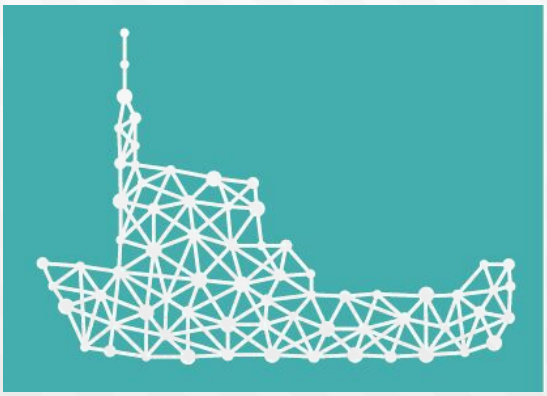

SIFIDS

Scottish Inshore Fisheries Integrated Data System

Work Package (8A) Final Report

On-Board Observers

Project code: WP00(8A)SIFIDS

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EXECUTIVE SUMMARY

The Scottish Inshore Fisheries Integrated Data System (SIFIDS) project aims to build on the success of a previous project called “Evidence Gathering in Support of Sustainable Scottish Inshore Fisheries”, which utilised temporal and spatial data collected from commercial fishing vessels in cooperation with the fishing industry. The On-Board Observer work package (WP8A) aimed to collect the raw data that could be used by the other work packages (WPs) by sending observers to sea. SeaScope Fisheries Research Ltd was tasked with providing trained observers and a total of 131 volunteer vessels were recruited to the project by the Facilitators (WP7) and observers.

The observer sampling occurred between May 2017 and June 2018 from a mixture of ports spread across the Scottish coastline and as determined by the WP8B project manager. The observers successfully completed 132 sea trips and had 3 last minute dockside cancellations, out of a target of 135 sea trips. This equates to a 98% success rate, although the 3 cancelled trips also still allowed skippers to be surveyed about their activities and main decision-making drivers, so could be classed as successful sampling trips. Vessels were targeting a mixture of species, including brown crab, velvet crab, lobster and *Nephrops*. In addition, some vessels were observed in both summer and winter periods to allow potential seasonal differences to be detected. In total 117 different vessels from 43 different ports were successfully sampled at sea.

Data was collected using handheld GPS, video cameras, activity logger applications, voice recorders and on paper logsheets, that documented the fishing effort, vessel specifications, skipper decisions and catches, temporally and spatially. This data was successfully stored on a specifically designed database and was supplied to the customer as specified.

The logistics of undertaking such a large widespread sampling project in a short time frame is also discussed and it was found that it took over 402 staff days to deliver the 132 days at sea. In addition, there was project management time and significant travel time/costs associated with sampling such a wide geographical area.

Safety during at sea observing activities was paramount, with comprehensive safety and communication procedures in place. No safety issues occurred with the observers during this project. A significant proportion of this report has been dedicated to sharing these procedures.

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ACKNOWLEDGEMENTS

SeaScope would like to thank all the fishing vessels that volunteered to take an observer to sea and for being so involved and enthusiastic about the project. We would also like to thank the facilitators of the project for all their efforts in promoting the project and encouraging the fishermen to take part.

1 BACKGROUND

The main aim of the Scottish Inshore Fisheries Integrated Data System (SIFIDS) project is to develop a decision-making tool that can be used to help inform stakeholders and assist marine planners and fisheries managers when making policy choices. The project aims to build on the previous work undertaken as part of the European Fisheries Fund (EFF) funded project "Evidence Gathering in Support of Sustainable Scottish Inshore Fisheries". This previous project collected spatial and temporal data related to fishing activity using Automated Identification Systems (AIS) from a large subsample of the inshore fleet (274 vessels). Subsequently, it was thought that by combining this information with other operational and catch data, it would be possible to predict fishing activities through interpretation of the AIS positional data alone, especially for creel fishing vessels. To enable this data to be collected and allow the comparisons and interpretations of the AIS tracks to be made, it was necessary to collect creel fishing activity and catch data at sea using on-board observers.

Whilst the observers were at sea they were collecting data for 4 of the subprojects (Work Packages (WPs)) of this overall project. These were: -

- WP2a – which needs to compile information on vessels characteristics, working practices, to elucidate how Electric Monitoring may be integrated on the vessel, and to identify 15 vessels willing to participate in trials
- WP2b – which is designing, building and testing an onboard system to capture catch and biological data automatically at sea and which needs data collected on deck layout and operations, to allow 5 suitable test vessels to be identified
- WP5 – which is collecting data on bycatch and gear used
- WP8b – which aims to identify fishing/non-fishing events and analyse which factors are affecting the decision to fish or not to fish on a particular day and where to go fishing on a particular day.

SeaScope Fisheries Research Ltd were recruited through open competition to provide seagoing observers to collect the data required for 105 sea trips initially. This target was raised to 135 days to allow seasonal comparisons and to incorporate the surveys for the other work packages.

2 SAFETY

Working at sea aboard commercial fishing vessels can be extremely dangerous but was a necessary part of this project. SeaScope treats safety with equal priority with the delivery of the task and if a task is too unsafe, all SeaScope staff have the option of not completing it. However, they need to be equipped with the skills and knowledge to make this assessment and also be equipped with the tools and support to reduce risks, improve safety and to complete tasks in a safe fashion. This safety section could have been contained in an Annex but because safety at sea is so important it was thought that it should remain within the body of this report.

Undertaking seagoing work carries a high risk of serious injury and fatality due to the intrinsic dangers of working at sea, remoteness from immediate assistance, and the need for on-the-spot assessments and decision-making by observers working largely on their own. Establishing a robust safety control system is, therefore, imperative to ensure, as far as is reasonably practicable, that risks of loss or injury are minimised.

Observers are trained and expected to be able to assess whether a vessel is suitable for sailing and sampling on, through a visual assessment of the vessel and its equipment. Therefore, it is essential that suitable staff are identified for this work and that the proper training and guidelines are provided.

Staff Suitability and Training

Suitability - Staff with previous experience in going to sea on board commercial fishing vessels and with a sound knowledge of personal safety equipment and the use of that found aboard commercial fishing vessels, are thought to be suitable for undertaking sea going work and training. Additional useful skills are a good knowledge of the common fish species found in UK waters, an ability to identify fin fish and commercial shellfish species and a good knowledge of fishing practises and the fishing industry and surrounding issues. However, all staff are trained and certified before any solo sampling at sea is allowed.

Training - Observers shall only undertake voyages if they are certified medically fit to go to sea and possess a valid ENG1 medical certificate; they have completed the safety training programme and possess valid MCA approved training certificates in line with this programme. Different levels of training are required dependent on the role of the observer at sea. All observers who are to be undertaking solo sampling voyages or voyages as the lead observer or providing training at sea must have completed the courses listed below.

Training and Courses for Solo Sampling and Lead Observers: -

- Personal Survival Techniques *(complete renewal training required every 5 years)*
- Fire Prevention and Fire Fighting *(refresher training required every 5 years)*
- First Aid *(refresher training required every 5 years)*
- Personal Safety and Social Responsibilities (*refresher training not required*)
- Manual Handling *(refresher training recommended every 5 years)*
- Hazard Awareness on Fishing Vessels (*mentor training*)
- VHF Radio certificate (*mentor training*)
- ENG 1 *(Seafarer Medical Certificate renewal required every 2 years or as specified by doctor)*
- Conflict Resolution/Dealing with Conflict in the Workplace (*mentor training*)
- Training in communications procedures (*mentor training*)
- Training in sampling procedures (*mentor training*)
- Training in On-board Safety Awareness (*mentor training*)
- Accompanied Sea Trips with Solo Certified Competent Officer (*mentor training*)

Observers can only undertake solo sampling trips after completing a number of trips accompanied by experienced sea going staff and are then judged competent by an experienced staff member. For new staff 4 accompanied trips are recommended but this can be reduced depending on previous experience of trainee and if the trainer judges the trainee fully competent. The training staff will be required to sign a Declaration of Competency that the observer being trained is now suitable for undertaking sea trips by themselves. Underlined training must be completed by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) approved centres or other certified providers, all other training can be undertaken in-house through appropriate mentorship. Additional mentored training will include species identification, sampling and measuring techniques and following the correct communication procedures.

Staff who are still undergoing sea training, or who are only going to go to sea as the second observer and always be accompanied by a fully trained lead observer, should undergo the training listed below as a minimum.

Training Courses for Second/Trainee Observers-

- Personal Survival Techniques *(refresher training required every 5 years)*
- Manual Handling *(refresher training recommended every 5 years)*
- ENG 1 *(Seafarer Medical Certificate required every 2 years or as specified by doctor)*

Risk Management and Assessment

Below is a list of the current guidance and risk assessments deemed necessary for undertaking seagoing duties aboard commercial fishing vessels; these cover travelling to and from the vessel, embarking and disembarking the vessel, working in a harbour and on board the vessel. These are held on SeaScope's shared directories.

Applicable Risk Assessments and Guidance

Shore Based

- Workstation
- Lone Worker
- Driving and Travelling for Work
- First Aid

Harbour-side

As above plus:

- Operating in and around water and docksides and on floating platforms including boarding vessels

During a Technology Installation

As above plus:

- Working at Height
- Using Cordless Battery Powered Drills

Seagoing

As above plus:

- Undertaking sea trips aboard unchartered commercial fishing vessels.

