NWIFCA Technical, Science and Byelaw meeting 9th of May 2023: 10:00 a.m.	Agenda Item 7

SCIENCE REPORT FOR INFORMATION
7TH OF FEB – 9TH OF MAY 2023

Purpose: **To provide an update on the work of the Science Team in the quarter.**

Recommendation: **Report for information, Receive the report**

This quarter, the main priorities of the science team have been to complete the whelk track record appeal, set up the summer whelk sampling program, progress with drone procurement, draft a cockle fisheries management plan, undertake mussel MLS work and develop the 2023 survey season schedule.

Key achievements since the previous meeting:

1) Drafted a HRA for the Foulney mussel bed fishery
2) Completed the Cold Weather Protocol
3) Carried out the first and second stage of the mussel MLS study – mapping the extent of smaller mussel and collecting and analysing samples
4) Completed Byelaw 4 track record appeals review
5) Carried out four mussel inspections and surveys with reports
6) Developed the 2023 survey schedule
7) Five consultation requests and six dispensation requests provided

ONGOING WORK STREAM UPDATES:

1. POTTING PERMIT BYELAW

a) Permit database

The science team have been logging whelk returns since the introduction of Byelaw 4 and assisting with setting up a database for the suitable logging and analysis of returns data. Science officers will feed into the returns section to improve recording returns and new ways of analysing the data to help management.

b) Whelk track record appeal

The final outstanding application for the whelk potting permit has been through Appeals and the applicant has been informed of the outcome.

2. COCKLE AND MUSSEL

a) Mussel minimum landing size study on Foulney

At the Technical Science and Byelaw meeting held on the 1st of November 2022, the Authority agreed an approach to investigating the presence of 'stunted' mussel on the Foulney mussel bed and the impacts of reducing MLS in this area – as requested by industry members. A report on the progress of this work is provided in Agenda item 8.

b) Dee cockle fishery order

Natural Resources Wales (NRW) are in the review process for the Dee Cockle Fishery Order and are in discussions with the Environment Agency who are joint grantees on the existing Regulating Order. NRW will be presenting the current state of play at the meeting of the Dee Estuary Cockle Fishery Advisory Group (DECFAG) meeting in May 2023 which the SS will be attending.

c) Cold Weather Protocol

Following the suspension of the Penfold Fishery, officers deemed it important that a cold weather protocol be drafted to set out the criteria that must be met and the steps that NWIFCA will follow. The protocol sets out a definition of severe cold and the threshold that would trigger a suspension, agreed weather stations and criteria for lifting the suspension. The document also details how NWIFCA officers will communicate with Natural England, Industry and Authority Members during such an event. The protocol has been finalised and is available on the NWIFCA website here: https://www.nw-ifca.gov.uk/marine-protected-areas/hra/.

d) Foulney mussel bed TSB Member's visit

Members of the TSB visited the Foulney mussel bed on the 20th of March. The purpose was to give members a first-hand experience of the size of the bed, see the work officers do in surveying and management, and have the opportunity to hear from some of the fishers.

e) Survey drone procurement

Progress has been made in identifying a suitable drone for surveying and drone training has been confirmed. Two members of the science team have been signed onto training and will look to complete this prior to obtaining the drone in the summer. An overview document on the drone spec under consideration, and training being undertaken is provided in Annex 3.

3. NWIFCA RESEARCH PROJECTS

a) Fisheries Industry Science Partnership Scheme (FISP)

No update.

b) Whelk Fisheries in the North West

A new sampling schedule for the summer of 2023 has been developed. The aim is to identify the size-at-maturity for whelks in the NWIFCA District.

Previously, the inherited Sea Fisheries Committee byelaws covering the district precluded fishers in the North from potting for whelk. Now new management has been introduced, it is important that research is undertaken to ensure the appropriate measures are in place, starting with establishing a suitable minimum landing size.

The Flexible permit Conditions of Byelaw 4 stipulate an annual increase of 55 mm to 65 mm to 75 mm each year from its inception, however, there is concern that the upper limit of this size might be too high for the stock, and detrimental to the fishery.

