Appendix 1 – <u>Methodology and outputs from initial assessment</u>

1.1 Criteria

Each species was initially assessed against nine criteria. Criteria for the initial assessment were chosen on the basis that the assessment could be applied to all species (i.e. there was sufficient data) and on their relevance to determining the importance of a fishery and its sustainability.

The outputs of the initial assessment are used as a starting point for consideration of the annual priorities. All fisheries within the district are considered in several different ways to provide a framework for further assessment.

Criteria used in the initial assessment are detailed below.

1. **Mean annual landed weight**

   Annual landed weight is used as an indicator of social and economic importance and as an indicator for effort. The assumption is that, the greater the annual landings, the more it represents a priority as a larger section of the fishing industry will rely on it and more effort is directed towards it. MMO data only were used as the methods of data collection have been consistent for at least the last six years and present a time series which can be used to determine trends and means. MMO landings data were selected only for those ICES statistical areas which correspond to inshore fisheries.

   Limitations: MMO and Eastern IFCA landings data were used initially however only MMO data were used to prioritise fisheries by annual landed weight. MMO landings data have significant limitations in that there is no requirement to report landings of under 30kg. Within the inshore sector, particularly Suffolk, this could represent a significant amount of unreported fishing mortality (estimated to be as high as 73% - pers comms Stephen Thompson, EIFCA) and socio-economic importance (particularly for high value species such as bass). However, MMO data are thought to be more consistent and have a much greater coverage than Eastern IFCA landings data. Landed weight does not equate to effort however in the absence of effort data (as is the case for almost all species) landings data is used as a broad indicator of effort. In addition, these figures have not been considered in the context of total stock sizes – i.e. whist annual landed weight may be low for a certain species; it may still represent a significant proportion of that stock. Landings data was selected by area fished such that it corresponds with fisheries within Eastern IFCA's district, however reported fishing areas correspond with areas which do not sit entirely within the district and as such, there may be over-reporting with regards to landings of some species.

2. **Mean annual value of landings**

Annual value of landings is used as an indicator of social and economic importance. More risk is associated with greater annual value of landings. The rationale for this is that the species associated with greater annual landed values will likely be associated with a greater number of vessels and fishers. Furthermore, there is a greater potential risk to local economies from the inappropriate management of a fishery that has a greater economic value. When used in conjunction with landed weights, it can also provide an insight into the market worth of species (i.e. where landed weights are low but annual landed value is high).

Limitations: Higher economic value may not necessarily translate into more jobs/a greater number of fishers involved in fishing that species if landings are dominated by a few large vessels. The vast majority of vessels active in the Eastern IFCA district are under 15m (most are under 10m) which are unlikely to be able to dominate landings in this way.

3. ICES advice

ICES advice pertinent at least to ecoregion IV was sought for all the species identified as being landed within the Eastern IFCA district. Advice was summarised as either favourable, not available/maintain effort or unfavourable and the associated species was given a score of 1, 2 or 3 respectively. The mean score was taken for species within a group, which was then ordered by score (highest mean score to lowest) and ranked accordingly. The assumption is that, the less favourable the advice, the higher the risk associated with that group.

Limitations: ICES advice represents a standardised method for providing advice to the European Commission on a yearly basis. It represents the most up-to-date indication of the well-being of a fishery stock or species. Where advice was available for a species, a 'favourable' was assigned when the advice was maintain or increase landings/catch. An 'unfavourable' was assigned to any species where a reduction was advised. Where advice was not available a score between favourable and unfavourable was given – the rationale for this is that, if no assessment has been produced, the species is less likely to have high effort associated with its capture and is at less immediate risk than if an assessment has concluded an unfavourable status. That said, if no assessment has been carried out, there is the potential that the status could be unfavourable or favourable, thus there is a greater risk than for species/stocks where the advice was favourable. In the case of crustaceans (brown crab and European lobsters) CEFAS[1] advice was used in addition to EIFCA research reports[2] as ICES advice does not exist. The Whelk fishery was

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[1] Centre for Environment, Fisheries and Aquaculture Science – the UK Government's fisheries advisor
[2] Crab and Lobster Stock Assessment 2015 (Peter Welby) - EIFCA Research Report

not assessed by ICES or Cefas but was given a score of 3 (unfavourable) as a result of an Eastern IFCA assessment conducted in 2015.

4. Available evidence

The available information for each species was considered. A subjective score of 1 (high confidence/sufficient data available) to 3 (Low confidence/little to no data available) was assigned to each of the following categories of information: Stock data (e.g. state of stock, size of stock etc.), Landings data, fishing effort and Spawning / nursery grounds. Scores for each data category are combined and a mean is taken for each group. Groups are ordered by combined mean (highest to lowest) and a rank was assigned accordingly.

