



## Lightfish Safety at Sea Information & SOPs

[info@seasats.com](mailto:info@seasats.com)

SeaSatellites, Inc.  
4901 Morena Blvd, Building 600  
San Diego, CA 92117



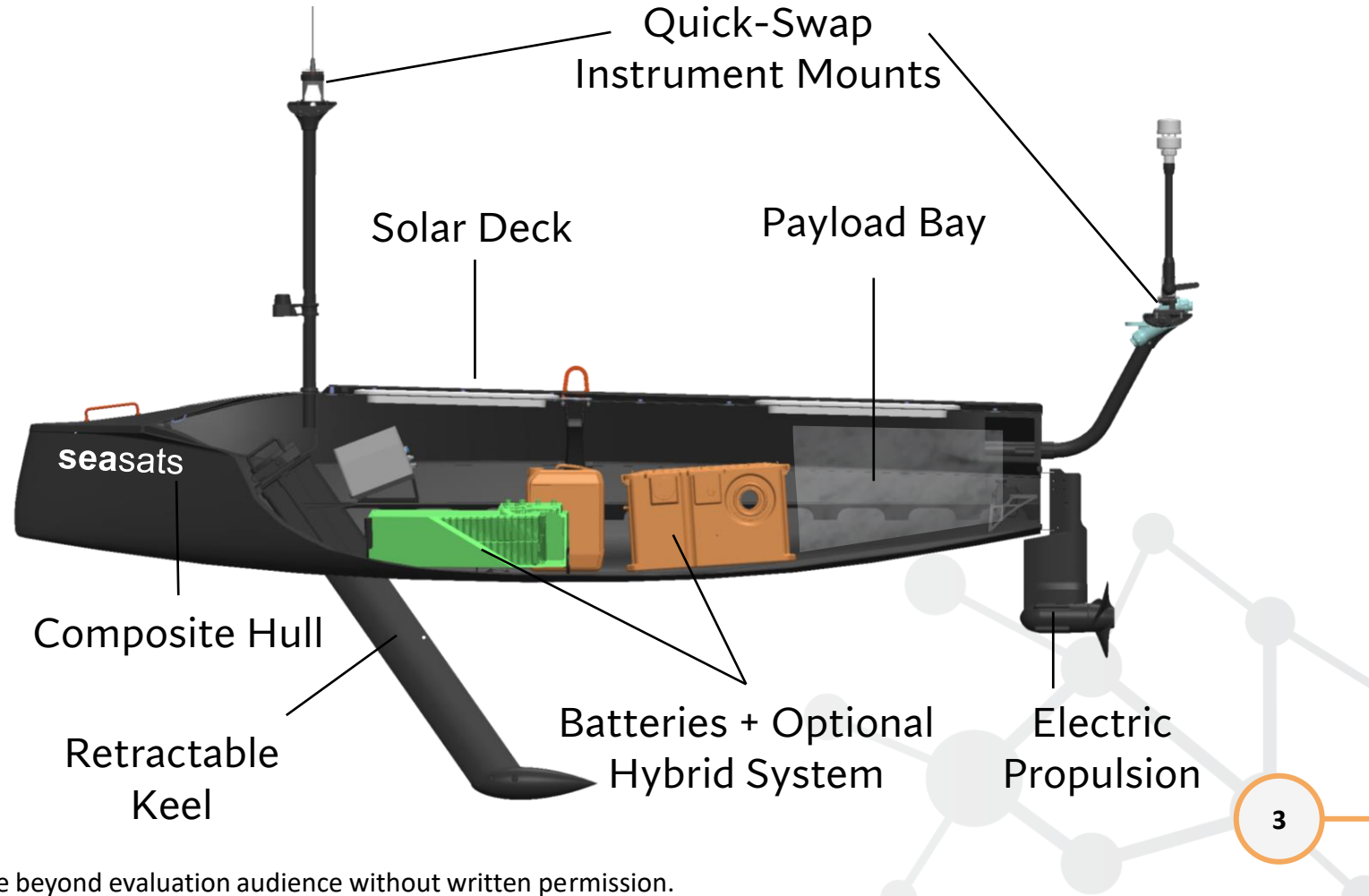
# 1. Overview of Lightfish ASV

The Lightfish autonomous surface vehicle (ASV) is a persistent, low-logistics workhorse for streamlined maritime operations.

