NWIFCA Technical, Science and Byelaw Committee

7th of February 2022: 10:00 a.m.

Agenda Item 7

SCIENCE REPORT FOR INFORMATION 1ST OF NOVEMBER – 25TH OF JANUARY 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 FISP project bid, assist with setting up a new returns database, organise training, develop plans for 2023 and start the mussel MLS work.

Key achievements since the previous meeting:

1) Completed Fisheries Industry Partnership Scheme proposal and submitted it to Defra
2) Presented our work at Cumbria University
3) Developed and agreed an action plan for mussel MLS studies
4) Four consultation requests and one dispensation requests responded to

ONGOING WORK STREAM UPDATES:

1. POTTING PERMIT BYELAW

The science team have been working to set up a database for the suitable logging and analysis of returns data. It is now agreed that a new database will be introduced in 2023, science officers will feed into the returns section to improve recording returns and new ways of analysing the data to help management.

The final outstanding application for the whelk potting permit has gone to appeal and requires the appeals panel to be reconvened at the earliest convenience.

2. COCKLE AND MUSSEL

No surveys or inspections were undertaken this quarter

a) Mussel minimum landing size

At the Technical Science and Byelaw meeting held on the 1st of November, 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.

Owing to suitable tide times and fisher availability, the earliest opportunity for NWIFCA officers to meet fishers on the Foulney mussel bed is in January. The meeting is to identify the area of interest and conduct an initial mapping phase.

b) Dee cockle fishery order

At the Authority meeting on the 29th of September, a member of the public raised the issue of future management of the Dee cockle fishery once the regulating order expires. Members of industry have enquired as to whether cockle beds on the English side of the Dee will be managed under different regulation post 2028.

On the 8th of November, the SS met with a NRW representative responsible for managing the Dee cockle fishery. Early discussions within NRW indicate that the organisation is looking to re-apply for another regulating order and are not pursuing the possibility of it becoming a public fishery. However, the process is at a very early stage and engagement with current license holders will begin 2023. NRW need to confirm with the EA as to their role in a future RO and will keep NWIFCA engaged in the process. The SS will attend a consultation meeting for the Dee fishery RO when it is arranged.

3. NWIFCA RESEARCH PROJECTS

a) Fisheries Industry Science Partnership Scheme (FISP)

The Fisheries Industry Science Partnership (FISP) scheme is a £10 million government fund which seeks to: improve data collection, particularly for data limited species, enhance knowledge of technical measures including fishing gear selectivity, and/or build a better understanding of the ecosystem benefits and environmental impacts of aquaculture. Projects required collaboration between industry members and a research organisation and needed to fulfil a number of criteria such as improving our knowledge of data limited species, produce results that will inform fisheries management plans, and support fishing opportunities. There were 4 lots available to apply to, these being: 1) Fisheries data collection, 2) mixed fisheries and selectivity, 3) environmental impacts of aquaculture and 4) other factors impacting fishing (such as offshore construction).

NWIFCA science officers developed a proposal looking at the long-term sustainability of the intertidal shrimp fisheries in the NWIFCA District. This project fell into Lot 1. This project was based on reports from industry members that there has been a long-term decline in both the number and size of shrimp across the District. Shrimp are a data poor species with no stock assessment and little information available other than that provided by industry. The project, therefore, aimed to 1) establish a baseline dataset by conducting trawl surveys carried out by industry members, and 2) identify reasons for decline by undertaking water sampling and micro-cosm experiments in collaboration with Salford University. Further information on our proposed methodology and bid response is included in Annex 1.

A total of 5 fishers agreed to take part, 1 from the Solway, 2 from Morecambe Bay and 2 from Southport. The results of the application will be announced before April 2023.

b) Whelk Fisheries in the North West

A new sampling schedule for the summer of 2023 is in development. The aim is to follow previously established methodology to sample whelks across the NWIFCA district and analyse them for size-at-maturity. This work will begin in the summer. The estimates will inform the MLS and help inform fishers of suitable riddle sizes.

