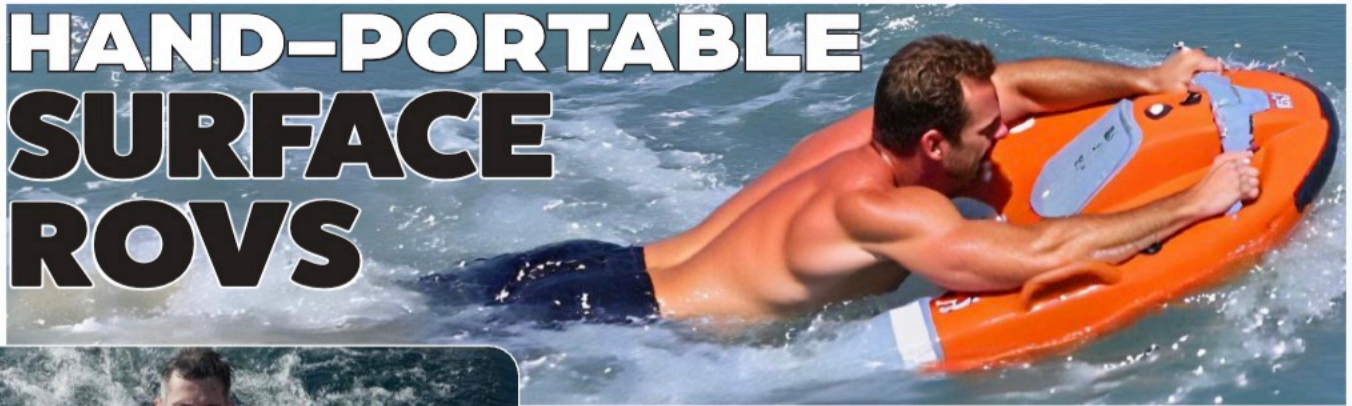
HAND-PORTABLE SURFACE ROVS



RESCUE#84, the technology of Surface ROVs is relatively new and a little out of our expertise so we have deferred to OceanAlpha's main engineers for this introduction, and are grateful for their unbiased assessment of what to look for in a surface ROV.

Most of the models in this Guide are more accurately described as Powered Rescue Buoys (PRB) or Remote Control Rescue Bouys (RCRB) and in the reconstituted words of the great Dr Michael Croslin - anything that helps rescue the casualty without the rescuer needing to enter the water is a good thing. Currently, there are **5 types of SURFACE ROVS:**

- ***Aerial life belts*** (not to be confused with AUV's like Australia's ***Little Rippers*** that drop floatation rather than 'being' flotation themselves.)
- ***Horseshoe shaped Jet-propulsion Boards (RCRBs)***
- ***Flat 'long' or 'Stretcher' Jet Propulsion Boards***
- ***Remote controlled Boats - both mini and full-size***

The majority are Chinese - both the top-end professional models and the more dubious cheap ones! It is best to go with the models you have heard of, seen advertised or had recommended to you. One of the most prolific manufacturers would seem to be JTT in China with some really interesting rescue products but we could not find any viable certification or adoption by any agency outside of China so you would need to research and liaise with such companies to take things further. Most of these powered buoys have a shell made of high density polymer or reinforced composite with closed cell foam inside to ensure buoyancy even if damaged and make no mistake, these things are pretty robust with bump guards on the nose. The majority will self-right thanks to strategic weight and buoyancy placement, hull curvature and directional thrusters. Some can be manually controlled by the rescuer like the Amara R1 above (shown in our tables with ♦) but the remote element lends itself to a degree of full autonomy that will (and is) seeing these things used in place of a regular lifebuoy/life-ring. Above-right is Vector's vision of how RCRBs can be used in the absence of a beach rescue/lifeguard service.