Several fishers across the district have agreed to take part and provide samples for this project, that officers will then analyse for maturity. Officers are working to obtain the relevant dispensations and arranging for sample collection. This work will begin late May to June subject to the availability of fishers. Once a size-at-maturity estimate has been identified, we can assess the appropriateness of the MLS flexible permit conditions. The project aims to be completed by winter 2023.

4. MARINE PROTECTED AREAS IN THE NWIFCA DISTRICT:

a) Marine Natural Capital

NWIFCA officers have been engaging with local Natural England intertidal surveys in the Solway and Morecambe Bay. The surveys look to gather information on prey availability for protected bird species and will help to contribute to our understanding of bird food requirements. The Senior Scientist attended surveys in the Solway on the 7th of March. Assisting with surveys provides a good opportunity for partnership working and contributing to the dataset that will be used for future management advice.

5. FISHERIES MANAGEMENT

a) Cockle management plan

At the TSB meeting on 7th of February it was agreed that a first draft of the NWIFCA cockle fisheries management plan should be developed to provide a framework for future decision making and management. It is also necessary in the light of the upcoming national FMP's to have a clear framework which we can put forward during the data collection phase.

A first draft has been developed internally and will be presented to the Authority upon completion.

6. MMO MARINE LICENCE AND OTHER CONSULTATIONS FOR THE QUARTER

a) Offshore Wind Leasing Round 4

No further update

b) Mersey Tidal Power Project

NWIFCA officers had a meeting with consultants on the 27th of March to get an update on the project, and provide information necessary to the Impact Assessment. Oficers are continuing to share information with the consultants working on this project.

c) Geological Disposal Facility (GDF)

No further update

Consultations this quarter:

- Area 457 EIA Scoping Opinion
- Mostyn Energy park Extension
- Rhyl Pont Foryd waterproofing and resurfacing works
- Bretherton Outfall Updates
- Walney Extension Offshore Windfarm: Maintenance works

Dispensations this quarter:

- EDF sampling
- Springfield Fuels Ltd sampling
- Wyre Rivers Trust
- EA
- AECOM Mersey gateway Surveys 2023
- University of Essex

7. WORKING GROUPS AND MEETINGS

a) **Technical Advisory Group**

The next TAG meeting will be held 19th of May.

b) Whelk Working Group

NWIFCA attend, and contribute to, the biannual Whelk working group (WWG). The group brings together members of all IFCA's, NE, relevant stakeholders, researchers and government bodies (Welsh government, cefas etc.) from across the UK to share research and current management strategies in order to learn from one another. Next meeting TBC.

24th of April 2023

Annex 1

Drone Procurement and Training Report 2023

Purpose of this report

This report aims to outline the rationale behind the need for a drone at NWIFCA. The report will also outline the research conducted by staff and the procurement process to date, including drone specifications, training and additional requirements. The report will make a recommendation for the drone NWIFCA will look to procure, along with training and additional software.

Background

Drones are Unmanned Aerial Systems (UAS), typically small aircraft controlled by a pilot on the ground. Drones can have a multitude of camera and surveying attachments, making them a piece of equipment used widely by organisations for a variety of purposes. A number of regional IFCAs utilise drones in day-to-day activity, and they have proved invaluable for surveying, enforcement, management and research. At NWIFCA we would like to utilise a drone to increase survey capacity, collect data to add to existing and novel research, and improve enforcement efforts.

Current survey practises and limitations

Currently, surveys for mussel are undertaken across the district by the science team with support from IFCOs. The surveys are labour intensive, limited by daylight and tides, and rely heavily on the availability of officers, vehicles and quad bikes.

Many areas such as Heysham Flat, South America, Falkland's, and mussel beds in the Dee, are not accessible by quad. Officers have to cross channels on foot often over long distances and are limited by tides and currents. Once on these beds, the assessment is limited by the tide and bed perimeters and stock estimates are therefore restricted. Previously, aerial extents of the bed were provided by industry on helicopter flights, but difficulties with licences and insurance cover meant that last year this was not possible.

Drone Benefits

There are numerous ways in which having drone capability can benefit the NWIFCA. These include:

- Increased survey capacity.
- Reduced survey time.
- Increased officer safety.
- Increased resilience of survey methods.
- Ability to undertake and contribute to novel research.
- Improved data accuracy.
- Improved data for GIS mapping.
- Improved evidence collection for monitoring of MPAs and closed areas, including the newly designated HPMA at Allonby Bay.
- Improved evidence collection for enforcement duties.
- Comparison of drone data with available LIDAR data to assess historic changes in mussel beds in the district.

