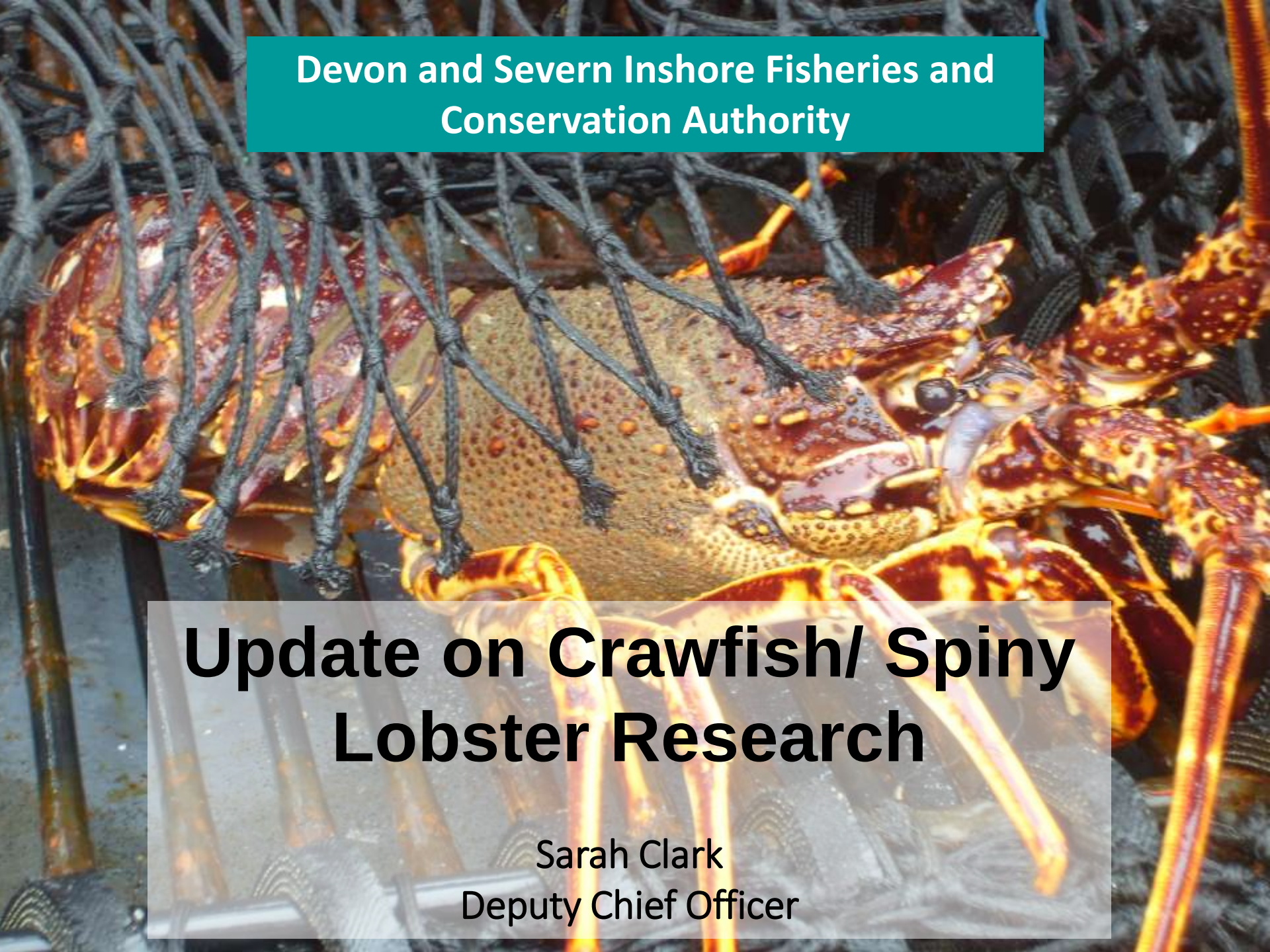


Devon and Severn Inshore Fisheries and Conservation Authority

Update on Crawfish/ Spiny Lobster Research

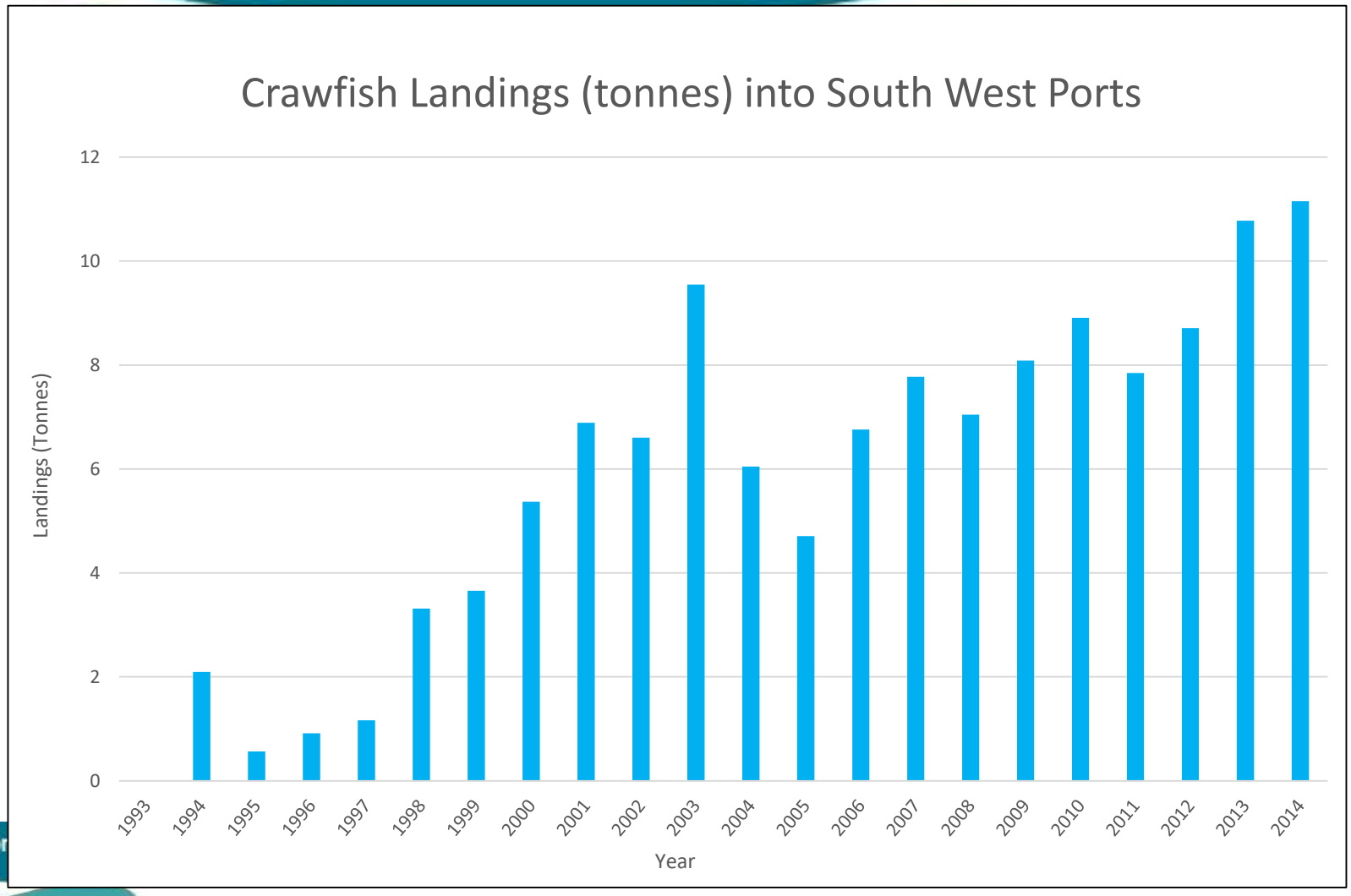
Sarah Clark
Deputy Chief Officer

Ecology and Biology – Summary Information

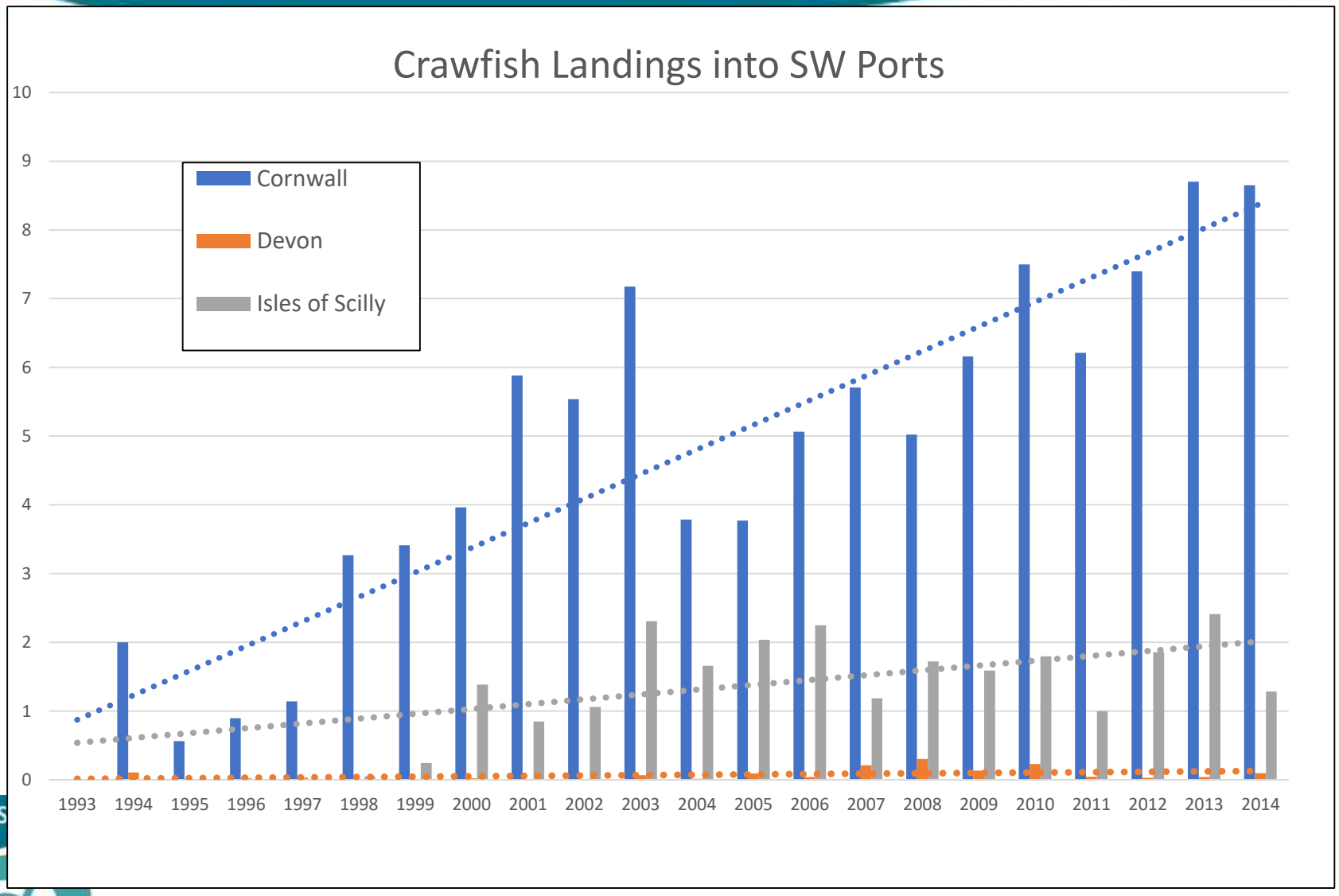
Size at sexual maturity	95mm (Brittany) 82mm F 84.5mm M (Ireland)
Reproduction	Two weeks after female moult. Females stridulate to attract males. Egg laying takes place 2 weeks after mating. Between June and October
Period of egg bearing	Approx. 9 months of egg bearing Hatching occurs March to June.
Fecundity	120,000 for 1kg crawfish, 250,000 for 3kg. 3 to 5 x less fecund than other spp.
Moulting	Move to deeper water. 15-20 mins to complete. 7-19days to become hard again. Female moult prior to mating

Larval Development	10 stages. 10-12 months as larvae. Eggs hatch inshore. Larvae drift along shore.
Growth	Amongst the largest crustacea. Up to 60cm TL. Growth increments unclear - 2mm Cornwall; 12mm Ireland
