Devon & Severn IFCA

The Automated Remote Electronic Monitoring System Project (AREMS)

Aims of the project

To evaluate how technologies and can improve management through enhanced monitoring of fishing activities.

To demonstrate how technologies can improve access to fisheries by changing management measures.

To demonstrate how much data can be generated from on board technologies.

To demonstrate the cost and monitoring effectiveness of technologies compared to the current approach.

To demonstrate opportunities for vessel owners when their vessels are at sea.

Fastview360 and Rewire Security

Fastview360 and Rewire Security are two leading technology providers for the transport industry.

Fastview360 specialises in providing mobile camera systems that are built for harsh industrial environments

Rewire Security are a specialist vehicle tracking company who have a range of sensors from specialist electronic sensors

Both Fastview360 and Rewire Security have years of experience of providing integrated tracking and camera solutions.

Both companies have worked together in collaboration to develop a unique system that uses the alerts that Rewire Security's application – GPSLive generates to create incidents in Fastview360's application AutoCMS. AutoCMS then automatically retrieves the videos from the on board camera system.

Rewire Security has other REM projects with Jersey fisheries department, Cornwall IFCA and between Fastview360 and Rewire Secuity have another REM project with Marine Scotland.

Devon & Severn IFCA
Inshore Fisheries and Conservation Authority

FASTVIEW360
superfast vehicle monitoring

REWIRE SECURITY

AUTOCMS

GPSLIVE™

2023/24 project

Aims

- Apply the technology to different towed gear vessels.
  Initially had seven vessel owners that volunteered to participate in the project (3 scallop vessels, 3 otter trawlers and 1 twin beamer)

- Continue to get wider industry knowledge of the systems and support.

- Continue to test robustness of the hardware in different scenarios

- Identify barriers to rollout, e.g limitations of devices, feedback from fishers.

Installed AREMS on 5 vessels. (2 beamers, 3 otter trawlers)

One additional vessel owner has agreed to have devices fitted as part of a praactice roll out process.

MFV SPECULATE BD1

D&S IFCA has worked on the project with Alex and Russell Passmore, Directors of Passmore Fishing Ltd and owners of the fishing vessel SPECULATE BD1

SPECULATE BD1 is 14.98m in overall length and is one of the most technically advanced vessels that operates in D&S IFCA's District.

Whilst participating in the project, the fishing vessel owners received an authorisation to use longer tow bars that were capable of attaching 8 dredges per side but were restricted to using just six dredges aside in D&S IFCA’s District

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MFV AMY R E495

D&S IFCA has worked on the project with Mr M Rogers Owner of the fishing vessel AMY R E495

AMY R is 14.98m in overall length and is one of the most technically advanced vessels that operates in D&S IFCA's District.

Whilst participating in the project, the fishing vessel owner received an authorisation to use longer tow bars that were capable of attaching 8 dredges per side but were restricted to using just six dredges aside in D&S IFCA’s District

Devon & Severn IFCA Inshore Fisheries and Conservation Authority

MFV EMILY J E123

D&S IFCA has worked on the project with Mr P Stone, owner of the fishing vessel EMILY J E123

EMILY J E123 is 14.98m in overall length and uses otter trawls and scallop dredges..

Whilst participating in the project, the fishing vessel owner received an authorisation to stream the fishing gear (doors remain on vessel) inside MPAs.

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Inshore Fisheries and Conservation Authority

MFV SEA SEEKER E68

D&S IFCA has worked on the project with Mr M Cornwell, owner of the fishing vessel SEA SEEKER E68

SEA SEEKER E68 is 11.15m in overall length and uses otter trawls.

Whilst participating in the project, the fishing vessel owner received an authorisation to stream the fishing gear (doors remain on vessel) inside MPAs.

Vessel operates almost exclusively in Lyme Bay.

Devon & Severn IFCA
Inshore Fisheries and Conservation Authority

MFV IMMY PZ110

D&S IFCA has worked on the project with Mr T Hook, owner of the fishing vessel IMMY PZ110

IMM PZ110 is 8.6m in overall length and uses otter trawls.

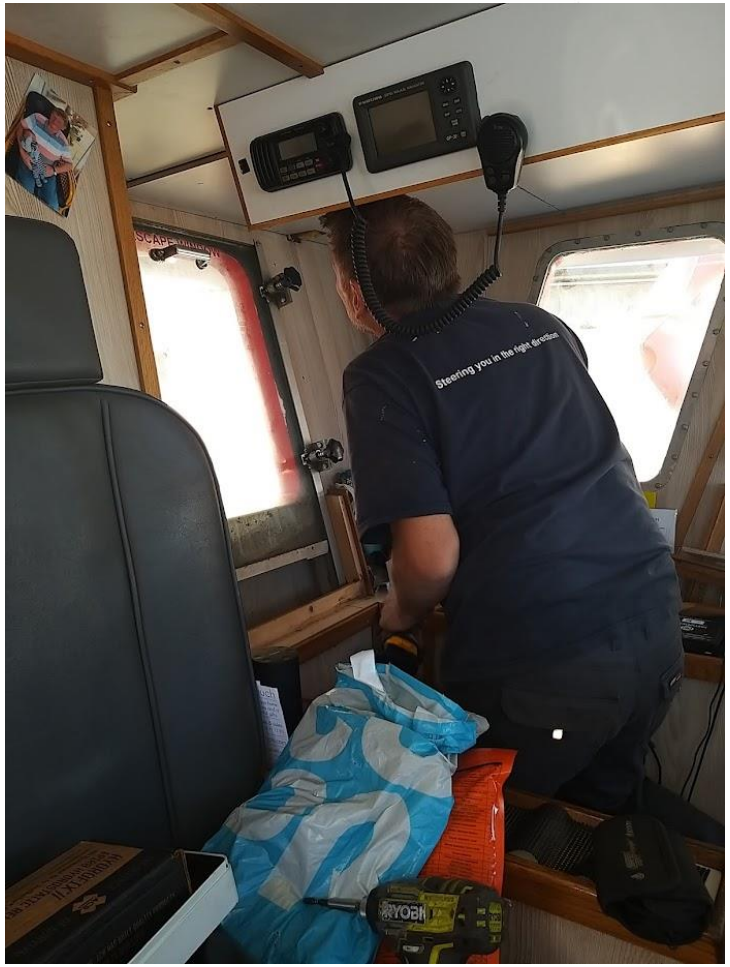
Whilst participating in the project, the fishing vessel owner received an authorisation to stream the fishing gear (doors remain on vessel) inside MPAs.

Vessel operates almost exclusively in Lyme Bay.

