as set- sheath/core | 8mm/5⁄16" 900kg PA/PP | 8mm/5⁄16" 900kg PA/PP | 8mm/5⁄16" 900kg PA/PP | 8mm/5⁄16" 900kg PA/PP |
| WEIGHT with specified rope BAG ONLY | 0.7kg 1.54lb | 0.9kg 2lb | 1.1kg 2.42lb | 1.2kg 2.64lb |
| DIMENSIONS | 27 x 11cm 10.6 x 4.3" | 35 x 11cm 13.8 x 4.3" | 38 x 11cm 14.9 x 4.3" | 40 x 11cm 15.7 x 4.3" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | 2 1 * | 2 1 * | 2 1* | 2 1 * |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | - | - | - | - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | toggle-cord NO | toggle-cord NO | toggle-cord NO | toggle-cord NO |
| BAG MATERIALS REFLECTIVE | Cordura® nylon * | Cordura® nylon * | Cordura® nylon * | Cordura® nylon * |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE NOTES | *Reflective rope. Mesh draining base with handle and tie-in eye. *Optional LED fits to lash tab | *Reflective rope. Mesh draining base with handle and tie-in eye. *Optional LED fits to lash tab | *Reflective rope. Mesh draining base with handle and tie-in eye. *Optional LED fits to lash tab | *Reflective rope. Mesh draining base with handle and tie-in eye. *Optional LED fits to lash tab |
| WEBSITE | ndiver-rescue.com | ndiver-rescue.com | ndiver-rescue.com | ndiver-rescue.com |

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= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs

| MANUFACTURER | WWTC | WWTC | WWTC | WWTC |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Classic 1820 | Hero 18 | Hero 20 | Hero 18-20 |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £49 $46 €44 | £99/145 $93/136 €89/130 | £103/148 $96/139 €92/133 | £50 $47 €45 |
| ROPE CAPACITY | 18m/60' | 18m/60' | 20m/66' | 20m/60' |
| ROPE DIA TYPE if sold as set- sheath/core | 7.8mm 5⁄16 PP/PESPP 14kN | 9.3mm 3⁄8 PP/PESPP 21kN | 9.3mm 3⁄8 PP/PESPP 21kN | 9.3mm 3⁄8 PP/PESPP 21kN |
| WEIGHT with specified rope BAG ONLY | 113g 4oz | 1.29/1.35kg 2.8/3lb | 1.1/1.4kg 2.4/3.1lb | 138g 4.9oz |
| DIMENSIONS | 2526 x 11 x 8cm 9.810.2 x 4.3 x 3.2" | 26 x 13 x 9cm 10.2 x 5.1 x 3.5" | 28 x 13 x 9cm 11 x 5.1 x 3.5" | 2628 x 13 x 9cm 10.211 x 5.1 x 3.5" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | 1- | 1- | 1- | 1- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | -- | -- | -- | -- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | Web/velcro x2* | Web/velcro x2* | Web/velcro x2* | Web/velcro x2* |
| BAG MATERIALS REFLECTIVE | Cordura® nylon | Cordura® nylon | Cordura® nylon | Cordura® nylon |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE NOTES | NO ROPE - BAG ONLY *grommets on side. Velcro carabiner pouch. Exc 'biner. | Waist belt included *grommets on side. Velcro carabiner pouch. Exc 'biner. *WEIGHT & COST = exc/inc Waist belt | Waist belt included *grommets on side. Velcro carabiner pouch. Exc 'biner. *WEIGHT & COST = exc/inc Waist belt | NO ROPE - BAG ONLY |
| WEBSITE | wwtc.info | wwtc.info | wwtc.info | wwtc.info |

