

Kent & Essex



Inshore Fisheries and
Conservation Authority

Strategic Evidence Plan

2018 – 2023

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1. Purpose of the Strategic Evidence Plan

Kent and Essex Inshore Fisheries and Conservation Authority (KEIFCA) has a statutory duty under the Marine and Coastal Access Act 2009 to promote the sustainable exploitation of sea fisheries resources and to seek to ensure that the conservation objectives for marine protected areas (MPA) are furthered. Research and survey activities within KEIFCA are diverse, ranging from fisheries or MPA feature surveys to fishing activity data gathering and analysis. Through working closely with a wide variety of organisations and through KEIFCA surveys, we collect and analyse data to provide evidence for management decisions, for both MPA and fisheries management.

IFCAs are small multi-functional organisations that combine a range of management, enforcement and evidence gathering duties, and as such work is rarely segmented (e.g. when an IFCA vessel undertakes a survey it still gathers enforcement data and can act if an offence is seen). Due to the integrated nature of our work the KEIFCA annual plan is used as the key planning and operational document where actions and priorities under a range of headings including evidence gathering can be agreed in context. The KEIFCA strategic documents help identify wider and longer-term approaches and priorities for the organisation, and help in identifying strategic asset needs, skill requirements and future areas of opportunity as well as help explain our role to others and maximise the coordination of our resources.

1.1 Objectives of the plan

- Match KEIFCA's strengths with opportunities
- Cultivate broad research partnerships and promote coordinated, collaborative research with community and national partners
- Identify the best opportunities for funding and maximise KEIFCA evidence/research spend.
- Support the recruitment, training, and retention of highly qualified staff, and ensure that such individuals are able to access the resources required to undertake their role
- Encourage effective communication and dissemination of research results, emphasizing the importance of knowledge transfer and collaborative research with community partners

2. Partnership Working

Over the past six years since transitioning from a Sea Fisheries Committee to an IFCA, KEIFCA has built on existing links with other governmental agencies and developed new opportunities for collaborative working with industry, NGOs and

the academic community. A key objective of public bodies is efficiency and for research activities, this is often best achieved through partnership working, drawing on expertise or equipment pools outside the organisation. KEIFCA will continue to expand collaborative working where beneficial and this will be achieved through various routes; some key existing ones are highlighted below.

2.1 Working with local and national stakeholders

Working closely with stakeholders at different scales, from local to national will improve research capabilities and assist with developing locally relevant, targeted evidence gathering. KEIFCA will work with a range of stakeholders including local fishermen, Wildlife Trusts and other NGOs to achieve shared objectives regarding evidence gathering. Ongoing links with the fishing industry will enable specific evidence gaps to be addressed and will utilise resources outside the organisation to maximise KEIFCA's research potential.

2.2 Academic Collaborations

In the past four years, KEIFCA has established new collaborations with Universities to carry out specific research in fisheries and in MPAs. Specifically, KEIFCA and the University of Essex successfully applied for government research council funding for a PhD student to work on native oyster restoration in the Blackwater, Crouch, Roach and Colne MCZ. Other recent academic collaborations include hosting a Masters' student project from Queen Mary University, London working on whelk population biology and genetics in the KEIFCA district. Future academic partnerships and funding opportunities will continue to be explored and are envisaged to be an important pathway to gathering evidence for fisheries and MPA management.

2.3 Working together with other governmental organisations

The direction and priorities of government research are published in thematic evidence plans. The Defra marine programme evidence plan sets out evidence gathering to be focussed on three key areas;

1. Achieving Good Environmental Status of our seas by 2020 (to fulfil obligations under the Marine Strategy Framework Directive)
2. Secure, healthy food supplies delivered by a more sustainable fishing industry (under reform of the Common Fisheries Policy)
3. Sustainable growth in the wider marine economy (through revised approaches to marine planning via the MMO)

A range of government agencies work on different projects to deliver objectives set by Defra under the three evidence gathering priority areas. KEIFCA works alongside agencies such as Natural England, the Marine Management Organisation, the Environment Agency and Cefas to undertake specific projects gathering and analysing data for fisheries and MPA management. Details of research and survey projects undertaken by KEIFCA and the partners involved are summarised in Appendix A.

2.4 IFCA Technical Advisory Group

KEIFCA works closely with other IFCAs and government agencies through the IFCA Technical Advisory Group (TAG). The TAG facilitates an exchange of information relating to fisheries, marine science and technology between IFCAs and other government agencies, and so helps to improve cooperation and consistency between organisations and help IFCAs be valued as national and international fisheries managers. The aims of the IFCA TAG are:

- To improve the quality and extent of fisheries management information through better coordination and dissemination of fisheries related scientific research.
- Define and apply best practice relating to the scientific & technical functions responsibilities of IFCAs
- To identify and facilitate joint working opportunities between member organisations.

