

Technology for MPA Monitoring



Satellite monitoring

Detects distant vessels



Drones

Aerial surveillance



Electronic monitoring

Onboard cameras



Shore-based radar

Nearshore surveillance



Management platforms

Integrated data & analytics



Vessel tracking (VMS)

Tracks small boats



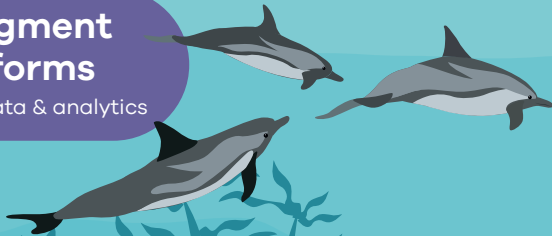
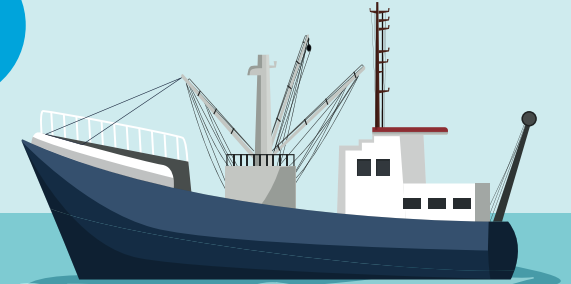
Uncrewed vessels

Autonomous patrols



Acoustic sensors

Detects vessel noise



Type	Management Platforms	Satellite Monitoring	Shore-based Awareness	Vessel Tracking (VMS)	Electronic Monitoring (EM)	Acoustic Sensors	Drones	Uncrewed vessels
Best uses	<p>Integrates and visualises real-time data from multiple sources on a single dashboard.</p> <p>Enables detection of illegal fishing activities.</p> <p>Facilitates coordination of enforcement patrols.</p> <p>Supports analysis of spatial trends for adaptive management.</p> <p>Enhances community engagement and reporting for conservation outcomes.</p>	<p>Provides real-time vessel detection and activity monitoring through satellite-based AIS and radar data.</p> <p>Helps identify potential IUU fishing activity and incursions into MPAs.</p> <p>Can track compliance of MPA regulations and support adaptive management decisions.</p>	<p>Detects nearshore vessels using radar and AIS, ideal for areas with poor satellite coverage.</p> <p>Integrates with patrol operations and management platforms for coordinated enforcement response.</p> <p>Complements satellite monitoring by covering small-vessel activity and AIS gaps.</p>	<p>Tracks vessel positions via satellite or cellular to ensure compliance with MPA boundaries.</p> <p>Provides near real-time monitoring for quick detection of incursions.</p> <p>Enables analysis of fishing effort patterns around MPAs for adaptive management.</p> <p>Integrates with electronic monitoring and management systems for comprehensive surveillance.</p> <p>Acts as a deterrent to IUU fishing through mandatory reporting.</p>	<p>Monitors vessel activity and gear use within or near MPAs using onboard cameras and sensors.</p> <p>Verifies compliance with MPA regulations, such as no-take zones and gear restrictions.</p> <p>Provides video and positional data for enforcement.</p> <p>Enables resource management through detailed catch and bycatch data analysis.</p>	<p>Identifies engine/propeller noise and gear deployments in an MPA without the need for AIS.</p> <p>Can operate 24/7 across a range of weather conditions.</p> <p>Can inform patrolling efforts</p> <p>Can capture biological data alongside MPA enforcement.</p>	<p>Can be rapidly deployed for surveillance and data collection.</p> <p>Captures high-resolution imagery to identify vessels and activities.</p> <p>Can provide wide coverage of large or inaccessible areas without physical patrols and operate BVLOS.</p> <p>Monitors in real-time through live data streaming.</p>	<p>Can provide persistent presence for longer duration patrols.</p> <p>Covers large areas efficiently with remote operation.</p> <p>Collects multi-sensor data including video, radar, and acoustic signals.</p> <p>Enables real-time monitoring and data transmission to enforcement teams.</p> <p>Operates in challenging or hazardous conditions.</p>
Limitations	<p>Potential connectivity challenges in remote areas.</p> <p>Reliance on external sensors/integrations for accurate data.</p> <p>Complexity of integrating multiple data streams.</p> <p>Technical capacity and resources for setup and maintenance required, with effective training key for implementation success.</p>	<p>Tools reliant upon AIS transmission which can be turned off by vessels during IUU activities.</p> <p>Non-AIS methods of satellite-based remote sensing are affected by weather (i.e. clouds) and temporal/spatial resolution coverage (i.e. return rate, swath).</p> <p>High resolution satellite imagery is expensive but Skylight offers this free of charge to MPA managers.</p>	<p>Limited to coastal zones and cannot monitor offshore marine areas.</p> <p>Expensive set-up and ongoing costs.</p> <p>Requires training to operate and trouble shooting.</p>	<p>Data is transmitted at intervals, not always real-time, which can restrict the extent of information that is gathered.</p> <p>Units can be tampered with or disabled by vessels if IUU fishing activity is taking place.</p> <p>Requires infrastructure and trained personnel for monitoring.</p>	<p>Requires reliable power and connectivity, which can be challenging in remote MPAs.</p> <p>High initial cost for hardware and ongoing expenses for data review and storage.</p> <p>Limited effectiveness for small vessels and reliant upon effective camera placement or sensor coverage.</p> <p>Fishers may resist adoption due to privacy concerns or perceived surveillance.</p>	<p>Depending upon how the array is set up there can be acoustic blind spots.</p> <p>Sound can be confounded by external noises (shipping traffic) or impacted by bathymetry.</p> <p>Requires specialised set-up procedures and ongoing maintenance.</p>	<p>Limited flight time and range due to battery constraints.</p> <p>Can be weather-dependent and can be restricted in strong winds or heavy rain.</p> <p>Requires reliable skilled operators and regulatory compliance.</p> <p>Can face signal loss or connectivity issues in remote areas.</p>	<p>Can have limited endurance compared to larger manned vessels for very long missions.</p> <p>Vulnerable to very harsh sea conditions and may need retrieval during storms.</p> <p>Require reliable communication links, which could fail in remote areas.</p> <p>Can be costly to procure and maintain.</p> <p>May face risks of collision or interference from other vessels/ ocean users.</p>