Where little information exists regarding the fishing activity of a species, it is considered at a greater risk from sustainability issues.   Eastern IFCA's regulation and compliance strategy places an emphasis on evidence based regulation.   Without sufficient and accurate information, management measures cannot effectively improve sustainability nor have a protective effect on the environment. This category is intended to increase the priority of groups where information is lacking to the extent that management measures would likely be less effective.

5. Fisheries management

This criterion is used to prioritise the risk of fisheries based on the current fisheries management. Three elements of fisheries management were used to determine risk associated with each species – protection of pre-spawning individuals (i.e. minimum landing size etc.), gear management or specification (e.g. mesh sizes, use of certain gears) and effort or landings restrictions (e.g. total allowable catches and quotas). The assumption is, where a species is managed for all of these aspects, the risk of sustainability issues, including ecosystem impacts, is lower.

Limitations: Management of fisheries according to these criteria is only likely to reduce the risk of sustainability issues if the measures are appropriate. In several cases it could be argued that current management of the fishery is insufficient. For example, recent whelk management measures have been implemented which cover all three criteria and as such, scored highly in this assessment, however minimum landing size of whelk is still thought to be too low and is part of an ongoing research project to address this.   The appropriateness of existing regulations is discussed further in the additional assessment (1.2.2) and applied as a contextual criterion.

6. Ecosystem impacts of fishing gear

This criterion assesses each fishery against six factors relating to gear impacts – fish size selectivity, species selectivity, by-catch mortality, ghost fishing,

habitats effects, energy efficiency and catch quality. The assessment uses scores based on an assessment carried out by the FAO[3] to determine the impacts of fishing gears in this wider sense. The scores relating to fishing gears associated with each species (which in most cases is a combination of gears) were used to order fishers by risk associated with gear impacts. A primary and secondary gear type is assigned to each species to reflect that often, one gear type is principally used with other gear types used less frequently.

Limitations: The scoring system used from the FAO research takes a wide range of criteria into account, some of which have more political context than others – for example by-catch and habitat damage were weighted the same as energy efficiency and catch quality. Additional emphasis is placed on certain factors within the additional assessment in accordance with the contextual issues surrounding each fishery (i.e. habitat damage). In addition, where a species is thought to be targeted by more than one gear, a secondary gear is also assigned which is weighted less than the primary gear (i.e. Primary gear = 0.67, secondary gear = 0.33).

7. Assessment of EIFCA landings vs total UK landings

This criterion assesses the 'importance' of the fishery in a national context. Where catch from within Eastern IFCA's district is a higher proportion of the UK total, this species is considered a higher risk as it is considered to have grater 'national importance'. This takes into account indirect aspects of the inshore fishing industry, for example infrastructure and the maintenance of a viable market for fish be sold to. Brown shrimp landed form within the Eastern IFCA district account for circa 90% of annual UK shrimp landings and the district hosts two major shrimp processing plants as a result.

Limitations: MMO landings data excludes landings under 30kg and as such is likely to preclude smaller yet important fisheries (particularly in Suffolk).

8. Spawning and nursery grounds

Species are given a score of between 1 and 3 which reflects the absence (1) or presence (3) of spawning and nursery grounds within the EIFCA district. A score of 2 is applied where it is not known whether spawning or nursery grounds exist. Where fisheries occur within spawning or nursery areas, poor fishing practices can have a disproportionately large, detrimental impact on wider fish stocks. Where such areas occur within the district, the associated fishery s considered at a higher strategic risk.

Limitations: Spawning and nursery area data is not available for all species caught from within the district. This criterion had not previously been included

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[3] Food & Agriculture Organisation, a United Nations advisory body

within the initial assessment however, because of the importance of these areas (and their vulnerability to a range of fishing practices) these are now considered despite the paucity of data. Confidence in spawning and nursery area data is considered within the 'available evidence' criterion. In addition, where nursery or spawning areas are not present within the district, fish may still have to transit the district to reach them. As such, where fisheries are not associated with a local spawning or nursery ground, the associated risk may be an underestimate.