These aims are achieved through the following objectives:

- To improve cooperation between all the bodies represented in the group and integrate individual IFCAs science strategies with relevant organisations' plans and wider national and international policies.
- To help standardise research and technical 'practices' and reporting between IFCAs and other relevant bodies so that information can be easily shared and analysed.
- To help disseminate key research and technical information between IFCAs and other relevant organisations and produce recommendations to inform decision makers within those organisations.

3. Resources

3.1 Staff

At present KEIFCA employs 13 full time staff, 1 part-time staff, a part time Clerk and a part time financial advisor. Staff have a diverse knowledge and experience base with several officers holding university degrees or higher in marine biology or fisheries management. The lead scientific and conservation officer, based in Essex, manages evidence gathering projects and whilst all officers may be involved at some point in various research and evidence gathering activities, some enforcement officers have secondary duties dedicated to evidence gathering. The junior scientific officer role (based in Ramsgate) has a secondary

duty of managing GIS data whilst an MPA compliance officer is also based in Essex. The 2nd mate of the Kent based vessel has a secondary duty of survey logistics and equipment maintenance.

3.2 Offices

KEIFCA currently rents two offices; a main office in Ramsgate in Kent and a satellite office in Brightlingsea in Essex. The location of the two offices allows the organisation to efficiently undertake all its duties and helps KEIFCA build and maintain strong links with all its stakeholders either side of the Thames Estuary. The remit of the offices revolves primarily around the spatial distribution of work, with the Brightlingsea office specialising in Essex based issues relating to enforcement, consultations and surveys; the Ramsgate office also undertaking the equivalent tasks on the Kent coast but in addition is the centre for core overarching organisational activities (e.g. administration support, legal support, HR work etc.).

3.3 Vehicles

KEIFCA owns two Toyota Hilux trucks, one based at each office. The vehicles are used to help transport key research equipment around the district as well as undertake shore patrols. The Authority also owns four 'Sand Survey' Honda 500cc All-Terrain Vehicles (ATV) that are based at Shoeburyness and are used for cockle surveys on the Maplin Sands. They are fitted with plotters, marine radios, GPS and a range of safety and survey equipment.

3.4 Vessels

'Tamesis', a 12m catamaran, which is partially EU grant funded, came into service in 2011. This vessel is based at Brightlingsea, and has a standing crew of two which is supplemented by the Essex shore officer post to make a mustered crew of three, and can undertake enforcement, monitoring and survey duties. The vessel also carries a RIB for boarding (when this is in use the vessel will carry a crew of four). She is fitted with pot and fixed net haulers and has a winch, rated to 900 kgs, capable of deploying drop and towed equipment.

The 'FPV Nerissa' has its home port in Ramsgate and has a crew of four. The Nerissa is a 17m catamaran with a novel hydraulic ramp launching system for its stand-alone 5.5m RIB which can be used in various sea conditions to undertake boardings at sea. Although Nerissa's primary function is enforcement, she is also fitted with a winch, A-frame and pot hauler capable of deploying survey equipment.

An Olex system is also fitted to both vessels for seabed mapping.

The 'FPV Bluejacket' is a 7.8m RIB, based in Brightlingsea. This vessel is capable of high speed and has a range of upwards of 100 miles. Bluejacket can operate with a crew of two, although she is able to carry up to six, and can be used for boarding fishing vessels independently of either Tamesis or Nerissa.

3.5 Equipment

In addition to vehicles and vessels, KEIFCA has a variety of equipment for sampling benthic habitats and organisms including a 0.1m² Day grab, a VideoRay Pro3 remote operated vehicle (ROV), GoPro Hero3 HD cameras with waterproof housing, a camera sled frame, a selection of sieves and riddles and an on-deck survey table. Fisheries specific research equipment includes an oyster dredge and 50 experimental whelk pots.

Large pieces of high tech survey equipment have been purchased in recent years using Defra funding, coordinated by the Association of IFCA's and the IFCA TAG. These include two Seaspyster underwater camera systems, three Edgetech 4200 side scan sonars and an Aris 3000 sonar camera. This equipment is held at different IFCA's around the country. TAG coordinates a national inventory of all IFCA's' research and survey equipment which may be loaned out to other IFCA's or other governmental organisations.

3.6 Data Analyses

Three officers are trained in QGIS software with the secondary duty of the Kent-based junior scientific officer to create maps and manage the day-to-day running of GIS databases and associated datasets. The LSCO and the KPVS have both attended training in EUNIS biotope mapping, underwater camera survey and acoustic survey techniques which will be used in upcoming surveys for MPAs.