2. MARINE PROTECTED AREAS IN THE NWIFCA DISTRICT:

a) Highly Protected Marine Areas (HPMAs)

No further update

b) Marine Natural Capital

No further updates

3. FISHERIES MANAGEMENT

a) Fisheries Management Plans

The purpose of the fisheries management plans is to define the fisheries, assess and account for their possible socio-economic and environmental effects and give a framework for their sustainable management.

FMPs are required at a national level under the Fisheries Act 2020. Following Brexit, the UK Fisheries Act 2020 placed FMPs as the main tool for reforming UK fisheries management.

The release of FMP's is being conducted in tranches – with the front runners consisting of whelk, scallop, crab and lobster, and bass. NWIFCA officers met with Seafish and other stakeholders in Fleetwood on the 29th of November to discuss the whelk FMP. At the meeting, a draft framework for the plan was presented.

4. MMO MARINE LICENCE AND OTHER CONSULTATIONS FOR THE QUARTER

a) Offshore Wind Leasing Round 4

No further update

b) Mersey Tidal Power Project

No further update.

c) Geological Disposal Facility (GDF)

No further update

Consultations this quarter:

- Jubilee Bridge Painting Works
- Burbo Bank Extension Offshore Windfarm - Maintenance Works
- Cottage Lane SPS Emergency Overflow
- Geotechnical Investigations Mona Offshore Wind Farm - 75 Boreholes

Dispensations this quarter:

- **Cefas Offshore catch sampling programme 2023**

5. WORKING GROUPS AND MEETINGS

a) Technical Advisory Group

The most recent TAG meeting was held virtually on the 15th of December 2022. NWIFCA officers were unable to attend the meeting.

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. A meeting was held on the 29th of September where updates on work were shared.

c) Cumbria University

On the 13th of December the SS presented our work in Morecambe Bay to the post-graduate students at Cumbria University as part of their module on marine management.

25th of January 2023

Annex 1

E02 Summary Description **For information only**
Please provide a brief (plain English) summary of your proposal. If successful, this will be used in future communications and promotional material (including spending announcements) on the scheme. **This question is not scored.** Please use the following sub-headings to structure the summary: • Project Aims • Action (what you will do and the methodologies you will use) • Expected Outcome (benefits of project) Responses should be no more than 250 words with a font size of 11. Do not include any links in your response.

Response
Project Aims The project aims to understand the potential causes for the decline in brown shrimp (*Crangon crangon*) in the Northwest and develop the first baseline dataset for future stock assessments and monitoring in the region. Brown shrimp is of significant importance to the local fishers, offering seasonal fishing opportunities and supporting well established traditional potted shrimp businesses. In 2021 national landings were valued at £1.2 million. Over the past five years, fishing industry representatives have reported declines in the number and size of shrimp across the Northwest, but the lack of data on the fishery has hindered management decisions. It is therefore important to establish a baseline stock assessment to further monitor the state of the fishery and investigate the potential causes of decline. Actions: 1) The projects industry partners will undertake trawl surveys to collect size frequency, and weight data across the main areas of the North West District. Data will be collected across two years to establish an initial dataset 2) Samples will be analysed to see how factors including (but not limited to) fishing practices, water quality, temperature, predator-prey relationship, and food availability impact the shrimp life cycle, and stock levels. 3) Collation of CPUE data where available 4) Fishers interviewed to gather concerns and input into management recommendations. Expected outcome: 1) First baseline dataset on brown shrimp from which to monitor future stock changes, from which to measure sustainable exploitation 2) Increased engagement with commercial shrimp fishers and knowledge of stock variables

E05 Approach and Methodology
Weighting: 25%

The questions being assessed under this section are in bold.