9. Trends in landings weight

A Pearson product moment correlation coefficient is obtained for landings data over the period 2010 to 2015 (inclusive) to determine if there are any trends (i.e. steady increases or decreases) in fisheries productivity. Where the fishery shows a strong trend in either direction it is considered to be at higher risk. This was considered as part of the contextual assessment previously but has now been applied as a criterion within the initial assessment. Such trends are possibly indicative of changing market demand, poor productivity (in the fishery analysed or in other fisheries leading to displacement) or increases in catching efficiently. This criterion is more relevant in the context of the 'landing obligation', the implementation of which in continuing and which may result in higher landings of certain species in the first instance.

Limitations: The cause of any trends cannot be detected within the assessment and may be indicative of a range of situations however, the inclusion of this assessment does highlight strong increases or decreases which can be considered in the wider, contextual assessment. Strong positive or negative coefficients can be an artefact of 'one-off' landings at the beginning or end of the time series and may only relate to species for which annual landed weight is low (less than one tonne annually) where even high proportional changes are actually insignificant. In addition, some trends are likely to reflect changing quotas as many of the species landed within the district subject to quotas.

1.2 Incorporation of results from Community Voice Method project

In 2016 Eastern IFCA undertook to engage with stakeholders using an innovative technique known as the 'Community Voice Method'. The enabled Eastern IFCA to capture the views of people from across the spectrum of our stakeholders including naturalists, scuba divers, local interest groups, fishers and NGOs. Outputs from the project will be published in a report in March 2017.

More information on the project can be viewed from the Eastern IFCA website, including a video complied from interviews with stakeholders (www.eastern-ifca.gov.uk).

The draft data from the Community Voice Method (CVM) workshops was used to determine appropriate weightings for each of the criteria outlined above. Results from 3 workshops were analysed to determine which criteria are most important to our stakeholders by grouping suggested action into themes which match the criteria, namely; management, evidence base, fisheries performance and ecosystem impacts.

However, the weightings provided by the CVM data had the effect of almost completely diminishing the scores of two of the groups, namely 'fisheries performance' and 'ecosystem impacts'. As such, the weightings were not ultimately used in the scoring system (although this did prompt further development of the scoring system). Final data outputs from the project (due March 2017) will be reviewed to determine if these can be incorporated into future assessments.

1.3 development of 'initial assessment' method

The data driven, initial assessment usually provides a score for each criterion and then an overall score for each fishery is determined from the mean of all these scores which is then reflected as a relative rank. However, on attempting to incorporate the CVM data it was recognised that scoring fisheries in this way had the effect of skewing the results towards a dependence on the outputs of criteria related to fisheries performance. This was a symptom of having more 'fisheries performance' criteria than in any other category which effectively gave this category a greater weighting.

As such, a new approach was undertaken. The nine criteria were split into the four categories (available evidence, current regulations, ecosystem impacts and fisheries performance) and a mean score was taken from within each category these (i.e. scores for each category were aggregated to give each category an equal weighting).

In addition, rather than giving each fishery a rank based on the assessment, each fishery was assigned a 'high', 'medium' or 'low' risk in relation to each category. This is set out in table 1 below. This provides a more accessible output of the assessment than in previous assessments and enables the identification of related work-streams in relation to each category.

1.4 Results

Table 1. Shows the mean rank for each fishery group and the 'risk overview' to reflect a 'high', 'medium' or 'low' risk for each category of the assessment. Mean ranks closer to 1 reflect a higher risk. 'Risk overviews' were determined taking into account the distribution of mean ranks and highlighting those which stood out as high risks (i.e. the top 2 or three scores, depending on the distribution of the mean ranks).

Species	Mean fisheries performance Mean Rank	Risk Overview	Mean evidence base rank	Risk Overview	Current regulation	Risk Overview	Ecosystem impacts	Risk Overview
Bivalve Mollusc	19.3	High	55.7	Low	58.3	Low	29.3	Medium
Crustaceans	26.5	High	48.7	Low	6.3	High	42.5	Low
Demersal	44.4	Low	23.7	Medium	28.6	Medium	17.2	Medium
Dogfish/sharks	40.6	Low	14.6	High	31.8	Medium	17.3	Medium
Flatfish	36.1	Medium	26.5	Medium	37.7	Medium	12.6	High
Cephalopods	50.4	Low	3.0	High	14.6	High	20.3	Medium
Pelagic	38.1	Low	34.4	Medium	38.8	Medium	35.1	Low
Shrimp/prawns	29.1	Medium	39.3	Medium	33.0	Medium	5.5	High
Skate/Ray	36.3	Medium	27.9	Medium	34.7	Medium	17.8	Medium
Whelks	5.8	High	74.0	Low	65.0	Low	42.5	Low

Due to the inclusion of additional criteria and a new approach to scoring, the results from the present assessment are not directly comparable to previous assessments.