Staff should acknowledge having read and understood these risk assessments prior to conducting any sea trips and complete a Risk Assessment Acknowledgement form.

Safety Equipment
The safety equipment provided to sea going observers is listed below. All staff are provided with training and guidance on how and when to use this equipment as well as in maintaining the equipment.

Safety Equipment

- Self-Inflating Lifejacket (275N)
- EPIRB Personal Locator Beacon
- Mini-flares
- Mobile Telephone
- Wet and cold weather gear – oilskins, warm clothing, steel toed capped boots

All equipment is for personal use only and should not be loaned to other staff or the vessel's crew. All equipment is the responsibility of the staff it was issued to and they are responsible for carrying out regular checks for defects and arranging for repair or replacement, when necessary. As a general rule, observers should take the full complement of safety gear with them on every sea-trip made, however it is not expected that all Personal Protection Equipment (PPE) will be worn at all times and staff will have received appropriate training and guidance of when it is appropriate to use equipment. A full list of all safety and sampling equipment is shown below.

With regard to lifejackets and flotation devices, staff should follow the guidance document regarding the use of life jackets. However, staff should also take note of the additional operating guidance below:

- When out on an **open deck** wearing oilskins, wear a lifejacket with a minimum of 150N flotation at all times (275N is recommended);
- If wearing a flotation suit or other buoyancy aid on an **open deck**, wear a 275N lifejacket so that the face up righting motion of the lifejacket is not compromised by the additional buoyancy aid;
- If working under a **fully-sheltered deck**, there is a risk of not being able to leave a capsized vessel if you are buoyant. The standard issue lifejacket is fitted with an automatic inflation device that cannot be disarmed, so do not wear any buoyancy or flotation device but have a 275N lifejacket kept readily accessible in a safe, dry place in case of emergency.
- If working under a **partially-sheltered deck,** there is a risk of being washed overboard and of becoming trapped. At the very least, a 275N lifejacket should be accessible in case of emergency, and it is a matter of personal judgement whether or not to actually wear one, bearing in mind any instructions from the skipper.

All vessels sampled by observers must carry a life raft which is in-date and large enough to take all people on board, including additional SeaScope staff. If a vessel is less than 10m in length it is not legally required to carry a liferaft. Therefore, if the voyage is being conducted on a <10m vessel where there is not a suitable liferaft, the observer should consider taking their own portable life raft, large enough to carry all observers and crew. The liferafts are transportable in a large holdall and can be leased from safety equipment suppliers at a weekly charge. Or they should politely decline the trip.

Vessel Safety
Before sailing on a fishing vessel, the observer should make an assessment of whether the vessel is safe to undertake the voyage with the additional observers aboard and whether it is suitable to undertake the work required. Observers should contact the Maritime and Coastguard Agency (MCA) and ensure the vessel has the required safety certificates; contact local Port Offices and make enquirers of the boat, skipper and crew; contact other team members who have experience of this vessel; and carry out a visual assessment of the vessel when it is docked on port and prior to sailing. Training to carry out this visual assessment is provided.

The checklist in Annex 1 is a guide that the observer can use to assist in the visual assessment of the safety equipment aboard a vessel, as well as the general appearance and maintenance of the vessel.

Communications & Checking-In Procedures
The purpose of the Communications and Checking-In Procedures is to ensure that a shore-based contact (usually the Project Manager) is fully aware of the whereabouts and wellbeing of observers at all times. This is similar to a "Buddy" system but differs in that a manager will be the contact for all staff who are at sea and will therefore have the responsibility and authority to ensure that the lone worker/at sea observer follows the correct procedures. The Buddy system also requires daily checking in, but this is often impractical and impossible at sea due to communication equipment limitations and therefore the following procedures provide a checking in structure with in-built "trigger" times and responses. These communication procedures and equipment also help provide the observer with management assistance and support as well as a 2-way communications channel between observers and their family, in the case of an emergency at home.

A Response Procedure should also be in place and be triggered when the pre-arranged communications plan is not fulfilled.

Duties are as follows:

Sea Going Observers

- Should provide details of the voyage in the Trip Details Form (see Appendix V) to the Shore Based Contact and the Project Manager. This should detail the ports of operation, expected dates out of the office and at sea, details of the vessel, contact numbers for the vessel and skipper, next of kin, and any other relevant details.
- Text the essential trip details to the Shore-Based Contact, i.e. vessel name and PLN, skipper's name, skipper's or vessel's mobile number, and time/date due back.
- On sailing, the observer should phone or text the Shore-Based Contact to confirm departure and an expected return date.
- The observer should try to give daily up-dates if the vessel is in mobile range. If not in range, then this is not necessary, but should be highlighted as a possibility prior to sailing.
- The Shore Based Contact should be informed immediately on landing to report completion of the trip.
- For trips in excess of 3 weeks duration, the observer should use the vessel's satellite phone, and make contact every 2-3 days or at pre-arranged intervals.

Shore-Based Contact

- The Shore-Based Contact should be available 24 hours a day whilst an observer is at sea or lone working.
- They should ensure they have the details of the trip available and that they have all relevant contact numbers available at all times e.g. telephone numbers for observers, their next of kin, the skipper and owner, boat phone, etc.
- On receiving a call or text, the Shore-Based Contact should ensure that they log details of the call on the Trip Details File and when the next communication is expected.
- If an observer is overdue in contacting the Shore Based Contact (6 hrs late for a day trip, 24 hrs for a multi-day trip), they should attempt to contact (in order of priority):
    - the overdue observer
    - other members of the observer team
    - the vessel and/or the owner
    - The local fishery/port office
- If all attempts at contact have failed, then the Shore-Based Contact should:
    - Alert the MRCC by dialling 999 and selecting 'Coastguard', stating that the vessel is overdue. You will probably be transferred to the local station. Be on standby to provide as much information about the trip in question as possible to assist search and rescue.
    - Report situation to the Directors
    - Record all actions, together with dates and times.

On receipt of a call from the Maritime Rescue Coordination Centre (MRCC) relating to a distress signal having been picked up from an Observer PLB, the Shore Based Contact should provide support to the rescue services and communicate all developments to Directors and senior management. This will include:

- Identifying the registered holder of any PLB serial number quoted by MRCC by referring to the Safety Equipment List and the Trip Details Form.
- Arrange for the Observer's next of kin to be notified.
- Inform project managers and clients of the situation.
- Invoke any other relevant procedures

Accident/Incident Reporting

Observers should report all accidents, injuries, time off work due to illness whilst at sea, damage to the vessel, unsafe situations and near misses to the Shore Based Contact, Project Manager and Directors and complete necessary Health and Safety forms and accident book. This should include Near Hits. In the event of a serious incident then the Project Manager shall contact the H&S Executive for further guidance.

3 METHODOLOGY

Port Selection

Five marine regions within Scottish inshore waters were chosen for sampling: North East, Argyll, North West, Western Isles, and South East. These five areas were selected to allow the fishing activities occurring over a wide geographical spread to be recorded. Some regions such as the Clyde, Solway, Shetland and Orkney were excluded for the following reasons. Shetland and Orkney were mainly discounted due to the logistical reasons associated with sampling these islands, but also because they have their own trial sampling programmes in place; the Solway has very little creeling activity compared to other areas and these are mainly limited to targeting lobsters; and the Clyde has been heavily engaged in scientific projects in recent years and there was concern that another research project in this area could result in negative outcomes due to "survey overload".

Each of these areas has a main Administrative port and within each there was a representative range of vessel lengths between 5 – 11.99m. This was essential as the project was only concerned with inshore vessels which, for the purposes of this project, were defined as vessels less than 12m overall length. This also removed potential sources of variation in the resulting data that could have been introduced by differences in vessel size in the local fleets of different geographical regions.

However, within each region there was likely to be differences in the fleet's fishing behaviour and how they operate. These differences could be related to port size, tidal regime, species being targeted, type of creel used, number of crew members, vessel length, seabed type, etc., but it is important to capture this information and try and attribute it to a causal factor. There are many different factors that influence behaviour that it would be nearly impossible to identify these during a short-term project of this nature, but two proxy factors were thought to be able to capture most variability. These were: -

- Geographical Spread – this would cover different port types, tidal regime, differences in ways the boats are operating, and
- Season (winter/summer) – this would potentially allow for covering different species targeted at different times of the year, poor weather conditions and any associated operational differences.

To cover geographic spread, three/four zones inside each marine region were identified. Each zone was composed of either one, two or three associated fishing ports. Information was gathered confidentially by the Facilitators (WP7) through discussions with the local industry and their representatives, to quantify the number of active fishing vessels in each port and to determine whether they were active in the summer or winter or both, to help stratify the sampling approach.

For logistical reasons, ports with higher numbers of vessels were usually selected for sampling. The project also needed to spread sampling effort during summer and winter, with the main sampling effort allocated to summer, spread over two summer periods (some in 2017 and some in 2018). An additional 30 sea trips were added to the original total of 105 to allow seasonal variations to be explored. These were to be undertaken during winter time and preferably on vessels that would also be sampled in the summertime, to allow comparisons to be made.

The port selection process and seasonal strategy will be more fully described in the report for WP8b.