# WATER RESCUE THROWBAGS

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| **SRE (NDIVER)** | **SRE (NDIVER)** | **WWTC** | **WWTC** | **WWTC** | **WWTC** |
| **Pro 20**<br>PROTHROWBAGRLM-20 | **Pro 25**<br>PROTHROWBAGRLM-25 | **Pro 15**<br>000 | **Pro 15**<br>000 | **Classic 18**<br>000 | **Classic 20**<br>000 |
| £59 $78 €68 | £69 $92 €79 | £73/111 $69/104 €66/100 | £39 $37 €35 | £85/132 $79/125 €76/120 | £94 $88/130 €84/125 |
| 20m/66' | 25m/82' | 15m/50' | 15m/50' | 18m/60' | 20m/66' |
| 8mm ⅝ PP 17.6kN | 8mm ⅝ PP 17.6kN | 7.8mm ⅝ PP/PESPP 14kN | 7.8mm ⅝ PP/PESPP 14kN | 7.8mm ⅝ PP/PESPP 14kN | 7.8mm ⅝ PP/PESPP 14kN |
| 600g 1.32lb | 900g 2lb | *575/785g 1.3/1.7lb | 80g 2.8oz | 620/960g 1.4/2.2lb | 690/1030g 1.5/2.3lb |
| 35 x 13 x 13cm<br>13.8 x 5.1 x 5.1" | 39 x 13 x 13cm<br>15 x 5.1 x 5.1" | 24 x 10 x 7cm<br>9.5 x 4 x 2.8" | 24 x 10 x 7cm<br>9.5 x 4 x 2.8" | 25 x 11 x 8cm<br>9.8 x 4.3 x 3.2" | 26 x 11 x 8cm<br>10.2 x 4.3 x 3.2" |
| -- * | -- * | 1- | 1- | 1- | 1- |
| - | - | - -- | - -- | - -- | -- |
| toggle-cord x2 | toggle-cord x2 | Web/velcro x2 | Web/velcro x2 | Web/velcro x2* | Web/velcro x2* |
| Cordura® nylon * | Cordura® nylon * | Cordura® nylon | Cordura® nylon | Cordura® nylon | Cordura® nylon |
| ptional -LED fixes to lash tab.<br>*Rope is also reflective | *Optional LED fixes to lash tab.<br>*Rope is also reflective | *WEIGHT & COST = exc/inc Waist belt | NO ROPE - BAG ONLY | Waist belt included<br>*grommets on side. Velcro carabiner pouch. Exc 'biner.<br>*WEIGHT & COST = exc/inc Waist belt | Waist belt included<br>*grommets on side. Velcro carabiner pouch. Exc 'biner.<br>*WEIGHT & COST = exc/inc Waist belt |
| ndiver-rescue.com | ndiver-rescue.com | wwtc.info | wwtc.info | wwtc.info | wwtc.info |

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| **WWTC** | **WWTC** | **WWTC** | **WWTC** | **WWTC** | **WWTC** |
| **Hero 23**<br>- | **Hero 25**<br>000 | **Hero 23-25**<br>000 | **Craft 23**<br>000 | **Craft 27**<br>000 | **Craft 23-27**<br>000 |
| /145 $93/136 €89/130 | £103/148 $96/139 €92/133 | £50 $47 €45 | £0 $102/150 €98/144 | £117/123 $110/156 €105/150 | £57 $53 €51 |
| 23m/75' | 25m/82' | 25m/82' | 23m/75' | 27m/88' | 27m/75' |
| 3mm ⅝ PP/PESPP 14kN | 7.8mm ⅝ PP/PESPP 14kN | 7.8mm ⅝ PP/PESPP 14kN | 9.3mm ⅜ PP/PESPP 21kN | 9.3mm ⅜ PP/PESPP 21kN | 9.3mm ⅜ PP/PESPP 21kN |
| 55/1110g 1.9/2.45lb | 855/1180g 1.9/2.6lb | 138g 4.9oz | 1.23/1.53kg 2.7/3.4lb | 1.4/1.7kg 3/3.75lb | 151g 5.3oz |
| 24 x 13 x 9cm<br>9.5 x 5.1 x 3.5" | 26 x 13 x 9cm<br>10.2 x 5.1 x 3.5" | 2426 x 13 x 9cm<br>9.5 x 5.1 x 3.5" | 32 x 14 x 10cm<br>12.6 x 5.5 x 4" | 34 x 14 x 10cm<br>13.4 x 5.5 x 4" | 3234 x 14 x 10cm<br>12.613.4 x 5.5 x 4" |
| 1- | 1- | 1- | 1- | 1- | 1- |
| -- | -- | -- | -- | -- | -- |
| Web/velcro x2* | Web/velcro x2* | Web/velcro x2* | Web/velcro x2* | Web/velcro x2* | Web/velcro x2* |
| Cordura® nylon | Cordura® nylon | Cordura® nylon | Cordura® nylon | Cordura® nylon | Cordura® nylon |
| Waist belt included<br>rommets on side. Velcro rabiner pouch. Exc 'biner.<br>*WEIGHT & COST = exc/inc Waist belt | Waist belt included<br>*grommets on side. Velcro carabiner pouch. Exc 'biner.<br>*WEIGHT & COST = exc/inc Waist belt | NO ROPE - BAG ONLY | Waist belt included<br>*grommets on side. Velcro carabiner pouch. Exc 'biner.<br>*WEIGHT & COST = exc/inc Waist belt | Waist belt included<br>*grommets on side. Velcro carabiner pouch. Exc 'biner.<br>*WEIGHT & COST = exc/inc Waist belt | NO ROPE - BAG ONLY |
| wwtc.info | wwtc.info | wwtc.info | wwtc.info | wwtc.info | wwtc.info |