We would expect to see the following detailed under this section:

- **Project approach and methodology**
- **Details of how you plan to deliver your project, this should include a project plan, highlighting milestones and the processes in place to ensure outputs are achieved, (for example, this can be expressed as a Gannt chart). This should take into account the required regular reporting to Defra.**
- **Details of project outputs, including datasets and analysis that will be undertaken**
- **MEDIN data standard that will be used and, where there isn't one for the data being collected, sufficient detail and timeframes within the project for developing one with MEDIN**
- **Completion of risk log and identification of strategies for managing the risks**

Responses should be **no more than 3 A4 pages** with a font size of 11.
Any annexes included within the response can be provided in addition to the page limit.
Figures (e.g. graphs and charts) can be provided in addition to the page limit

Response

Methodology for aim: **1)** ***to develop a baseline dataset for the stock in the District***

Research has shown that brown shrimp lack a clear age structure and reproduce almost year-round, therefore, an age-based stock assessment is not possible. An alternative approach is to survey during peak occurrence in late summer/autumn when mature shrimp migrate inshore. Depth and area-stratified samples can be obtained to estimate the total biomass and size frequency of shrimp. This can then be compared with total annual landings to identify if fishing levels are sustainable. Collating this evidence will establish the first baseline biomass-stock assessment for shrimp in the district.

To establish the baseline dataset, local fishers and industry partners will undertake monthly surveys in their respective areas (Solway, Morecambe, Ribble, Dee) from September to December 2023 and 2024. All data will be recorded according to MEDIN data standards, and participants will attend MEDIN workshops. This part of the project will be predominantly lead by NWIFCA and the fishing industry.

Survey methodology:

- The survey will be conducted with shrimp trawl (sampling areas to be determined in collaboration with industry members) once per month from September to December 2023

and 2024 by industry in partnership with NWIFCA. (these will be standardized)

- Number and location of sample hauls will be based on stratified random sampling strategy and dependent on the conditions of each location. Similar methodology set out in *Bourges et al 2021*.

- For each haul the position, date, time of day and depth will be recorded. Including total catch by weight of shrimp.

- Mesh size, tow speed and gear spec used will be the same and determined with industry.

- 200 animals from each haul will be separated from fish and other epibenthos (also recorded) and be frozen for later measurement of length, weight and sex (following similar methodology as set out in Tulp *et al* 2016) in the lab.

- Collate landings data from industry over the same time period, with detail on number of hours fishing, total weight caught (if possible) and total retained (size).

- Additional water samples to also be collected for salinity, dissolved oxygen and nutrient levels.

Key outputs:

- Survey dataset 1 completed by spring 2024, and survey dataset 2 completed winter 2024

- Landings dataset collated by spring 2024.

Data analysis:

- Density, mean number and weight per haul will be calculated from the trawled distance and samples.

- Length frequency distributions, size and undersize comparisons.

- Mean abundance per area will be calculated for all areas using the estimated total area of the ground and the total area covered by the trawl.

- Statistical analysis will be conducted in R following methodology outlined in Bourdages *et a*l 2021

- To calculate the CPUE, landings datasets over the same time period will be collated from fishers (this will be by voluntary agreement as there is no legal obligation for them to do so). Landings will then be compared with the results of the monthly surveys to identify the levels of stock removal.

Key milestones are noted in Figure 1. A copy of the potential risks to the projects success and strategies for management are provided in Figure 2.

References

Tulp et al., 2016. Annual brown shrimp (Crangon crangon) biomass production in Northwestern Europe contrasted to annual landings, ICES Journal of Marine Science, Volume 73, Issue 10,

November 2016, Pages 2539–2551, https://doi.org/10.1093/icesjms/fsw141

Bourdages et al., 2021. Preliminary results from the ecosysteic survey in August 2021 in Estuary and northern Gulf of St. Laurence.
https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41072224.pdf

Methodology for aim: **2) *Determining the reason for decline in the regions shrimp (both size of individuals and overall biomass of catch)***

A key concern for industry has been the decline in both the abundance and size of shrimp across the district. Establishing a baseline dataset in aim 1 will provide a measure against which to monitor future decline, however, there is a need to investigate the cause of this decline in order to predict future changes and develop stock management approaches. A number of abiotic and biotic factors will be explored using shrimp and water samples collected from survey trawls to identify how these variables may be influencing shrimp behaviour and life history characteristics such as growth and survivability.

Field and lab methodology:

- Measure abiotic factors from water samples (some parameters in the field, other bringing water samples in the lab).