A drone would offer the ability to give NWIFCA autonomy for gathering its own data on the aerial extent of the bed, limit officer time in higher risk situations such as crossing long water channels by foot, and allow for a comparable, highly accurate level of monitoring which is useful for monitoring a highly dynamic resource. Drones would allow an optimum survey

approach, capturing mussel bed perimeter extent and percentage cover to utilise alongside ground-based sampling for size, weight and biomass calculations.

In addition, recent research conducted by Newcastle University and Northumberland IFCA demonstrates that the use of drone footage can be used to distinguish mussels from surrounding substrates using multispectral camera systems.

The NWIFCA district is now home to the pilot Highly Protected Marine Area (HPMA) at Allonby Bay. As one of the first of its kind, the protection and conservation of this area will be highly scrutinised. The addition of drone technology to the organisation will increase our ability to ensure the HPMA is protected from extractive activities and succeeds as a pilot site.

Introducing drones to the NWIFCA will also allow further collaborative working with other IFCAs. Sharing of technology and payloads such as different cameras will allow the NWIFCA and other regional IFCAs to increase survey and monitoring capacity without any additional costs. This will also lead to knowledge sharing, improving data collection and operations.

As well as the obvious benefits that the drone hardware will provide, it is likely that a new computer of higher spec will be needed to aid in data processing. This higher specification computer will also be useful for the processing of other survey data such as that produced by our Sidescan Sonar surveys in the Solway.

Other IFCA use of Drones

A number of regional IFCAs around the country use drones. There is also an IFCA drone taskforce, which is a technical group set up to share best practise amongst the IFCAs and assist IFCAs in building drone capability. Below is an overview of the IFCAs that have drone capability, the models used and brief description of the work completed using drones.

IFCA	Drones	No of Pilots	Uses
Northumberland	DJI Mavic 2	3	Environmental monitoring and monitoring fishing activity. Working with Newcastle Uni using multispectral cameras to map mussel beds.
North Eastern	DJI Phantom 4 Pro+ SplashDrone 3+ C1-XR	2	Survey work and enforcement work.
Eastern	2 x DJI Mini 2 DJI Mavic 2 Enterprise	2	Monitoring of fishing activities.
Kent and Essex	2 x DJI Mini 2	2	Monitoring of marine vessel activities and Marine Protected Areas (MPAs).
Southern	DJI Matrice 300 RTK with Zenmuse H20T camera DJI Mini 2	2	Long range visual recording for monitoring and evidence gathering of closed areas. Thermal imaging allows deployment at night.

Drone Procurement Research

Following discussions and research into other IFCA drone specifications, 3 models were originally selected as possible options for the needs of NWIFCA. These models were:

- DJI Phantom 4 Multispectral,
- DJI Mavic 3 Multispectral (3M),
- DJI Matrice 300 RTK.

Research and analysis of these models led to the removal of the DJI Phantom 4 multispectral as a viable option. Research revealed that the Mavic 3M provided a number of upgrades to the Phantom 4, including better portability, improved flight time and improvements to the camera and data capture specifications. An in-depth analysis of the two drones can be read here: DJI Mavic 3 Multispectral vs DJI Phantom 4 Multispectral – heliguy™.

Further research and analysis was then undertaken on the two remaining models, the DJI Mavic 3M and the DJI Matrice 300 RTK. Heliguy has also written an article on this comparison: DJI Mavic 3 Enterprise Series vs M30 vs M300 RTK – heliguy™. We have amalgamated some of the important specifications for these models in the table below.