Customers in the science, commercial, and defense industries utilize the Lightfish by loading mission specific sensors into the payload bay.

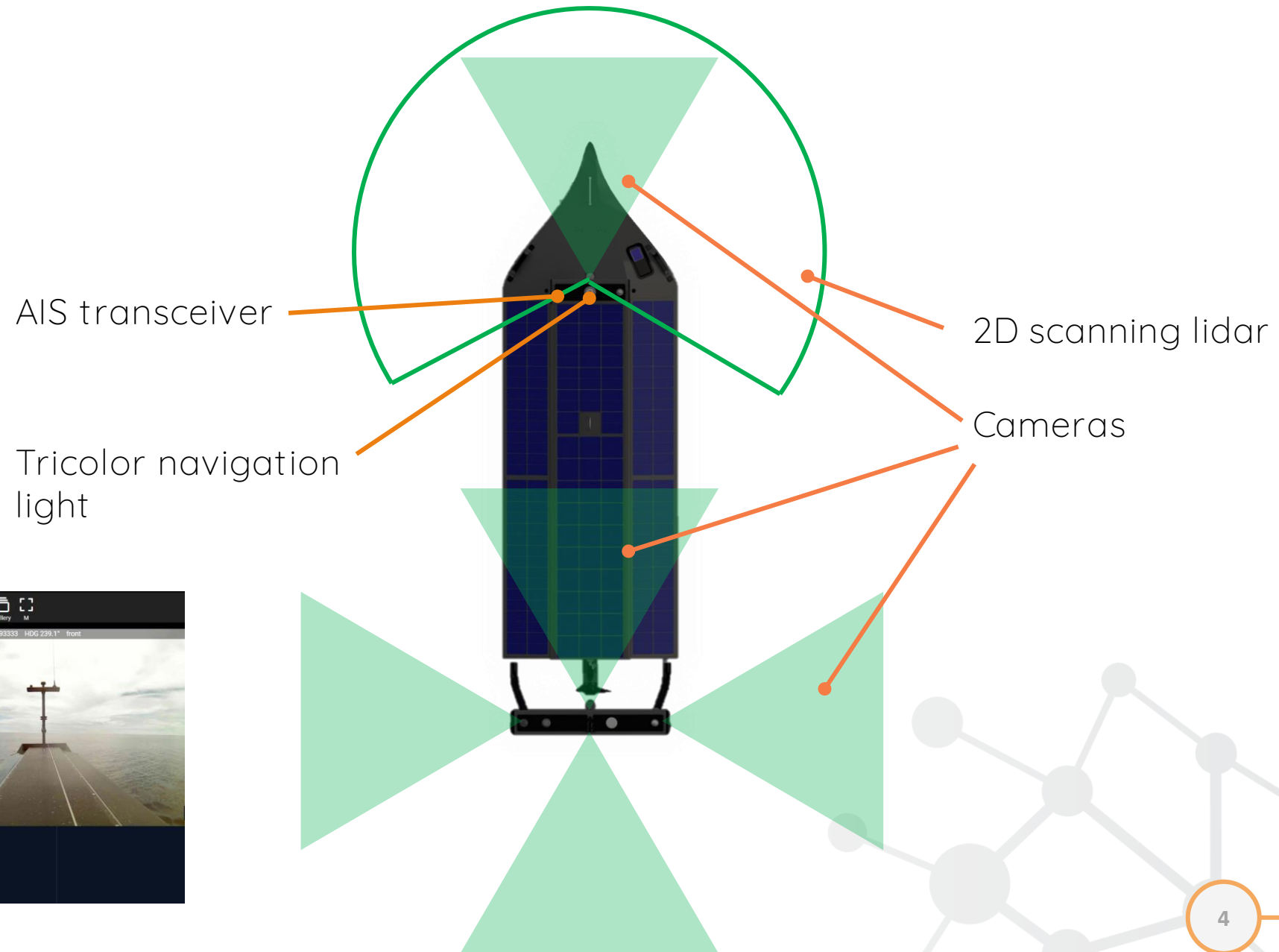
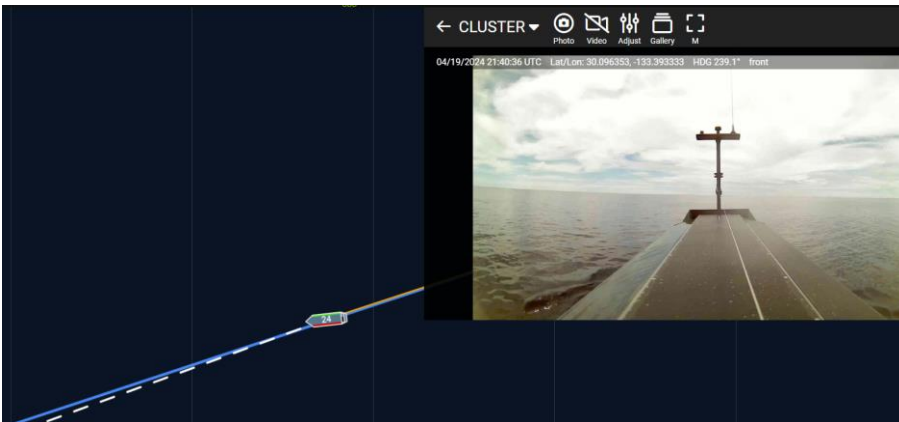
Some breakthroughs achieved by the Lightfish platform include:

