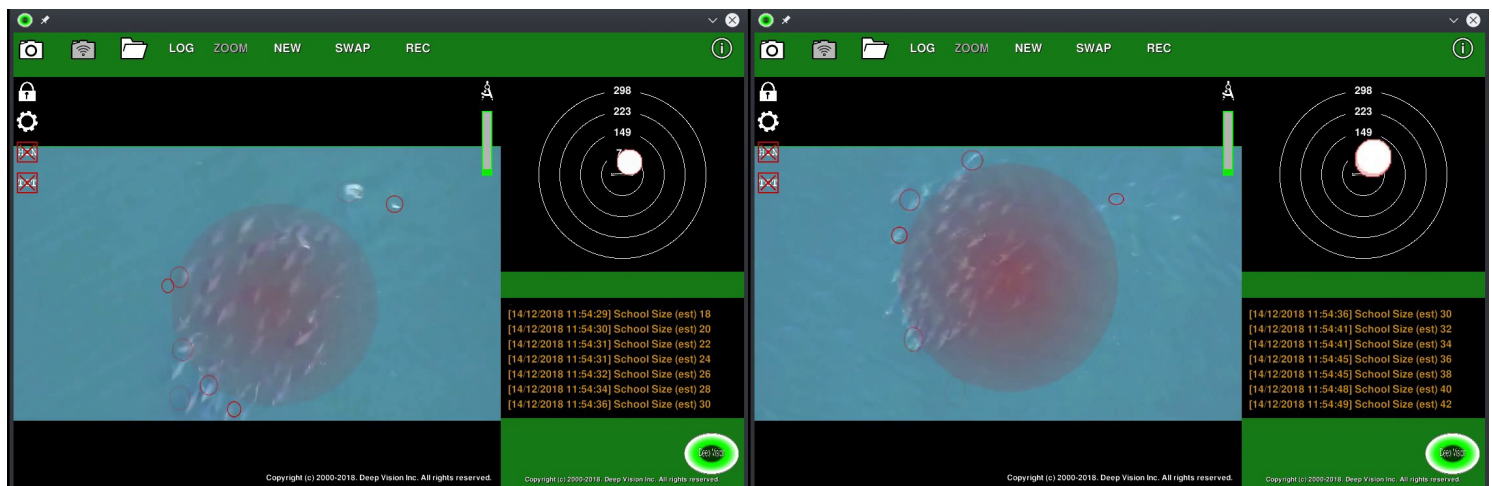




# MAKO: Autonomous Surface Fish Spotting

## What Is MAKO?

MAKO is an automatic surface/near surface schooling fish spotting technology for aerial and surface level platforms. The technology uses electro optical (EO) sensors to provide persistent situational awareness for the detection and continuous monitoring of fish schools. MAKO provides real-time feedback of school density/counts, biomass estimates, geolocation, and school heading. The technology is passive (non-emitting sensors do not interfere with animal behaviour), and deployable from manned and unmanned aerial vehicles, and ship masts.



## How Does MAKO Add Value to the Fishery?

MAKO is a means of rapidly and automatically collecting data about the locations, headings, and size of aquatic populations, such as tuna. The technology is operated independent of a human operator, and may be deployed as part of an unmanned system or as a supplemental observer on a manned operation. MAKO provides accurate biomass estimation, fish count, and geolocation for schools of fish visible from an aerial platform, providing valuable information to commercial fisherman.

MAKO can be used to supplement aerial fish spotter efforts by providing reliable, accurate measurements of fish locations and scale. For deployment as part of an unmanned system (UAV), the technology can enable significant cost savings to fishing operations without sacrificing quality of fish reporting. MAKO serves as an independent survey tool, providing rapid, wide area surveillance of fishing grounds to identify the regions of highest fish concentrations.

All data generated by MAKO can be transmitted to one or more vessels. Data can be integrated into existing systems/displays to provide a unified picture, or used as a stand-alone system to supplement existing sonar/fish finder equipment. All reported fish sightings include geolocation (GPS/GNSS coordinates) for ease of planning and navigation.



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## How is MAKO Deployed?

MAKO is a camera system that can be deployed in a number of ways, including:

- On a manned aircraft (rotary or fixed wing) to supplement existing spotting efforts, or add additional spotting resources.
- On an unmanned aerial vehicle (UAV) to expand existing spotting areas, increase spotting frequency, and reduce spotting costs.
- On ships to provide real-time feedback of surface fish populations for planning and decision making.

The aim of MAKO is to provide a tool that can be deployed across a number of platforms to increase awareness/intelligence of fish locations and sizes, and to reduce the operational expense associated with the deployment of aerial platform spotters.



Deep Vision is the sole Canadian distributor of Hanseatic Aviation Solution's S360 fixed wing UAV. The S360 is capable of long flight times and can withstand harsh maritime conditions experienced in the commercial fishery.

## How Does MAKO Work?

MAKO is built from Deep Vision's Autonomous Maritime Persistent Surveillance (AMPS) module. This technology is a multi-purpose situational awareness tool for the defence and civilian industries. The AMPS module has been applied to autonomous surface vessel operation, maritime live gun firing training, and maritime search and rescue. The AMPS module works with EO sensors to detect all surface or near surface objects in the maritime environment. MAKO is a customisation of this module to focus directly on the detection and monitoring of surfacing fish schools.

## Is MAKO Ready for Deployment?

Deep Vision is currently seeking exploitation partners for market entry of MAKO. This includes seeking interest and requirements from the commercial fishery. The emphasis for 2019 is entry into the commercial tuna fishing industry to provide an assistive solution to existing fish spotting efforts.