4. Evidence gathering Activities

In order to deliver proportionate, evidence-led management, KEIFCA undertakes a range of research and survey activities targeted to gathering evidence. Evidence gathering projects can be one off projects or ongoing work streams creating valuable long term data sets. In many cases, projects are carried out in collaboration with other stakeholders, e.g. the local fishing industry, academic researchers, conservation NGO's, and other governmental organisations (Natural England, Environment Agency etc.) in order to draw on specific expertise, share limited resources and to deliver to a high standard the objectives of KEIFCA in the most efficient manner. Current and recently completed evidence gathering projects are summarised in Appendix A.

This strategic plan highlights ongoing evidence gathering work streams and some of the current projects in addition to looking forward at potential projects that may arise in the next five years. These activities broadly fall under three themes;

- 1. Marine Protected Area**
- 2. Sustainable Fisheries**
- 3. Access to Information and Development of Evidence**

4.1 Theme 1: Marine Protected Areas

The coastal areas of Kent and Essex are highly diverse, from chalk reef habitats extending off the north coast of Kent to vast saltmarshes supporting thousands of migrating birds in Essex. Many of our marine and coastal habitats and species are of national, European or even international importance, with Kent and Essex having some of the best or most extensive examples of some habitats. As such, large sections of the coastal and marine environment are protected by Marine Protected Areas (MPAs).

Different types of Marine Protected Areas, designated under different national and European legislation are found in the KEIFCA district. There are thirteen European Marine Sites (EMS) and seven Marine Conservation Zones (MCZs) within the KEIFCA district along with several Sites of Special Scientific Importance (SSSI's) and Ramsar sites. Further sites in the KEIFCA district are being considered for designation in a third tranche of MCZs.

IFCAs are defined as competent and relevant authorities in respect to the implementation of the Habitats and Birds Directives (for EMS) and under the Marine and Coastal Access Act of 2009 (for MCZs). KEIFCA therefore has a statutory duty to implement appropriate conservation management measures to avoid damage to EMS and MCZs by fisheries activities.

With many species and habitat features designated for conservation within these protected areas, it is important that the extent and condition of features along with the impact of fishing is assessed in order to inform management decisions. Natural England are responsible for providing feature maps for MPAs, however due to resource constraints, the scale and accuracy of feature maps (especially for mobile or shifting features) provided are sometimes not at a fine enough scale to inform local management decisions. We will continue working with Natural England (NE), Cefas, NGOs and the fishing industry to collect further habitat and species data where necessary, collate existing feature data and assess the impacts of fishing.

4.1.1 European Marine Sites (EMS)

European Marine Sites (EMS) or 'Natura 2000' sites are a network of marine areas that protect habitats and species of European importance. This network consists of:

- **Special Areas of Conservation** (SACs) which are designated under the EU Habitats Directive to conserve habitats and species of European importance
- **Special Protection Areas** (SPAs) are established under the EU Wild Birds Directive to protect populations of bird species of European importance and regularly occurring migratory birds within the EU.
- **Sites of Community Importance** (SCI) are sites that have been adopted by the European Commission as SACs but not yet been designated by the member state.

In 2012, Defra introduced a revised approach to managing fisheries within EMS in order to bring fisheries in line with other activities occurring within EMS. A risk-based matrix of all fishing activities and sub-features of EMS was compiled by various national stakeholders (NE, JNCC, MMO, IFCAs) and the risk of impact of fishing activities on sub-features was colour coded, red, amber and green. High risk 'red' interactions were managed first, with the Kent and Essex bottom towed gear byelaw introduced in 2014 to protect fragile chalk reef and sea grass.

In 2014-2015 work focussed on assessing the lower risk amber and green interactions between fishing gear and EMS sub-features. There are thirteen EMS in the Kent and Essex district which produced a total of 1648 interactions that required assessment. A large proportion of officer's time was spent in 2014-2015, initially prioritising the amber and green interactions, based on risk and then grouping activities and sub-features where appropriate to carry out tests of likely significant effect. Data-gathering and analysis were also key to provide the evidence required for the assessments. All of the 1648 interactions were assessed at the first stage by the end of 2014-2015. This produced a total of 366 documents of tests of likely significant effect. These were submitted to NE for review and approval.

For interactions where there is insufficient evidence to ascertain if the fishing activity is damaging the feature or if it is deemed likely to have a significant effect, a second, more in-depth, assessment stage is required; an appropriate assessment. From the 366 tests of likely significant effect, nine appropriate assessments were required and these have been completed and approved by Natural England.

Future Projects

Future work streams in this area will focus on developing management measures where required and in the longer term, any new evidence acquired through KEIFCA surveys or from outside sources will be used to review the habitats regulations assessments and associated management if necessary. In 2016-2017, management measures were developed for Margate and Long Sands SCI and Essex Estuaries SAC. Where data gaps are identified, specific projects to address this may be important, these could be ground truthing existing acoustic habitat data, collecting further targeted fishing activity data or examining the impacts of specific fishing gear on EMS features.