- Rapid payload integration
- Long endurance and range
- Low weight
- Low cost
- Low operations risk
- Zero personnel at sea



## 2. Vision, communication and navigational systems

For vision and navigation the Lightfish has 5 optical cameras, a 2D scanning lidar, a tricolor navigation light, and an AIS transceiver. The cameras can provide an operator with a real time video feed while the AIS and lidar can provide vessel traffic awareness and automatic collision avoidance depending on the setting.

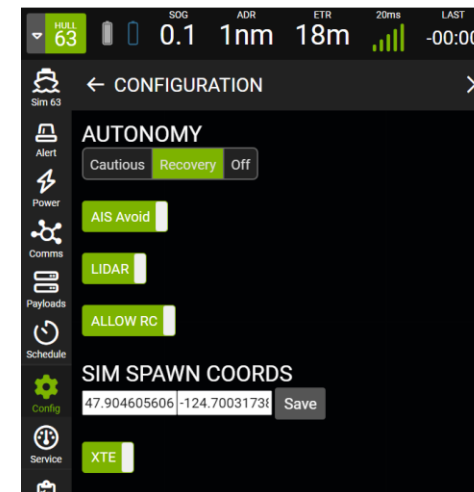
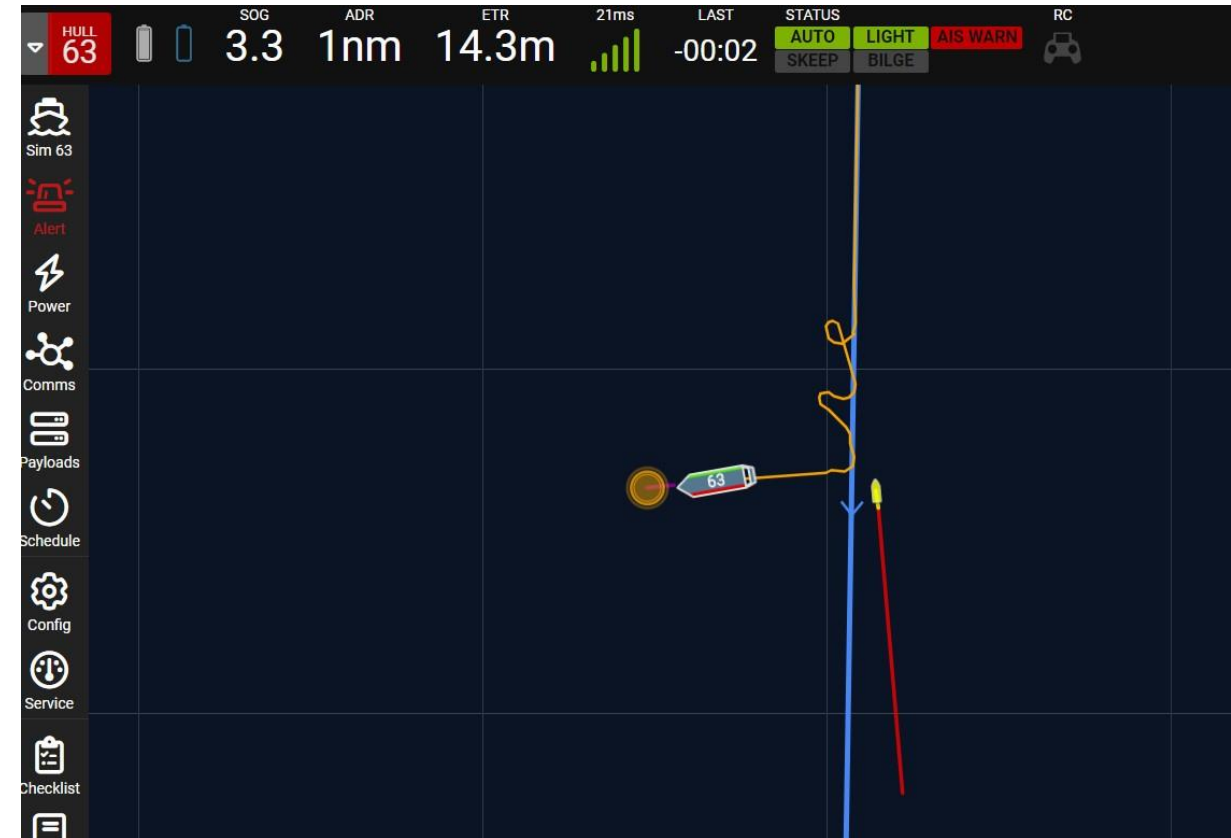


### 3. AIS Collision Avoidance

The Lightfish AIS transceiver can broadcast the vehicle's information to help make surrounding traffic be aware of its position and course.

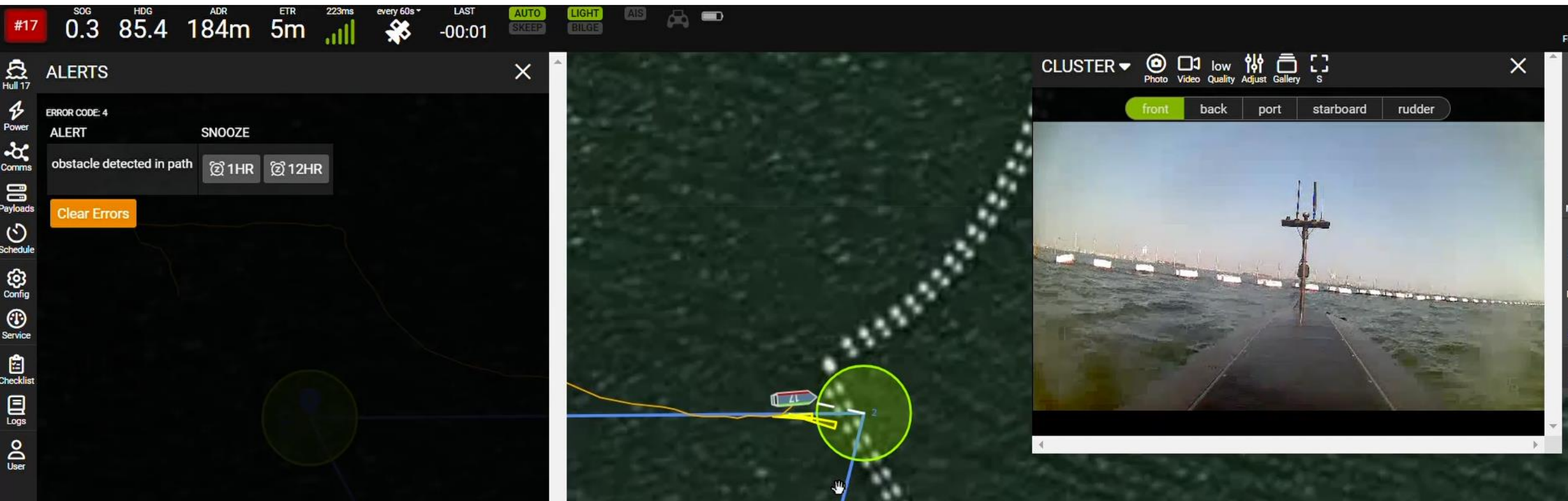
When the autonomy AIS avoid feature is enabled the collision avoidance will also enable the Lightfish to detour off track by up to 300 meters to avoid close passes with AIS vessels.

