



# SAVING THE SCALLOPS

## A TRIAL PROJECT IN THE US SHOWS HOW VESSEL TRACKING TECHNOLOGY CAN SUPPORT SUSTAINABLE FISHING. NICK FARRELL REPORTS

With more than 450 active vessels, the scallop fishery of the state of Maine in the US is today very healthy. But during 2008/09, things weren't quite as buoyant. Overfishing had resulted in massive depletion of stock, leaving the state's Department of Marine Resources only one choice – to close large areas of the coast to scallop fishing for three years. The move, while unpopular with those whose livelihoods were affected, had the desired results. Stock levels started to return to normal and the fleet could begin to fish those areas once again.

But the reopening of the scallop fisheries begged an important question – how could they avoid the same thing happening again? Letting the fleet back in to harvest uncontrolled would devastate the stocks once more, so a more conservative approach had to be developed to ensure sustainability for the future. Interestingly, although their businesses depended on access to the fishery, the scallop fleet was mostly in favour of changing from the previous 'wild west' model to an approach that would help to ensure availability of the fishery for the future.

Conversations within and between the department and the fishing fleet during 2012 would be the catalyst for the new management model: a rotational system, which resulted in the implementation of dynamic, in-season closures that accurately match where fishing has occurred and stocks have been lowered.

It was a big undertaking, but the department developed a system that can deliver the data needed to decide in-season closures, should areas become low on stock. The system involves self-reporting by the fishing fleet and brokers on-shore, stock-assessment surveys carried out by the department's marine science bureau, and intervention by its enforcement bureau. All these areas feed into its policy & management bureau, which activates in-season closures based on the data and evidence provided.

While the system undoubtedly resulted in massive improvements, it is not without overheads. Recognising the impact on budgets and manpower, the marine science bureau started to look at how

digitisation and automation could lighten the load, while improving the accuracy of the scheme's data.

### Real-time monitoring

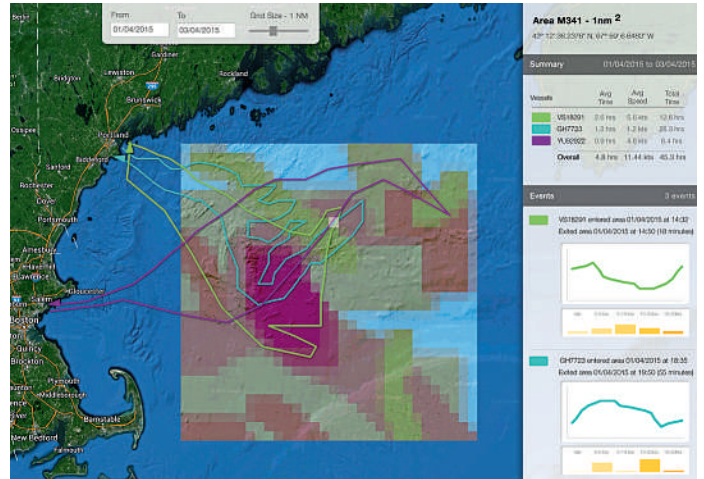
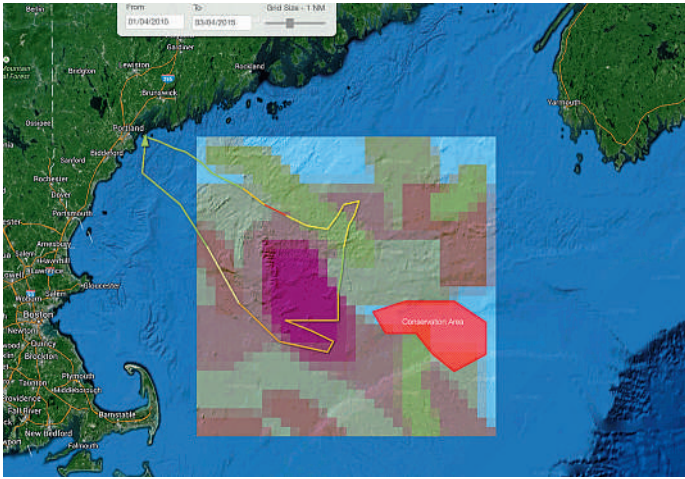
Which is where vessel tracking comes in. While the department is constantly in contact with the fleet to gather data on individual vessel activities (even as far as having 'spotters' on the coast), the approach could not deliver a fully real-time overview of the activity of all the vessels. But by combining the location and speed of vessels with accurate scientific data from regular stock assessment surveys, it is possible to track how much stock has been taken from any area at any time. This information ensures that in-season closures are based on facts.

To achieve this, the department needs the co-operation of the fishermen. There is no official mandate that a vessel must have a tracking system on board or who should buy it. So, when the marine science bureau started a vessel tracking trial, cost and ease of installation of the equipment were important requirements.

After reviewing the technology available, the team eventually chose the RockFLEET vessel tracking system to test. RockFLEET is a compact, weatherproof, fixed installation system for maritime tracking and data applications. The small form factor with multiple mounting options would ensure the hardware had minimal impact in terms of installation and daily use on small scallop fishing boats. Likewise, the low cost, while not vital for the trial, would be a significant benefit should the system be rolled out across the whole fleet.