	Mavic 3 Multispectral	**M300 RTK**
Dimensions (L x W x H)	Folded (without propellers): 223 x 96.3 x 122.2 mm; Unfolded (without propellers): 347.5 x 283 x 139.6 mm	Folded: 430 x 420 x 430 mm; Unfolded (propellers excluded): 810 x 670 x 430 mm
Weight	951g (with propellers and RTK module)	Approx. 6.3 kg (with two TB60 batteries, and single downward gimbal)
Max Take-off Weight	1050g	9 kg
Max Flight Time	43 minutes	55 minutes (no payload); With payload: Depends on payload. Examples include H20T: 43 min; P1: Up to 44 min; L1: Up to 42 min.
Camera/Payloads	Fixed, multi-sensor payload. RGB Camera: 4/3 CMOS, Effective pixels: 20MP Multispectral: ½.8-inch CMOS, Effective pixels 5MP	Interchangeable payloads, including third-party payloads. Can carry up to three at a time. Payload options include H20T (Laser rangefinder + Wide + Zoom + Thermal); P1 full-frame photogrammetry camera; L1 LiDAR and photogrammetry sensor; gas detection modules; speakers/spotlights; and agricultural sensors.
IP Rating	No	IP45

Operating Temperature	-10°C to 40°C	-20°C to 50°C
Max Speed	15 m/s (Normal Mode); Forward: 21 m/s (Sport Mode)	S mode: 23 m/s P mode: 17 m/s
Max Wind Speed Resistance	12 m/s (during take-off and landing)	15 m/s; 12 m/s (during take-off and landing)
RTK	Supported (RTK Module comes with drone)	Supported (Dual RTK Built in)
Controller	DJI RC Pro Enterprise (No IP rating)	DJI Smart Controller Enterprise; No IP Rating *RC Plus compatibility is expected soon
Max Transmission Distance (CE)	8km	8 km
Dual RC Control Mode	Not supported	Supported
Safety Features	Includes omnidirectional binocular vision system; DJI AirSense; Smart Return To Home; APAS 5.0; Health Management System.	Includes omnidirectional sensing; DJI AirSense; Smart Return To Home; Three Propeller Landing; Health Management System.
Suggested Industries	Precision environmental monitoring and agriculture.	Depends on the payload, but M300 RTK has a solution for all industry verticals, including public safety, inspection, surveying, and agriculture.
Price Bracket	Low tier	High tier

Mavic 3 Multispectral

This lightweight, highly portable drone is designed for environmental monitoring and land management. It has a 20MP RGB camera and four 5MP multispectral cameras, allowing high precision surveying. It also includes an RTK (real-time kinematics) module, allowing improved accuracy to 1cm. A flight time of 43 minutes allows data capture of up to 2km^2 per flight, with a max range of 8km. This is a lower price tier option but unfortunately it does not have an IP rating for working in wet conditions.

Image from Heliguy product brochure © Heliguy.

Matrice 300 RTK

This highly versatile drone is a large commercial drone with numerous capabilities that can be tailored to suit. Although the price is higher, the drone has an IP45 rating for poor weather use and can carry a wide range of different payloads, including photogrammetry, LiDAR and thermal imaging cameras. As the name suggests, an RTK module is standard for accurate surveying, and this drone has long flight times similar to the Mavic 3M depending on payload options.

Image from Matrice 300 RTK – Built Tough. Works Smart. – DJI.

Training and software requirements

Drone operators and pilots will need to register with the UK Civil Aviation Authority (CAA), and get an operator ID and Flyer ID.

- **Operator ID** – if you are responsible for a drone you are required to register as a drone operator to get an operator ID. This is £10.
    - The operator will be the person within the IFCA responsible for the drone. This includes maintenance and ensuring anyone who flies it has a valid flyer ID and correct training, qualifications and insurance. The same operator can be used for a number of drones within the organisation and does not need a flyer ID/intention of flying the drone.

- **Flyer ID** – Drone pilots must register and get a flyer ID. This includes a 40-question multiple choice exam and is free.

- **Training - General Visual Line of Sight Certificate**

Categories: Open/Specific.

The General Visual Line of Sight Certificate is a remote pilot competency certificate which provides a single qualification that is suitable for most VLOS (Visual Line of Sight) operations. This course comprises of theory training units and end-of-unit assessments, creation of an operations manual and a practical flight assessment. The operations manual, along with your GVC Certificate, can then be submitted to the CAA for your operational permissions.

- **Training – Aerial Surveying Course**

This course over 5 days provides training on utilising drones for surveying. It comprises theory, practical and scenario-based training. It includes surveying fundamentals, GNSS (Global Navigation Satellite Systems) data capture, aerial photogrammetry, 3D modelling, aerial LiDAR and data capture and processing.