- Examine whether nutrient levels, pollution and sewage, temperature, salinity, heavy metal presence are potentially causing stress. Refer to bibliographic references and historical data for comparison of methodology. Use Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) to conduct trace-level elemental analysis.

- Conduct micro-cosm experiments to see how temperature and salinity may be affecting life history traits and their life cycle, early or late molting etc. preliminary data have been collected on colour change in natural conditions– this may be considered beyond the life of the initial project.

- Biotic factors: Interaction with other fisheries – monitor the presence / abundance of juvenile flat fish in trawls. Correlation with predator species abundance; Investigation into changes in other species

- Comparison on trends in other areas, including Netherlands and Germany, where declines have been reported as well

Key outputs:

- Dataset of abiotic factors completed by spring 2025

- Pilot data from lab experiments to be potentially expanded with a PhD work (two PhD thesis already produced at the University of Salford; Althomali 2019; Siegenthaler 2017).

Data analysis:

- Seasonal variation in abiotic factor compared to historical trends

- Comparison of number decline in other populations

References:

Althomali A. W. 2019. Behavioural ecotoxicology of the brown shrimp, Crangon crangon*: changing colour in polluted environments PHD thesis The University of Salford*

Siegenthaler A. 2017. Hide and seek: a multidisciplinary study on the ecological success of an estuarine dweller PHD thesis The University of Salford