All of the EMS work has involved close working with key stakeholders, primarily NE, MMO, NGOs and the fishing industry, through targeted meetings. These working relationships will continue, specifically in future assessments of the effectiveness of management measures introduced by KEIFCA.

4.1.2 Marine Conservation Zones (MCZs)

Marine Conservation Zones (MCZs) are a relatively new MPA designation, created under the Marine and Coastal Access Act (2009). These sites are created to protect wildlife, habitats, geology and geomorphology of national importance. They aim to conserve the diversity of nationally rare, threatened and

representative habitats and species around the English coast. Unlike other marine protected areas, MCZs also take social and economic factors into account when identifying potential sites, alongside the best available scientific evidence.

Since the designation of the first tranche of MCZs in November 2013, KEIFCA has gathered and evaluated evidence for all four MCZs and also for future proposed MCZs (Appendix A) with some of the projects summarised below. Three further MCZs were designated in the KEIFCA district in January 2016 in a second tranche of designations with a future third tranche of designations planned.

Blackwater, Crouch, Roach and Colne (BCRC) MCZ

Native oysters (*Ostrea edulis*) are a feature of the BCRC MCZ and in August 2014, Kent and Essex IFCA undertook an extensive dredge survey covering all of the public fishing grounds in the MCZ. The abundance and distribution of native oysters and other competitor and predator species (e.g. slipper limpets, Pacific oysters and starfish) were recorded along with the amount of cultch (dead shell) available for oysters to attach to. This initial survey provided a more detailed and comprehensive dataset for native oysters in the MCZ and was used to identify key areas for native oysters. These data were used to design a more targeted native oyster population survey in 2015 and this will continue as an annual stock assessment survey.

In 2015 KEIFCA used evidence gathered from the 2014 native oyster survey to decide to close the native oyster fishery on public grounds in Essex Estuaries SAC for three years due to low stocks. Future annual surveys will build on this data set and generate information on inter-annual variability and recruitment within native oyster populations in Essex that will be used as key evidence for future management decisions.

In 2014, links were formed with researchers at the University of Essex and a successful funding proposal was written and submitted for a PhD project to examine native oyster restoration methods in the BCRC MCZ. The funding (approximately £80,000) covers a stipend for the student for three and a half years plus £8,000 towards research and training costs and is provided via the ENVEAST NERC doctoral training partnership. The PhD student started in October 2015 and is co-supervised by the LSCO at KEIFCA.

Folkestone Pomerania MCZ

KEIFCA officers participated in a NE funded evidence gathering research cruise with Cefas to gain further evidence on the extent of designated features. Additional underwater camera work was carried out by KEIFCA to ground truth previously collected acoustic seabed data. All the available data were analysed and used as evidence to support the introduction of KEIFCA's restriction of bottom towed gear byelaw across the entire 34 km² site.

Future Projects

In the coming years, the timelines for evidence gathering for MCZs will in part be determined by the tranche 3 site designations by Defra. The timings and decisions on the sites that will be designated will influence any research that is required. Once designated, KEIFCA aims to act quickly to collate existing evidence on fishing activity and feature distribution. Evidence gaps will then be identified and options for addressing those gaps will be explored including new data collection by KEIFCA or other partner organisations. A clear objective for the purpose of data collection for MCZ's is to inform management decisions and future projects will address this.

KEIFCA is committed to native oyster restoration work in the BCRC MCZ in Essex. In addition to the ongoing native oyster stock assessments, we also support a PhD student, providing training in survey techniques and GIS. Until spring 2019, this student, based at the University of Essex, will work with KEIFCA to assess methods for native oyster restoration in Essex. KEIFCA will also work with stakeholders through the Essex Native Oyster Restoration Initiative (ENORI) to apply for funding and carry out research projects to evaluate the viability of active management techniques in achieving the conservation objectives of the MCZ. A key aspect of future projects will take into account the conservation objectives of the co-located SAC to achieve a balance that protects the most sensitive habitats and species in the estuaries.

4.2 Theme 2: Sustainable Fisheries

When KEIFCA was formed in 2011, 18 commercially important fish species were identified as priority species for management. For each of these species, species management plans are being produced that provide a systematic approach for defining the management, enforcement, and research for individual species. These species management plans will be published on the KEIFCA website and will be a point of reference for people interested in the species and their associated fishery and management. They will also establish a framework around which KEIFCA will work towards creating sustainable fisheries.

Ongoing projects creating long term data sets are undertaken by KEIFCA which to date has focussed on shellfish. Some of the ongoing projects and future evidence gathering projects are summarised in this section.