What technologies have been installed on SPECULATE BD1

The technologies trialled in the pilot project are similar to those being introduced by Marine Scotland on their scallop dredging fleet

Installation of mobile DVR and HD Monitor allows the master access to the data being generated on from the cameras.



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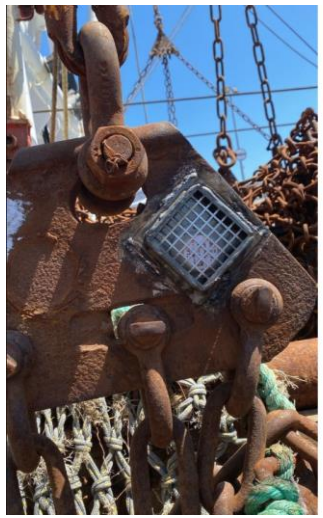
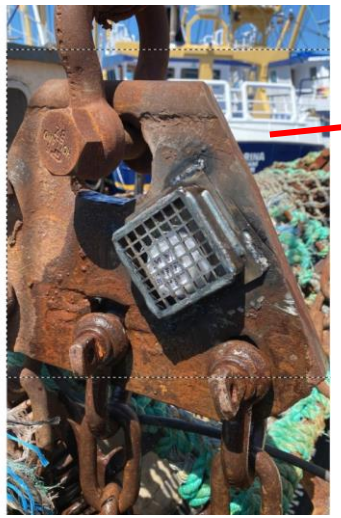
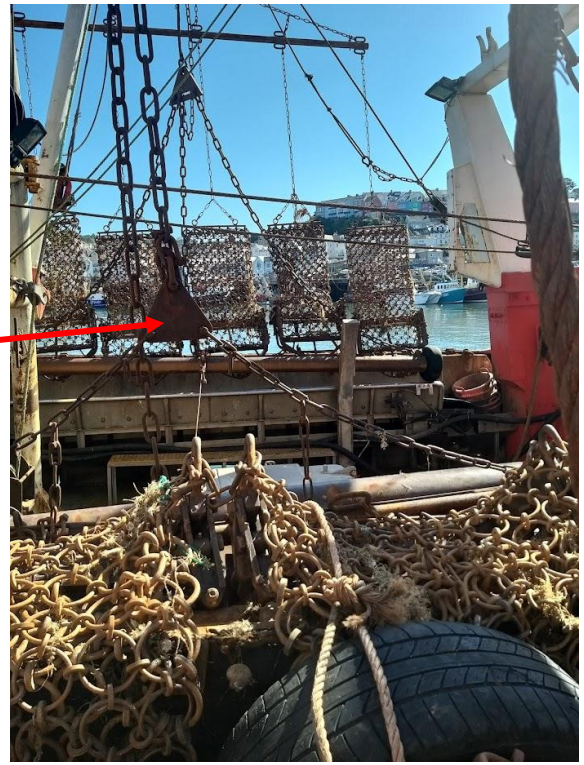
What technologies have been installed on SPECULATE BD1

Installation of Marine Ultra Star light 1080p cameras

Installation of Beacon Sensors on the towing plates







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Gear sensor on trawl door aboard IMMY PZ110

What technologies have been installed on SPECULATE BD1

Extra internal camera looking over the deck and one side of the boat

Extra external camera looking at the deck

Up to 8 HD cameras can be installed to help with observing what is being fished or to assist the owners if needed

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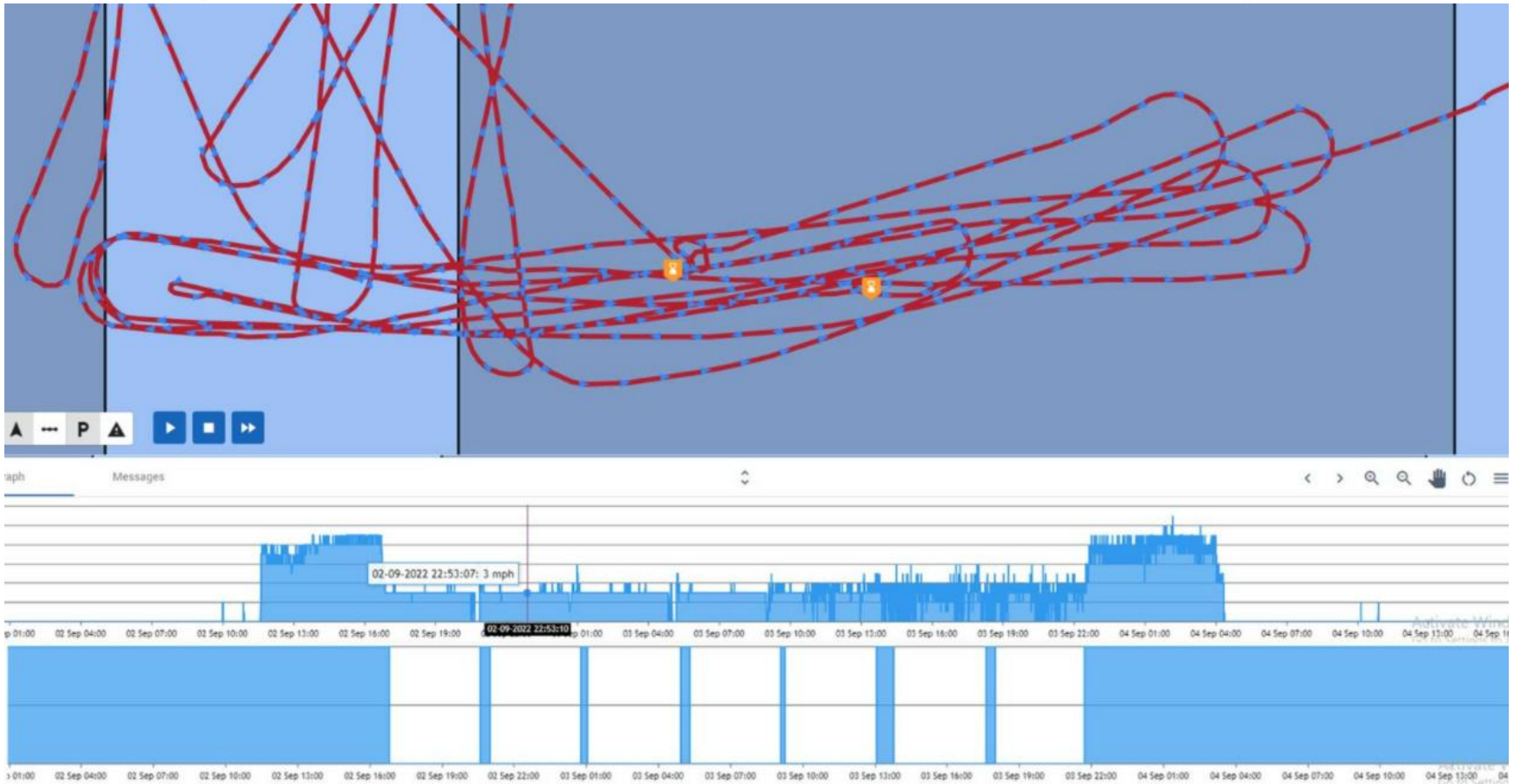
Alerts are created by the tracking system