Vessel Recruitment and Selection

WP8a and the SIFIDS project in general relied on the creel fishing industry to participate on a voluntary basis. The main reason behind this was the premise that the fishing industry will be

the eventual beneficiaries of any developments or outcomes of the project, as the project will increase the knowledge base and management options available to the industry. By participating in this way, the fishing industry are active stakeholders in the project and processes. This approach helped to ensure that skippers interested in the study and who want to help improve the state of their stock and how it is managed, were involved. To identify and recruit potential participating vessels to the study and to inform stakeholders of the aims of the project, the SIFIDS project had a work package (WP7) that employed Facilitators to communicate with the fishermen and their representatives. The Facilitators approached industry and informed them of the project and its aims. They then created a list of all vessels who had agreed to be involved in the sea trials and supplied this to SeaScope, who used this to approach vessels and arrange sea trips. It should be noted this list was "live" throughout the duration of the project and was routinely reviewed or added to. This was to ensure that vessels did not feel forgotten if delays occurred between agreeing to participate and being contacted for a sea trip, as well as to avoid delays in sampling whilst waiting for the list to be fully compiled.

The first list of vessels was supplied to SeaScope in mid-May 2017 and sampling commenced in earnest on 23rd May 2017. Two trips were completed prior to this (29th April 2017 and 9th May 2017). These were staffed by 1 SeaScope researcher and the SIFIDS WP8b project lead. The purpose of these trips was to observe fishing operations aboard 'typical' Scottish creel vessels and develop a realistic set of data collection protocols to fulfil the SIFIDs 8B project goals and to develop onboard sampling procedures and data recording sheets. These trips also allowed the work package managers to test the different types of electronic equipment that had been suggested for collecting the data at sea.

Once an adequate number of vessels was available on the Vessel List, the at-sea observer would decide which geographical region to sample the coming week. This was mainly dictated by weather. Having a mix of north, south, east and west regions usually allowed the observers to focus on one area of coastline where the least wind and swell was occurring. Observers would then attempt to contact vessels in these areas and arrange sea trips for the coming week (or two weeks).

Onboard Sampling Equipment and Procedures

Once a vessel had agreed to take an observer, the observer travels to the specified port and joined the vessel for a sea trip on the following day, or first opportunity if the trip was postponed. The setting up of equipment and recording of data would start almost immediately the observer met the vessel. Permission agreements would be signed, video cameras would be attached to view catch handling and activities would be electronically or manually logged e.g. starting engines, getting fuel etc.

The following equipment and logsheets were taken on sea trips: -

Equipment

- Garmin eTrex 20x portable GPS receivers with GLONASS support
- Olympus digital voice recorder VN-741PC
- Campark Xtreme II UHD 4K action video cameras, with aluminium tubing boom and attaching clamps
- Activity logger mobile application, installed on either the researcher's mobile phone or a small portable tablet device

The Garmin handheld devices were activated for the duration of all WP8a sea trips, collecting positional data at 1 point per second from the time researchers boarded the vessel until the trip was completed and the vessel had returned to port and tied up at its usual overnight berth.

The Olympus voice recording devices were used to document fishing events on a real-time basis, as well as to document the researchers estimates of catch components (both retained and discarded) on a pot by pot basis, for all fleets fished during the days trip. Of these voice recordings, 30%, or a maximum of 4 fleets of catch data per trip, were subsequently transcribed and entered into a purpose-built database created by SeaScope to 'house' all forms of data collected for WP8a.

Campark video cameras were used to collect video recordings of a minimum of 2 randomly selected fleets per trip. Video footage was targeted to collect good imagery of the creel sorting area. The aim was to use the video data to corroborate voice catch records, as well as better describe catch handling and sorting behaviours to land-based researchers.

Finally, the Activity logger application was used by researchers at sea to record real-time fishing events and describe behaviours or vessel movements that may have shown as anomalies in the GPS data tracks. It also allowed the researcher to log when marker buoys and creels were hauled and shot away so that these could be compared against the collected GPS tracks to determine if creel counts and fleet counts (fishing effort) could be obtained from positional data alone.

The equipment used can be seen in Figures 1 and 2.

Figure 1. Equipment used during observer trips (clockwise from top left). The Garmin eTrex20x, the Campark Xtreme II UHD 4K action video camera, the Activity logger application on a handheld tablet, and the Olympus VN-741PC digital voice recorder.

Figure 2. An Observer using the equipment in Figure 1 at sea, to record catch and effort details.

Paperwork

The observers were provided with the following paperwork on all trips: -

- Permission forms (Annex 2)
- Paper logsheets and a step by step completion guide (Annex 3)

As previously mentioned, all participation in this project was on a voluntary basis. However, to ensure that fishermen and vessel owners were happy to allow the data collected on the trip and their data held by Marine Scotland, to be used in this project, it was necessary for the observer to have the fishermen sign a Permission form. This document described the project and detailed how the data would be collected, stored and used. It also specified that they gave their consent for the data collected during the SIFIDS can be used in an aggregated format for this and subsequent related research and that Marine Scotland could share their FISH 1 (weekly landings data) with the project staff.

As well as the electronic equipment the sea going observers also recorded data and observations on to a set of paper logsheets. These were printed on waterproof paper to ensure that data was not lost through water damage. The full description of what data was collected and how, is shown in Annex 4, but a summary is included below.

Summary of data collected – The observers collected details of the vessel and number of crew, as well as a list of electronic and mechanical equipment e.g. type of hauler, make of echo sounder etc. They also took photographs of the vessel from various different angles and provided a sketch of the deck layout with details of deck equipment e.g. holding tanks and associated approximate measurements.

There was also a requirement to collect information on the type and quantity of gear being fished by the vessel, the main target species, the type and lengths of the different sections of rope used on the fleet of creels, the creel design and its dimensions, and the type of bait being used.

Another objective of the project and sea trips was to try and identify the drivers for why fishermen operate the way that they do. Observers asked the skipper questions related to why they fish in a particular place and what factors could have stopped them fishing on the day of the trip.

During the sea trip the observer would use a voice recorder to quantify the fishing effort, hauling activities and the catch. These would also be transcribed once the observer had returned from the trip along with the details of the actual catch landed.

Database Design and Use

Whilst at sea, the observers collected large quantities of data in both paper and digital format. This included paper records of permission to sample forms, the completion of the questionnaire of decision drivers, sketches of deck layouts and information concerning the fishing gear and used and other onboard equipment. Digital data included the GPS track of the days fishing, the activity logger spreadsheet, the voice recordings of gear activity and catch records, and the video footage. It was necessary to convert this non-digitised paper records into a more useable digital format and to listen to the voice recordings and record the catch/effort data on to a spreadsheet. It was also necessary to centralise storage of all data collected. To facilitate this SeaScope developed a relational database to store the data and binary files associated with each sea trip. Due to the large size of the video files collected at sea it was not possible to store these within or linked to the database. Instead they were stored in a separate directory, backed up to a hard drive, and periodically posted to St Andrews University project managers.

This system was hosted on a cloud server and could be accessed remotely in the field, on return to the office, or whenever/wherever there was an internet connection. The software could also operate against a local copy of the database with new data uploaded in bulk to the cloud server once an internet connection became available. The cloud database was accessible in a read-only form for researchers analysing the data using various packages e.g. R.

The binary files (voice, GPS tracks), photographs of equipment and scans of documents/paperwork completed during the trip are also uploaded on to the database and linked to all the other data collected on a particular trip. Annex 5 shows some screen shots of the database data entry tables.

4 RESULTS AND DISCUSSION

Port and vessel selection

Initially the list of ports that vessels were recruited from was adequate as it theoretically provided enough vessels to satisfy the 105 trips and 30 repeat trips. However, throughout the project it became apparent that more ports and vessels would need to be added as some vessels were unavailable for sampling and the options for the observers to get to sea became limited. This also meant extending into other port regions in addition to the original 5 chosen, with 1 extra region being added.

The reasons that vessels could not be sampled when contacted by the observer included: -

- Broken down
- Would not answer or return calls
- Sunk
- Sold to a different owner or outside the sampling area
- Weather was too poor to fish or to take an extra person to sea
- Fishing was poor, so the vessel was not very active
- Paternity leave
- Holidays
- Seasonal fishing patterns

The main factors being poor weather, not returning calls and poor fishing.

In total 131 vessels were successfully recruited by the Facilitators from 6 marine areas and 55 different ports. Table 1 and the map in Figure 3 shows the spread of recruited vessels. These ranged from the Outer Hebrides in the north west to Burnmouth in the south east of Scotland. As the project progressed it became clear that some vessels were either unsuitable or had no real intention of participating. This led to 10 vessels being removed from the sample population. A further 4 vessels were recruited from ports that were not part of the targeted port areas (i.e. reserve ports), and these remained unsampled and so were removed from the vessel list.

Table 1. The regions where the vessels were recruited for sampling.

Port Region	Number of Vessels
Argyll	19
Forth and Tay	25
Moray Firth	5
North East	33
Outer Hebrides	22
West Highlands	27
Total	**131**

Figure 3. Map showing the location of each vessel recruited to the project.

Number of trips

In total the observers completed 132 trips on 117 different inshore vessels. In addition, there were 3 trips that were aborted at the last minute by the skipper, bringing the total to 135 trips in total. These cancelled trips had a cost associated with the observer turning up and the event was also recorded through data collection and were therefore legitimate trips from an accounting point of view but will not be considered further during this report.