4.2.1 Cockle surveys

In order to successfully manage the commercially important cockle fishery in the Thames Estuary, K&EIFCA has conducted surveys of the cockle beds since 1988. Bi-annual surveys of cockle population size and age structure will continue and these data are used to inform and monitor the effectiveness of management, specifically setting a total allowable catch limit based on scientific data. Surveys are carried out using ATVs to access intertidal areas, collecting cockles by hand or using a day-grab sampling method from our survey vessel FPV 'Tamesis' to access subtidal cockle beds. Detailed reports of the surveys and population

estimates are published annually in a dedicated cockle report. Results of the surveys and management for the Thames Estuary cockle fishery order area are presented and discussed at regular meetings with cockle licence holders. The fishery is monitored closely throughout the season and management altered if necessary.

In 2013, new cockle permit byelaws were introduced to manage cockle harvesting on beds outside the Thames Estuary cockle fishery order. Cockle stocks in these areas are also assessed annually and the results used to determine how many days if at all these lower density cockle beds can be opened for harvesting.

By actively monitoring cockle populations in the KEIFCA district, management of the fishery can be controlled but flexible to reflect changes in stocks thus promoting a sustainable cockle fishery.

Future Projects

Cockle stock assessments will continue in the Thames Estuary with procedures reviewed periodically and ongoing staff training. In addition, through collaborations with academic researchers, we will further analyse this large historical data set to examine long term trends in ecosystem functioning and effects of the fishery. By collaborating with academia, expertise and resources from outside the organisation will be utilised and the resulting information will inform future habitat regulations assessments necessary for the operation of the cockle fishery. These data will also inform management of the cockle fishery to ensure a sustainable stock and a healthy and diverse environment.

4.2.2 Whelk research

Over the last three years, KEIFCA has been at the forefront of whelk fishery management in the UK, introducing an effort limitation scheme in the form of a permitting byelaw, carrying out potting surveys and collaborating with CEFAS, partner IFCA's and academic researchers on funded scientific studies.

In November 2011 KEIFCA introduced an emergency byelaw limiting the number of whelk pots that can be used in the district to 300. The introduction of the emergency legislation was in response to the dramatic increase in fishing effort. In January 2013 the Authority made a flexible whelk permit byelaw that allowed the number of whelk pots, the riddle gap size and the number and size of escape holes to be defined and periodically reviewed.

Many of the principles of the new byelaw replicate some of the best practice that has been developed in the Thames cockle fishery, by trying to engage with fishermen and involve them as much as possible in the management process. Since 2013 KEIFCA has gathered evidence from the fishing community (annual survey) and scientists (working with CEFAS and local universities) to review the management measures for this fishery following a review process agreed by the Authority. In January 2016, a whelk technical panel was held to review the new evidence that had been gathered since the byelaw was introduced and make

recommendations to the full authority on the review of the technical specifications of the byelaw.

Over the last 4 years KEIFCA have worked with stakeholders such as Cefas, Defra, University of Bangor, Queen Mary University as well as other IFCA's to help progress the understanding of whelk biology, and stock management. Using grant funds as well as KEIFCA research reserves, KEIFCA have supported a range of projects as well as analysed landings data to help inform appropriate management measures.

Working with an MSc student, KEIFCA teamed up with Queen Mary University, to conduct research on whelk size at maturity and population genetics within the KEIFCA district. The research covered a number of different whelk fishing grounds and concluded that the KEIFCA district has several separate whelk stocks with distinct genetic differences. These results supported previous research findings which suggest that whelks mature at different sizes over relatively small geographical distances.

Building on this work, in 2017 a whelk sampling project was conducted with four KEIFCA whelk permit holders and Dr Phil Hollyman of Bangor University. The aim of the project was to look at differences in size at maturity and the growth rates of populations from the four whelk areas in the Kent & Essex district (Dr Hollyman had established an innovative and effective new technique to determine the age of individuals, using a small internal fragment of calcium carbonate (called a 'statolith')). Using whelks collected by local fishermen, Dr Hollyman assessed 1,000 whelks of various sizes from across the District in order to determine the age, size and maturity stage. The findings of the project were written up, discussed with local fishermen and presented to the Authority as part of the management process.

Future Projects

To move forwards, information regarding the size at maturity, population density and connectivity of whelk populations is required to understand the biology of stocks, create an effective stock model and to inform successful management decisions. As part of this work, KEIFCA has been granted European funding to conduct a two-year population study, to gather a long-term picture of the size-at-maturity of whelks in the district. KEIFCA is also looking to work with the University of Essex on a North Thames FLAG project looking at the genetic links between different populations in the District and in areas offshore.

4.2.3 Finfish stock assessments

Managing finfish that have a large geographical range is very different to managing shellfish beds. For fish species that travel far outside the KEIFCA district, management at an IFCA district level may not always be appropriate

and effective monitoring and management of these stocks may be better carried out by a national or European organisation (e.g. Cefas or ICES).