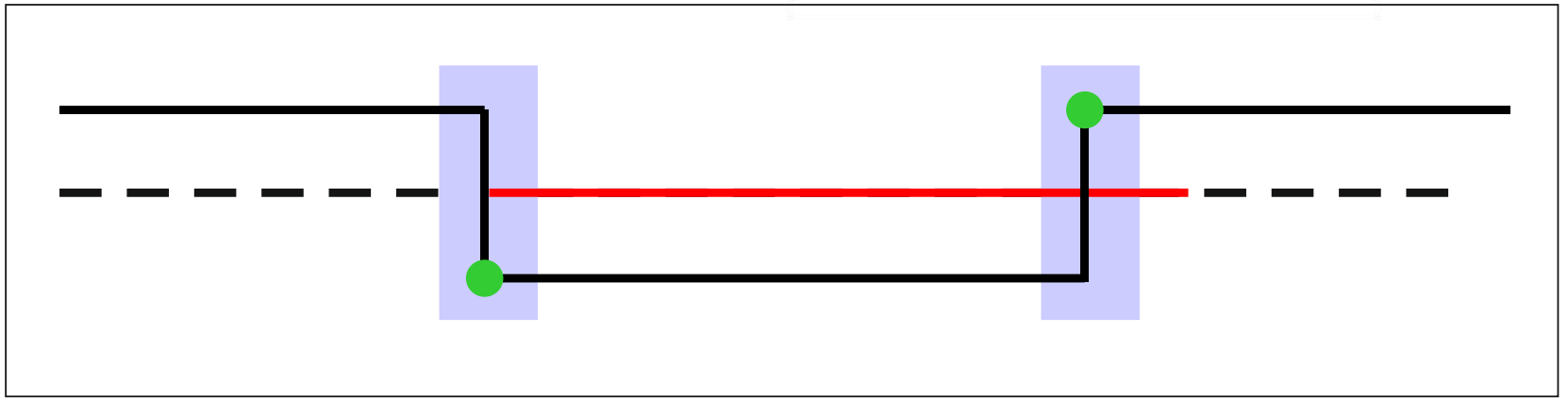
The Vessel Monitoring System (VMS) continuously records the vessel's position, speed, and course.

If the dredges are put into the water, then the system uses the logic (on the next two slides) to work out if the fishing is legal and allowed.

Logic of Alerting D&S IFCA when Fishing in Prohibited Area (Gear sensors)

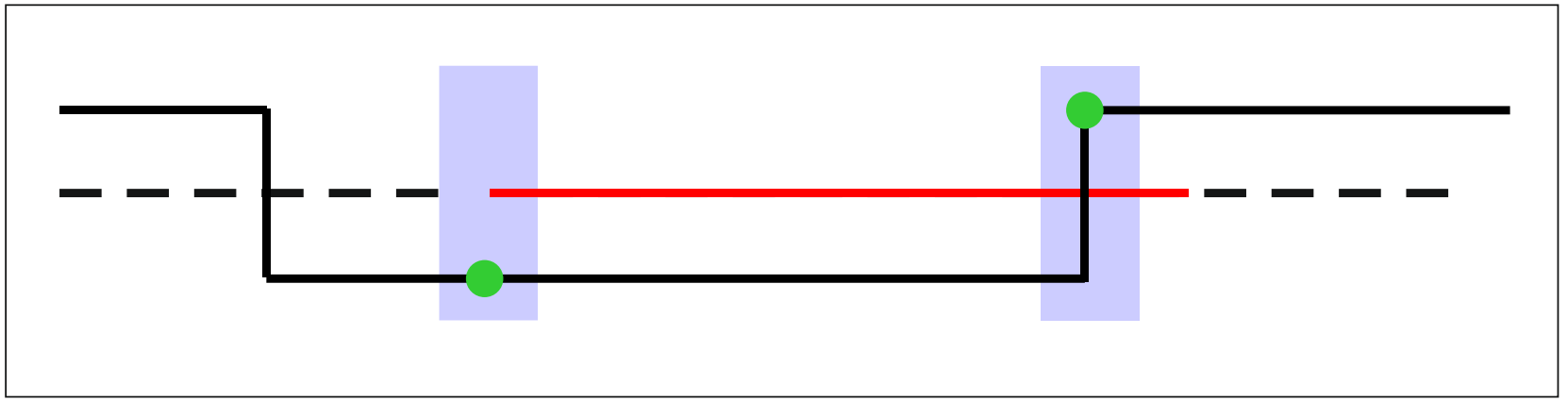
Alert 1

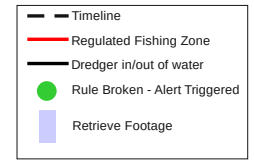
- Dredges down as vessel enters the no fishing zone
- Dredges up while vessel is in the no fishing zone



Alert 2

- Vessel enters the no fishing zone with the dredges down
- Dredges up while vessel is in the no fishing zone





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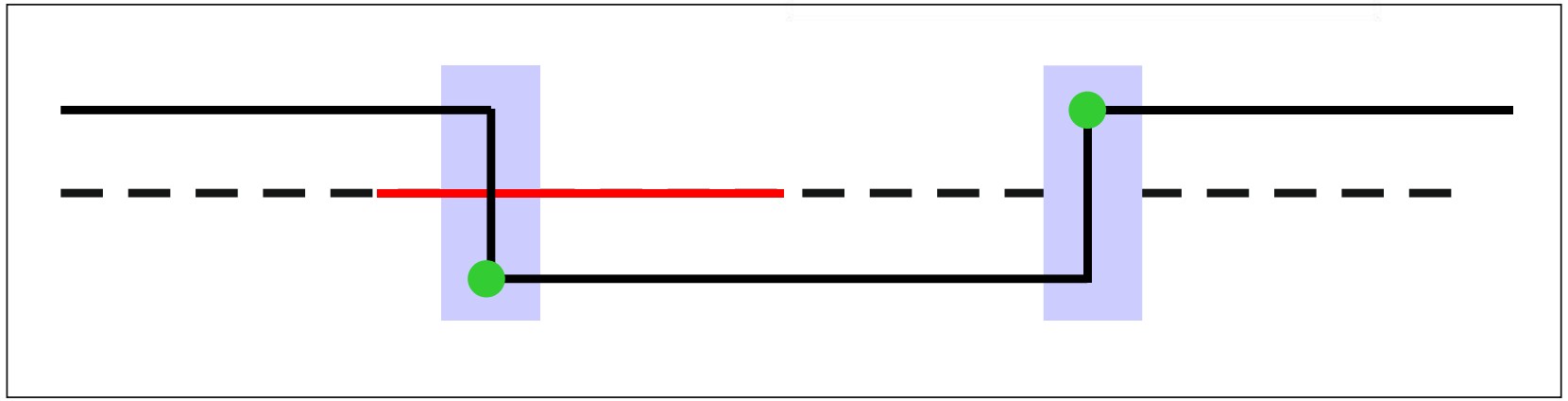
Logic of Alerting D&S IFCA when Fishing in Prohibited Area (Gear sensors)