The 135 trip target was split into winter and summer trips to allow the data collected to be analysed for any seasonal variations. To do this, 30 trips were allocated to winter and these were to be undertaken on vessels that had or would be doing a summer trip. The "Winter" season was classified as 15th November 2017 to 30th March 2018, whilst the summer season was split over two different years because of the late start to the project. "Summer 1" ran from 20th April 2017 to 14th November 2017, whilst "Summer 2" ran from 1st April 2018 to 30th June 2018 (date of end of sampling period).

Table 2 and the map in Figure 4 shows the location and season of achieved trips.

Table 2. Summary of the location and season of observed trips.

Marine Region	Number of Ports Sampled	Summer Trips	Winter Trips
North East SMR	11	27	11
Argyle SMR	7	17	6
West Highlands SMR	9	24	3
Outer Hebrides SMR	9	17	0
Forth & Tay SMR	7	17	10
Total	**43**	**102**	**30**

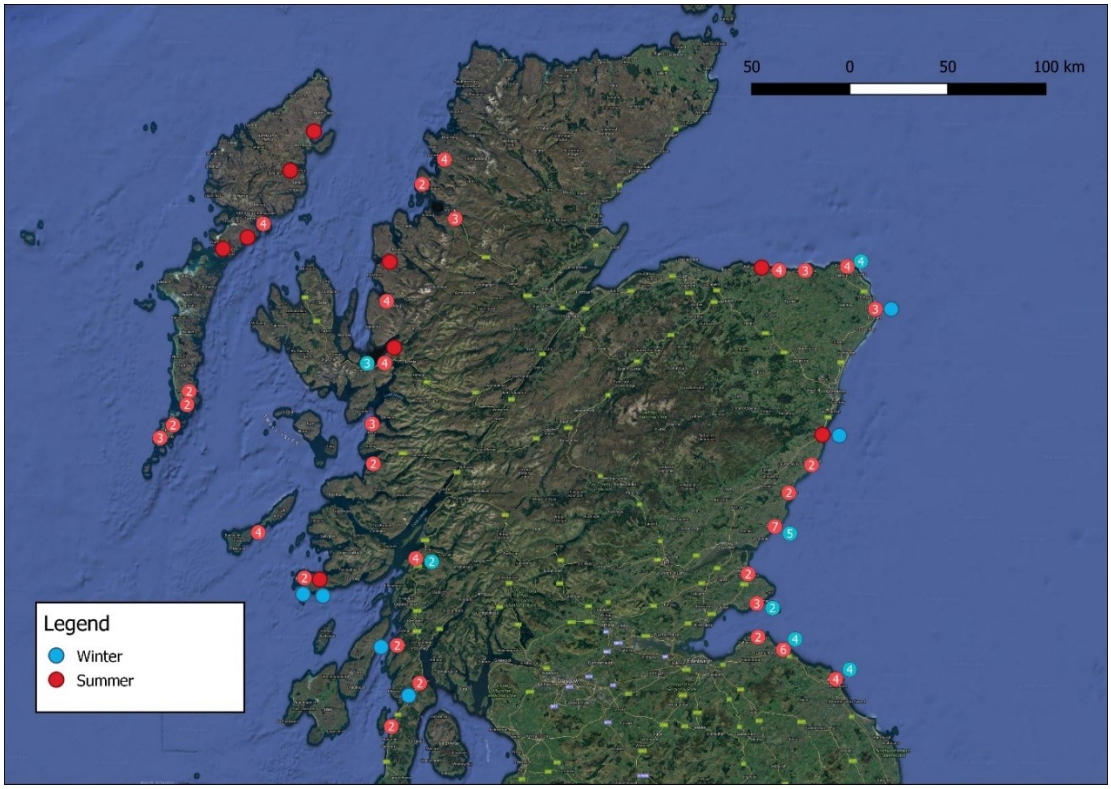


Figure 4. Map showing port of landing for the observed trips.

The winter sampling was originally limited to 30 trips spread over 3 areas but because fishing was so poor and the weather unusually inclement, a further area (West Highlands, port of Kyleakin) needed to be added and the North east area was extended to include ports on the Moray Firth coast e.g. Whitehills. A total of 33 trips were completed in the winter which included the 3 cancelled trips, so a total of 30 successfully completed winter trips. Of these trips, 26 were undertaken on vessels that had also completed a summer trip and 4 on vessels that were unavailable for summer sampling when approached. The Outer Hebrides was excluded as a winter trip area because of the likelihood of stormy weather cancelling trips and the potential logistic difficulties associated with ferry crossings and cancellations.

A total of 103 summer trips were completed over the two summer periods. These were well spread across the marine areas with at least 17 trips in each region (Outer Hebrides summer trips only). The North East region was the most heavily sampled with 27 summer trips and 11 winter trips.

Logistics, Management and Staffing Levels

SeaScope employed a dedicated observer to undertake the majority of the at sea sampling and used existing staff to supplement the sampling levels. In April 2018 an additional observer was employed to help meet the agreed targets. This resulted in 132 trips being successfully completed out of a target of 135, equating to 98% completion rate. As mentioned earlier there were also 3 trips where the trip was cancelled on the dockside and these were also classified as trips, as the sipper could be interviewed at the time as to why the trip was being cancelled.

However, there were also other cancellations and postponements that occurred the day (or a couple of days) before a trip which had an impact on the observers plans. These changes in the sampling plans was not unexpected and during the planning of this project it was predicted that there would likely be a further 2 land-based days associated with every successful day spent at sea. This would include data entry, data processing and transcription, equipment preparation, booking/finding accommodation and travelling between ports. Originally a total of 315 observer days were allocated to this project to achieve the original 105 sea days target and when the target was increased to 135 days, it was predicted that 405 days would be required. Table 3 shows the observer staff time by region and whether it was "at-sea" or "land-based" staff time. A total of 402.1 observer staff days were used to undertake the 132 successful trips, this equates to 3.05 days per seaday. It should also be noted that a sea-day could often be in excess of 12 hours long and therefore can incur overtime costs, whereas a land-based day was limited to 8 hours.

Table 3. The number of staff days required to fulfil the number of sea days completed.

Marine Region	Sea Days	Shore Days	Total
Forth & Tay SMR	27	49.33	76.33
West Highland	27	53.85	80.85
Argyll SMR	23	50.27	73.27
Outer Hebrides SMR	17	46.39	63.39
North East and Moray Firth	38	70.26	108.26
Total	**132**	**270.1**	**402.1**

Safety Incidents

Working on commercial fishing vessels can be a dangerous activity and staff safety should always be treated as a priority task. During normal daily operations mechanical faults can develop or injuries and accidents can occur. Observers are asked to log these events to help improve safety at sea from lessons learned, or to help prepare staff in what to expect. It is also a good way to for assessing how often these types of events occur.

The following are examples of potential risk and safety incidents that occurred during the project.

- Breakdowns: engine failed on 1 vessel and it was towed in by another nearby fishing boat; the winch failed whilst at sea and fishing was abandoned for the day.
- Fouling: ropes and other items got caught in the propeller on fishing trips on 2 different vessels.
- Collisions: a non-project vessel collided with the marker buoy of our observer's vessel whilst gear was being hauled during a trip.
- Sinking: whilst arranging a trip with a skipper it transpired that his vessel had recently sunk whilst in harbour and was currently being repaired;
- Industry intelligence; whilst arranging a trip with one vessel the observer was advised to avoid sailing on a different vessel due to their poor local reputation.

Although the majority of these incidents were minor, they can easily escalate if not addressed correctly at the time by the skipper and crew. Mitigation measures cannot easily be put in place for these unexpected events, but risk to staff can be reduced by training observers to recognise poorly maintained vessels and through communication with the local industry and its representative organisations, during vessel recruitment. This helps ensure that only the more professional vessels are involved in the projects. Having vessels participate in the project

on a voluntary basis also helps in a similar way, but only if there is not undue pressure to recruit more vessels.

5 CONCLUSIONS

Undertaking a project that involves at sea sampling on board commercial vessels that are participating on a voluntary vessel with no monetary reward, can be a challenging process. Success of a project relies on good communication skills and building a relationship based on mutual respect and an understanding of the difficulties faced by industry and their working environment, as well as effective communication of the project aims and how these may benefit the industry. This process begins at the very first contact. Having effective facilitators involved in the process allows the fishing industry to be included in the development of the project objectives or sampling techniques and removes the surprise or suspicion that may arise when an observer "cold calls" a skipper to arrange a sea trip.

However, the need for effective communication only begins with the facilitator. It must be continued by having a highly motivated and effective observer and team. Even though a vessel agrees to take an observer to sea, the skippers are often extremely busy people who are difficult to get in contact with. Trips need to be arranged around the weather, the fishing patterns, transport options and the available pool of vessels and their locality. There is no point in an observer arranging a sea trip from Fraserburgh, then Tiree, then Barra all in the same working week if there is poor weather from the west and ferry times don't allow trip commitments to be met. In this case the observer would be more successful if they concentrated their efforts looking for trips on the more sheltered eastern side of Scotland. And still this relies on the fishermen answering their phones and agreeing to take the observer to sea. On top of all of this add the difficulties of finding overnight accommodation on the Scottish west coast in the height of summer, and it gives an indication of how difficult undertaking voluntary sea trips can be. To achieve 132 successfully sampled days at sea is an excellent achievement, but it should be remembered that for every day spent at sea there is a least 2 shore staff man days needed, probably more when the time spent booking accommodation and ringing round the fleet is taken into consideration. Thus, seagoing projects should not be over ambitious. The level of sampling trips and the size of the sample population to complete these trips, should be realistic and large enough to ensure that observers are not chasing the same 2 or 3 boats every week.