However, many finfish spend the early stages of their lives close to coastal areas with many important fish species in the KEIFCA district migrating into rivers to spawn. Salt marsh and riverine habitats are also important nursery areas for juvenile fish. KEIFCA works with the Environment Agency to conduct small fish surveys as part of the Water Framework Directive in key estuaries in the district.

Future Projects

SUMARiS

The 2 million Euro, Interreg project brings together regional fishermen, scientists and fisheries managers from France, England, Belgium and the Netherlands to discuss and develop future cooperative sustainable management of the shared rays and skates' stocks. Working at an international regional level KEIFCA is leading a review and developing new management options for 4c and 7d stocks.

4.3 Theme 3: Access to Information and Development of Evidence

In gathering evidence for fisheries management, the wide range of projects undertaken by KEIFCA generates diverse and in some cases large datasets. Over recent years, KEIFCA has not only increased its data gathering capacity but also developed data analysis, storage and dissemination capabilities. In future years as more data is collected these activities will remain to be important aspects of any evidence gathering projects. The KEIFCA data strategy outlines the commitment of KEIFCA to the collection, recording and sharing of high quality data. In accordance with EU law (INSPIRE directive), all publically collected environmental data must be made publically available. KEIFCA achieves this by submitting details of surveys and research undertaken via the Marine Environmental Data and Information Network (MEDIN) to a national database of all UK government funded marine research. This dissemination of data will continue with ongoing training for officers and regular archiving of data.

Standard operating procedures will continue to be employed for data collection. For policy driven evidence gathering, e.g. for MPAs, standard procedures will be followed to ensure that data collected are consistent with national approaches and can be utilised by other government agencies. Where standard operating procedures don't currently exist for research methods, we will introduce a standard methodology that ensures compliance with data collection regulations. Staff will continue to be trained in standard operating techniques and documents to assist this will be updated regularly.

Geographical Information System (GIS) is one tool for managing and analysing spatial data. The secondary duty of the Kent junior scientific officer is to input and analyse data using GIS. GIS data can be easily shared between partner organisations, with habitat data regularly received from NE in GIS format along

with the use of KEIFCA GIS data for national fishing activity mapping projects by Cefas. Ongoing training for the junior scientific officer and other staff members in GIS techniques will improve the ability to analyse fishing activity, habitat and species data and produce clear maps to inform future management decisions.

In addition to collecting data from surveys and research projects, KEIFCA will continue to work with the fishing industry to develop low cost methods of utilising local knowledge.

Future projects

Ongoing data collection, analysis and archiving are essential aspects of evidence gathering and these will continue to be supported by KEIFCA through staff training and development and investment in software and equipment needed. Through involvement in national working groups such as the IFCA TAG, standard operating procedures will be developed that align with national data collection methods, increasing the robustness and usefulness of any data collected and adhering to legislative requirements for data sharing.

Since 2015, fishing vessels over 12 m in length have been required to use a vessel monitoring system (VMS). As a consequence, all of the vessels engaged in the Thames Estuary cockle fishery had vessel monitoring for the first time in 2015. We are currently analysing this data to calculate the footprint of the cockle fishery and to relate vessel monitoring to enforcement monitoring. Discussions are currently being held at a national level to introduce inshore VMS to monitor the movements of the inshore (under 12 m) commercial fishing vessels. If this is implemented in the near future, it will revolutionise the way that enforcement and fishing activity monitoring is carried out within KEIFCA. It is envisaged that a significant work stream would be to collate and analyse this data to address a range of questions from fishing impacts in MPA's to enforcement and shellfish stock management.

5. KEIFCA's research strengths and limitations

Recognising the strengths and weaknesses in KEIFCA's evidence-gathering abilities is vital to delivering a successful research programme. Areas where KEIFCA have both the resources and expertise to conduct evidence gathering centre around data collection at sea. KEIFCA's two vessels and trained staff can operate a variety of survey equipment at sea for the purposes of fisheries and marine conservation research.

In the past year acoustic habitat mapping techniques, such as side scan sonar, have been employed by KEIFCA officers. At a large scale these techniques can be time-consuming and therefore costly, however for specific projects mapping defined areas, these techniques can be extremely valuable and effective and will be considered for future projects.

The authority has developed expertise in underwater imagery in addition to purchasing high-tech underwater camera systems. Unfortunately, due to low water visibility in the majority of the district, the use of these techniques is limited and highly weather dependent. Despite these limitations, visualising the seabed is a powerful tool for ground truthing other survey techniques and for highlighting issue to stakeholders and this capability will be maintained through ongoing training and equipment maintenance.