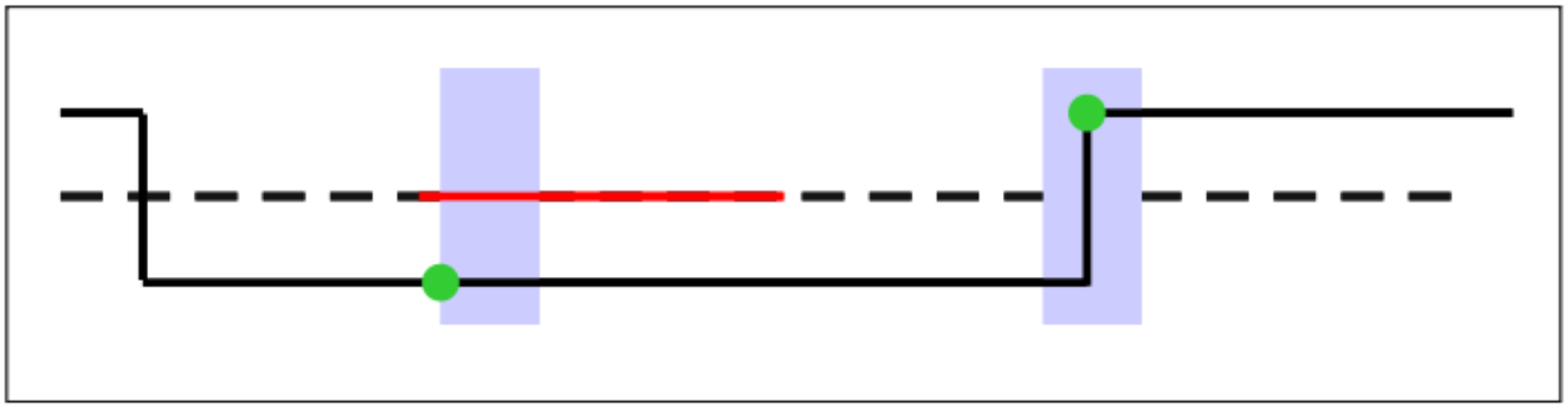
Alert 3

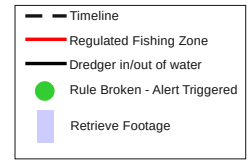
● Dredges down while in the no fishing zone — ●Dredges up while out of the no fishing zone



Alert 4

Boat enters the no fishing zone — with the Dredges down ● ● Dredges up while out of the no fishing zone





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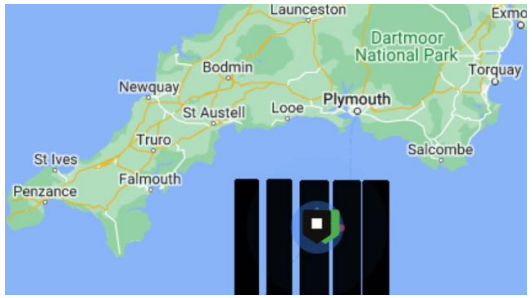
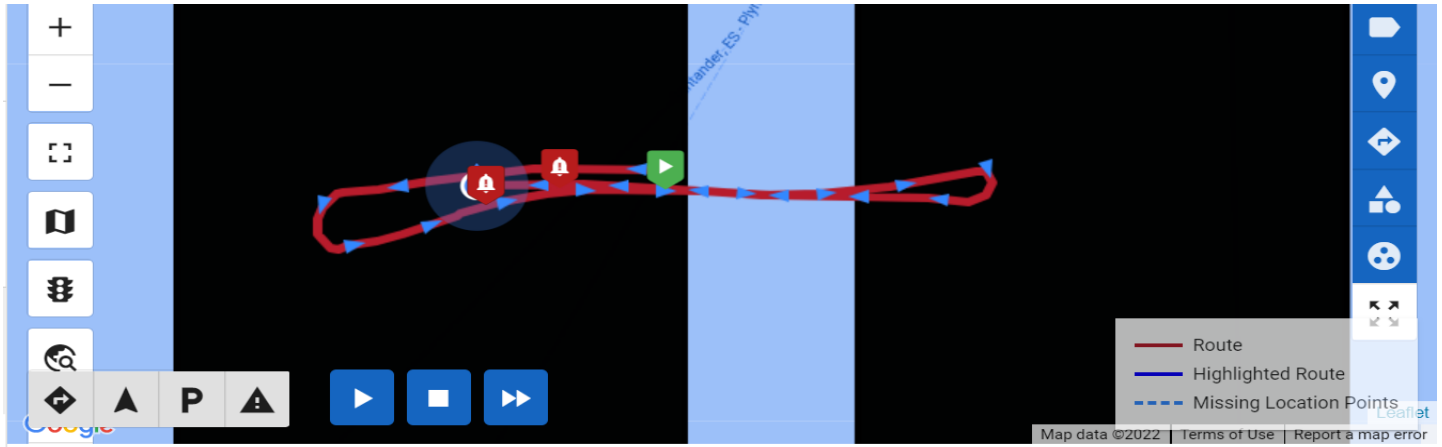
Sensors and trackers detect a potential breach of the regulations

Map showing test “zones”

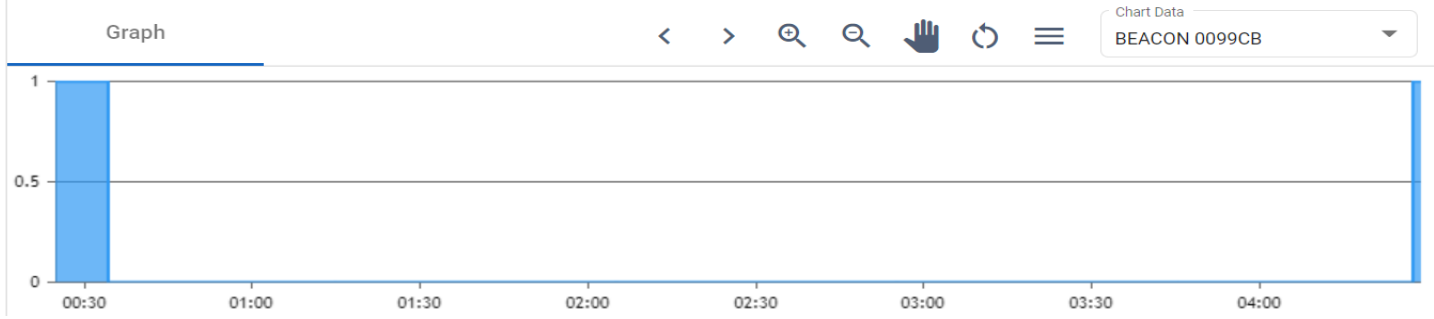


The VMS device with beacons installed on the towing plates creates alerts when the boat is fishing in a restricted zone.