The question often arises, whether it should be mandatory for vessels to participate in these types of projects or whether they should remain as voluntary participants. Forcing an observer onto an unwilling boat for a scientific project, makes for a very uncomfortable environment and can lead to conflict. Instead having interested and willing industry partners involved on a voluntary basis helps ensure that the science stays focused on its primary objectives and that the industry's wealth of experience and knowledge of the stocks is willingly shared.

During the course of the project the observers collected data on vessels creeling for brown crab, lobster, velvet swimming crabs and *Nephrops*. However, it transpired that some of these vessels also undertake other activities including handlining/angling for bait fish and gurdy line fishing for small pelagic species (mackerel). Other activities that small inshore creeling vessels sometimes get involved in include angler and sightseeing trips or taking divers out either as tourists or commercial scallop diving. Other inshore boats can also undertake towed gear fishing such as scallop dredging or trawling for *Nephrops* and fish. One of the main aims of this project was to use GPS data and the patterns described by the data points to try and identify fishing effort deployment and gear types fished. Perhaps if more varied gear types could be observed in this way in the future it would allow all fishing types and effort to be identifiable by their GPS tracks alone.

6 Annexes

Annex 1

Visual Vessel Safety Checklist for Observers

Emergency equipment & arrangements

- **Lifebuoys** - *accessible; lines secured and neatly coiled;*
- **EPIRB** - *in float free location; hydrostatic release and battery in date*
- **Life raft(s)** - *both the raft and the hydrostatic release to be in date; sufficient capacity; and fastened down correctly*
- **Escape hatches** - *clear, uncluttered, easy to open, signage*
- **Life jackets** - *good condition; freely accessible*
- **Flares** - *probably in a locker in the wheelhouse (ask skipper in context of emergency procedures)*
- **Radios** - *SSB and VHF; DSC function*
- **Compass**
- **Firefighting equipment** - *all types of extinguisher in date and accessible; fire blanket in galley (and engine room)*
- **Alarms** - *fire; bilge; watch alarm*
- **Ship's Arrangements -** *what to do in the case of fire, man-over-board, order to abandon ship (ask the skipper)*

Vessel Condition

- **Running gear** – *blocks, rollers, wires – look for excessive wear; look for evidence of good management, e.g. grease, blocks numbered or lettered*
- **Decks –** *cleaned; clear; lines coiled; equipment well stowed and secured*
- **Hatches & Doors –** *unobstructed; can close properly*
- **Scuppers** – *water on deck can flow freely overboard*
- **Stability –** *not listing unduly*
- **Navigation lights and shapes**
- **Space –** *somewhere to rest; observer's sea-going kit; room for sampling work*
- **Hygiene -** *washing facilities; galley and mess areas reasonably clean*

Annex 2a

Participant Information Sheet

Project Title

Scottish Inshore Fisheries Integrated Data System (SIFIDS) Project - Work Packages 5 and 8

What is the study about? (Yellow highlights the study you are participating in)

We invite you to participate in a research project aimed at improving methods of data collection within Scotland's commercial inshore fisheries (i.e. vessels of 12m or less fishing out to the 12nm limit). Among the potential benefits to industry, the project aims to generate evidence-based data that can be used within the scope of marine spatial planning and investigate ways of improving collection of data using industry-derived data. The project also seeks to identify useful anecdotal information and investigate ways of recording the experience of fishermen in a standardised format so that these data can contribute to fisheries management and marine planning.

This will involve engagement (through one to one semi-structured interviews and workshops) with a sample of inshore fishermen to gain feedback on what information they regard as being useful / worthy of collection. The participants will also be asked their views/opinions on various methods for collecting and categorising these data. In addition to this, researchers will accompany fishermen on board 105 vessels while they are undertaking their normal fishing activities. During these trips the observers will record details on vessel characteristics (deck layout, equipment, how gear is stored, deployed and recovered, and crew complement/roles) and activity (GPS data, fishing tasks performed, catch processing). Further to this will be a survey of the factors that influence the skipper decisions on when, where and how to fish.

The information collected will be used, in conjunction with vessel tracking data (GPS) to develop fishing activity "fingerprints" through behavioural modelling. These will then be utilised for the remote, automated detection of types of fishing activity from future tracking data using a specified set of vessel behaviour parameters (movement patterns and changes in course and speed). The information collected on vessel operational characteristics and the drivers informing decision making of a skipper will be used to develop robust behavioural models capable of inferring and predicting fishing behaviour for the purposes of exploring the potential effects of a variety of management, business and marine planning scenarios.

This study is being conducted as part of an EMFF funded project, by Drs Mark James, Tania Mendo, Sophie Smout and Simon Northridge of the School of Biology. Some of the anecdotal interviews will be performed by the Project's appointed Facilitators (Dr Kyla Orr, Alison McKnight and Kathryn Logan) as well as (Dr Suzi Billings from SAMS Research Services Ltd. and Dr Andrew Parker, Shannon Anderson and Emily Thomson from Imani Development Ltd). The vessel characteristics and fishing drivers survey will be undertaken by on board researchers from SeaScope Fisheries Research Ltd.

Do I have to take Part?

This information sheet has been written to help you decide if you would like to take part. It is up to you and you alone whether or not you wish to participate. If you do decide to take part you will be free to withdraw from the study at any time without providing a reason.

What would I be required to do?

This will vary depending on which part(s) of the study you choose to take part in. The anecdotal/experiential study will involve as a minimum a 30 minute interview with one of the project team and/or attendance of a group workshop lasting 1-2 hours.

Regarding the vessel characteristics and fishing drivers survey skippers of specific vessels will be approached and asked to participate. The vessels in question will form part of a sample that is representative of the majority of the 12m and under inshore fleet. If you agree to take part the study will involve a researcher spending a day (a single fishing trip) on board your vessel during the summer (and if fishing year round possibly a second day during the winter). The researcher will not interfere in the normal operation of your vessel and will record information on the fishing activity taking place (this will include GPS data and potentially video and still photography). In addition to this the researcher will also ask questions designed to gather information on the factors influencing the decisions you, as skipper, make in terms of the fishing taking place. (Most of these questions will not be asked whilst fishing but during quiet periods such as when in harbour or whilst steaming)

Will my participation be Anonymous and Confidential?

Only project researchers will have access to the raw data which will be kept confidential. The data collected will only be made available in reports or publications in aggregated or anonymised form. Your permission will be sought in the Participant Consent form for the data you provide, which will be coded*, to be used for future scholarly purposes.

*'Coded Data' refers to when data collected by the researcher is identifiable as belonging to a particular participant but is kept with personal identifiers removed.

Storage and Destruction of Data Collected

The data collected will be only be accessed in its raw form by the researchers involved in this study, unless explicit consent for wider access is given by means of the consent form. Your data will be stored for a period of at least 5 years before being destroyed*, i.e. in (1) coded format on the University computer system (2) in the case of hardcopy in a locked storage cupboard.

*Unless secondary data permission has been indicated on the consent form. In the case of electronic data destruction will involve the permanent deletion (overwriting) of files using Eraser© software, while any hard copy records will be cross-cut shredded.

What will happen to the results of the research study?

The results will be finalised by February 2019 and written up as part of the final reports* for the SIFIDS Project. These reports will be made publicly available after the conclusion of the overall project (likely June 2019). Also, it is the intent of the research team that wherever possible outputs from the project will be submitted for publication (with funder permission) as peer reviewed journal articles.

* For Work Packages 5 and 8

Are there any potential risks to taking part?

We do not regard there as being any personal, emotional or financial risks to taking part in these studies. Very limited personal information will be recorded (name, DOB and contact details) to be used by the project team for identification purposes. If these data is utilised at any point it will only be in aggregate form (e.g. participant age demographics). In cases where video/images may be taken during vessel surveys, specific permission (by means of the consent form) will be sort from the participants involved.

Questions

You will have the opportunity to ask any questions in relation to this project before filling in the Consent Form.

Consent and Approval

This research proposal has been scrutinised and been granted Ethical Approval through the University of St Andrews ethical approval process.

What should I do if I have concerns about this study?

A full outline of the procedures governed by the University Teaching and Research Ethical Committee is available at http://www.st-andrews.ac.uk/utrec/guidelinespolicies/complaints/

Contact Details

If you have any queries regarding the study, please contacts the SIFIDS Project Facilitators Kyla Orr and Kathryn Logan using the Freephone number **0800 043 3474**

Or via email at marineconsulting@kylaorr.com

Annex 2b

SeaScope Fisheries Research
Independent Marine Consultants

At-sea Researchers:

Seascope Fisheries Research Ltd have been contracted by the University of St Andrews to provide sea-going researchers to accompany commercial fishing vessels on fishing trips as part of the EMFF Scottish Inshore Fisheries Integrated Data System (SIFIDS) Project to identifying fishing activities and their associated drivers.

