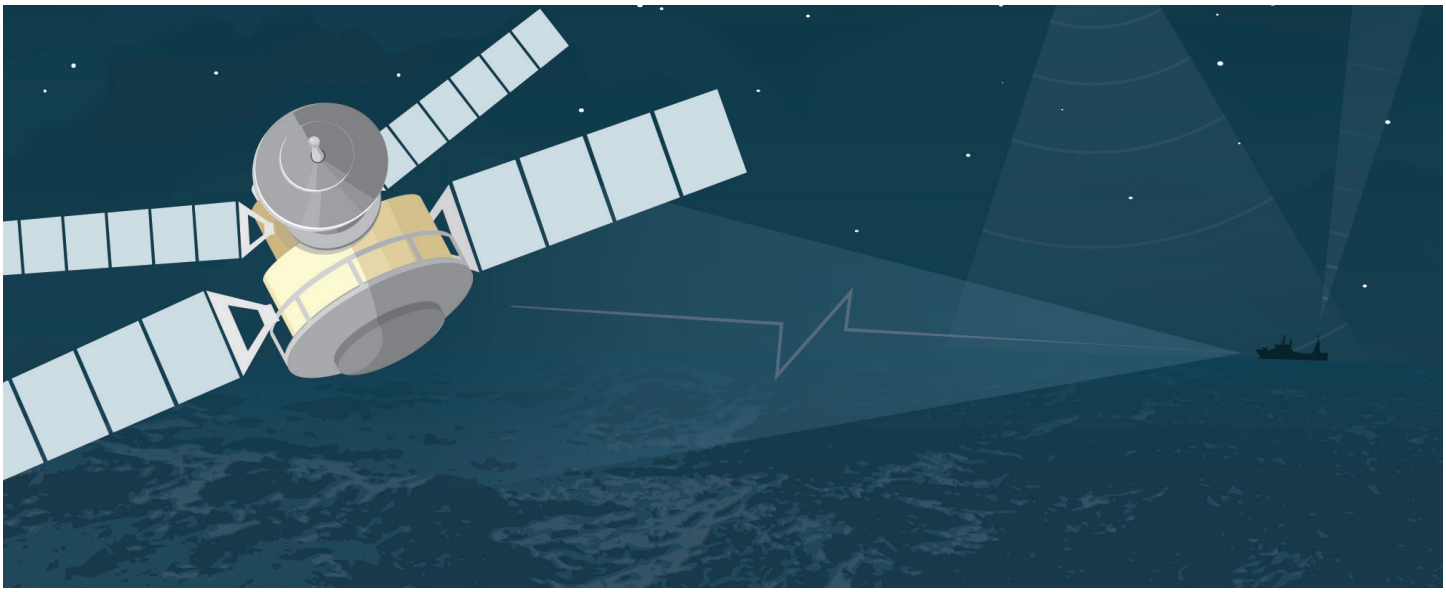
An infographic from THE PEW CHARITABLE TRUSTS | Feb 2014



Technology for Fisheries Monitoring and Surveillance

Monitoring and surveillance of fisheries is a complex and challenging problem. Traditionally, ships and aircraft have been the mainstay of surveillance efforts, however, the use of satellites and other technologies by fisheries enforcement officials has increased in recent years.

As more technologies are utilized to improve global fisheries monitoring and surveillance methods, it is important to note that no single technology can track and expose all illegal fishing activity. Fisheries monitoring and surveillance systems therefore often require a suite of available technologies.

This leaflet identifies several technologies that have emerged to assist authorities worldwide to improve information exchange and enforcement. These technologies fall into two groups:

1. **Monitoring technologies** collect information on fishing activities to verify that they are legal.
2. **Surveillance technologies** identify vessels and observe fishing activities through sightings by inspection vessels, aircraft and other technical means.

Data gathered by monitoring technology are captured for recordkeeping and analysis by experts. Those data can be used with inspection and other surveillance data to prosecute fisheries crimes in national and international courts. The data can also provide the basis for risk-analysis reports and are crucial to developing inspection and surveillance strategies.

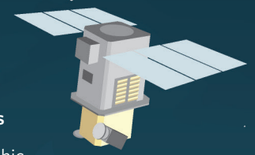
No technology on its own is a complete solution to the problem. Each must be part of an overall system that includes trained personnel, infrastructure, and the backing of a strong legal regime.

Technology for Fisheries Monitoring and Surveillance

1 **Vessel Monitoring Systems,** or **VMS**, aboard vessels broadcast GPS coordinates, speed, and other data to a fisheries monitoring center via satellite. These systems allow direct communication to/from vessels and are widely used—and required—by many flag States, coastal States, and regional fishery bodies.

2 **Synthetic Aperture Radar,** or **SAR**, satellites circle the globe day and night, independent of weather conditions, and can detect vessels in remote areas. The radar does not require cooperation from fishing vessels, providing a more complete picture of maritime activities.

4 **Automatic Identification Systems,** or **AIS**, broadcast a vessel's identity, position, and other information by VHF radio to nearby vessels and coastal stations and are mandatory under SOLAS for all commercial vessels larger than 300 gross tonnes. Satellites can also capture the radio signals to provide a global picture of vessel activity.



6 **Optical Satellite Sensors** provide high-resolution imagery and oceanographic and atmospheric data and can continuously cover one small area. Monitoring is restricted to daylight hours, and image quality degrades when cloudy.

3 **Electronic Monitoring Systems,** or **EMS**, are compact video monitoring systems installed aboard a fishing vessel to record its day-to-day activities and are required by some regional fishery bodies and coastal/flag States. The video is reviewed by authorities after a vessel returns to port.

5 **Unmanned Aerial Vehicles,** or **UAV**, are remote-controlled or autonomous aircraft outfitted with imaging and sensor equipment. Flight duration and range vary depending on the model. Some can be launched and recovered at sea.

7 **Wave Gliders,** an example of an unmanned surface vehicle, or USV, are crafts that use the ocean's wave energy for propulsion and do not need refueling. Solar panels power satellite communications and onboard sensors such as AIS receivers or acoustic monitoring equipment.

1 Vessel Monitoring Systems

- \+ Signals are secure and difficult to fake
- \+ Authorities can alert vessels not in compliance
- – Helps show vessel location but cannot verify vessel activity
- – Legal restrictions on data sharing

2 Synthetic Aperture Radar

- \+ Covers large, remote areas
- \+ Works in all weather conditions
- – Low resolution and inability to identify vessels

3 Electronic Monitoring Systems

- \+ Can be used to monitor fishing activity and catch
- \+ Compact and simple installation
- – Vulnerable to tampering, large time-delay for evaluation of data

4 Automatic Identification Systems

- \+ Can detect vessel patterns consistent with fishing
- \+ Satellite-based systems have unlimited range
- – Broadcasts can be switched off or altered to show inaccurate vessel information

5 Unmanned Aerial Vehicles

- \+ Imagery available for immediate analysis
- \+ Stealth and access to remote areas
- – Restricted by weather and flight duration

6 Optical Satellite Sensors

- \+ Provides detailed situational picture
- \+ Can cover remote fishing areas
- – Imagery is dependent on time of day, weather conditions

7 Wave Gliders

- \+ High endurance with low maintenance cost
- \+ Able to be deployed to remote areas
- – Limited payload, low speed

For further information, please visit:

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The International Monitoring, Control and Surveillance Network, or **IMCS Network** is an informal group of countries, regional economic integration organizations and fisheries management bodies cooperating to combat illegal fishing by enhancing the efficiency and effectiveness of fisheries-related MCS activities and improving information exchange among members.