Ecology & habitat	Live inshore and out to 200m depth. Rock substrate. Juvenile inshore, in algal cover and crevices?
Activity	Mostly forage at night. Movement less 5km. Juveniles mostly <5m depth. As increase in size offshore migrations.
Food	Omnivorous. Echinoderms, mussels, crustacea. Generalist and opportunist.

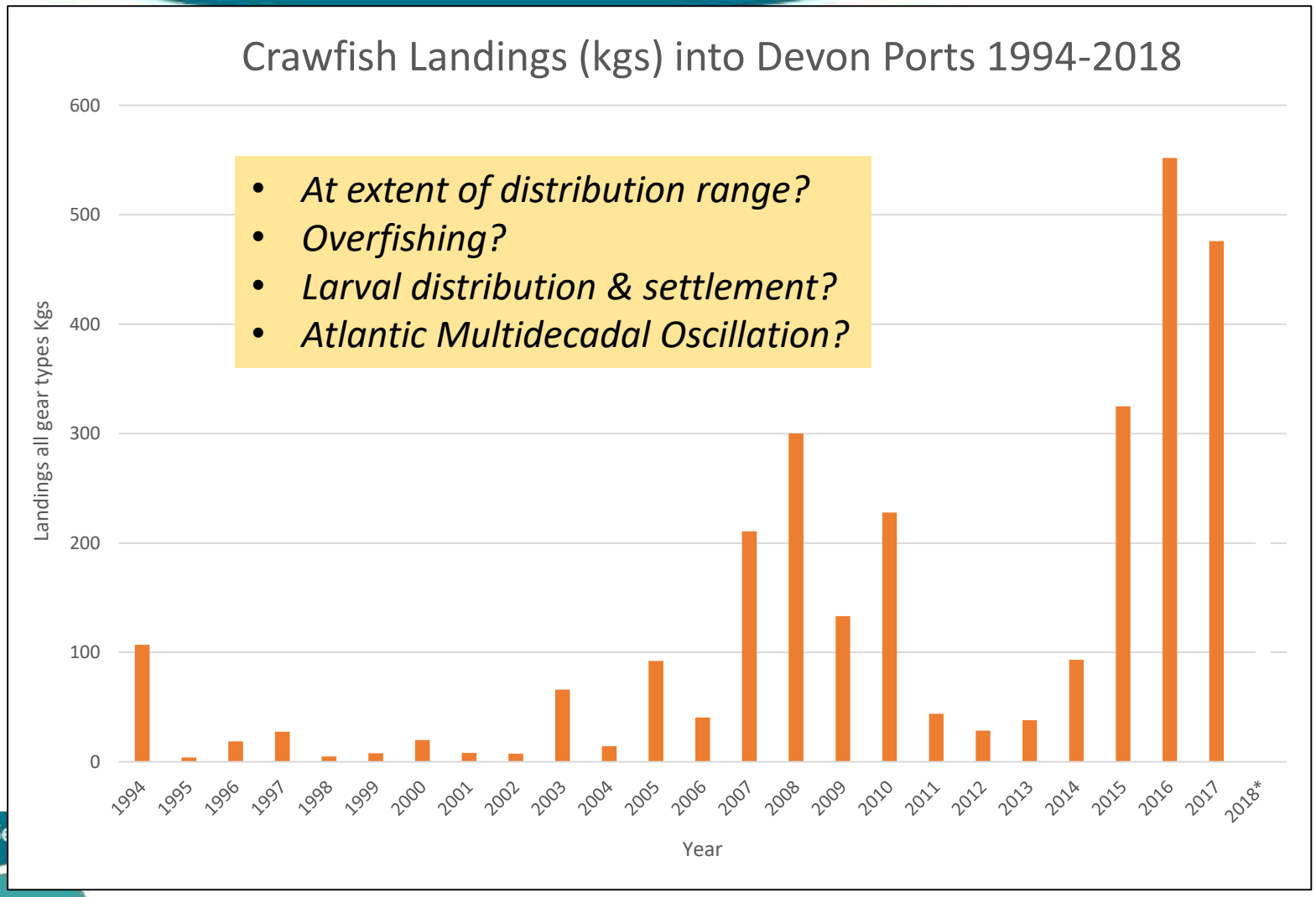
Crawfish Landings 1994 - 2014



Crawfish Landings 1994 -2014



Crawfish Landings in Devon Ports 1994 -2018



D&S IFCA's Current Management

- Increase in Minimum Conservation Reference Size – 110mm carapace length (also CIFCA) compared to 95 mm EU/National Regulations. IoS IFCA new byelaw to harmonise.
- Ban on landing berried spiny lobster – now also National Legislation
- Ban on landing soft shell spiny lobster
- Ban on landing parts of spiny lobster
- Catch limit of 2 lobsters (European and/or Spiny) per day for recreational divers, netters and potters
- In 3 MCZs in D&S IFCA's District total prohibition of removal of spiny lobster as a designated feature of the sites