Figure 1: project timeline and key milestones

Project timeline and milestones

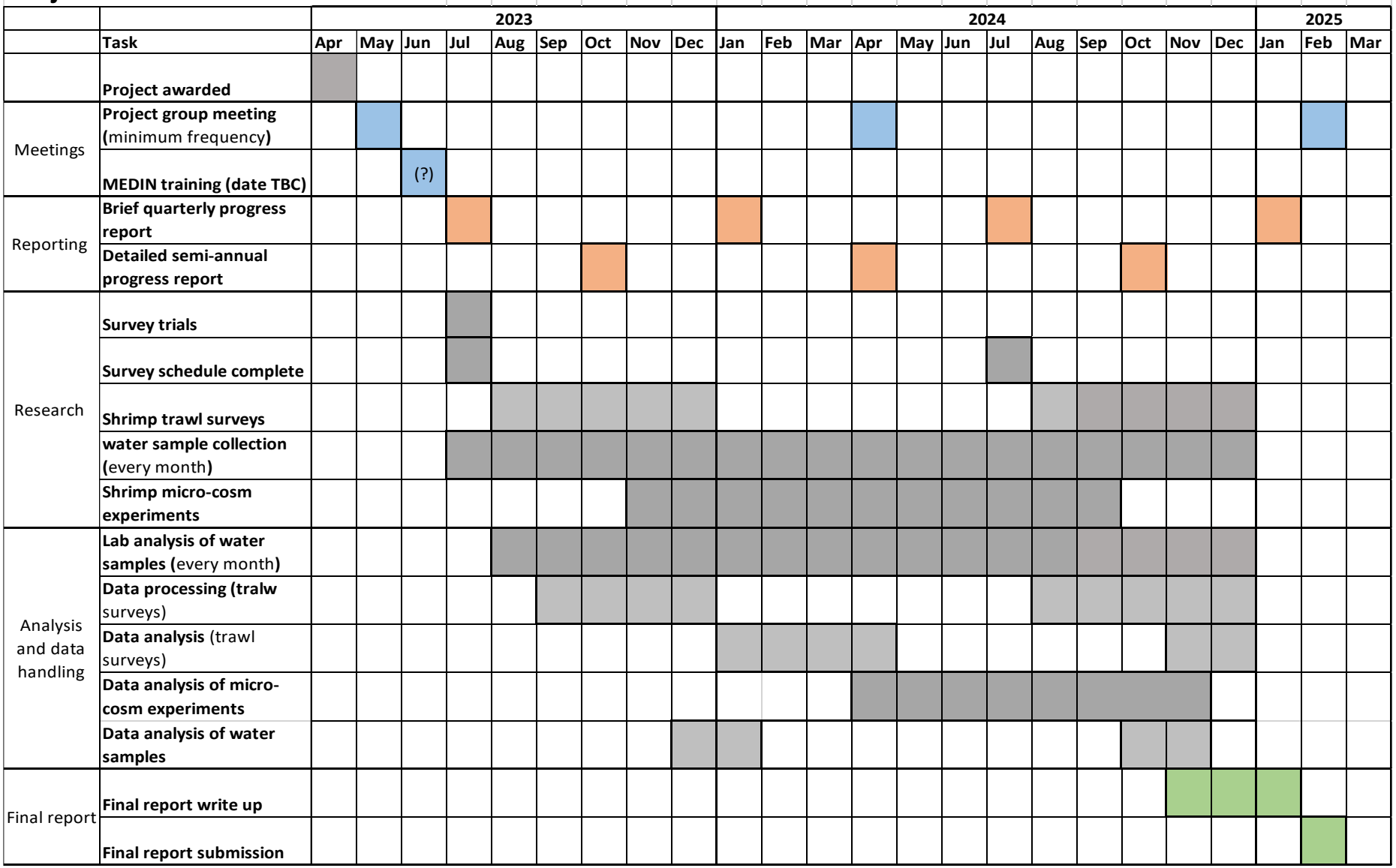

Figure 2: Details of risks and mitigation strategies for the project

Project Risk Log

Description of risk	Impact on project	Liklihood	Seriousness	Mitigation action	Person responsible	timeline for mitigation action
Interuption or delay to surveys - this may occur due to technical issues, weather, insurance issues, dispensation issues	Loss of data and gaps in the dataset. Difficulties in identifying trends	Medium	Low	1) Have identified multiple dates for samples so there is capacity to rearrange within the month. 2) maintain good communication to ensure problems are identified early so alternatives can be found 3) ensure fishers have apprpriate insurance policies to allow officers to work on board at least 3 months prior to the beginning of works 4) make dispensation requests at least 3 months prior to works	Vessel owner	1) Contact industry members a minimum of 1 month prior to the sample month. 2) Industry members to raise any concerns as soon as possible to allow for alternatives to be found 3) ensure insurance is checked and ready at least 3 months prior 4) ensure dispensation aquired 3 months in advance
Cancelled surveys - this may occur due to problems with industry partners vessels, personal matters etc. ie, other fishery commitments	Loss of data and gaps in the dataset. Difficulties in identifying trends	Low	Medium	1) Identify fall back industry members able to undertake the survey, or th possibility of NWIFCA undertaking the survey 2) Identify statistical methods to help analyse data. 3) maintain good communication to ensure problems are identified early so alternatives can be found	Vessel owners NWIFCA	Contact industry members a minimum of 1 month prior to the sample month. Industry members to raise any concerns as soon as possible to allow for alternatives to be found
Catch returns not provided	Inability to calculate CPUE for the year	Medium	Low	1) Contact and gain voluntary agreement from fishers early on. This informaiton is not essential to the outcomes of the project, but highlight the importance to stakeholders of how the information will be used	NWIFCA Local industry	Start of the project

Equipment failure - both in the lab and equipment use at sea	Loss of data and gaps in the dataset. Difficulties in identifying trends Inability to conduct surveys	Low	Medium	1) Industry to ensure that gear is up-to standard and well maintained 2) data is stored securely in at least 2 places, the NWIFCA server and back up 3) insure all NWIFCA gear is maintained to the agreed standard in time and regularly checked 4) lab experiments to have additional samples to ensure redundancy should failure occur for any reason.	NWIFCA Local industry and University of Salford	Start of the project
Dispensation denied	Inability to conduct surveys	Low	High	1) communicate as early as possible with the MMO and ensure at least 2 months 3 months is given for turn around	NWIFCA	3 months prior to starting
Organisation members moving on	Loss of project knowledge, delays in project progress	Low	Low	1) project partners given at least a months notice of change 2) contingencies agreed if members decide to depart from their role and therefore the project, ie. other staff who can fill the role	NWIFCA Local industry and University of Salford	At the earliest possible