**Images NOT to Scale**
**£$€** any price in 'burnt-orange' is a **Currency conversion only**-exc shipping, duties,taxes etc.
Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | WRS INTERNATIONAL | WRS INTERNATIONAL | WRS INTERNATIONAL | WRS INTERNATIONAL |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Chaos ≤25 oooo | Chaos Rapid 15 oooo | Chaos Rapid 18 oooo | Chaos 20 oooo |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £36 $47 €40 | £64/75 $84/99 €72/85* | £80 $105 €90 | £73/84 $97/113 €83/96* |
| ROPE CAPACITY | 25-15m/75-50' | 15m/50' | 18m/60' | 20m/66' |
| ROPE DIA TYPE if sold as set- sheath/core | 8-10mm | 10mm PP 12kN | 8mm PP 9kN | 10mm PP 12kN |
| WEIGHT with specified rope BAG ONLY | ~90g 3.2lb | 810g 1.79lb | 820g 1.8lb | 1kg 2.2lb |
| DIMENSIONS | 36 x 14 x 8cm 14.1 x 5.5 x 3.15" | 36 x 11 x 7cm 14.1 x 4.3 x 2.75" | 36 x 11 x 7cm 14.1 x 4.3 x 2.75" | 36 x 14 x 8cm 14.1 x 5.5 x 3.15" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | -- | -- | -- | -- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | -- - | -- - | -- - | -- - |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | Web/Press-Stud NO | Web/Press-Stud NO | Web/Press-Stud NO | Web/Press-Stud NO |
| BAG MATERIALS REFLECTIVE | HD Nylon | HD Nylon | HD Nylon | HD Nylon |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE ♦ NOTES | Light sticks slide into a pouch rather than extraneous eyes | *Costs for non-reflective/ reflective rope options | Rope =Reflective only | *Costs for non-reflective/ reflective rope options |
| WEBSITE | wrsinternational.com | wrsinternational.com | wrsinternational.com | wrsinternational.com |

**Images NOT to Scale**
**£$€** any price in 'burnt-orange' is a **Currency conversion only**-exc shipping, duties,taxes etc.
Prices in GREEN are for the bag & Rope
=Partial feature or OK but not ideal
= Option
**HANDLE**= ADDITIONAL to rope loop
**FASTEX**=web with side-squeeze clip as handle/attach
**PA**= Nylon **PES** = Polyester **PP**=Polypropylene
**HMPE/PE**= High Modulus Polyethylene / Dyneema
**DB**= Double Braid/braided core & sheath.
**HB** = Hollow Braid **KM**=Kernmantle
**CHEM-EYE**= Chemical/Lightstick attachment eyes
**CAM-HARDWARE** Majority of PP rope not suitable for use with camming hardware like descenders & grabs