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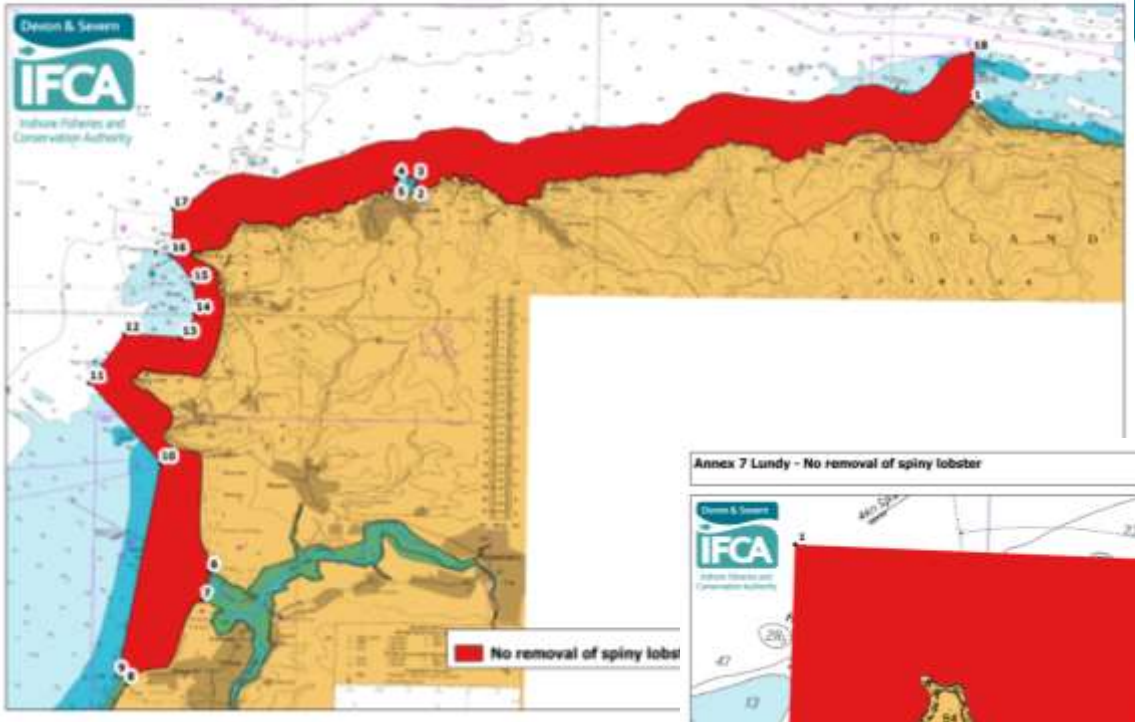
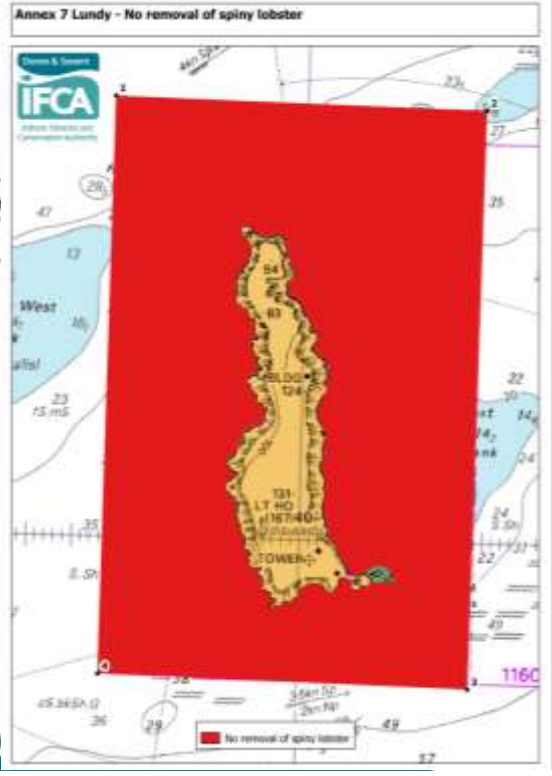
D&S IFCA Spatial Restrictions – No Removal of Spiny Lobster





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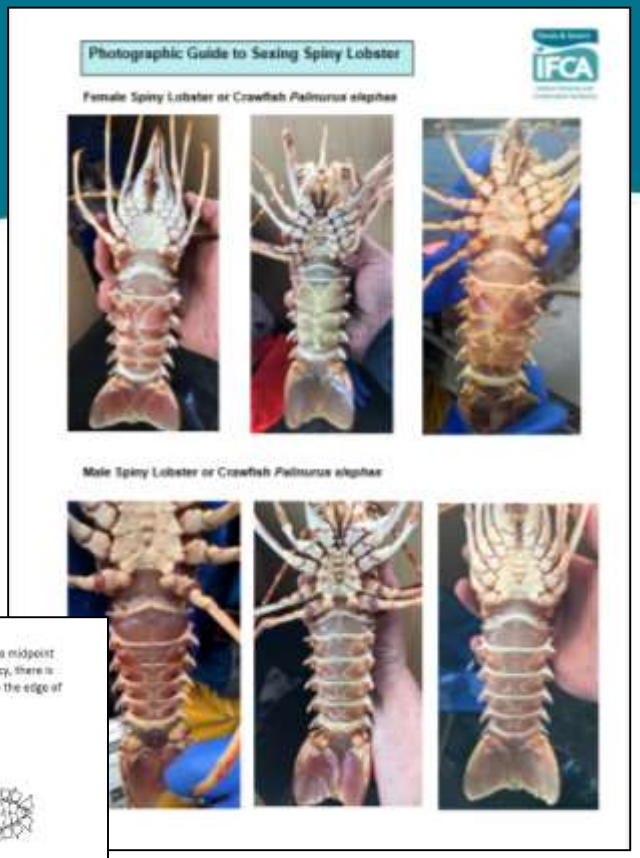
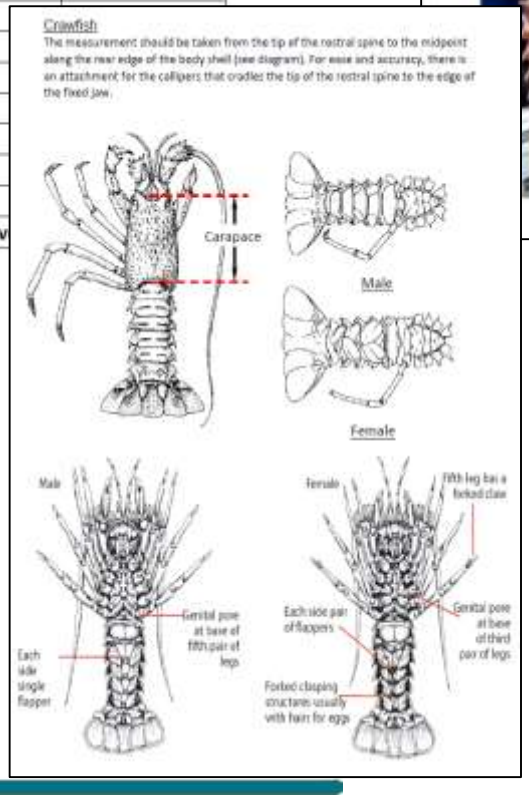
D&S IFCA Crawfish Surveys

Devon & Severn IFCA - Crawfish Survey 2018

Name:			Boat Name:			Tel No.	
PLN:			Port:			Pot/Net/Dive:	
Date caught	Carapace Length mm			Position Caught		returned or landed?	If tagged crawfish caught	
	male	female	berried	latitude	longitude		Tag number	where released

Contact: Sarah Clark mobile: 07517 050887 or email: s.clark@devonandsev





- Data are collected via forms, e-mails with photos and texts with photos.
- Four fishermen actively recording data.