Although we have reviewed the USAFE model in TECHNICAL

Powered Rescue Buys are not a replacement for trained rescuers, but they can change the first minutes of an open-water incident .Their value depends on speed, controllability, buoyancy, propulsion protection, communications, and how well they are integrated into rescue procedures. In many water rescue incidents, as lifeguards will tell you, the first challenge is in identifying that a person is actually in difficulty because it's the ones NOT waving and shouting that are most in need of rapid rescue and this will almost always require lifeguard or rescuer swimmer intervention because they are not able to help themselves onto a remote controlled craft or lifebuoy. For those that are in difficulty but still able to wave, shout or even swim, the first consideration is getting buoyancy to that person quickly, accurately, and without putting another rescuer into the same hazard.
Traditional equipment remains essential. Throw lines, rescue tubes, reach poles, inflatable boats, jet skis, and rescue boards all have clear roles in a trained response. Each, however, also has operating limits. A thrown lifebuoy is simple and reliable, but its range and accuracy depend on the rescuer, the wind, and the distance to the casualty. A boat or jet ski can cover distance quickly, but it needs trained operators, launch access, turning room, and careful handling near a person in the water. A swimmer rescue can be immediate, but it places the rescuer directly into the current, surf, cold water, low visibility, or panic contact zone.

Remote-controlled lifebuoys sit between these tools. They are best understood as powered flotation devices that can be sent toward a casualty from a safer position. The rescuer remains on shore, on a vessel, on a pier, or at another stable launch point, while the device carries buoyancy and handholds to the person in the water. Once contact is made, the device can be guided

TITLE PIC OPPOSITE: *OceanAlpha's Dolphin 3* is amongst the industries best known 'powered life buoys, here retrieving a swimmer but such devices can equally deliver a rescuer to a casualty as in the picture above of the *USAFE* device. Above. Not all surface ROVs arrive on the surface - there are an increasing number of aerial delivery platforms like this *JTT* rescue ring that arrives from above and then becomes a passive floating rescue aid while the surface arriving devices can power the casualty back to safety.

TOP: Remote control has been successfully applied to all manner of vehicles and craft. Rescue is usually a poor relation to the military in terms of development but there are already commercially available inflatable rescue boats like this model from *JTT* and below that an enlargement of the life-buoy concept with what *JTT* term a 'stretcher' akin to an open-backed swiftwater raft. .LEFT is the *FASTY* from *Marin Robotics*, one of several, including *Ocean Alpha's Dolphin* that use twin propulsion 'jets' in a horseshoe configuration. The remote controls for all of these craft are an important consideration. Some are simple controllers that rely on the rescuer watching the device itself while others have screens linked to on board cameras as well as two-way mics for direct communication with the casualty which can be essential in calming and advising.

back or used to stabilise the casualty until another recovery method arrives.

This makes the technology useful, but not automatic. For rescue organisations, the key question after affordability is not whether a powered lifebuoy is fast. It is whether it can be controlled, seen, held, recovered, maintained, and trusted under the actual conditions in which the team works.
The first design consideration is the balance between speed and controllability. High top speed helps when the casualty is far from shore or drifting quickly, but excessive speed near a person in the water can create handling and contact risks. Operators need progressive control, predictable turning, and a clear approach method. In practice, many teams train their operators to use higher speed during the transit phase, then reduce speed during final approach. This allows the device to arrive quickly without striking the casualty or overshooting the target.

Buoyancy and towing capacity are equally important. A powered lifebuoy does not need to lift a person fully out of the water, but it must provide stable flotation that a weakened, panicking, or cold casualty can hold. Handles, ropes, body shape, and the height of the device in the water all affect this interaction. In multi-casualty or heavy-current scenarios, towing capability also matters. A device may need to support one person, assist several people holding the same platform, or help move equipment and lines across water.

The propulsion system is one of the most safety-critical areas. Open propellers can create entanglement and injury risks, especially around hair, loose clothing, weeds, floating debris, and rescue lines. For this reason, many modern powered lifebuoys use guarded or ducted propulsion. The purpose is not only to protect the equipment, but also to reduce the risk of secondary injury when the device reaches the casualty. Intake design, grille spacing, thrust output, and resistance to blockage all affect reliability in rivers, surf zones, ports, and floodwater. Self-righting capability is another practical requirement. A device may be thrown from height, hit by waves, rolled by surf, or pulled over by a casualty. If it cannot recover its operating orientation, speed and power become irrelevant. Automatic self-righting reduces the number of failed deployments and makes the device more tolerant of rough handling during emergency use.

Communications and visibility determine whether the rescuer can keep control during the incident. Control range figures should always be read with conditions in mind, especially line of sight, antenna position, interference, rain, spray, and vessel traffic. Bright colour, navigation lights, position lights, and screen feedback help the operator track the device. In low-light operations, searchlights or loudspeakers can support both visibility and casualty instruction. A calm voice instruction from the shore may help a panicking person understand where to hold and how to cooperate with the recovery.

