

MPA NEWS

Published on *MPA News* (<https://mpanews.openchannels.org>)

MPA Perspective: Autonomous Vessels Offer New Tool for MPA Research and Enforcement

By **Brendan Tougher** and **Phillip A. McGillivray**

[Editor's note: The authors of this essay have no financial interest in the products they describe here.]

Autonomous vessels - that is, unmanned vessels that can operate independently of human direction or by remote control - offer MPA managers a new tool for research and enforcement. Recently developed autonomous surface vessels (ASVs) are now being tested in marine protected areas to provide a broad range of monitoring capabilities.

Using ASVs in MPAs enables the study of temporally short-lived events, such as the effect of storms, and spatially unpredictable features, such as upwelling and frontal zones. Understanding of these critical events is important for comprehensive ecosystem management but can be difficult to document. In addition, ASVs can provide persistent maritime law enforcement capabilities, which could be particularly useful in remote areas or in situations of low enforcement capacity.

The Wave Glider

The Wave Glider (www.liquidr.com) - a surfboard-like float roughly the length of a human - is an ASV that derives its propulsion from wave energy, and can thus remain at sea for indefinite periods. It can be launched directly from a dock or shore, without requiring a ship. Wave Gliders navigate in real-time with GPS fixes via Iridium burst communications (a satellite-based communication system), and can be directed where needed. This ASV is currently being tested within MPAs for hydrophone studies of marine mammals, and measurement of primary production (chlorophyll) and ocean acidification.

In addition to being useful for research, this ASV can be used for law enforcement monitoring in remote MPAs. ASVs can project a continuous law enforcement presence without the cost of manned patrols, and provide a deterrent to MPA violations. Including ASVs in MPA enforcement allows personnel to focus on law enforcement response rather than merely surveillance.

Wave Gliders have already been developed and tested around Hawaii for autonomous remote surveillance, fitted with digital cameras that stream video footage back to shore in real-time. The Wave Gliders' hydrophones can be used for monitoring vessel activity: sound recordings can be analyzed by software that discriminates transiting vessels from vessels engaged in fishing. Each Wave Glider carries an Automatic Identification System (AIS) that reports its location to shore and to other vessels nearby via satellite.

The WAM-V

Another ASV, the Wave Adaptive Modular Vessel or WAM-V (www.wam-v.com), can also be used for enforcing remote MPAs. This futuristic-looking, double-pontoon vessel differs in a significant way from a Wave Glider in that the WAM-V uses a fuel-based motor for propulsion, allowing it to transit rapidly to areas of concern. Use of a WAM-V for MPA patrols was demonstrated off Italy in 2009; details are on the WAM-V webpage. A hybrid of a WAM-V with a Wave Glider propulsion sub-system is also being discussed to allow rapid transit to and from a location, with the option of remaining on patrol or on station for extensive periods using only wave energy.

Cost involved

Wave Gliders are currently being sold for around US \$150,000. The price of the WAM-Vs varies with size. The smallest ones, at 12 feet in length, are around \$100,000 for each of the first two that have been constructed; the price may decrease as production increases. A larger 33-foot version is under construction that can be manned or autonomous.

To use these devices, the operator needs to know how to use a computer along with the required software, as well as be able to pan the digital camera to identify any illegal activity. With the Wave Glider, for example, the operator's computer displays the position of the device as a series of waypoints received once a minute, providing a so-called "bread crumb trail" display. The Wave Glider can be assigned pre-programmed tracklines or can be controlled in real time by directing it to GPS waypoints as warranted to investigate possible targets of interest.

Development of ASV systems for research and law enforcement in MPAs will increase temporal and spatial data availability for managers while reducing the cost of enforcement and reducing the attractiveness of no-take areas as sites for illegal fishing. The latter issue is important given the current status of too many MPAs as "paper parks" where maritime law enforcement is inadequate. Additional trial deployments of ASVs in MPAs are planned for 2011.

For more information:

Brendan Tougher, Environmental Management Graduate Program, University of San Francisco, California, US. E-mail: brendantougher@gmail.com

Phil McGillivray, US Coast Guard PACAREA Science Liaison, Alameda, California, US. E-mail: philip.a.mcgillivray@uscg.mil

Source URL: <https://mpanews.openchannels.org/news/mpa-news/mpa-perspective-autonomous-vessels-offer-new-tool-mpa-research-and-enforcement#comment-0>