| MANUFACTURER | WRS INTERNATIONAL | YAK | YAK | YAK |
|---|---|---|---|---|
| MODEL size (metres) VARIANT | Chaos 25 oooo | Throwline 15 6222 | Throwline 20 oooo | Throwline 25 oooo |
| ORIGIN | | | | |
| COST (inc Tax/VAT) BAG ONLY (in black) Currency conversion only inc ROPE (in green) | £96 $128 €109 | £55 $70 €60 | £60 $76 €66 | £65 $84 €73 |
| ROPE CAPACITY | 25m/82' | 15m/50' | 20m/66' | 25m/82' |
| ROPE DIA TYPE if sold as set- sheath/core | 8mm PP 9kN | 8mm PP 3kN | 8mm PP 3kN | 8mm PP 3kN |
| WEIGHT with specified rope BAG ONLY | 1.02kg 2.24lb | ~550g 1.2lb | ~675g 1.5b | ~775g 1.7lb |
| DIMENSIONS | 36 x 14 x 8cm 14.1 x 5.5 x 3.15" | *32 x 15cm 12.6 x 6" | *40 x 16cm 15.7 x 6.3" | *48 x 18cm 18.9 x 7" |
| FLOTATION RING/EYE INSIDE CHEM-EYE | -- | -- | -- | -- |
| HANDLE/FASTEX BELT BELT LOOP LASH TAB | -- - | -- -- | -- -- | -- -- |
| CLOSURE BASE ROPE EYE(S)/GROMMET(S) | Web/Press-Stud NO | toggle-cord x2 | toggle-cord x2 | toggle-cord x2 |
| BAG MATERIALS REFLECTIVE | HD Nylon | Polyester | Polyester | Polyester |
| OTHER BAG COLOURS USE ROPE WITH CAM-HARDWARE ♦ NOTES | Rope= reflective only | *Length/Heigh inc 'cuff' | *Length/Heigh inc 'cuff' | *Length/Heigh inc 'cuff' |
| WEBSITE | wrsinternational.com | crewsaver.com | crewsaver.com | crewsaver.com |

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# YB3

## Iridium/GPS Global Tracking Device, Software & Service

by Charlotte Ina-Sterland

photos by Heather Sterland

# YB3 GPS TRACKER

**We reviewed this as a personal or expedition group device rather than a rescue team device. For individuals and smaller teams not operating with Sat-Phones or similar high-end comms, it's easy to think of a mobile phone as sufficient to operate in wilderness environments particularly since so many mountain areas have good coverage, but so many places have weak or no signal that you can never fully trust them even in semi-urban areas that you wouldn't consider to be 'remote'.**

**Couple this with your mobile/cell's battery being drained using other apps, maintaining a charge very dependent on temperature and phone age such that in-field chargers are essential and an independent tracking service starts to look very appealing. A device whose sole focus is to monitor where the user is and receive alert messages, with a dedicated team monitoring progress, for a small one-off rental fee. We used *Yellow Brick's* (now *YB Tracking)* tracking device, the *YB3* now in its mk3 variant, for a winter climbing expedition in Scotland and got to grips with its tracking capability. We tested it as a communication device everywhere from no signal areas to covered but patchy places like caves and buildings; after all, it's not just in the wilderness where tracking might come in handy.**

## WHAT IS YB/YELLOW BRICK?

*YB Tracking* (originally *Yellow Brick*) is a tracking service for climbers, skiers, outdoors professionals and explorers operating in more remote areas and needing their location to be visible to others. WSAR magazine has previously reviewed the *SPOT* system and there is also a *Motorola* system together with the market leading G*armin InReach* system. Unlike the basic *'send'* devices that provide a simple emergency alert for rescue services, these use GPS, specifically the *Iridium* network of satellites, to allow worldwide communication using mobile phones via Bluetooth to enhance the messaging and reading capabilities. They will all operate as stand-alone devices with the *YB3* able to link to the communication base monitored by the *YB Tracking* team.

The *YB3 mk3* is the most recent hardware tracker from the company though we used the mk2. The size of a retro mobile phone, you purchase the handset for around £200/$220/€210 and then pay a monthly or longer term 'rental'. In *YB*'s case it is around £18/$24/€21. a month but others start from £13/$17/€15 depending on the service you have and the number of messages/alerts in your package; it's similar to Pay-As-You-Go mobile phone contracts where you pay per text or call. You can suspend some services if you have long-term contracts so that you only pay when active rather than when it's sat in your cupboard at home. We'll discuss *YB3*'s specific costs and credit packages later. The *YB3* packs up into a small protective case and is monitored via a central tracking line which is 'rented' by the user. The device is then on the tracking team's radar for the duration of the rental period whether you're in the Antarctic, the middle of Africa or the middle of the Pacific Ocean. During use, position info is sent periodically from the *YB3* back to the base.