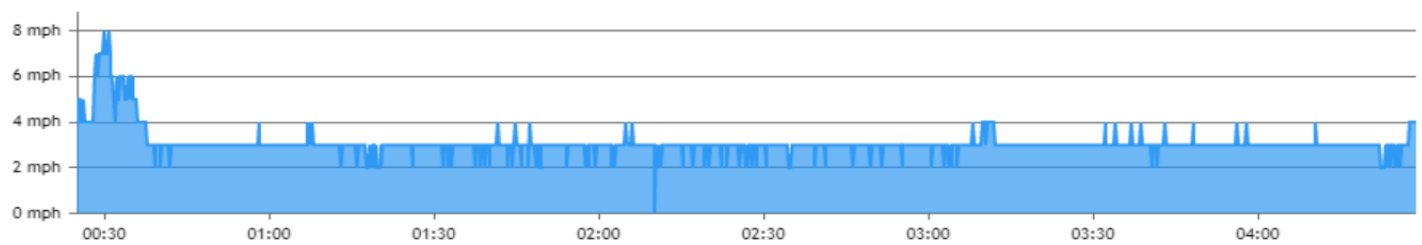
If the dredges are down at any time that the boat is in a restricted zone an alert is created at the point the infringement is made and the next time the dredges are raised from the water.



Zoomed in map showing the journey that the boat made between the 2 beacon alerts



Graph showing Beacons in and out of the water
White shows the beacon in the water and Blue is out of the water



Graph showing speed of the vessel

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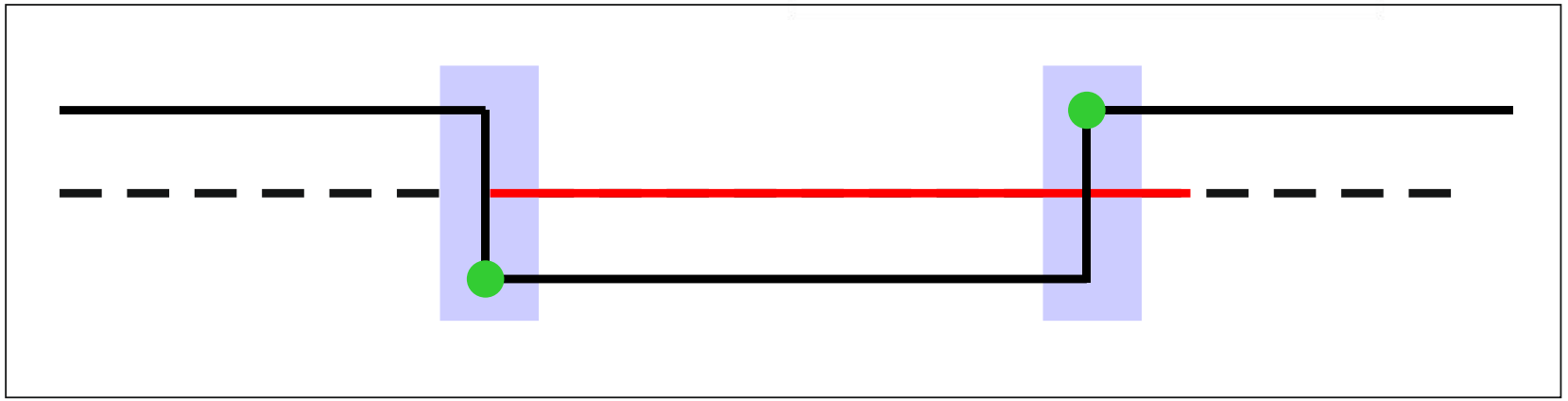
Logic of Alerting D&S IFCA when Fishing in Prohibited Area (Vessel speed)

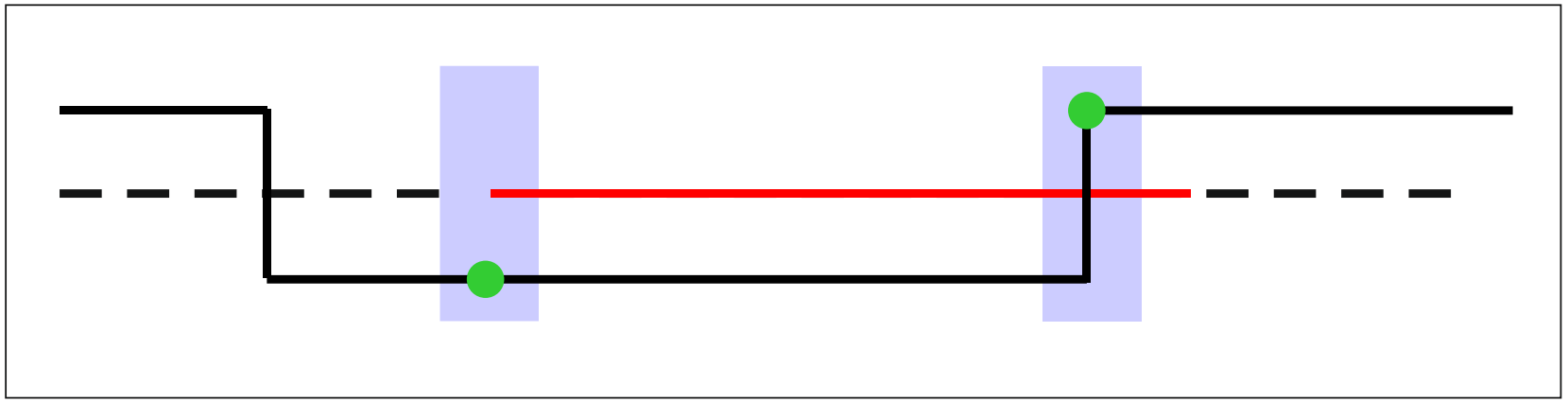
Alert 1

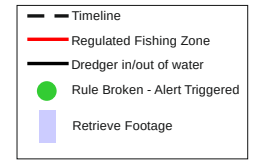
- Vessel speed drops down to ≤ 4 knots as it enters the no fishing zone —
- Vessel speed increase > 4 knots while in the no fishing zone —