Shellfish stock assessments are a particular strength of the organisation with all officers fully trained in cockle, whelk and oyster sampling techniques. It is envisaged that these data collection work streams will continue to be an important evidence gathering activity for KEIFCA and resources will continue to be used for these ongoing projects.

Some staff have been trained in small fish survey techniques and have worked with the Environment Agency to assist in their surveys. For future projects, e.g. assessing the effectiveness of the Medway Estuary no take zone byelaw, the best use of resources and officer's time would be to work closely with the EA and other experts to conduct small fish monitoring.

Limitations of technical expertise, vessel time and staff mean that certain research activities are better placed to be carried out by other organisations or in collaboration with partners. Example of these activities are large scale habitat mapping projects for MPA's; finfish surveys for species that travel outside the district and impact studies of fishing gear on MPA features. For projects of this nature, larger national government organisations would provide more resources and appropriate expertise than could be afforded by KEIFCA alone.

6. Project Evaluation and Prioritisation Criteria

One of the key attributes of KEIFCA is the ability to adapt and respond quickly to new challenges. Since becoming an IFCA additional ongoing work streams have been adopted and whilst maintaining long-term data sets is important, it does mean that less resources are available to undertake ad-hoc projects and several factors need to be considered when deciding on new projects to take forward.

Management and enforcement of the cockle fishery in the summer months involves all officers and therefore resources available (staff time and vessel availability in particular) for additional research projects during this time are limited. Currently, during spring and summer, in addition to management of the cockle fishery, ongoing cockle and native oyster stock assessments are carried out at sea. Another consideration when planning new projects is that weather conditions in autumn and winter are not always suitable for certain evidence gathering methods at sea and further time may need to be allocated in order to deliver research at sea during this time.

Existing ongoing research will take priority in order to maintain these important data sets, however KEIFCA is keen to pursue new evidence gathering projects

where possible. In order to prioritise new research opportunities, potential projects will be assessed against eight project evaluation criteria in order to obtain the most effective evidence whilst maximising our limited resource. In general proposed projects should satisfy seven of the eight criteria and projects that satisfy all eight criteria should take priority. New projects that satisfy the evaluation criteria and are considered to be undertaken by KEIFCA will depend on funding, staff and vessel availability and weather conditions. These projects will be included in a more detailed annual plan that is approved by the Authority and made publically available.

Project evaluation criteria:

1. Does the project help KEIFCA deliver its statutory duties?
2. Is a significant proportion of the project based in the district and will the outcomes of the project help work in the district?
3. Will the project develop key evidence for either one of the 18 priority species or help further the conservation objectives of an MPA?
4. Does the project match our organisational skills and resources?
5. Would the project represent the best value for money for KEIFCA?
6. Would the project develop evidence that would be used directly in management?
7. Does the project have support from stakeholders or is it a joint project with stakeholders?
8. Is there a reputational or legal risk associated with the work?

7. Implementation

The strategic evidence plan will be implemented over the next five years using the objectives as a framework for shaping future research directions. The research capabilities of KEIFCA are limited but resource utilisation will be maximised through collaborative projects, applying for external funding and investment in staff through ongoing training. Funding from a variety of sources will be explored including EMFF, research council grants, funding from other government organisations (e.g. NE, the EA or Cefas) for collaborative projects and other small scale independent funding opportunities.

All officers have a primary duty of enforcement, however their secondary duties are developed according to the needs of the organisation, including evidence gathering activities. Ongoing staff development will provide officers with the knowledge and skills to carry out their secondary duties. Training requirements and interests of the staff will be identified and external or in-house training will be given where appropriate. This may include courses run by the Institute of Fisheries Management, specific training courses run by other government agencies (e.g. NE, EA or Cefas) and through participation in national and international conferences to raise the profile of the organisation and to assist in career progression for staff members.

In addition to ongoing evidence gathering, new projects will be evaluated using defined criteria and by considering the strengths and limitations of KEIFCA to

undertake the project. Where appropriate, collaborations will be formed with other organisations to carry out projects which can be more effectively delivered using expertise or equipment outside KEIFCA. External funding will also be sought where possible to purchase equipment or to contribute to other research costs.

Emphasis will be placed on communicating science to wider stakeholders and the public. Dissemination of research results and project information will be carried out via twitter updates and the KEIFCA website in addition to presenting KEIFCA's work at local, national and international conferences and meetings. Involvement in national working groups such as the IFCA TAG will help to facilitate this knowledge transfer. Informal discussions with stakeholders will continue to be encouraged and officers will be informed to educate local fishermen and the public regarding research projects whilst undertaking their main duties.