Battery readiness is less 'dramatic' than speed, but it is central to real-world use. Rescue equipment must be ready at the start of the shift, not only after a full charge in a demonstration environment. Teams should consider charging time, standby mode, storage method, battery health checks, and post-incident turnaround. Waterproof charging interfaces, magnetic power isolation, and dedicated storage stands can reduce small operational failures that otherwise prevent a device from being available when needed.

Smart functions can add value, but they should be treated as support tools rather than a substitute for training. Positioning systems, auto-return, cameras, remote monitors, and status displays can help in certain scenarios. They are especially useful when the casualty is at distance, visibility is poor, or the operator needs real-time information about battery level and signal strength. However, teams should still train for manual operation, loss of signal, low battery, current drift, and recovery of the device after use.

The most effective deployments usually follow a simple sequence. The team identifies the casualty and hazard, chooses a launch point with the clearest approach, powers and checks the device, enters the water if the model supports water-triggered activation, drives toward the casualty, slows for final approach, instructs the casualty to hold the handles or ropes, and guides the device back to a recovery point. After use, the team should rinse the device if used in saltwater or contaminated water, inspect the hull and propulsion area, check the battery, and record any impact, drop, or abnormal operation.

There are also situations where a powered lifebuoy should not be treated as the primary answer. It may be unsuitable where the casualty is trapped, unconscious face-down, under a structure, beyond reliable visual control, close to heavy vessel movement, or in floodwater containing significant debris. It also does not remove the need for medical response, spinal precautions, casualty assessment, or trained extraction from the water. The strongest role for the device is often early flotation and contact: reaching the casualty before a boat, swimmer, or recovery team can do so safely.

We'll use the *OceanAlpha Dolphin 3* Series to describe the various features that can be present on the twin propulsion systems in particular:
The typical 'horseshoe' surface lifebuoy is an intelligent, self-propelled rescue device for water rescue. The *Dolphin 3* as an example, measures 100 cm x 70 cm x 25 cm and uses an LLDPE hull with an IP67 waterproof rating. Key specifications include a maximum speed of 7 m/s, endurance of up to 70 minutes at 3 m/s under calm-water conditions, and line-of-sight control range of up to 800 m. The device includes handles, handle ropes, position and signal lights, an OLED screen, magnetic power switch, charging port, camera, bumper, and throttle buttons. The *Dolphin 3* and *Dolphin 3 Plus* both include auto self-righting, while *Dolphin 3 Plus* adds Dual GNSS, auto return, on-board camera, and remote monitor. A charging stand, search light, and loudspeaker are listed as optional equipment.
These specifications are useful, but they are only part of the evaluation. A rescue organisation considering any remote-controlled lifebuoy should test it in its own operating environment: calm water, current, surf, night conditions, vessel deployment, pier deployment, and after repeated launches. Operators should practise approach angles, casualty instruction, manual recovery, lost-signal procedures, and multi-person coordination. The device should then be written into the team's standard operating procedures, with clear rules on who deploys it, where it is stored, how it is charged, and when another rescue method takes priority.
Remote-controlled lifebuoys are a great example of how technology is assisting rescuers. Their purpose is not to make rescue automatic. Their purpose is to give trained responders another way to deliver flotation, reduce unnecessary rescuer exposure, and buy time for a controlled recovery. Used with the right training and limitations, they can become a useful part of the modern water rescue toolkit.

A USER-PERSPECTIVE OF SURFACE ROV PERFORMANCE using the *USAFE*

by Dr Steve Glassey & Geoff Bray

Indicative of all the leading brands is the USAFE model which we reviewed in TECHNICALRESCUE#84 in 2024 - this is an excerpt:

Operating the remote control is straightforward: forward (and speed), left, right. Individuals familiar with gaming consoles or drones will quickly adapt to the device. Notably, if the buoy flips over, it automatically signals resetting it's orientation with the controller through its patented "Flip and Move" feature. Turn it on, toss it into the water, and start using the controller—it's that simple.