Alert 2

- Vessel enters the no fishing zone — at a speed at ≤ 4 knots
- Vessel speed increase > 4 knots while in the no fishing zone —





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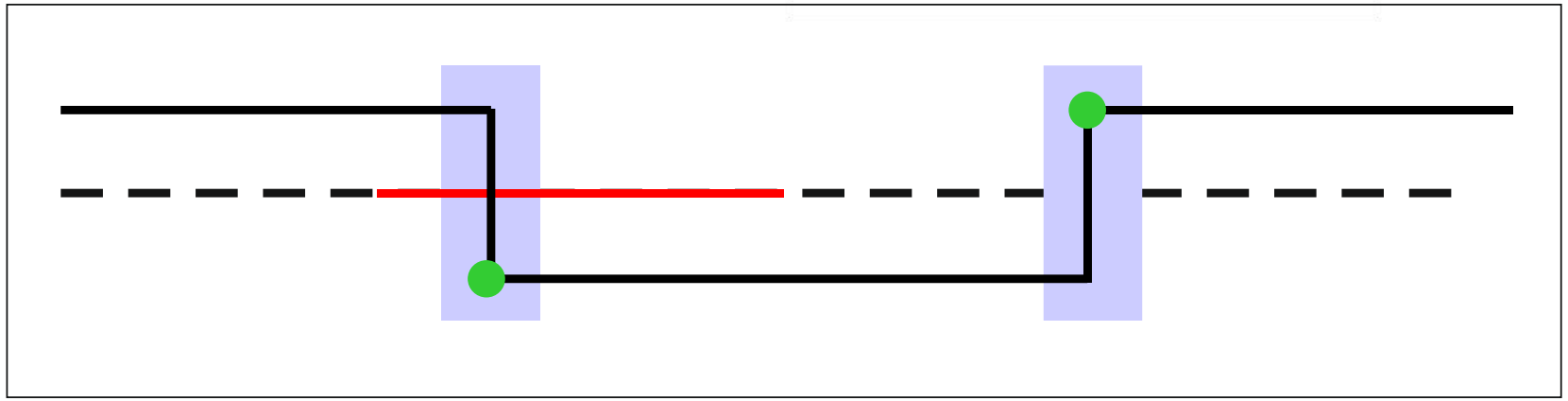
Logic of Alerting D&S IFCA when Fishing in Prohibited Area (Vessel speed)

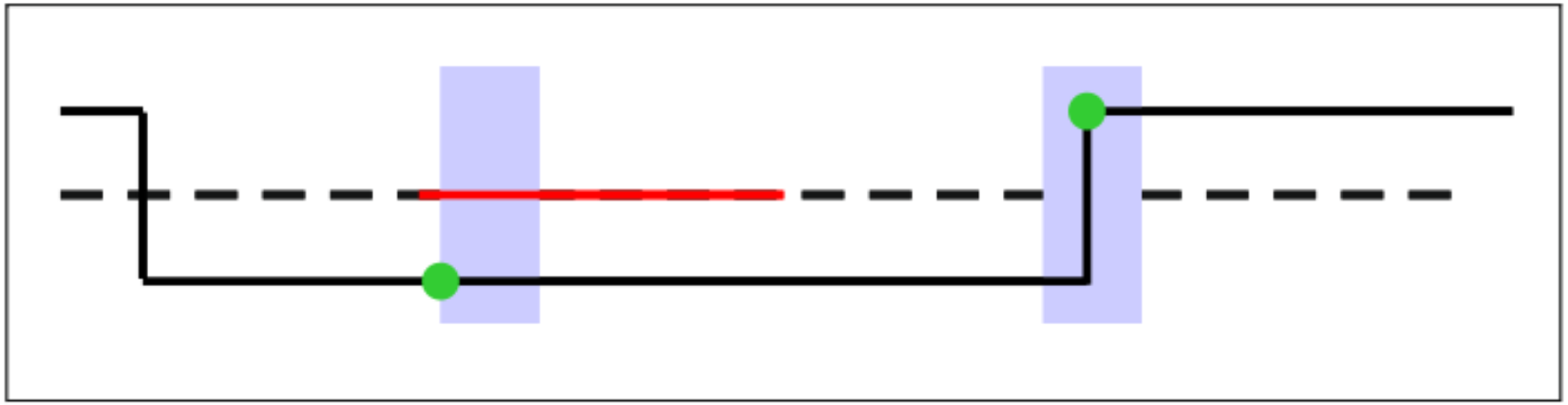
Alert 3

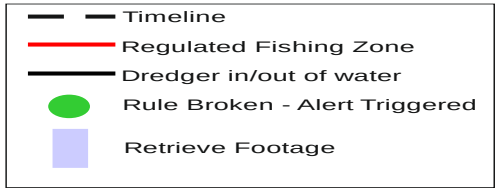
- Vessel speed drops to ≤ 4 knots while in the no fishing zone —
- Vessel speed increase > 4 knots ~~while~~ out of the no fishing zone



Alert 4

- Vessel enters the no fishing zone — at speed ≤ 4 knots
- Vessel speed increase > 4 knots while out of the no fishing zone —