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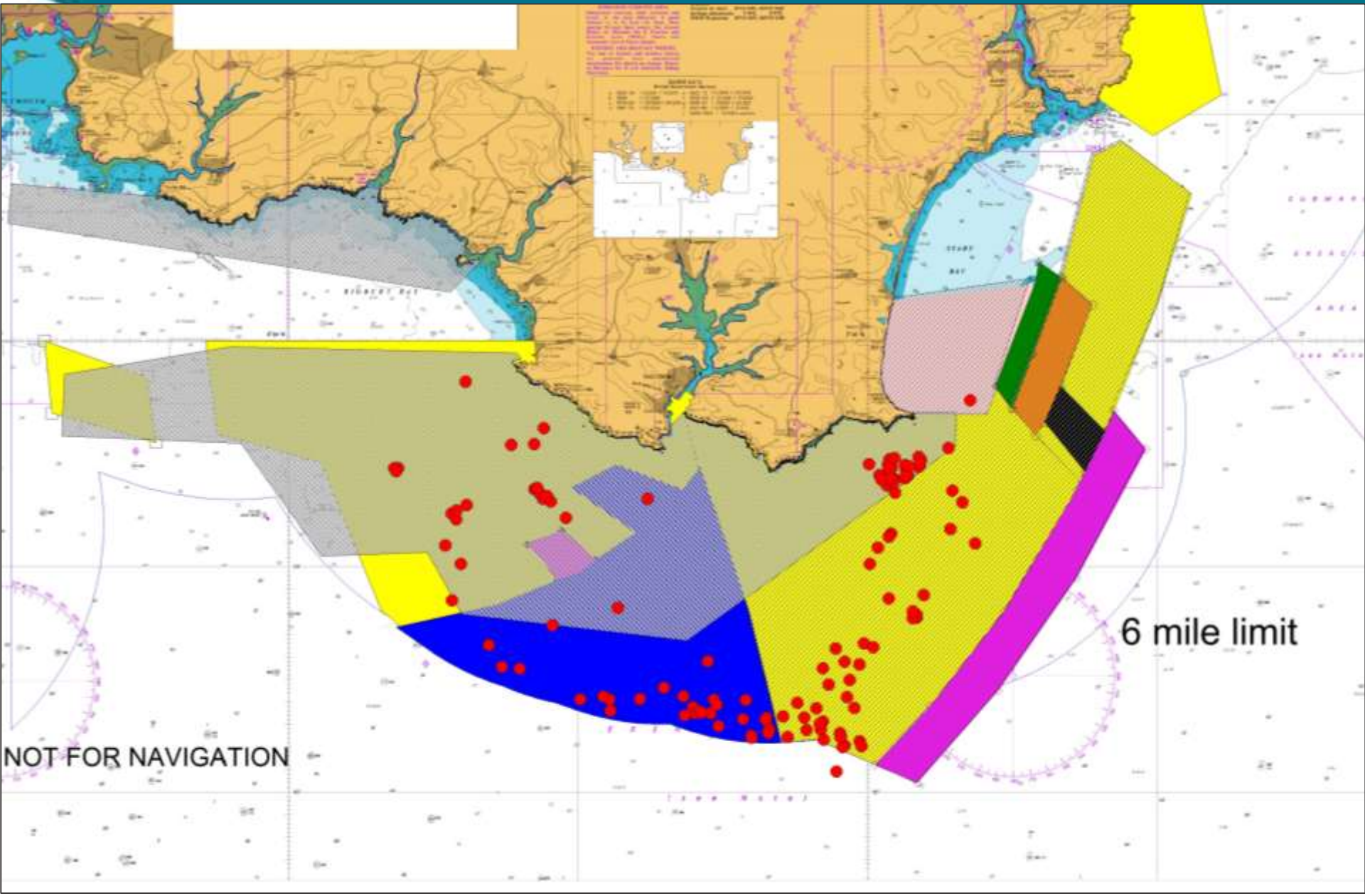
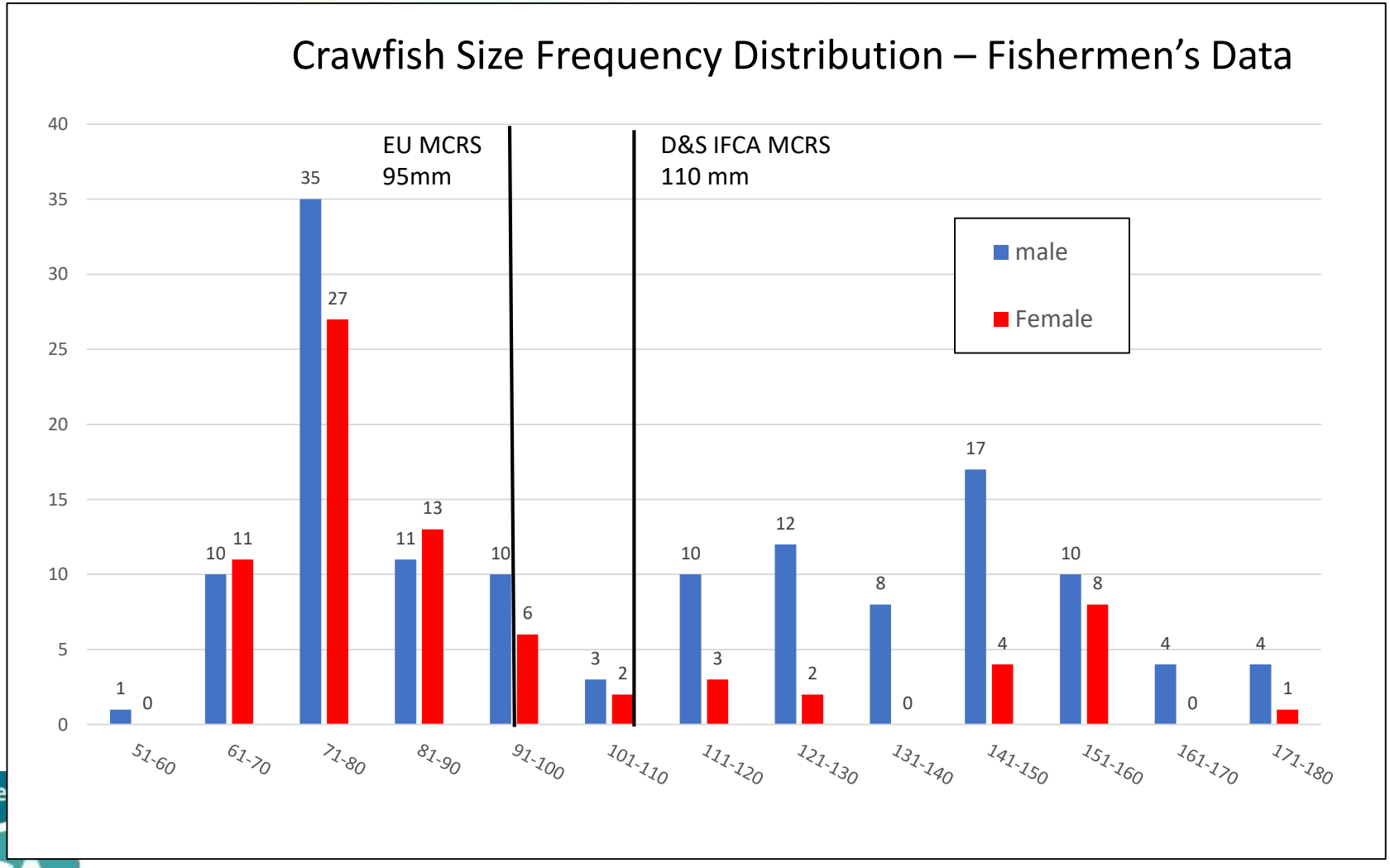
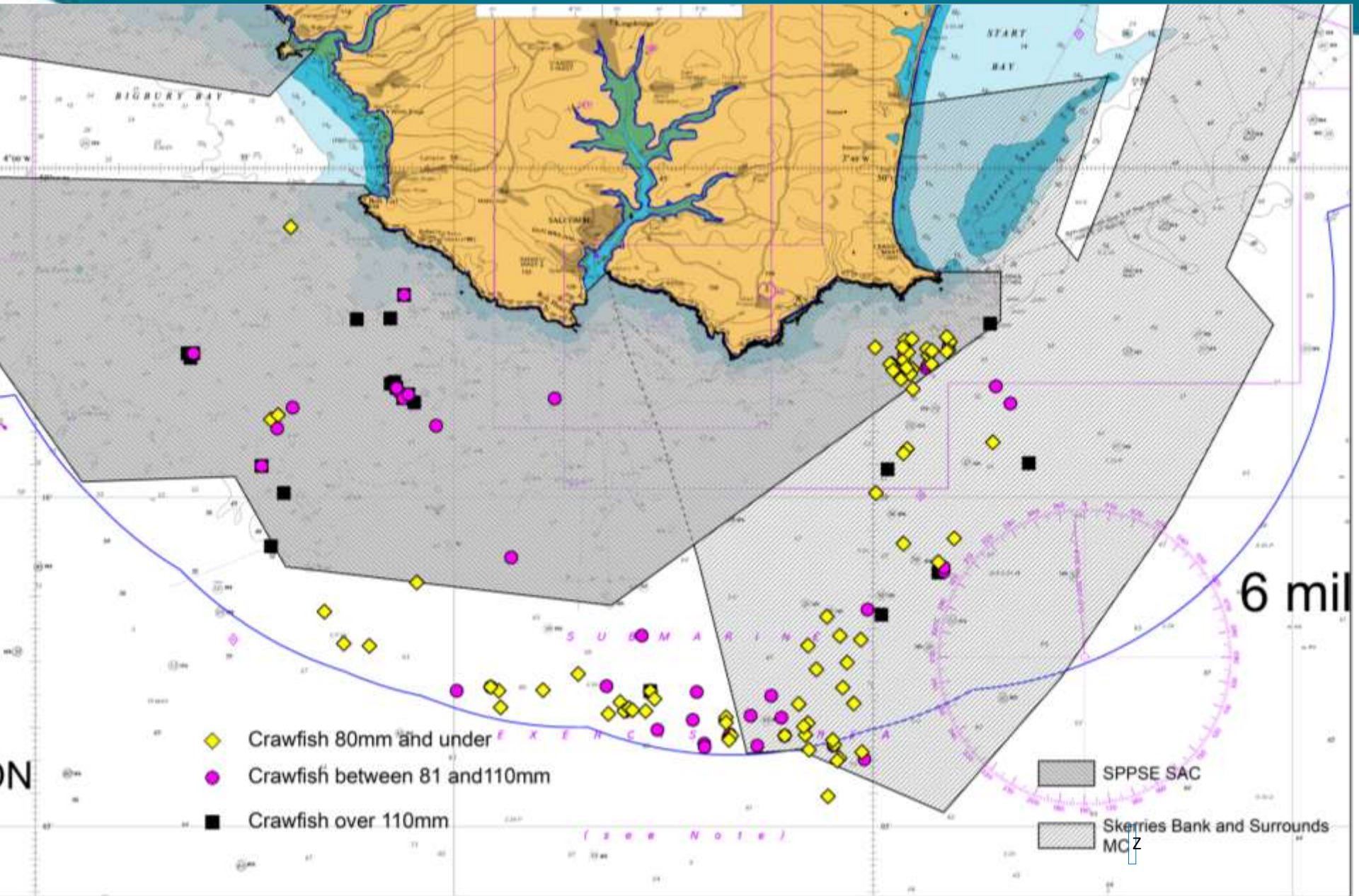
Fishermen's Data – Location of Recorded Catches from Three Vessels