## TRANSMISSION AND TRACKING VIA GNSS/GPS

*YB Tracking* and all similar systems use *Global Navigation Satellite Systems* of which GPS or *Global Positioning Satellites* (or 'system' if referring to the handset) is the best known and most used. The GPS project was originally a US Department of Defence funded satellite constellation. Launched in 1978, it became operational in 1993 and has been a worldwide, indispensable asset for rescuers ever since. Built and funded during the cold war, when the US was worried about the threat of nuclear war, GPS and precise location knowledge allowed soldiers to determine where to launch submarine ballistic missiles from. Since 2007, GPS has offered accurate locations without errors or restricted access. There are other satellite systems - most notably from China, Europe, Japan and Russia and these can be used in tandem with GPS by some systems. The satellite element is affectively a one-way receiver/location detector while the two way or messaging capability is provided by a different system, *Iridium* in the case of *YB3* and *Garmin* but *Inmarsat* is another well-known service particularly for shipping. Once four satellites have located you, the *Iridium* system can communicate your exact location and send and receive text messages, without the need for wifi or a cell-phone signal.

## WEATHER RESISTANCE & SIZE

An IP 67 rating means the yellow brick is fine if it is submerged in water for up to 30 minutes at up to 0.5-1m depth. Weighing 303g/0.6lb, with dimensions of 144mm/5.7" x 76mm/3" x 36mm/1.4" (plus antenna), it is longer than the *Garmin* and *Zoleo* but still small enough and light enough to carry in any pocket.

It requires four satellites to transmit a message, so is best when used in the open air. If far underground, in a building, cave, vehicle or in particularly deep forest, it may not transmit the signal, or may only do so once signal has been found. A clear view of the sky is definitely best but you can still get a signal in the most unexpected of obscured locations. When not active, the device does not send or transmit, and the screen is off, but the large red alert button that you can see at the bottom of the device (with protective cover) still functions when pushed.

The trackers are rated to work between -30°C and 60 °C. They have been used at -45°C in the Arctic and on events in Qatar in May this year (2025). We don't quite get those temperatures n Scotland.... ever; it was more a test of being cold and damp with very few sightings of the sun but in use on snowmobiles in Quebec it coped with -20C with no adverse effects.

## BATTERY AND CHARGING

The *YB3* should be charged for 8 hours before the first use. It charges via a USB-C cable, therefore can be charged via a secondary powerpack/solar panel, in a vehicle etc. The device is delivered with a multi-country charger and a USB charging adapter in the box. Also supplied is a transformer-mains lead reducing to 9- 30 volts from a 240 or 120v mains supply. Battery life is 3.3 days for continuous transmissions and 350 days for 8 hourly transmissions. Extreme temperature, either cold or hot will also affect the battery performance. Not surprisingly, we didn't drain the YB3 during daily use with charging once a day but YB3 quote a 12 month battery life or <3 weeks transmitting every 15 minutes,<three months transmitting every hour and <nine months transmitting twice per day.

## ALERTS

Alerts are messages sent from the *YB3* to the central monitoring team (not to be confused with an 'emergency alert'). These transmit the location and time when sent. They can be sent at any time even if the device is out of power, by pressing that red button on the lower front of the device. The device has several alert function. When out on a mission, the device has a 'regular wakeup,' when it transmits signals to the *YB Tracking* service, using GPS. Tracking can be performed from every 5 seconds to every 12 hours and is set up manually by the user. 'Dead man's switch' allows a user to set up a regular time interval at which they are required to 'check in.' If they do not send a check-in alert, a message will be sent centrally. Extra alerts are also set up so that if the temperature hits a certain point, or the power from the device is lost, a special alert is sent. *Geofence* auto alerts can also be set up; which are a signal sent if the device leaves a certain designated 'Geofence' area. Alerts are automatically uploaded to the user's blog, where their location is tracked and updated; their blog becomes a map of their movements; useful not only for those on the mission but for those monitoring their progress.

## SENDING MESSAGES

Messages you send originate from an email address ending @my.yb.tl. Messages can also be sent to this email address, and will arrive at the device.


Messages can be sent to mobile phone numbers and to reply, the phone-user simply hits reply as normal on receipt of the text message. Using your smartphone for the keyboard is easiest, otherwise on the device you have a cursor manoeuvred on-screen QWERTY keyboard - similar to finding a Netflix or Amazon film!

Using the *YB Tracker* app, a message can be sent from a phone via the app (when toggled via bluetooth to the *YB3),* to another phone number or email address. When we tested this, emails proved faster and more reliable in areas with sparse signal. Messages can also be set to update social media platforms, if the user wants to setup their own tracked blog. For snow-mobiles, signals are best set up to send more frequently (every 2 minutes) as a snow burying event could be very quick; while an `Atlantic yacht needs only send every four hours, as the likelihood of losing the vessel suddenly is smaller.