PERFORMANCE

The *USafe* is user-friendly and performs exceptionally well on flat water, allowing operation as far as the eye can see. It demonstrated the power to retrieve both a victim and a rescuer (manikin) without significant difficulty. We even had it tow a small inflatable sled and carry a rope across the water. In calm waters, it met expectations without any surprises. However, the real test was in swiftwater conditions.
In our first scenario, using the device unmanned under remote control, it navigated through Class III rapids while enduring waves and frequent flips. Thanks to buoy's "Flip and Move" auto-correct feature, we could easily continue operating despite the flips. What became evident was that the operator needed to master using water currents to their advantage, employing ferry angles, and understanding hydrology, all of which amplified the device's effectiveness. We successfully used it to carry an 8mm water rescue line across the channel.
In more challenging flow conditions, it performed well but couldn't navigate up drops, a feat that even competent kayakers or rafters might struggle with. While we attempted a run-up, our limited experience might have been a limiting factor. To assess its suitability for retrieving a victim with minimal water experience from the other side, we placed a swiftwater rescue technician on the device, with another operator on shore controlling it. Together, they worked effectively, with the in-water technician providing kick propulsion and adjusting their body position, while the shore-based operator transmitted additional propulsion through the electric motors. However, in isolation, both had their challenges, highlighting the device's potential when used in combination.
One notable shortcoming was a lag in the remote control, which, while not critical in static water, posed challenges in swiftwater, especially as the device moved around in eddies. A few seconds of delay could mean the difference between being pulled into the flow or missing the ideal timing for a turn. We ran aground several times, and a reverse option would have been beneficial instead of relying on a surge of current to recover the device. The cause of the lag, whether due to aerated water affecting the controller signal or other factors, was unclear.

If intended for swiftwater use, it would be more effective in the hands of an experienced swiftwater technician. Future versions should consider incorporating controls on the device's handles for local activation while maintaining remote control. Additional power, achievable with next-generation batteries and motors, could make it a more viable option for swiftwater rescues against powerful currents.
The device's weight (13.7 Kg) allows for easy carrying and operation by a single person. It performs exceptionally well in static water environments, making it ideal for lakes, ponds, pools, and calm rivers or slack floodwater. It might also be a valuable tool for air rescue operators focusing on winching swimmers into the water. Offshore platforms could benefit from its quick deployment compared to an IRB crew.

SUPPORT

The USafe's intakes and internal battery are reasonably easy to remove and service as needed, although the most common requirement is simply recharging the battery through an induction charger, requiring no tools. The distributor network was responsive and provided good customer service. The device includes a two-year warranty. Something we didn't have available at the time of the review was the APP which gives real-time diagnostics relating to battery power and engine status and maintenance regimes (but not physical control of the buoy.

VALUE FOR MONEY

The device is priced at approximately USD$10,000. Whether it provides good value for money depends on how you intend to use it. For the same price, one could purchase an IRB with a motor capable of rescuing multiple victims simultaneously. Therefore, its value is subjective and contingent on your specific needs and use-case.

LEGAL CONSIDERATIONS

While the Usafe is patented in 71 countries, the regulatory status remains unclear in various countries. In the context of New Zealand, it's uncertain whether the USafe falls under the definition of a commercial vessel, given its motorization and use for transporting people. Users should seek their own legal advice regarding any regulatory requirements that may apply. Obtaining exemptions or approval for its use may be necessary.

ADVANTAGES

- Single-person carry and operation
- Operator remains out of the water during rescues
- Low training requirements (minimal)
- Robust and capable of withstanding impacts
- Highly buoyant
- Auto-correcting controller for flipped device

DISADVANTAGES

- Cost
- Unproven performance in real swiftwater conditions
- Remote controller lag
- Insufficient power for swiftwater rescues involving victims and/or rescuers
- Unclear regulatory framework for use
- No reverse function

CONCLUSION

The USafe is an excellent water safety product for flat water environments. While we lack expertise in surf conditions to evaluate its performance in such an environment, it holds promise for swiftwater scenarios. However, further testing, including comparisons with similar products like the *OceanAlpha Dolphin*, is necessary. In our preliminary assessment, a next-generation device with increased power could be the game-changer needed for swiftwater rescues. In the meantime, it's a valuable addition to the toolbox, though legal considerations should be taken into account.

The authors would like to express their gratitude to Vector Wero, Auckland International Airport (Airport Emergency Service) and Fire & Rescue Safety New Zealand for their invaluable support during this review.