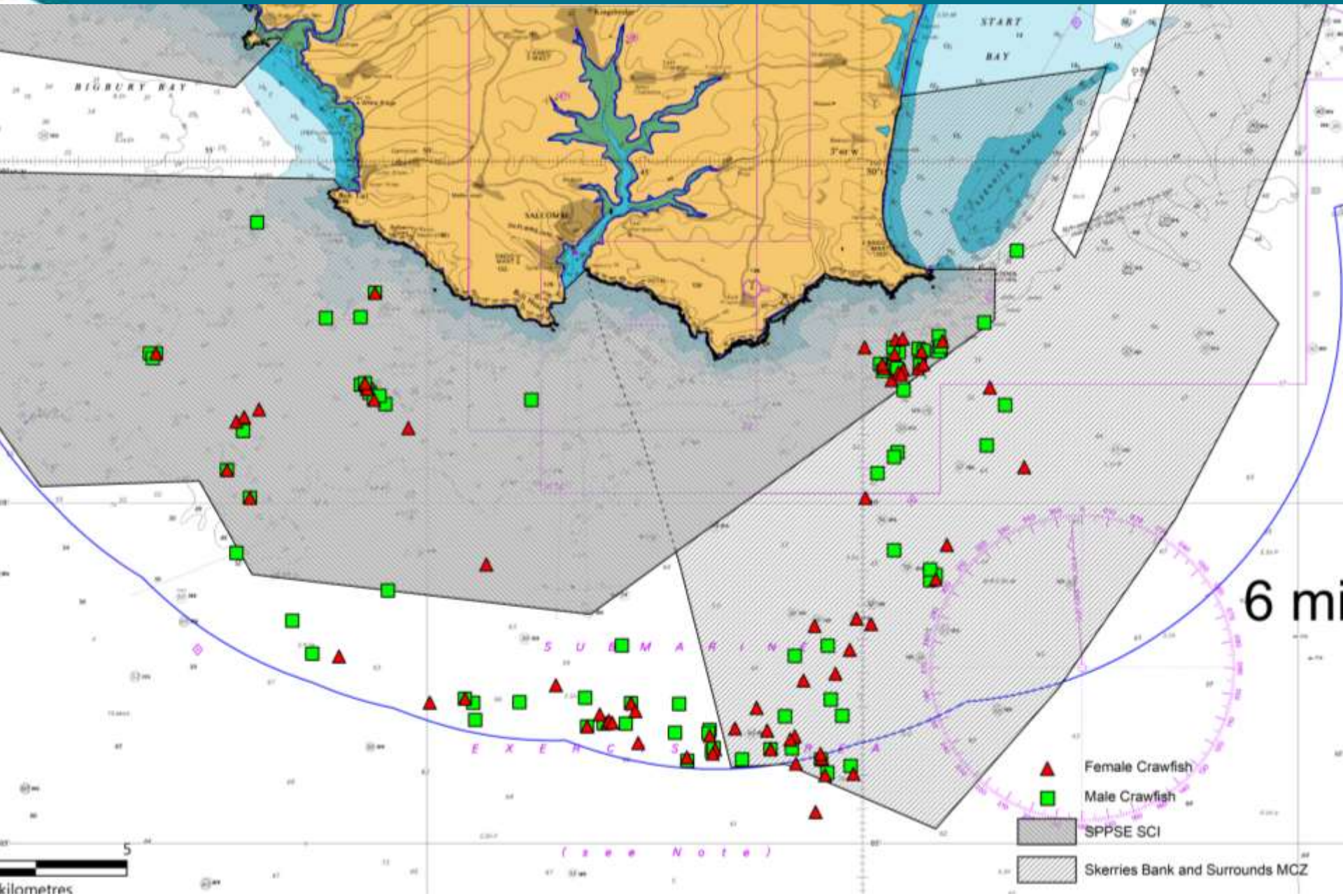
Fishermen's Data – Size Distribution of Recorded Crawfish Catches



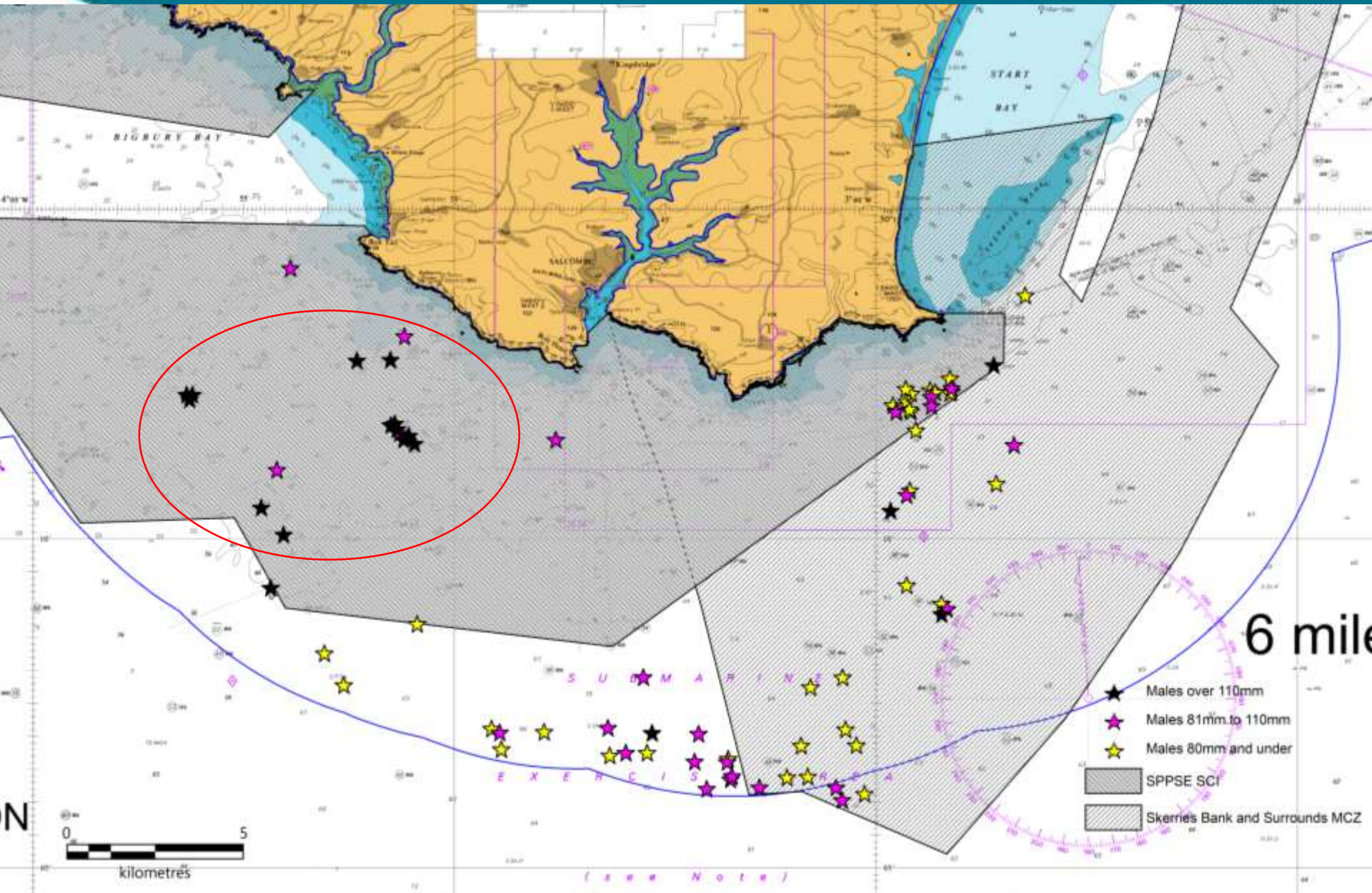
Fishermen's Data – Location of Different Size Ranges of Crawfish Caught