## PURCHASE VS RENTAL: PRICES

The hardware devices themselves can be rented as well as outright purchased. Price for buying the YB3 is around £450. ($650 €545) plus £15 for the weather-proof belt pouch. We mentioned monthly line rental earlier but there is also a per-message cost purchased as 'Credits' equivalent to a single alert transmission. These start at £0.16 (~20cents) per credit in the 50 credit bundle, down to £0.05 (~7cents) per credit for the 50,000 credit bundles.

1 credit is used per tracking position or per 50 characters of message sent or received. If SMS recipient(s) are selected, an additional 1 credit per 160 characters per recipient is charged. 1 credit is also used to check the mailbox even if there are no messages waiting. There is an automatic mailbox check when a message is transmitted, so to be more economical when not urgently waiting for a message, just wait for the next transmission. The cost is the same whether sending the message on the device, or through the *YB Connect* app, but it's a lot easier to compose on the app. As above, it's cheaper not to do a mailbox check - this is automatic every time a message is transmitted (1 credit is equivalent to 1 transmission or mailbox check). There is an additional 1 credit charge when sending an SMS, so email is cheaper. Cost is calculated based on characters used, so if someone has a very long email address, this will either reduce what can be written, or cost more. Short-term rental packages for the YB3 devices themselves vary, but with tracking for 4 days at 15 minute intervals, rental would be about £80 (~$140/€120), inclusive of shipping in the UK.

## SUPPORT AND SURVEILLANCE

One of the major benefits of this service is that the *YB* support team monitor transmissions a couple of times a day. The office can be called or emailed during the day and there is an emergency line after hours for renters. For those who buy, there is also a US office on call after hours. Another package offers support for £99 / year (not including geofencing or multiple groups). *YB Tracking* recommend having a 'first responder' or colleague of the user monitor progress and get blog updates and act as an alternative point of contact for the *YB Tracker* team.

### Other Devices

*YB Tracker* also make the *YB3i*; a 'permanent' version of the *YB3*, which can be installed on water craft and vehicles. *YB* also work with companies like *SeaLabs* to help with ocean data collection. Not directly rescue-related but *YB* recently accompanied the 'highest altitude ultra marathon' and a rowing trip from Brighton in the UK to Barbados.

## SAFETY IN THE WILDERNESS

With devices like the *YB3, Garmin InReach, ZOLEO* and *SPOT,* some of the wide-area searches as a result of over-reliance on a cell-phone or indeed no comms measure at all, can be avoided. The user does not need to worry about checking in from whichever wifi establishment they may or may not be able to find, and can allow their friends and family to watch their progress step by step, via their personalised *YB* blog. This can be equally applicable to personal issue for rescuers but in terms of search time mitigation, more widespread use by the general public is also a big help.

Use of the YB3 quickly became second-nature - it's pretty simple even for technophobes and in particular if you can marry its use with a regular smart phone. While this style of device has already been around for several years it doesn't yet look as though this technology will be usurped any time soon.

Web address: **www.ybtracking.com**

# Search Theory and the Age of Intelligent Machines

## Balancing Promise and Prudence

By Doug Lothian and Ryan Erickson
International Association of Search and Rescue Coordinators (IASARC). www.iasarc.org

If you were to fall into the sea today, even with modern aircraft, advanced sensors, and skilled rescuers searching for you, the odds of survival are still dauntingly low.

Fewer than one in five searches for people in the water end in a life saved, and when flotation or signalling devices are absent, the chances plummet even further. The reason is sobering: humans, despite their skill and dedication, are not naturally effective searchers in vast, dynamic environments.

### From Submarines to Search and Rescue: The Birth of a Science

Search Theory, as a science, was born during World War II when Allied scientists sought to bring mathematical rigor to the problem of locating enemy submarines. Bernard Koopman's groundbreaking work applied statistical methods to search optimization — giving rise to a discipline that continues to underpin modern search and rescue (SAR) operations.

Koopman's inverse-cube law of sighting captured a simple but powerful truth: detection opportunities fall rapidly with distance. Refinements, including the concepts of sweep width and coverage factor, became the foundation of modern search planning.