The pictures to the right show both an active avoidance maneuver and the warnings displayed in the UI as well as the settings panel for enabling the AIS avoidance.



## 4. Lidar Collision Avoidance

The Lightfish is equipped with a 2D scanning LIDAR. The role of the LIDAR is to prevent collisions in the 2-30 meter range particularly when the Lightfish is operating out of eyesight of the operator but still close to shore. The LIDAR is not a 100% solution and does miss small objects (thin stick buoys) or rapidly moving objects, for those reasons the LIDAR should be enabled during inshore operations and treated as a layer of collision prevention, but not the only solution. Operator awareness and proper training is important for reducing risk.





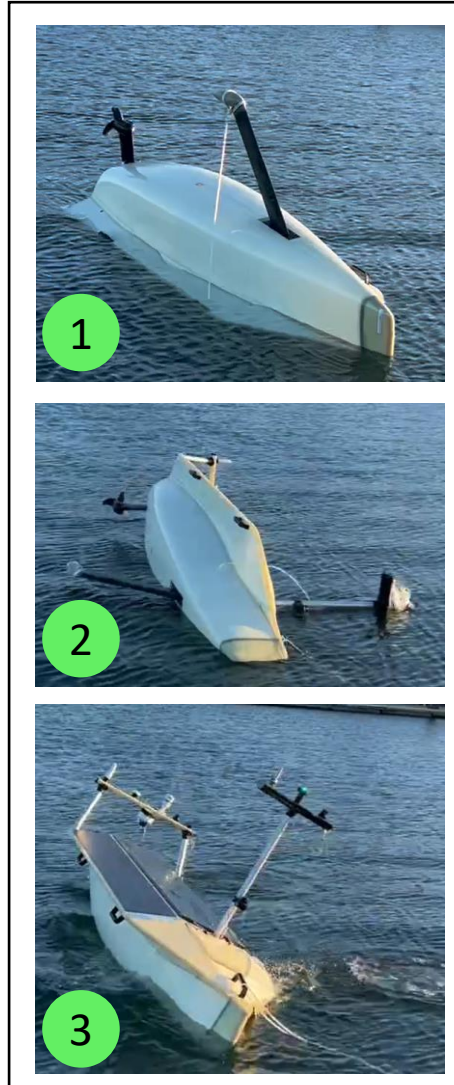
## 6. Stability

The Lightfish is fully self-righting vessel designed to be able to survive and continue missions through hurricanes and typhoons.

