Paper 1 WCRIFG Management Committee Meeting 27 March 2109

West coast scallop fishery mapping exercise

Framing the problem

Scallop fisheries are the third most valuable fishery in terms of first sale value of landed product in the UK. Scallop fisheries comprise both king and queen scallops, the former being the dominant target species. The fleet is comprised of a combination of inshore and offshore dredge vessels, otter trawl vessels (for queen scallops), and a hand diving component.

The current challenges facing the scallop industry include (but are not limited to):

- a lack of fishery independent data in some regions, poor resolution of industry data,
- inter and intra sectoral conflict over the spatial use of different areas of the sea,
- variable seabed impacts that are particularly problematic in areas of conservation importance or for long-lived species,
- the occurrence of illegal fishing in MPAs,
- a lack of vessel monitoring systems for the inshore fleet,
- low poll frequency for the VMS systems on >12 m vessels.

The west coast of Scotland is dominated by inshore fisheries, for which data are limited. Gear conflict is an acknowledged issue of concern, as is the footprint of the fishery, which can cause damage to areas of conservation concern. The latter may be 'legal' but undesirable, or is illegal if the fishing activity occurs inside statutory protected areas such that the protected features are negatively impacted. Establishing the footprint of the current and past scallop fishery is important given the existence of over-capacity and latent effort in the fleet. The proposed project aims to develop an evidence-base that would usefully inform management approaches that might aim to minimize conflict, reduce or eradicate illegal fishing, and manage the footprint of the fishery such that it fosters seabed recovery and does not lead

There are three categories of interaction between scallop fishing (or other bottom tending gear) and the seabed:

1. Interactions with the seabed that lead to changes in the seabed community structure, but where the biota and habitat are resilient to disturbance these activities may be within the tolerance limits of the natural environment.

2. Interactions with habitats or with species that are less resilient to disturbance, but that are not within statutory protected areas. Such interactions are undesirable and may occur due to a lack of knowledge about their existence leading to long-term changes in habitat and species composition.

3. Interactions with habitats or with species that are within statutory protected areas and within which scallop dredging would not be considered compatible by the relevant authorities, such interactions would be considered illegal incursions and would lead to long-term changes in habitat and species composition.

to further degradation of seabed biological communities. The latter often provide important ecosystem services that support scallop populations through the provision of nursery and broodstock areas.

What do we need to know?

Phase 1. We need to understand which sources of spatial data exist already. A key task will be the integration of known data layers, seabed geological maps, SNH species and habitat maps, residual tidal currents, primary production, extract scallop fleet data >12 m vessels (log-books and VMS). Overlay MPAs. Mapping using VMS data for the >12 m component of the fleet is problematic given the mismatch between the polling frequency of VMS and the non-linear nature of scallop dredge tows, and would require consideration of how to deal with this source of error.

Phase 2. In a data-poor situation, fishermen's local ecological knowledge (LEK) is the most useful source of data as shown in previous studies (English Channel, Isle of Man, Wales). An industry mapping exercise would be undertaken to map the extent and social importance (frequency of use and proportion of catches derived from areas) of scallop and other fishery grounds (static and mobile sector – *Nephrops* and others). This element would include a retrospective element that viewed footprint over a longer time-scale (i.e. 20 years). Importantly, fishermen would be asked to prioritize areas in terms of their importance to their livelihood maintenance.

Phase 3. Fishermen's LEK about biological aspects of the fisheries would be ascertained, e.g. habitat type, extent, life-history parameters such as growth rates, recruitment cycles, spawning cycles. Fishermen's knowledge would be gleaned to map areas where conflict among different sectors occurs.

Phase 4. Once the data in phase 1 and 2 has been compiled, this can be used together with industry derived knowledge (phase 3), to model in a predictive manner those areas that are suitable for scallops. Model outputs can be ground-truthed by simple fieldwork (deployment of drop down video cameras from industry vessels) and industry knowledge. Predictive mapping of the potential extent of sensitive habitats (e.g. flame shell beds) and other unmapped ecosystem-services (e.g. herring spawning grounds) would be undertaken.

Phase 5. In order to ascertain the overlap between scallop fishing activities (and other sectors) with conservation features, data from Phase 1 would be supplemented with expert knowledge, mapping of areas of nature conservation importance. Areas would be prioritized in terms of their conservation importance (from an ecological perspective). Expert knowledge would be used to map areas of uncertainty, i.e. where is knowledge data deficient.

Looking beyond the PhD project

Given the information gathered through the PhD, it would be possible, if considered desirable, to engage stakeholders in a choice experiment of management approaches to balance accessibility, conflict, nature conservation needs and other issues. A choice experiment would inform more objective

and evidence based discussions about the pros and cons of different approaches to resolving the problems outlined in the introduction.

Governance

Open and transparent methodologies are essential to the success of the project, hence it is proposed to have a steering committee that includes: Fishmonger's Hall, Macduff Shellfish, SWFPA, Open Seas, Scallop Diving & Static gear representative (Alasdair Hughson), The proposal is for the data gathering and translation of the science to be undertaken by a neutral science body.

Approximate costings (subject to confirmation)

Student PhD fees £4260 per annum x 3.5yrs incremented for inflation each year (H-W fee waiver).

Student stipend £15500 per annum x 3.5yrs incremented for inflation each year (to be found).

Travel and subsistence costs: Y1 £2500, Y2 £4000, Y3 £1500, Y4 £500 (to be found).

Equipment: Go-pro cameras (underwater) and drop down frame and lights £2000 (to be found).

Prof MJ Kaiser – time (75 days over the project) (in-kind contribution).