Yet even the best mathematicians could not compensate for the inconsistencies of the human eye and brain. As post-war studies confirmed, the "human-in-the-loop" element introduced randomness that no equation could perfectly capture. One U.S. Coast Guard study found that even when a search aircraft passed within 0.1 nautical miles of a person in the water, the probability of detection was only 18%.

### The Rise of Intelligent Detection

Fast-forward to today, and the tools available to rescuers are changing faster than at any point since the advent of radar. High-resolution electro-optical and infrared (EO/IR) sensors, LIDAR, and synthetic-aperture radar have transformed what can be seen; however, the real revolution lies in consistency and repeatability.

The International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual puts it simply: "The eye is vulnerable to the vagaries of the mind. We can 'see' and identify only what our mind permits us to see." At sea, glare, haze, and empty-field myopia (where the eye fails to focus without visual reference) all conspire to limit human effectiveness. At the same time, age, fatigue, and biological factors affect consistency across individuals. Even the most experienced observers can fly directly over a survivor and never see them. This is where technology and the advancements from science fiction to reality come into play. Modern machine-learning systems can process many sensor feeds concurrently, in real time, recognizing complex patterns, and detecting people or vessels in conditions that would defeat even experienced observers. In controlled trials, intelligent detection systems have demonstrated a probability of detection and recognition (POD + R) exceeding 90 percent on a single pass.

These systems never tire, never lose focus, and their results are testable and repeatable. In essence, if something of context is within their field of view, they will almost certainly see it.

Photo: Damerau

## The Human Question

Such performance inevitably raises a larger question: if machines appear to see and detect better than us, what happens to us?

The integration of Artificial Intelligence (AI) into Search and Rescue represents not just a technological leap but a psychological one. Across the world, AI is quietly moving from assisting humans to replacing their judgment in time-critical decisions. In some demonstrations, fleets of autonomous drones have conducted multi-hour search missions without pilot input. In others, operators accept and "approve" AI decisions after mere seconds of review, often without real scrutiny.

This gradual erosion of "meaningful human oversight" raises ethical and operational questions. If an autonomous system misses a survivor, who is accountable: the developer, the operator, or the algorithm itself? And as we rely more on automation, what happens to the human expertise that has historically defined SAR professionalism?

## The Case for Balance

There is no doubt that AI can dramatically enhance SAR effectiveness. Drones equipped with EO/IR sensors can reduce the cost of a search, increase its efficiency, and conduct searches at night and in hazardous weather without putting human crews at risk. Machine learning models can fuse data from multiple sensors across various assets to provide a unified, real-time Common Operating Picture. However, human coordinators bring something that no algorithm yet replicates: context and abstract thought. They read subtle cues, the local weather, the behavior of a drifting object, and the cultural norms that might explain where people go in distress. They also bring empathy and an appreciation for the moral dimension of rescue, which is difficult to replicate in code.

Removing human oversight entirely risks not only mission failure but potentially the gradual atrophy of human expertise. Indeed, some SAR organizations now rely so heavily on planning software that few coordinators can perform manual search planning calculations; however, in doing so, planning professionals are also losing the skills to plan or plot manually.

## Looking Forward

Search Theory gave SAR its scientific foundation. AI and autonomy are now offering the tools to take that science further — to overcome the limits of human detection and recognition, finally.

Yet, as we move into this new era, we must resist the notion that human oversight is outdated. The goal is not to remove people from the loop, but to design systems that enable humans and intelligent machines to work together, combining computational precision with moral responsibility.

Today, the International Association of Search and Rescue Coordinators (IASARC) is championing a similar philosophy for AI-era SAR. It is developing globally accepted Certification Frameworks for Professional Search Coordinators, and technology-neutral performance standards for planning tools, AI detection software, and modern sensors.

IASARC's vision captures this balance: "A world where every SAR practitioner has access to modern, effective tools and practices, and contributes to their continuous improvement." AI may extend our eyes, but it can never replace our conscience. The future of SAR lies not in choosing between humans and machines, but in ensuring they search together, intelligently, ethically, and with purpose.

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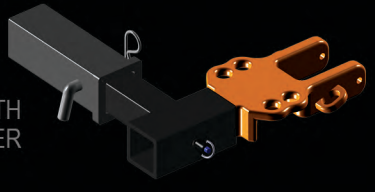

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