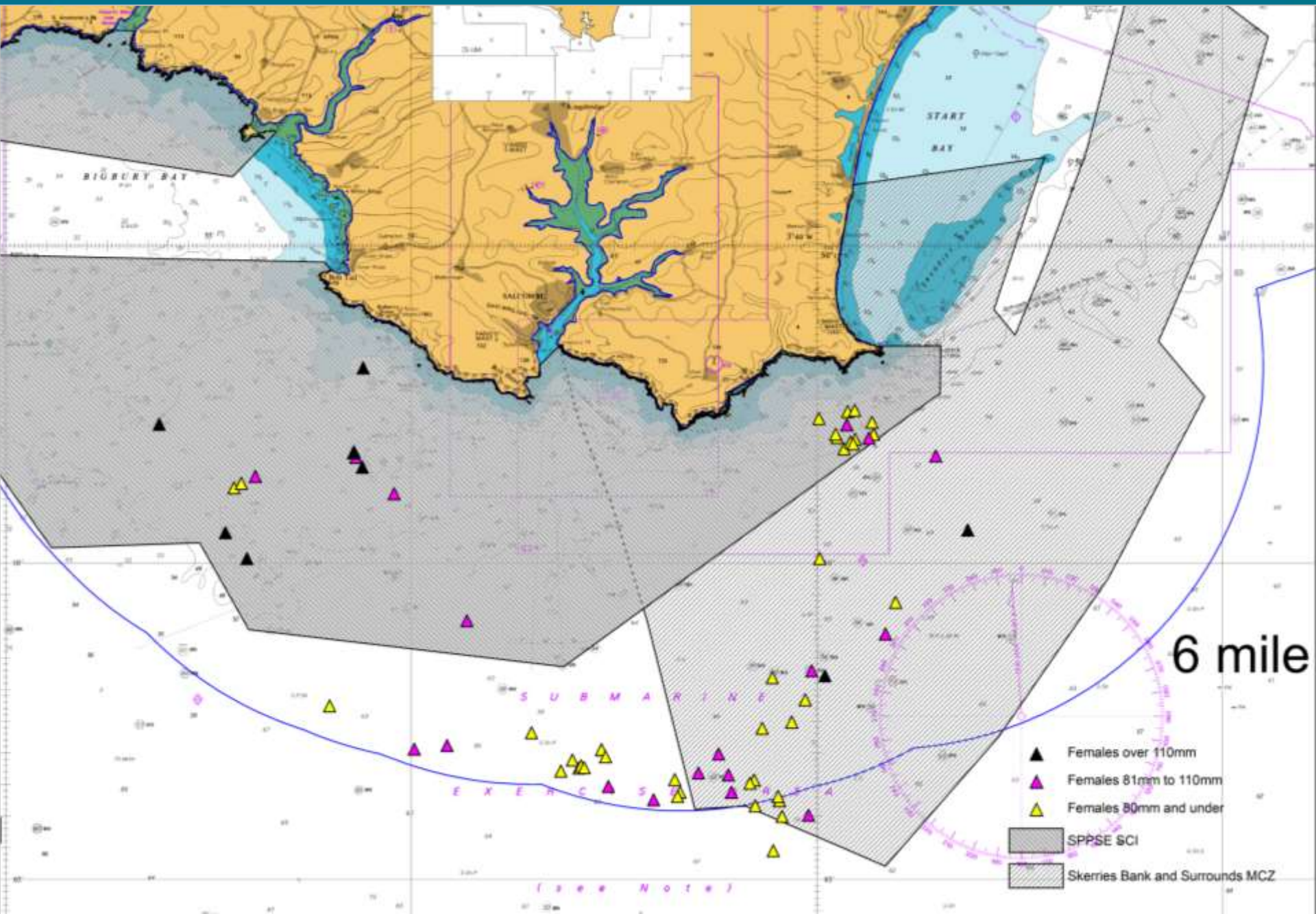
Fishermen's Data – Location of Male and Female Crawfish caught



Fishermen's Data – Location of Males of different sizes



Fishermen's Data – Location of Females of Different Size Ranges



Summary of Responses to D&S IFCA's Call for Information

Size

- Increase min size – 10/20mm increase on top of 110mm.
- Maximum landing weights have been suggested – convert to size?
- Introduce maximum size

Spatial

- Why closed areas – don't crawfish move?
- No trawling in 6nm
- Zonal restrictions
- Restrictions should apply inside and outside 6nm

Season/ Time

- Close fishery for 1-3 years to allow recovery and establish stock status
- Close fishery during migration
- Limited fishing season –Jan to April?

Gear/Gear Type

- No removal by divers - resulted in decline in 70s/80s
- No tangle nets
- Need management of divers and netters
- Storing in cages – concern about increased mortalities
- Restrict commercial landings 250-300 kg/year or number of crawfish
- Recreational fisher/divers 1 crawfish per day

Devon & Severn IFCA Inshore Fisheries and Con

Crawfish Research & Management Workshop

- Crawfish workshop 11th April 2019 to determine evidence gaps; management needs and research options and collaboration
- Range of attendees – Universities of Plymouth and Exeter; Isles of Scilly IFCA; Cornwall IFCA; Devon & Severn IFCA; Southern IFCA; members of Cornwall and Devon Fishing Industry; Natural England; Defra; Cefas; MMO; Cornwall Wildlife Trust; Marine Conservation Society; Seasearch; MBA
- Very positive and research projects determined

Devon & Severn IFCA
Inshore Fisheries and Conservation Authority

Workshop 11th April 2019

Overall Objectives

- Managing fishery and conservation features together
- Developing a localised, co-ordinated and precautionary approach to management

Management Objectives

- Need to avoid boom and bust fishery
- Consistent management across South West

Existing Research

- Seasearch sightings and surveys with Devon and Severn and Cornwall IFCA
- Data from three fishermen in South Devon
- Other research summarised at: https://www.marlin.ac.uk/species/detail/1145

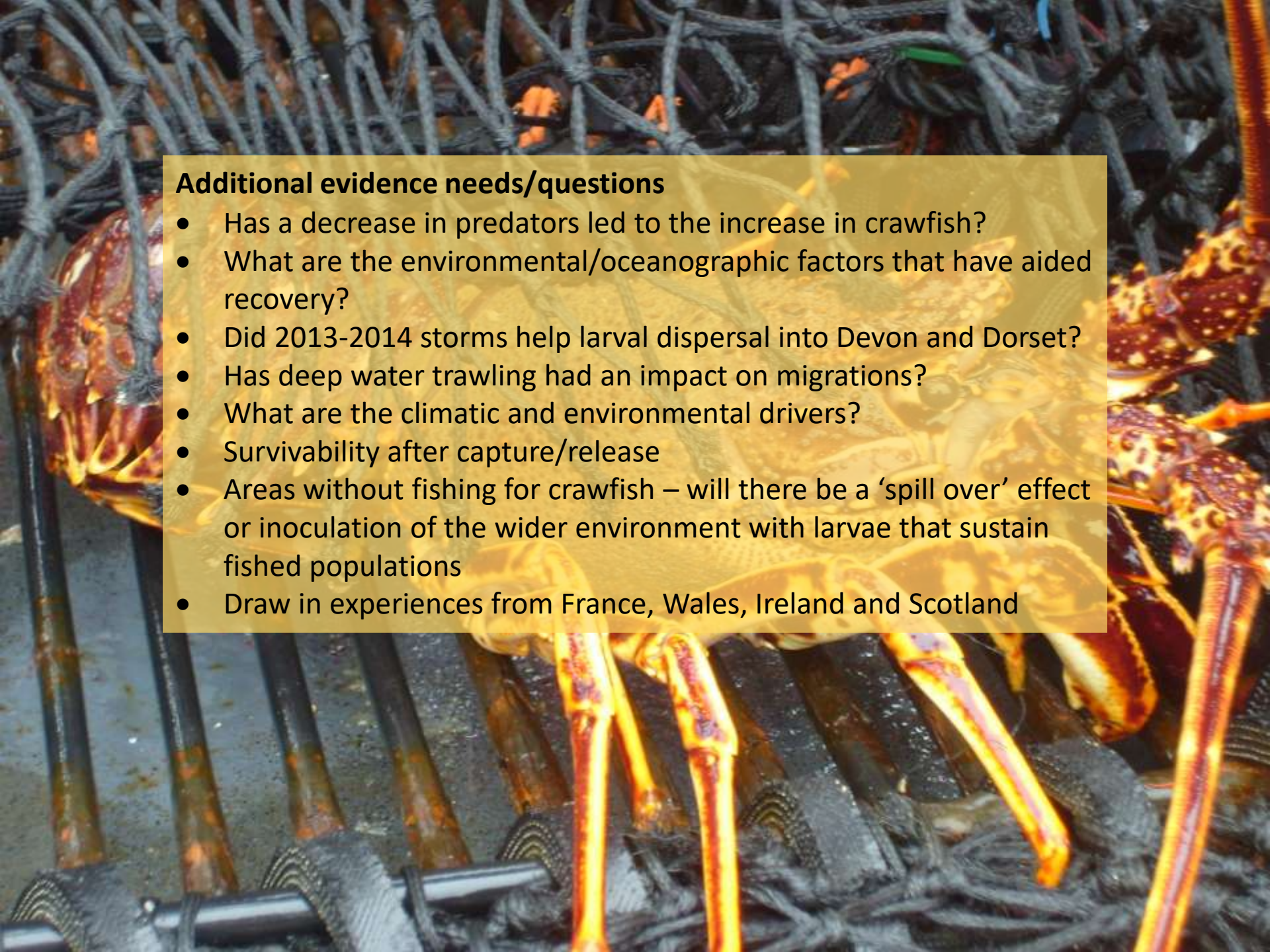
Evidence Needs for Management

Key questions:

1. Is this a sustained recovery?
2. Is recruitment coming from the plankton or migration continuing?

Some Unknowns

- Size at reaching sexual maturity in SW
- Stock assessments are necessary to provide catch limits
- Monitoring presence of recruits to ensure continued recruitment to stocks
- Where are larvae coming from and where are they going to?
- Landings associated with gear type
- Need to understand growth increments – how long until the size class enters the fishery? – use tagging work and on-board surveys
- Catch data – needs to be more standardised across the region
- Are there genetically different populations across the NE Atlantic?
- What are their habitat preferences including for food and shelter?
- Stock assessments or baselines from the 1950s and 1960s 'Can we establish anything from the 1980s or 1990s from returns, local fishermen, recreational effort or anecdotal evidence?' This could be used as a reference period for the management of the fishery.
- On-board catch data (sizes, length/weight relationships, year classes)
- Biometric relationships
- Landings split - between male and female
- Environmental and oceanographic factors that have aided recovery

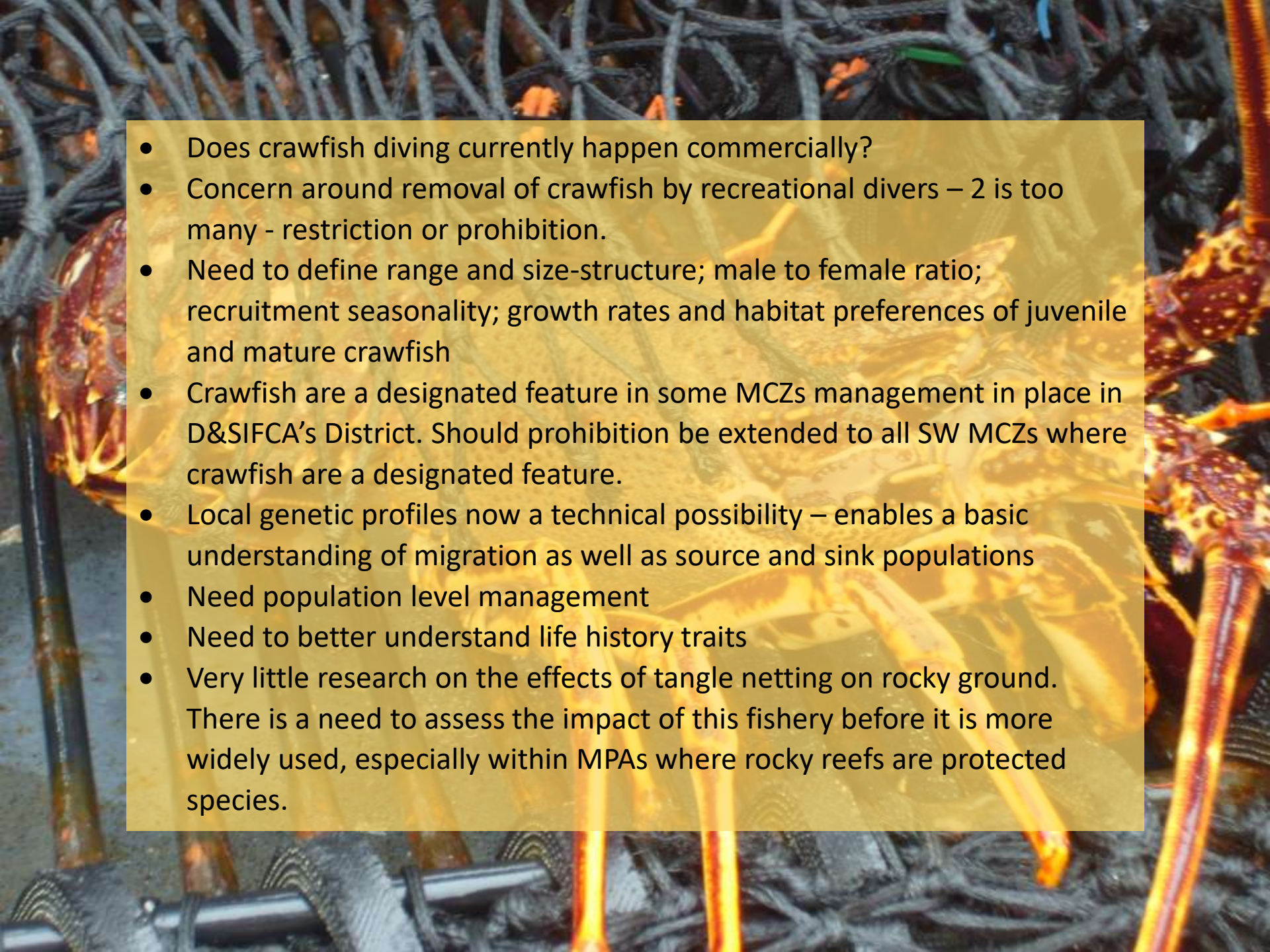


Additional evidence needs/questions

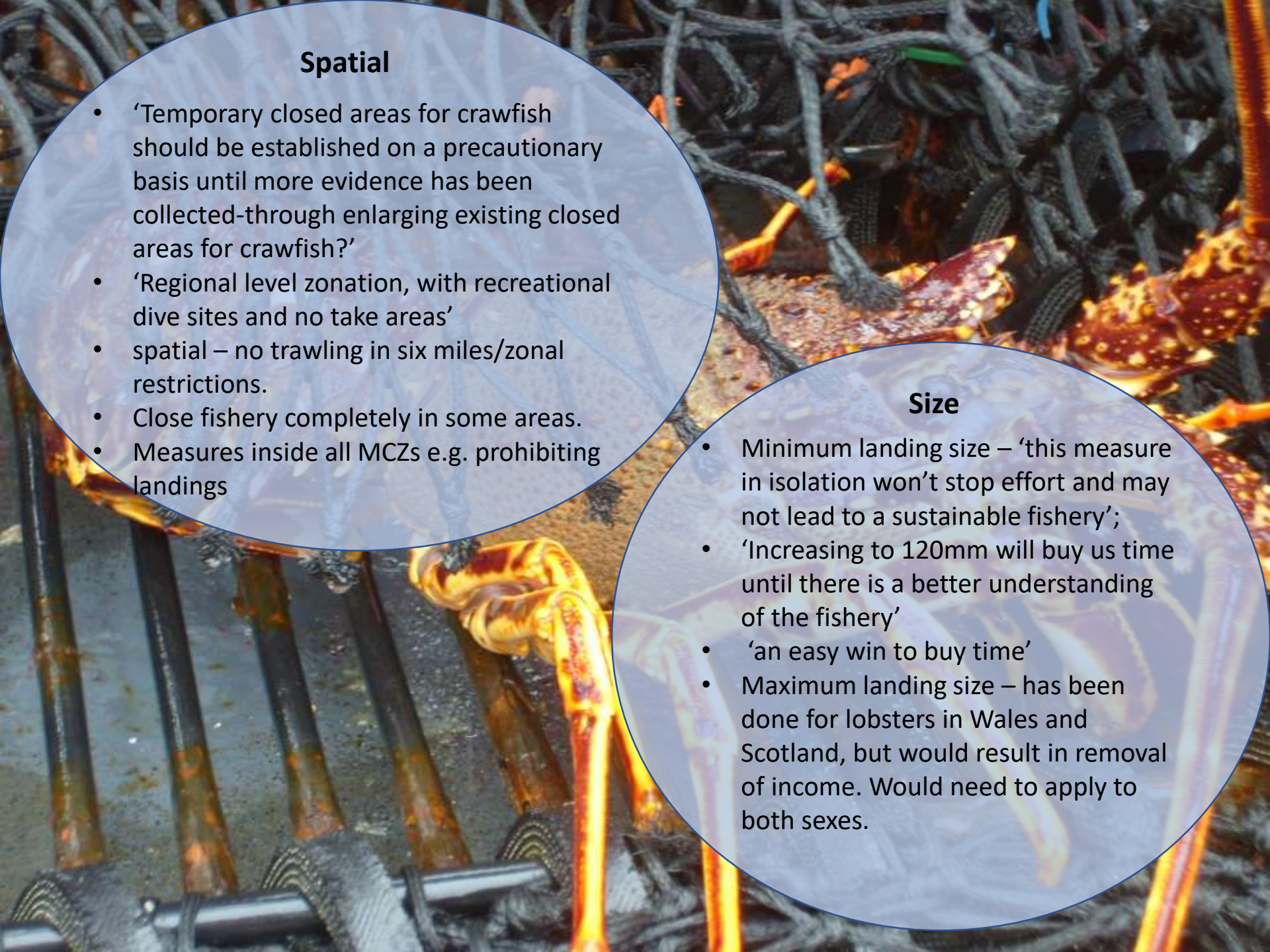
- Has a decrease in predators led to the increase in crawfish?
- What are the environmental/oceanographic factors that have aided recovery?
- Did 2013-2014 storms help larval dispersal into Devon and Dorset?
- Has deep water trawling had an impact on migrations?
- What are the climatic and environmental drivers?
- Survivability after capture/release
- Areas without fishing for crawfish – will there be a ‘spill over’ effect or inoculation of the wider environment with larvae that sustain fished populations
- Draw in experiences from France, Wales, Ireland and Scotland

General Management Concerns/ Needs?