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8. Appendix A: Research projects carried out to date (Projects since becoming an IFCA*)

Ongoing (core duties)					
	When	Key Equipment/ resource	Approx. officer days	Evidence used for	Partners in the project
Cockle Survey – Inside the Regulating Order (licence fishery)	4 surveys a year (April, June, September, December)	Quad bikes, vessel Grab	43	Setting TAC in Regulating Order cockle fishery	
Cockle Survey – Outside the Regulating Order (permit fishery)	April (3 weeks)	Vessel Grab	50	Setting TAC in permit cockle fishery	
Blackwater, Colne, Crouch and Roach MCZ oyster survey – annual*	September (1 week)	Vessel Dredge	32	Assess oyster stocks against MCZ conservation objectives	Natural England
Medway WFD small fish survey*	April – June	Work with EA equipment	10	Data used for bass stock assessment and KEIFCA nursery area closure	EA, CEFAS, ROFF
Fishing Activity Mapping	All year	All patrol vessels GIS support	All officers, all days at sea	Spatial baseline of fishing activity levels in the district	
Annual whelk permit questionnaire*	December	Admin support	3	Inform Authority when deciding whelk stock management measures	Commercial fishermen
Analysis of whelk catch return data	All year	Admin support	4	Inform Authority when deciding whelk stock management measures	Commercial fishermen

Medium term						
	When	Key Equipment/ resource	Approx. officer days	Evidence used for	Partners in the project	Funding contribution from partners
Sponsoring Oyster PhD*	2015 - 2019	Vessel Snr Officer support	40	Help inform future Oyster MCZ management measures	Essex University Essex Wildlife Trust Local fishermen	KEIFCA £9K Grant £90K (over 3 years)
Blackwater, Colne, Crouch and Roach MCZ - harrowing trials*	June 2015 June 2016 June 2017	Vessel Grab Underwater video camera	46 per year	Help inform future Oyster MCZ management measures	Local fishermen, Essex University Essex Wildlife Trust E-NORI	

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One-off projects						
	When	Key Equipment/ resource	Approx. officer days	Evidence used for	Partners in the project	Funding contribution from partners
Red Throated Diver survey*	Winter 2011/12 Winter 2012/13	Vessel ID training	79	Assess the impact of gill netting on Red Throated Divers for EMS	Natural England	£20K (Natural England)
Whelk pot experiments*	Autumn 2012- 2013	Vessel Pots Riddle	15	Evidence to set measures in whelk permit byelaw	CEFAS, Sussex IFCA, local fishermen	£18K (CEFAS)
D. vex survey*	Spring 2012	Vessel Underwater video camera	17	Evidence to inform NE invasive species plans	Natural England, CEFAS, EA	£10K (Natural England)
Angling 2012*	All 2012	Officer time	130	Evidence to inform national angling policy	DEFRA, CEFAS	£20K (CEFAS)
Hythe Bay megafauna/sediment size survey*	Summer 2013	Vessel Grab Underwater video camera	27	Evidence to inform Hythe Bay MCZ management decisions	DEFRA	£17K (DEFRA)
Blackwater, Colne, Crouch and Roach MCZ oyster survey – whole site*	Summer 2014	Vessel Dredge Underwater video camera	85	Evidence to inform MCZ conservation objectives/ management decisions	Natural England	£10K (Natural England)
Whelk MSc. Assessing the genetic similarities between stocks in the district*	2014/15	Vessel Pots Riddle	20	Evidence used to set Whelk permit management	Queen Mary University, London	MSc student self funded, plus funding for laboratory analyses from Queen Mary University
Filling the knowledge Gap –whelk population study	Jan 2018 to Jan 2020	Officer time	60	Evidence used to set Whelk permit management	Local fishermen, University of Essex	£8k (EMFF)

INTERREG 2 Seas SUMARiS (Sustainable Management of Rays and Skates).	Oct 2017 to June 2020	Officer time	166	Evidence to implement a species specific cross-border management strategy for rays and skates fishery in the English Channel and the North Sea, in particular by setting up common and cross-border management.	Local fishermen, FROM Nord, IFREMER, ILVO, Nausicaa, the French National Sea Centre and associated partners, VisNed, the AQUIMER Hub and CEFAS.	£104,000 (Interreg EU funding)
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9. Appendix B – Abbreviations

BCRC	Blackwater, Crouch, Roach and Colne
Cefas	Centre for Environment, Fisheries & Aquaculture Science
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EMS	European Marine Site
EMFF	European Maritime and Fisheries Fund
EUNIS	European Nature Information System
GIS	Geographical Information System
IFCO	Inshore Fisheries and Conservation Officer
IFCA	Inshore Fisheries and Conservation Authority
KEIFCA	Kent and Essex Inshore Fisheries and Conservation Authority
MCZ	Marine Conservation Zones
MMO	Marine Management Organisation
MPA	Marine Protected Area
NE	Natural England
RIB	Rigid Inflatable Boat
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
SPA	Special Protection Area
TAG	Technical Advisory Group
VMS	Vessel Monitoring System