RockFLEET uses Iridium Short Burst Data (SBD), a simple and efficient network transport capability of the Iridium satellite network for transmitting short data messages between equipment and centralised host computer systems. Iridium SBD transmits a vessel's GPS location reports at user-defined intervals using RockFLEET. The data can be viewed using an online map-based portal operated by Rock Seven called 'The Core'. The portal can be configured for secure private access





'Heatmaps' help the State of Maine determine which areas are being over-fished and need to be closed



straightforward to install and the web-based user interface accessible to scientific staff and cooperating fishermen.

The department meets weekly to discuss the progress of the season, and as soon as the first unit was working, the group was watching the activity on the computer screen.

Another important asset of RockFLEET is that it can be managed remotely, which enables the department to poll for extra location reports as and when required. At one meeting, the group received a text and a picture from a fisherman about a scallop that seemed to be spawning early. The group could pull his position and a detailed conversation ensued. Finally, this same fisherman, who tends to be rather nomadic in his fishing practices, pulled up his data feed to check on the location of his boat during a storm, giving him peace of mind when the wind is blowing 40 knots and his boat is moored two hours' drive away.

### Dynamic heatmaps

However, the system's 'heatmaps' were the big jump forward, as they provided a 'real time' way to evaluate the cumulative impacts of fishing. The marine science bureau needs to know what stock is available in any given area, so it conducts 'scallop drag' surveys that provide accurate data about the density and quantity of scallop biomass. The surveys are a collaborative effort, with scientists on board commercial scallop vessels sampling in pre-determined randomised locations. Survey locations are based on knowledge of the distribution of scallops, which invariably changes over time.

Fishermen are good at reaching their limit, especially when there is abundant resource to be fished, so if the department knows through the vessel tracking system how many boats are in an area, it knows how much product was removed. The estimated removals are then compared to the survey data.

The heatmaps use vessel locations to show the impact of fishing through a varying colour scale, providing the department

or integrated into public websites. A third option is available through the API offered by Rock Seven, which enables RockFLEET transmitted data to be injected into a user's own software systems.

However, considering the commercial confidentiality of a fishing vessel's position at sea, the department chose to use The Core privately.

But, it was the simple fact that Iridium bandwidth costs as little as US\$0.04 per message that ensured that RockFLEET was suitable, should the system be fully adopted and the fleet of small businesses had to foot the bill.

### In practice

Trials began early last year and the department found the RockFLEET units to be



with a quick and easy to understand visual tool for checking potential stock levels in different areas of the fishery. The heatmaps combined the vessel tracking data with the department's survey results to show exactly where problems may be developing, enabling targeted closures to reflect where the fishing activity has been. The idea is to close areas responsibly while maintaining the opportunity for people to continue to fish. Additionally, scientific surveys can be improved over time by a greater understanding of the location of fishing effort.

By understanding the activity of an in-shore scallop fishing boat and the accumulative effect of the fleet in real-time, the department can predict with high confidence what has been happening on the water. For instance, a vessel travelling at 2-5 knots will be fishing, but one travelling faster would be in transit, which would be accounted for on the heatmap. Given that the fleet is almost 100% efficient at collecting scallops, it is very straightforward based on the time spent to quantify the effect a single vessel is having on stocks and indeed the accumulative effect.

The department can now make automatic in-season closures, the established 'trigger mechanism' being when 30-40% of the harvestable biomass has been removed from an area. The goal is sustainability. While closing the very resource that the fishermen depend on could sound like a counter-intuitive move, the results over the past four years have been positive and generally well received. In fact, the fleet has grown from approximately 168 active vessels to over 445, so it's clear to see that the scallop fishery is presenting real opportunity.

### Digital fisheries

The trials have pointed towards a more digitised and automated future of fleet management for the fleet, but with funding and engagement challenges to overcome, full deployment is some years off. When it eventually comes, it is likely that the vessel tracking data could be part of a much larger digital system of checks and balances.

The department also envisages other uses for the system. Currently, dealers report catch, harvesters report catch and effort. But the department sees dealers transitioning to a swipe card, and harvesters moving to electronic reporting, with tracker data connecting everything. In this scenario, a trip ID would be initiated as a fisherman heads out to sea. The ID would then be linked with dealer reports, and the fishermen's reports would be linked to the tracker. Thus, there would be only one step for the dealer and harvester, and a two-ticket system for the department with considerably greater detail on fishing location.

It's conceivable that a smartphone app would be the front-end of such a system,



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which could connect directly to RockFLEET using Bluetooth. Fishermen would enter any required data for the day, which would be uploaded at the same time as the location data over RockFLEET, essentially eliminating paperwork for everybody.

The app could also be integrated with the swipe-card. When the fishermen land their catch, they could swipe their cards at the dealers and the information automatically uploaded, giving the department a real-time view of the landings. By having the app attached to the RockFLEET system and the swipe cards, the whole process will become fully digital.

While digitising the fishery has an associated expense, the department believes that it would break down some of the traditional points where it had previously hit a wall, due to capacity, manpower or co-operation with the fleet.

The State of Maine fisheries are the livelihood for many people, so securing sustainability and access for fishermen is vital.

The goal is to streamline the processes and reduce the burden that dynamic fisheries management creates. The simple act of knowing where vessels are at any given time is the catalyst that could make it happen. There are many technical, financial and social challenges to overcome, and although technology can have positive effect across the board, full digitisation of the fishery still has a very long way to go. The RockFLEET trials have at least been a successful first step.

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