All Seascope staff are experienced sea-goers, with a range of experience aboard both commercial fishing vessels and research vessels. Staff deployed on sea-trips will, as a minimum, have completed all required health and safety training prior to deployment. This includes;

- Personal Survival Techniques
- Elementary First Aid
- Fire Prevention and Fire Fighting
- Personal Safety and Social Responsibility

as per the requirements of STCW 2010 (Manila amendment). All Seascope researchers will also hold a valid Seafarers Medical Certificate (ENG 1).
Furthermore, Seascope Fisheries Research Ltd acknowledges that it is liable for the acts and omissions of its employees whilst they are acting in the course of their employment at sea, and has appropriate insurance coverage in place, including;

- Public Liability £5 000 000
- Marine Liability £5 000 000
- Employers Liability £10 000 000
- Professional Indemnity £1 000 000

All Seascope researchers are required to carry their appropriate Personal Protection Equipment to undertake their duties. Inflatable life jackets must be worn by Seascope staff on exposed / uncovered decks at all times. Seascope Researchers are not trained in any aspect of fisheries legislation or regulation.

House-Keeping:

Whilst on board the vessel, Seascope staff acknowledge that they are onboard as invited guests and they will conduct themselves accordingly.

Communication and Feedback:

Should the Master wish to provide feedback on any other aspect of the Seascope researchers conduct, or on any aspect of the SIFIDS WP8 project, they may also contact the Seascope Project Manager at any time.

Seascope Contact Details: Skippers will be contacted directly by Seascope staff to arrange a sea-trip at a time and date that is most suitable. Should you need to change any arrangements please contact SeaScope direct:

Grant Course	Guy Pasco
Project Manager	Field and Technical Research (Sea-Trips)
Tel: 01461 700309	
Mob: 07880 362092	07880 362082
Email: grant@seascopefisheries.co.uk	guy@seascopefisheries.co.uk

Annex 2c

Participant Consent Form Coded Data

Project Title

Scottish Inshore Fisheries Integrated Data System (SIFIDS) Project - Work Packages 5 and 8.

This research project aims to improve methods of data collection within Scotland's commercial inshore fisheries.

Researchers

Dr Tania Mendo

Dr Mark James

Dr Sophie Smout

Dr Simon Northridge

The University of St Andrews attaches high priority to the ethical conduct of research. We therefore ask you to consider the following points before signing this form. Your signature confirms that you are happy to participate in the study.

What is Coded Data?

The term 'Coded Data' refers to when data collected by the researcher is identifiable as belonging to a particular participant but is kept with personal identifiers removed. The researcher(s) retain a 'key' to the coded data which allows individual participants to be re-connected with their data at a later date. The un-coded data is kept confidential to the researchers. If consent it given to archive data (see consent section of form) the participant may be contacted in the future by the original researchers or other researchers.

Consent

The purpose of this form is to ensure that you are willing to take part in this study and to let you understand what it entails. Signing this form does not commit you to anything you do not wish to do and you are free to withdraw at any stage.

Material gathered during this research will be coded and kept confidentially by the researchers with only the research team having access. It will be securely stored; in (1) electronic form (coded format) on the University computer system; (2) in the case of hardcopy in a locked storage cupboard.

Please answer each statement concerning the collection and use of the research data.

I have read and understood the participant information sheet.	Yes	No
I have been given the opportunity to ask questions about the study.	Yes	No
I have had my questions answered satisfactorily.	Yes	No
I understand that I can withdraw from the study at any time without having to give an	Yes	No

explanation.

I understand that my data will be confidential and that it will contain identifiable personal data but that will be stored with personal identifiers removed by the researchers and that only the project researchers will be able to decode this information as and when necessary. Yes No

Secondary Data Permission/Decline

I agree to my data (in line with conditions outlined above) being kept by the researchers and being archived for potential use in further research projects / by other bona fide researchers. I understand that this may allow other researchers to de-code the data and identify me Yes No

I have been made fully aware of the potential risks associated with this research and am satisfied with the information provided Yes No

I agree to take part in the study Yes No

Photographic Images and Video

Part of our research may involve taking photographic images and video. These images / recordings will be kept secure and stored with no identifying factors i.e. consent forms and questionnaires.

Photographs and recorded data can be valuable resources for future studies therefore we ask for your additional consent to maintain data and images for this purpose.

I agree to have my photo taken / to being videoed ☐ Yes ☐ No

I agree for my photo and video recorded material to be published as part of this research ☐ Yes ☐ No

I agree for my photos and video recorded material to be used in future studies ☐ Yes ☐ No

Participation in this research is completely voluntary and your consent is required before you can participate in this research. If you decide at a later date that data should be destroyed, we will honour your request in writing.

Name in Block Capitals _____

Signature _____

Date _____

Annex 2d

SIFIDS
Scottish Inshore Fisheries Integrated Data System

SIFIDS Project Participant Consent

I wish to participate in the research conducted under the EMFF SIFIDS Project and as such agree to allow a member of the project team on board my vessel (while fishing) for the purposes of collecting data on fishing activity and the factors influencing skipper decision making.

Name: ……
Date: ……
Signature: ……..
Email: …….
Tel: ……

FISH1/ logbook Data Access Consent

Vessel name:

PLN:

I, ……. the fishing license holder agree that Marine Scotland

Compliance may release the data submitted via the FISH1 form or logbook for the above stated vessel to researchers at the University of St Andrews for the purposes of research under the EMFF SIFIDS Project The information provided will span the period 1st December 2016 to 31st May 2019 (the duration of the SIFIDS Project).

SIFIDS
Scottish Inshore Fisheries
Integrated Data System

Only for skippers who participated in the 2016 Marine Scotland Creel Effort Mapping Survey*

Marine Scotland Creel Effort Mapping Survey Data Access Consent

Access to your survey data is sought to prevent the SIFIDS Project from requesting from skipper's information that has been collected previously. However, in order for Marine Scotland to share the information collected during the creel effort mapping survey your consent is required.

If at any time you wish to withdraw your consent you may do so by contacting the Project Facilitators using the Freephone number 0800 043 3474.

Vessel name: ……
PLN: ……

I, the fishing license holder agree that Marine Scotland may share the data submitted during the Creel Effort Mapping Survey for the above stated vessel with researchers at the University of St Andrews for the purposes of research under the EMFF SIFIDS Project.

Name: ……

Signature: ……..……

Date: ……

***About the MS creel survey**: In 2016 Marine Scotland conducted surveys on static gear fishing activity around the Scottish mainland from the Ullapool and Oban areas on the west coast, and the North East, Fife and Borders areas on the east coast. Skippers were interviewed on their effort and location of gear on fishing grounds (mapped using GIS). In addition, they were asked to describe their main concerns for the local static gear sector, and give their opinions/ideas for potential management approaches (e.g. closed areas, creel limits, permits schemes).

The SIFIDS Project would like access to this Marine Scotland creel survey data to validate some of the research being conducted under SIFIDS, and also to prevent the work being duplicated again (i.e. to avoid asking skippers the same questions again).

Annex 3

**********TRIP-SPECIFIC DETAILS**********

Date: Home port:

Trip ID: Vessel name: Vessel PLN:

Port out: Port in:

# crew members today including skipper	Experience fishing (years)

Fisher arrived as agreed? Yes/No Going to sea? Yes/No If no, why?

List main target species of this trip? Total number of creels in water?

Type of hauler? Deck tank?: Y/N Size of deck tank?

"Behaviours"*	Time
Trip start (time when vessel starts engine)	
Trip end (time when vessel returns to port –docking time):	
Final engine off time (time when engine is turned off):	
Working day end (time when fisher leaves the vessel):	

*Any other vessel activities? Bait fishing? fuelling? Manoeuvring to find pots; anchor or drift for periods for breaks or to lay up whilst awaiting tide to rise or turn? Please record the time.

Retained catch by marketable species:

Species name	Numbers	Weight (kg)/#bins?	Retained or landed?

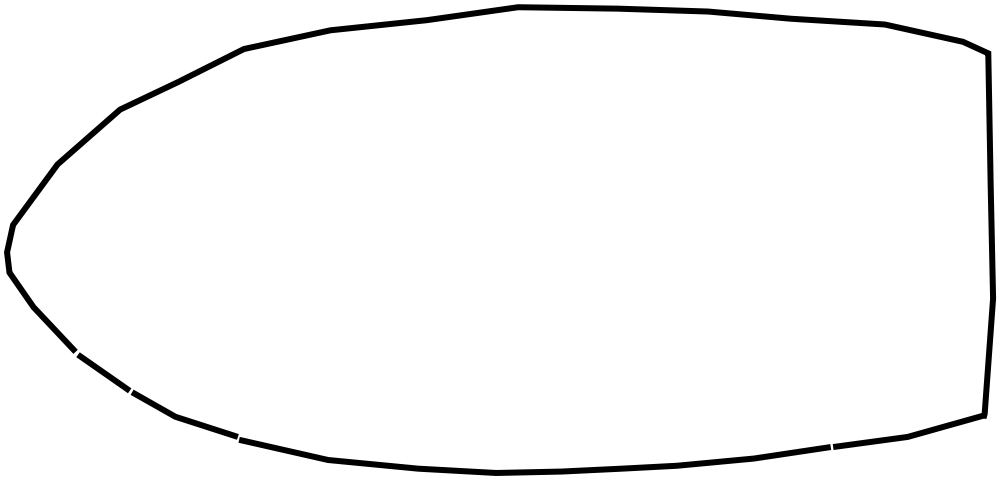
Notes: Catch stored in keep pots (by species - GPS location)
Notes on any birds, mammals, turtles, and unusual fish observed during this fishing trip. Record the time. Also, note if there is any destruction of pots by seals. Record the time.