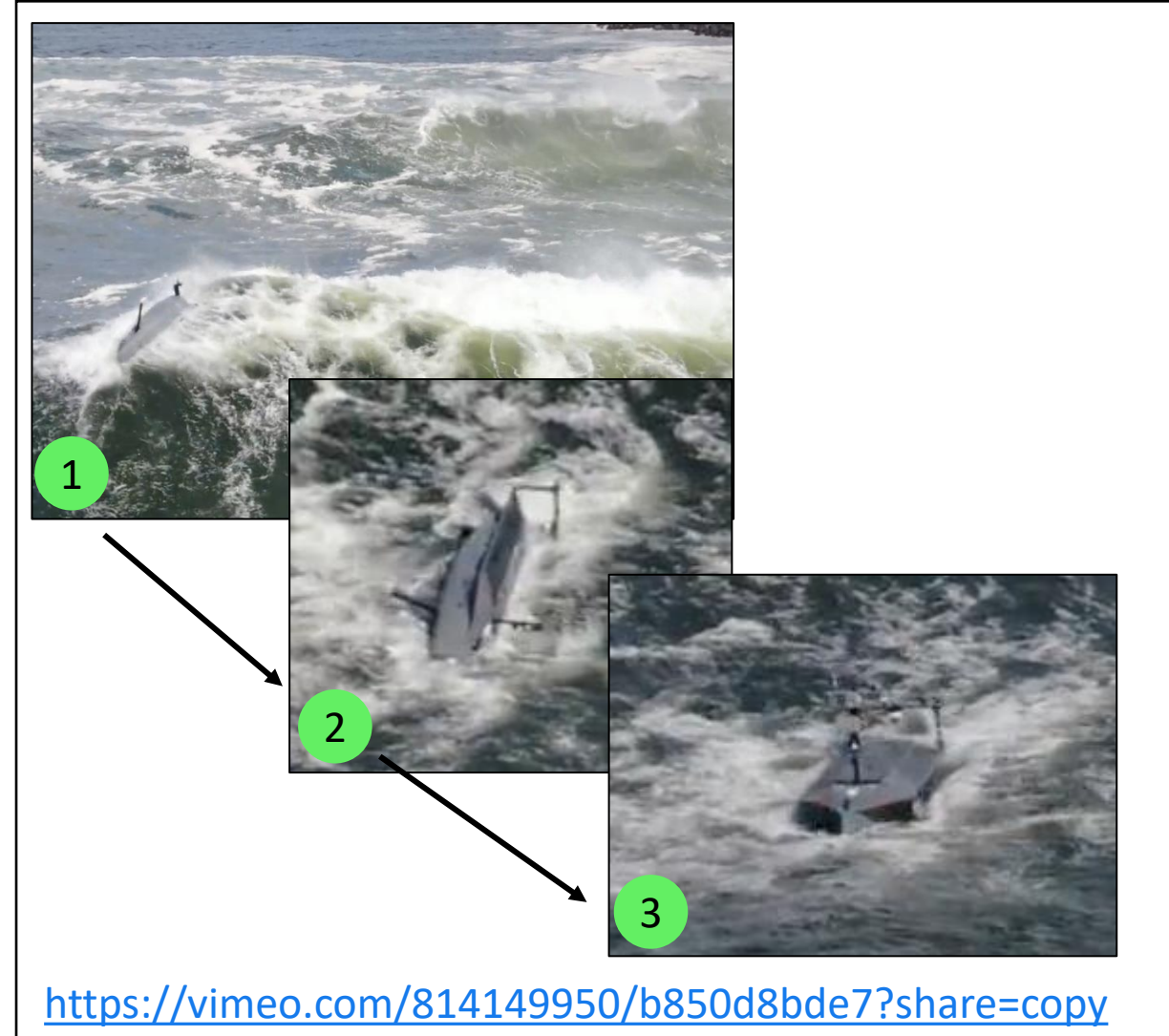
With no passengers on board to worry about motion sickness hull efficiency was prioritized over achieving a high initial stability at low heel angles.

Righting moment:  
5° ..... 40 Newton meters  
90° ..... 140 Newton meters

Flat water test



Dynamic test



# 7. Design and construction

The Lightfish's design was built around several product goals:

- Ocean storm survivability
- Weight & solar efficiency
- User friendly touch points

Each of those drivers can be seen in the design decisions of the vehicle:

- Minimal water ingress points
- Double shielded connectors and hatches to protect against high pressure wave loading
- Fiberglass and high shear foam core panel construction in the hull and deck provide stiffness, puncture resistance, and inherent buoyancy
- Minimal hull drag and maximized solar area
- Multiple sensor placement options