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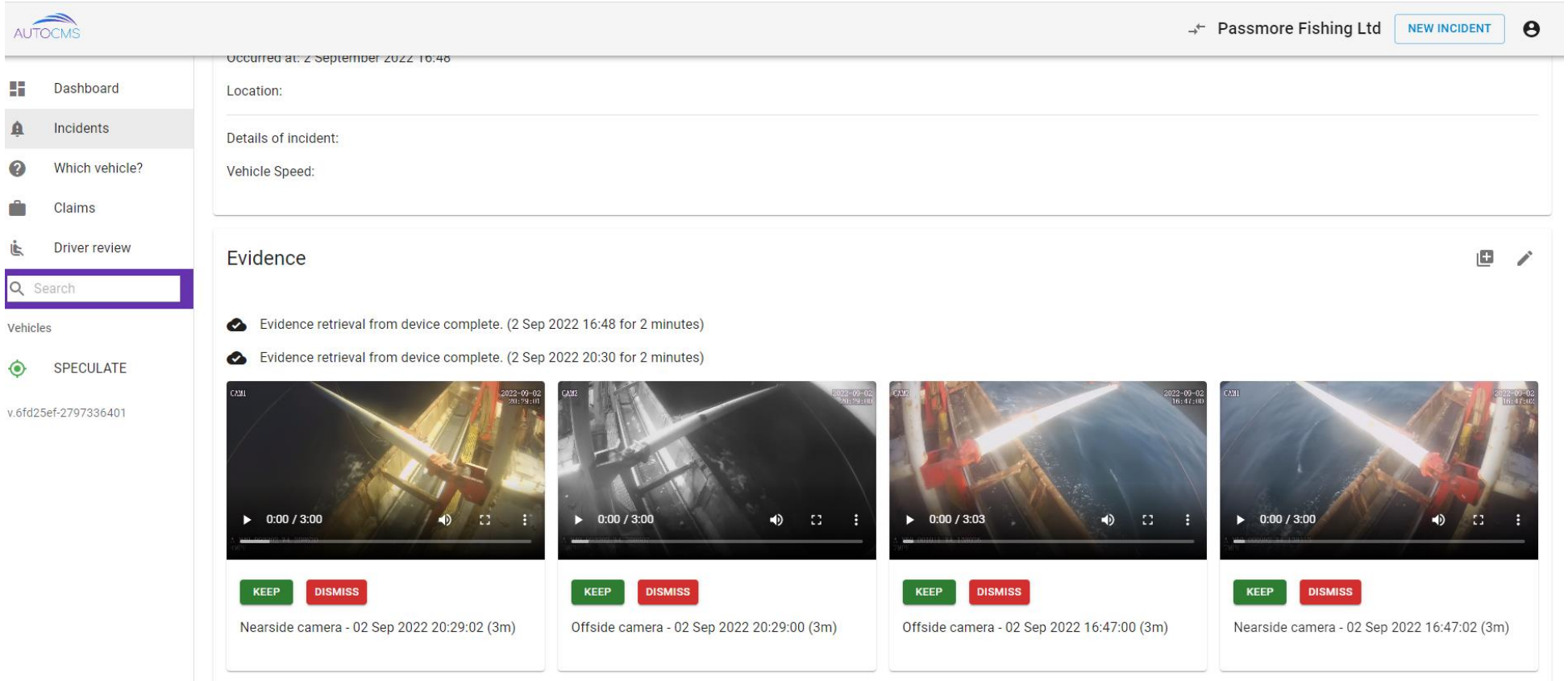
Automated Incident creation with evidence

The alerts from the VMS triggers an incident in AutoCMS, AutoCMS then requests videos from the cameras overlooking the dredges, firstly at the time of the infringement and the next time the dredges are lifted to the surface.

An email alert is sent to D&S IFCA when the incident is created, and a second email is sent when all the video is available to be reviewed.

Incidents are created automatically, and videos uploaded into the Incident portal for the evidence to be reviewed



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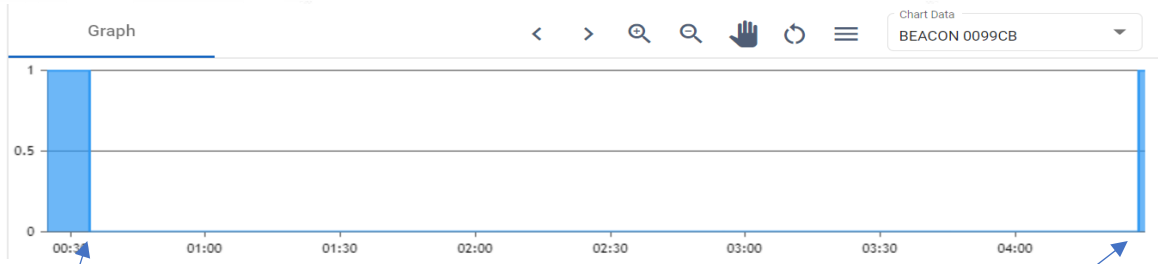
Review the uploaded evidence

Night time Video Evidence

Dredges entering the water



Dredges entering the water

Dredges leaving the water

Dredges leaving the water

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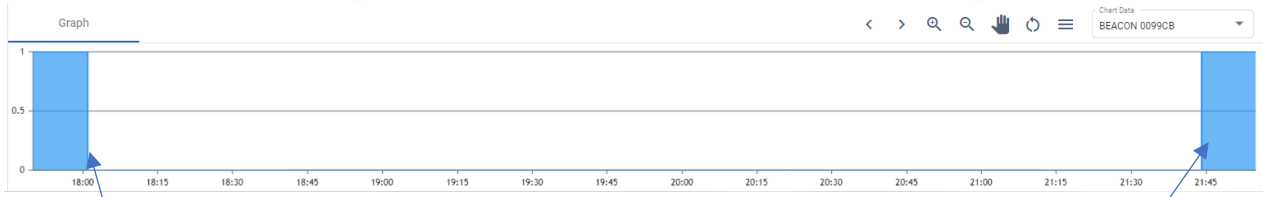
Inshore Fisheries and Conservation Authority

Review the uploaded evidence

Day time Video Evidence

Dredges entering the water



Dredges enter the water

Dredges leave the water

Dredges leaving the water

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Monitoring compliance with derogation to use longer towing bars