Annex 4

**********VESSEL CHARACTERISTICS**********

Trip ID: ☐ Vessel name: Vessel PLN:

Please provide a diagram depicting the main working components and arrangements of boat (hauling area, working table, creel platform,). Provide rough measurements of working table and operating areas



Photos of (remember to use ruler provided as scale). Tick box if photo was taken.

Hauling area ☐ Plan view ☐ Wide angle view ☐

Back of vessel to front ☐ Front of vessel to back ☐

Which other equipment (sonar, GPS, echo-sounder, etc) is present in vessel?

**********FISHER SPECIFIC INFORMATION – IDENTIFYING DRIVERS**********

Trip ID: ☐ Vessel name: Vessel PLN:

1) **What would have stopped you going to sea today?**

Importance **(order from most important to least)**	Driver or reason	Likelihood of happening **(1-5)** ***1= almost impossible*** ***5= very likely***	Extra comments (can you identify thresholds?)

2) **How do you pick where to place creels? (list the 5 most important factors)**

Importance **(order from most important to least)**	Driver or reason	Extra comments (can you identify thresholds?)

Question 3: is there anything else that has influenced your choice of where to go today?

**********HAUL-SPECIFIC DETAILS**********

Trip ID

Haul ID	Soak time	Water depth	Wind direction	Sea state	Ground-rope (length/material/diameter)	Up-rope (length/material/diameter)	Length-rope (length/material/diameter)	Distance between creels	Weak links?	Creel identifier
001										
002										
003										
004										
005										
006										
007										
008										
009										
010										
011										
012										
013										
014										
015										
016										
017										
018										
019										
020										
021										
022										
023										

Creel used in this trip – take pictures of each type of creels

Creel identifier	Creel type	Size	Opening size	Soft-hard eye	Top/side entry	Escape vents	Mesh size	Bait used	Other characteristics?	Pictures taken?
A										
B										
C										
D										

WP2B Phase 2: Supplementary survey information

1. Equipment on board. Please supply as much information as possible on plotters, depth sounders etc. Where possible include make/model number.

Equipment type	Make	Model number

2. Vessels power supply. Please note supply voltages available onboard, e.g. 12-volt DC

3. Potential data transfer methods. Please ask skipper if any wi-fi networks are available at their normal berth in harbour. Also note network strength etc for phone signal, and providers if possible

4. If no wi-fi, would skipper be prepared/willing to collect data from SIFIDS technology via a USB stick (provided) and upload from home periodically?

5. On vessel layout sketch, please include location, number and type of storage containers used (e.g. boxes, keep pots, Nephrops tubes) to store catch during the days fishing operations. Take photos, showing their position relative to main sorting area.
6. Is any additional processing of catch (e.g. nicking crabs, banding lobsters) conducted on this vessel/trip? If yes, please note location of secondary catch processing on vessel layout diagram. Please also note which species/grades/ sex are subject to secondary processing.

Secondary processing			
SPECIEs	SEX	GRADE	PROCESS

7. If possible, try to record a short segment of video showing normal catch sorting area, where retained catch is stored, and discarding practice. If vessel does nick/band catch, a short video of this process, and the area it is performed in should also be collected.
8. Is vessel suitable for further engagement/participation in WP2A/WP

General notes for on-board observers:
Note: Start GPS recording device as soon as you are on vessel! Place GPS inside the Cabin (if feasible), making sure that there is good satellite coverage. The GPS should be placed at the midline of the vessel (prow-stern orientation and should be secured to prevent it from moving.

All times to be recorded at the nearest second!

TRIP SPECIFIC DETAILS

- Researcher's name: Please write down your full name
- Date: Format dd/mm/yyyy
- Trip ID: Observer's initials followed by the trip number (e.g. Guy Pasco's first trip : GP – 001)
- Vessel name: Record vessel's name
- Vessel PLN: Record vessel's PLN
- Crew members: Write down number of crew members including skipper.
- Fishing experience. For each crew member record the total number of years fishing (either creeling or other fishing gears)
- Fisher arrived as agreed? Yes or No answer. (A date and time was set and when arriving at port the fisher was there as planned).
- Going to sea? If fisher arrived as agreed, are you going to sea yes or no.
- If no then please list the reasons behind the change of mind. – Also proceed to complete the Fisher specific information – identifying drivers form (WP8), as well as all other possible information that can be collected without going on a trip (e.g. Trip specific details form, data for WP2, etc).
- Port out/port in: Please record the name of the port
- Main target species in this trip? What are the main species targeted in this trip (for which the creels/pots are being set in that day)
- Type of hauler? electric/hydraulic – size Power?
- Deck tank/vivier tank: Does the vessel have a built-in deck tank? Or a bin/tank that works like one?
- Size of deck tank? Please give rough dimension of deck tank
- Working day start: Is the time to the nearest minute when a fisher goes on board of vessel
- Trip start: is the time to the nearest minute when the fisher starts engine.
- Engine off times during trip (time when engine is turned off):is the time when the vessel engine is turned off during the trip – not during hauling operations
- Trip end (time when vessel returns to port –docking time)
- Engine off time: Time to nearest minute when the engine is turned off.
- Working day end (time when fisher leaves the vessel):
- Trip end: is the time to the nearest minute when the fisher returns to port and stops engine
- Work day end: Is the time to the nearest minute when fisher leaves the vessel
- Retained catch by marketable species: Specify for each one of these: lobster, crabs, velvet crabs, prawns (*Nephrops*) and any other marketable catch the numbers and/or weight of catch. If the number of boxes or bins are given, then please provide a description of what each box/bin means in terms of quantity or weight
- Notes: Catch stored in keep pots? Was the catch stored in keep-pots or landed?
- Any other vessel activities? Bait fishing? manoeuvring to find pots; anchor or drift for periods for breaks or to lay up whilst awaiting tide to rise or turn? Please record the time. We need to be able to look at the track and know if there was something different happening at the time- please write time start time end for each different behaviour recorded.

HAUL-SPECIFIC DETAILS

- Trip ID: Observer's initials followed by the trip number (e.g. Guy Pasco's first trip: GP – 001)
- Haul ID: Trip ID followed by the haul number (e.g. Guy Pasco's first trip, second haul: GP – 001-02)
- Start time: is the time to the nearest second when the buoy rope is being pulled by winch/hauler.
- End time: is the time to the nearest second when the final end of the rope is pulled by winch/hauler.
- Soak time: In hours or nearest possible time estimate of how many hours the fleet was submerged.
- Sea state: Use the Beaufort scale to describe sea state (attached)
- Wind direction: E.g. North, East, West, Northwest, etc.
- Number of creels per fleet: Number of creels/pots used in that particular fleet
- Bottom type: Ask the skipper about the bottom substrate (e.g. rocky, sandy, muddy, shingle)
- Water depth: record depth either from sonar or ask for rough estimate if not available

<u>Ropes used:</u>

- Ground rope is the rope from one anchor to the other (metres). Please record its length, material and diameter – rough estimates of length are fine.
- Up rope/tailing is the rope length from anchor to buoy (metres) – rough estimate of length is fine
- Legs/strops is the average distance from creel to ground rope (metres). Rough estimate is fine.
- Weak links: Are there any weak links that will break if a pressure over XX is applied to avoid entanglement with marine mammals or sharks?

<u>Creel types used in this fleet:</u>

- Type: E.g. parlour, no parlour, inkwell pot, *Nephrops* creel
- Size: Record creel size – inches? volume?
- Numbers: total number of each type of creel
- Opening size: rough estimates of opening sizes
- Soft/hard eye: Hard eye has the apex of the entrance funnel held open with a plastic ring attached to the netting, held in place by twine strops. The soft eye has an entrance entirely made from netting.
- Top /side entry: Where on the pots are the entries for lobsters – at the top or at the sides?
- Escape vents: are any escape vents/ grids present?
- Mesh size: Record mesh size (mm?) of netting around creel
- Bait used: Predominant bait used for each type of creel
- Other descriptors: Any other descriptors you make think are relevant to describe the gear.

<u>Re-deployment of this fleet?</u> If the same fleet hauled is being redeployed, please record the:

- Time start deploying: is the time to the nearest second when 1st buoy is thrown into water?
- Time end deploying: is the time to the nearest second when buoy lands on water.
- Number of creels shot back: total number of creels that when back in the water.
- Include notes filed – add anything of note – especially sightings of marine mammals etc, seal damage, whales nearby. Destruction of pots by seals: Please make notes on any evidence of destruction of pots by seals – count numbers of creels. Take pictures

CATCH DETAILS

- Trip ID: Observer's initials followed by the trip number (e.g. Guy Pasco's first trip : GP – 001)
- Haul ID: Trip ID followed by the haul number (e.g. Guy Pasco's first trip, second haul : GP – 001-02)
- Creel ID: 1,2,3,4,5, etc…
- Type of creel? E.g. parlour, no parlour, inkwell pot, *Nephrops* creel
- Escape vents? are any escape vents/ grids present at a creel level

Lobsters:

- Retained lobsters (#) Number of lobsters (European lobster, *Homarus gammarus*) per creel
- Discarded lobsters (#) Number of lobsters not retained

Brown crabs:

- Retained crabs (#) Number of crabs (edible crabs, *Cancer pagurus*) per creel
- Discarded crabs (#) Number of crabs not retained

Velvet crabs:

- Retained crabs (#) Number of crabs (velvet crabs, *Necora puber*) per creel
- Discarded crabs (#) Number of crabs not retained

- Prawns (#): Numbers? Or weight?
- Whelk *(#)*: Number of whelks in each creel
- Wrasse: Number of wrasse in each creel – please specify with an R if they were retained
- Cod: Number of cod in each creel – please specify with an R if they were retained
- Squid eggs: Please specify the number of egg batches in each creel.
- Complete the other fields with other species caught, e.g. coalfish, sea scorpion, shore crabs, ling, spider crab, etc??
- Any diseased animals: please specify if any of the lobsters or crabs showed signs of disease (e.g. shell necrosis/carapace lesions) – and if so please ask skipper if he has further information on this.