- Larger crawfish are more fecund, but as a catch are harder to sell
- Crawfish are not potted for – landable crawfish caught in nets
- Is there a design of trap that would attract crawfish for a crawfish-specific fishery?
- Most vessels are not currently netting for crawfish, but could switch if brown crab stocks decline
- Need to protect existing fishers who have a track record
- Local demand and entitlement to catch (through establishment of a track record) may increase
- Concern that there could be an increase in targeted fishery/ increase in potting effort
- Need to be able to distinguish between targeted and bycatch crawfish – landings data
- Management needs to be applied nationally, and if possible co-ordinated regionally
- Already natural management through reduction in effort in winter and fishing within neaps (in the region of 150 days not targeted due to weather and tides)



- Does crawfish diving currently happen commercially?
- Concern around removal of crawfish by recreational divers – 2 is too many - restriction or prohibition.
- Need to define range and size-structure; male to female ratio; recruitment seasonality; growth rates and habitat preferences of juvenile and mature crawfish
- Crawfish are a designated feature in some MCZs management in place in D&SIFCA's District. Should prohibition be extended to all SW MCZs where crawfish are a designated feature.
- Local genetic profiles now a technical possibility – enables a basic understanding of migration as well as source and sink populations
- Need population level management
- Need to better understand life history traits
- Very little research on the effects of tangle netting on rocky ground. There is a need to assess the impact of this fishery before it is more widely used, especially within MPAs where rocky reefs are protected species.

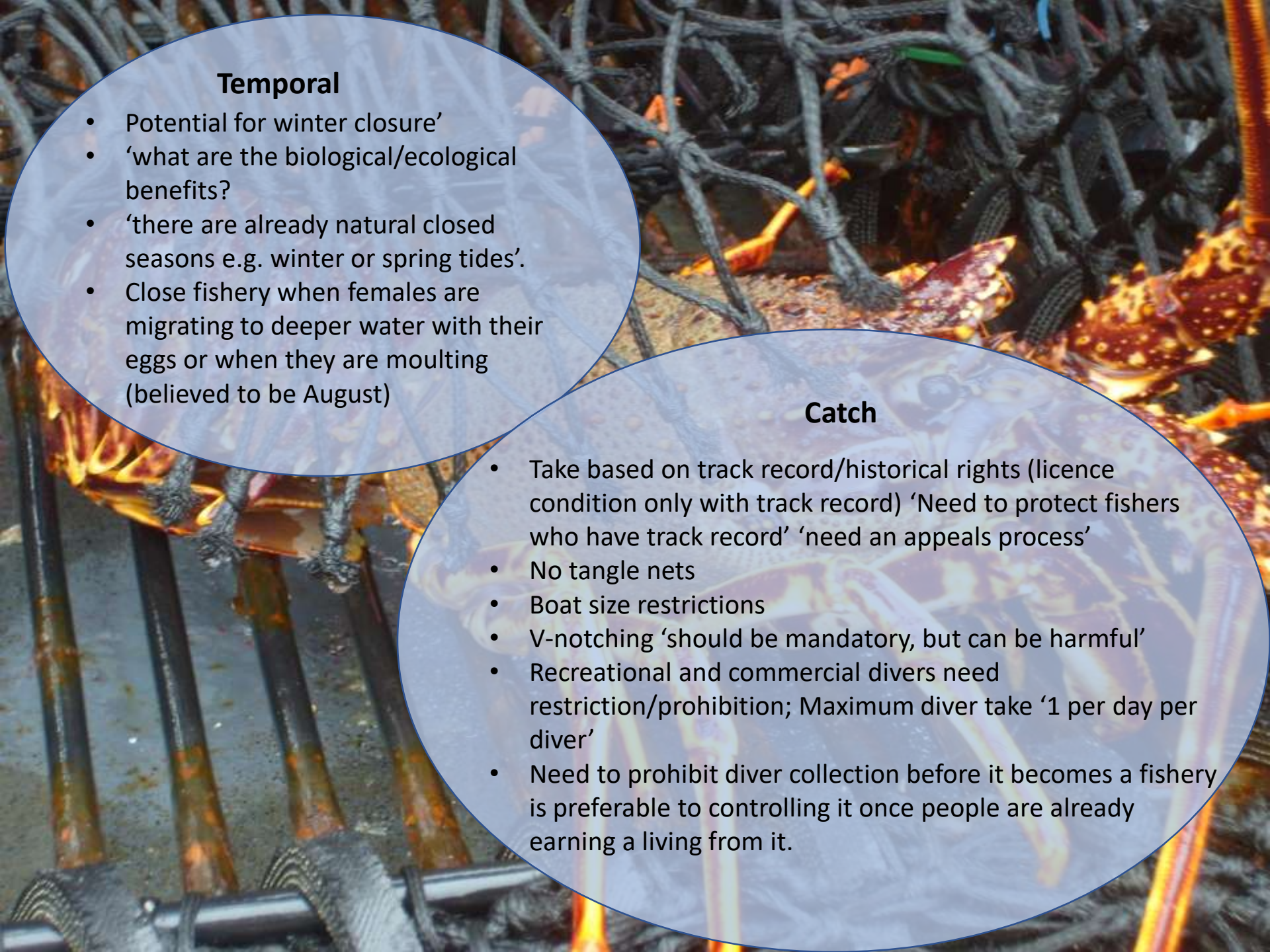


Spatial

- ‘Temporary closed areas for crawfish should be established on a precautionary basis until more evidence has been collected-through enlarging existing closed areas for crawfish?’
- ‘Regional level zonation, with recreational dive sites and no take areas’
- spatial – no trawling in six miles/zonal restrictions.
- Close fishery completely in some areas.
- Measures inside all MCZs e.g. prohibiting landings

Size

- Minimum landing size – ‘this measure in isolation won’t stop effort and may not lead to a sustainable fishery’;
- ‘Increasing to 120mm will buy us time until there is a better understanding of the fishery’
- ‘an easy win to buy time’
- Maximum landing size – has been done for lobsters in Wales and Scotland, but would result in removal of income. Would need to apply to both sexes.



Temporal

- Potential for winter closure'
- 'what are the biological/ecological benefits?
- 'there are already natural closed seasons e.g. winter or spring tides'.
- Close fishery when females are migrating to deeper water with their eggs or when they are moulting (believed to be August)

Catch

- Take based on track record/historical rights (licence condition only with track record) 'Need to protect fishers who have track record' 'need an appeals process'
- No tangle nets
- Boat size restrictions
- V-notching 'should be mandatory, but can be harmful'
- Recreational and commercial divers need restriction/prohibition; Maximum diver take '1 per day per diver'
- Need to prohibit diver collection before it becomes a fishery is preferable to controlling it once people are already earning a living from it.

Evidence Gathering - Next Steps:

- Continue to request and collect SW fishers' catch/landings data *
- On-board surveys of fishing vessels to gather morphometric data:*
  - size frequency distribution
  - carapace length : weight ratio
  - relationship between antennae, antennules, carapace width, carapace length, total length, other relevant data
  - population analysis
  - year classes/recruitment
- Size of sexual maturity – size first showing eggs*
- Tagging of crawfish to investigate movements/migration and growth increments*
- Population genetics research across the SW
- Life history
- Sales notes data from MMO – further analysis of landings data*
- Investigate past landings and historical information to determine track record information
- Extent of commercial / recreational diver and removal*
- Dive surveys
- Stock assessment
- Benefit of non-fished areas vs fished areas

What's underway?

- D&S IFCA is organising on-board surveys with fishermen
- Dispensations to bring in undersize for D&S IFCA to train fishermen to tag and undertake morphometric measurements – Salcombe, Dartmouth, Plymouth? Ilfracombe?
- Encouraging more data collection by fishermen – extending catch recordings –SD&CS
- SW IFCAs meeting in May – Isles of Scilly to share tagging methodology and genetic sampling for Exeter university population studies
- Cefas observers to take genetic samples
- Universities of Exeter and Plymouth to look at past and present landings data
- Seasearch to extend dive surveys