Six dredges leaving the water

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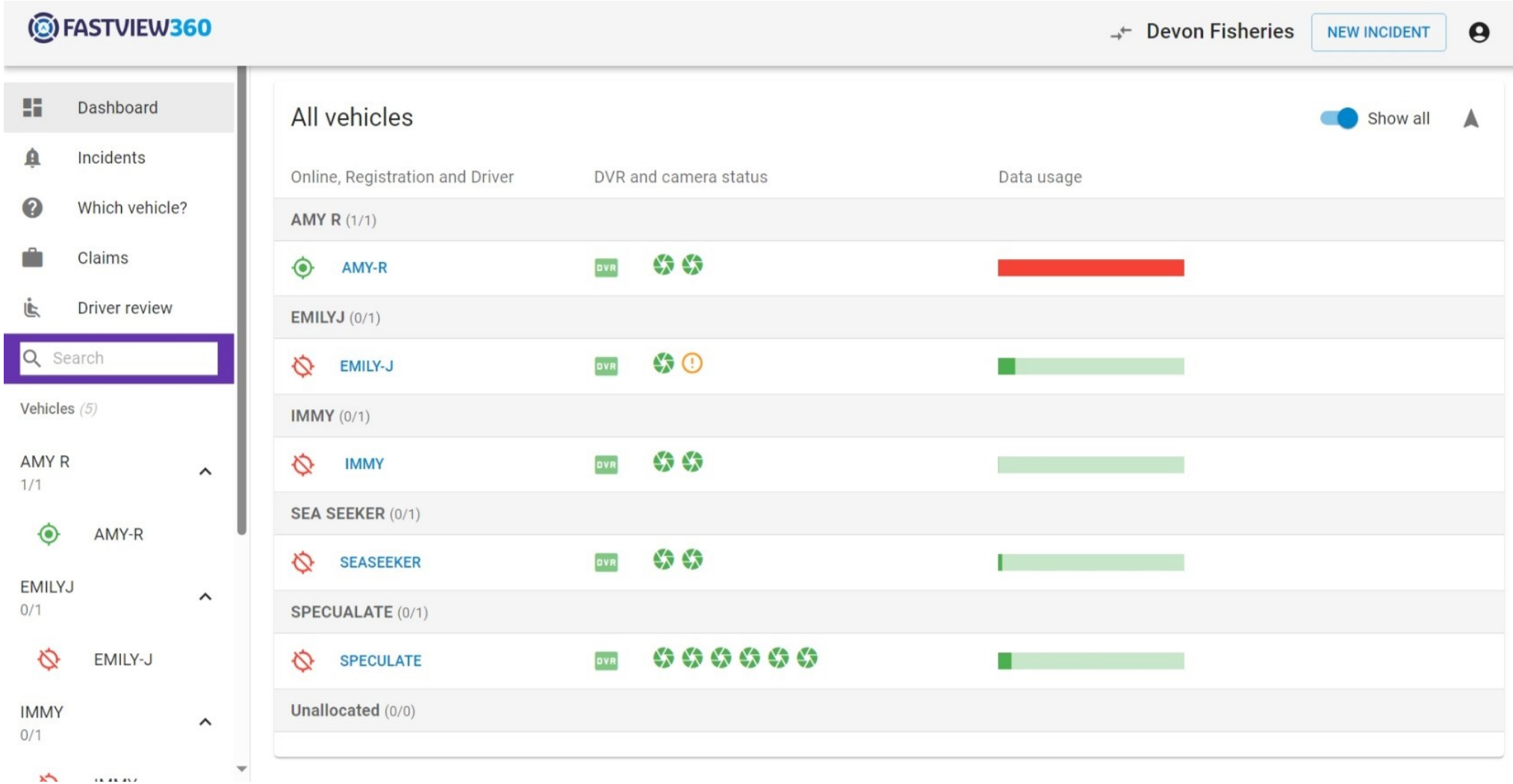
Monitoring status of devices

Status of the various technology on the vessels is monitored remotely and alerts sent to owner and D&S IFCA if any device fails

If gear sensors fail, system switches to speed alert system for monitoring MPAs

Slightly less accurate but alerts can be quickly dismissed if gear can be seen on deck and the vessel is on passage through an MPA at low speed.



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GDPR and data security

Understandably fishers are concerned about the amount of video footage that can be viewed from on board the vessel.

Users can have different access permissions, so the owners can see everything that they want to, but D&S IFCA would be restricted to only seeing the incidents and getting relevant footage for the purpose of gathering evidence of any potential infringement of relevant spatial legislation

All video footage accessed by D&S IFCA is logged by AutoCMS and would be disclosable to the owner of the vessel.

The software is all hosted in Amazon's AWS. All videos, images and any data are saved securely on the AWS servers for the life of the contract.

GDPR is a huge issue for the haulage industry, and AutoCMS and REWIRE ensure that they comply with all necessary regulations.

Cost of the system – Per system

Hardware

- Fastview360 8 Channel DVR inc — **£2,371**
  - 2T4/3 G Data communication module
  - Monitor
  - Incident button
  - 2 cameras
- Rewire Security tracker and sensors inc
  - Marine GPS Tracker with 2G data connection SIM
  - Bluetooth sensors to detect that the Dredges are in/out of the water*1

- Installation — **£650 expenses** *2
  - Approximately 8 hours installation for 2 men

Monthly Costs

- Monthly support and incident management fees
  - Includes
  - GPSLive tracking and full sensor telematics
  - AutoCMS – Incident management and video system
  - Unlimited hardware monitoring, management and remote support
  - Extended hardware warranty for the life of the contract*3
  - Mobile data charges*4 — **£55 per month**
  - B solid state HDD

- The Sensors have a battery life of 5-8 years in normal working conditions, they will have to be replaced when the battery run out
- Hardware warranty includes unlimited warranty against manufacturers fault.
- Site visits to fix hardware issues are chargeable at £45 per hour, + 45p per mile and expenses
- All data is aggregated between all of the marine systems, more data can be included for a small increase once we know what data will be used.

Cost of the system

Based on 120 mobile gear vessels operating in the D&S IFCA district the hardware and installation costs would be;

Hardware £284,520
Installation approx. £78,000

Total approx. £362,520

Annual support and incident management fees £79,200

Based on 57 scallop dredging vessels operating in D&S IFCA district the hardware and installation costs would be;

Total approx. £172,179

Annual support and incident management fees £37,620

Cost benefits of the system

D&S IFCA Officers currently spend most of their enforcement time dealing with Marine Protected Area infringements. The system will reduce that need considerably and allow officers to focus on other fisheries.

Cost in taking legal proceedings can be high and D&S IFCA legal budget is higher than its Operational budget. REM is likely to increase compliance and reduce the likelihood of challenges to the Prosecution's evidence.

Protection of the Marine Protected Areas will be more effective and the marine environment's natural capital will increase.

Increase in the effective protection of MPAs will reduce the financial losses incurred by the static gear fleet when illegal activity tows away their pots and nets.

Changes in fisheries management regulations will reduce the cost to the towed gear fleet.

Improve confidence in monitoring capabilities which will reduce the need for displacement around sensitive habitats.

Vessel Owners can install additional cameras to improve the safety of the crew and vessels and reduce downtime, possible to live stream mechanical issues to engineers ashore to help problem solve and keep the vessel at sea.

REM development - future work

REM system worked really well.

Fully automated reporting – new reporting features developed.

With better 4G coverage, footage from the vessels' cameras was accessible live to approximately 12 miles offshore.

Provides real time monitoring and speeds up downloading incidents.

'Marinise' the terminology

Improve installation processes

Improve gear sensors design

Integrate fully Fastview and Rewire data on to one platform

Next steps

Demonstrate the cost benefits of the REM approach to fisheries and conservation management to Fishers, Defra and other Regulators.

Identify options to fund not only the purchase and installation of the hardware but also to fund the ongoing maintenance and operational costs. A significant barrier to fishers accepting further technologies is the concern that they are left to financially support the systems post installation.

Work with AutoCMS to modify the language (terminologies) and maps to reflect the application of the technologies in a marine context.

Work with AutoCMS to explore the application of Artificial Intelligence to reduce number of alerts.

Thank you

Thank you to;

Alex and Russell Passmore for supporting the project and for making their vessel SPECULATE BD1 available for the project

Nick Billington and the team at Fast View 360

Ilir Bakiji at Rewire Security