VESSEL CHARACTERISTICS WP2

Some characteristics for WP2 to record:

- Trip ID:
- Vessel name: Record vessel's name
- Vessel PLN: Record vessel's PLN
- Diagram of boat?
- Remember to take photos of different areas of the boat (hauling area, plan view, wide angle view, back of vessel to front, front of vessel to back
- Record which other equipment is present on boat (GPS, radio, echo-sounder).

FISHER SPECIFIC INFORMATION – IDENTIFYING DRIVERS

- Trip ID:
- Vessel name: Record vessel's name
- Vessel PLN: Record vessel's PLN

An example of possible drivers is presented in Figure 1. Please avoid giving examples of possible drivers unless you are really struggling to get information from fishers!

Fig. 1 List of possible drivers affecting their decision to fish in a particular day.

Question 1: **What would have stopped you going to sea today? (list the 5 most important factors)** With this question we want to capture information about which sort of factors would have stopped them from going to sea. **If the trip is cancelled on the day, please also take the opportunity to complete this question.**

Question 2**: How did you pick your destination today? (list the 5 most important factors)?** This question aims to determine why the skipper chose going to a particular area – was it any of the listed drivers or was the area picked based on a rotational system to pick up creels?

For each of the drivers mentioned, please specify:

- Their importance, e.g. which drivers have a greater impact on your decision to go to sea today?
- The likelihood of it happening, e.g. does it occur very frequently? Use a scale from 1 – 5 where 1=almost impossible, 2=highly unlikely, 3 = same chance of happening as not happening, 4=likely to occur; 5 = very likely to occur)
- Thresholds, e.g. if swell greater than 2 metres will not go out fishing, or if fishing for 4 days that week won't go fishing an extra day; or I don't fish on a Friday?

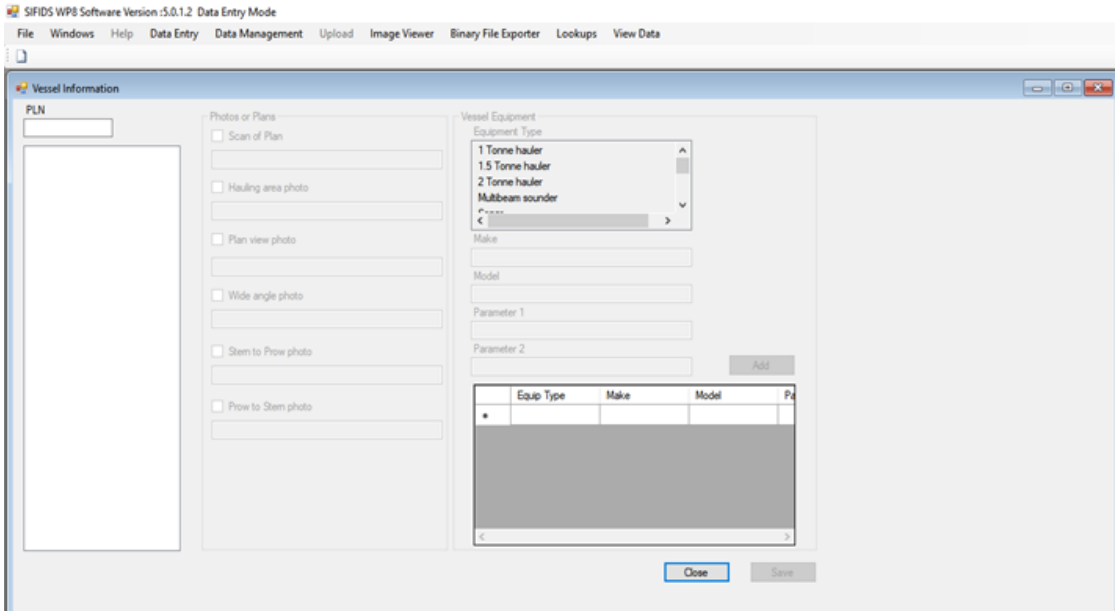
Beaufort wind force scale

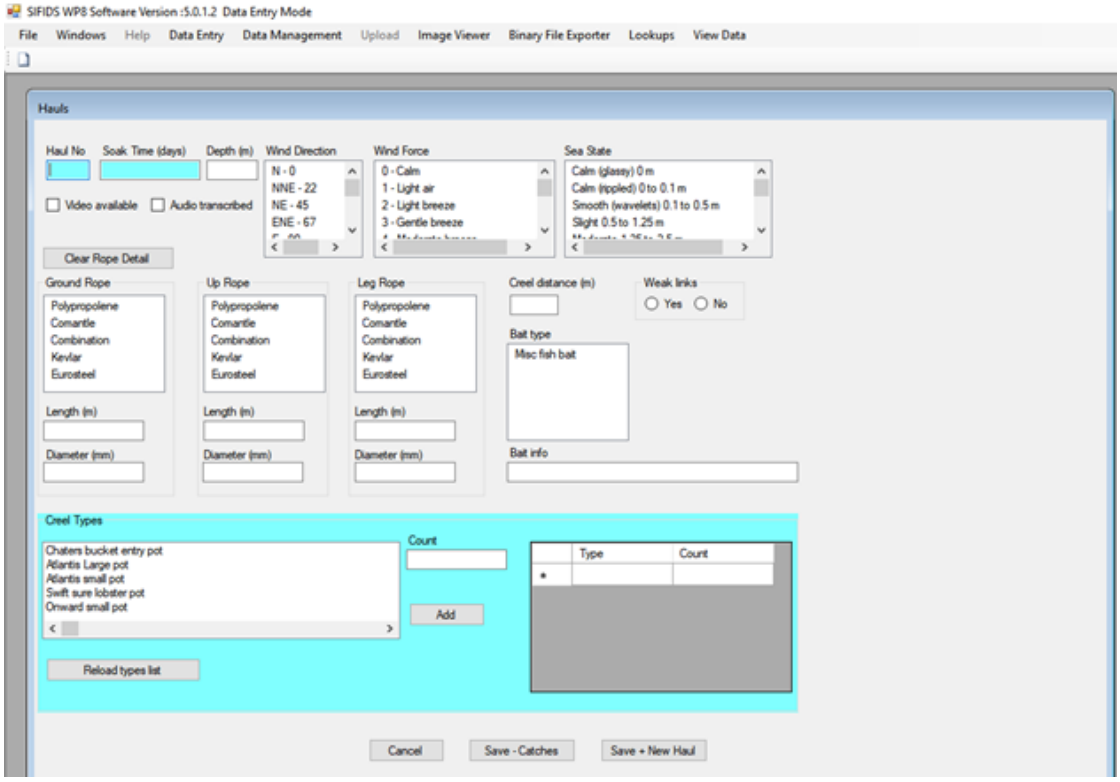
The Beaufort scale, which is used in Met Office marine forecasts, is an empirical measure for describing wind intensity based on observed sea conditions.

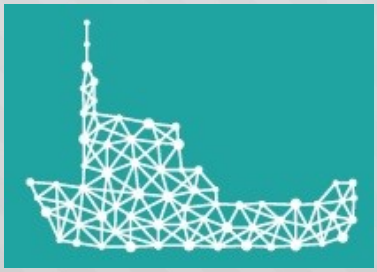
Specifications and equivalent speeds

Beaufort wind scale	Mean Wind Speed		Limits of wind speed		Wind descriptive terms	Probable wave height	Probable maximum wave height	Seastate	Sea descriptive terms
	Knots	ms^{-1}	Knots	ms^{-1}		in metres*	in metres*		
0	0	0	<1	<1	Calm	-	-	0	Calm (glassy)
1	2	1	1-3	1-2	Light air	0.1	0.1	1	Calm (rippled)
2	5	3	4-6	2-3	Light breeze	0.2	0.3	2	Smooth (wavelets)
3	9	5	7-10	4-5	Gentle breeze	0.6	1.0	3	Slight
4	13	7	11-16	6-8	Moderate breeze	1.0	1.5	3-4	Slight - Moderate
5	19	10	17-21	9-11	Fresh breeze	2.0	2.5	4	Moderate
6	24	12	22-27	11-14	Strong breeze	3.0	4.0	5	Rough
7	30	15	28-33	14-17	Near gale	4.0	5.5	5-6	Rough-Very rough
8	37	19	34-40	17-21	Gale	5.5	7.5	6-7	Very rough - High
9	44	23	41-47	21-24	Strong gale*	7.0	10.0	7	High
10	52	27	48-55	25-28	Storm	9.0	12.5	8	Very High
11	60	31	56-63	29-32	Violent storm	11.5	16.0	8	Very High
12	-		64+	33+	Hurricane	14+	-	9	Phenomenal

Annex 5
Some examples of the data inputting tables developed as part of the Observer database.







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