Devon and Severn Inshore Fisheries and Conservation Authority

Update on Crawfish/ Spiny Lobster Research

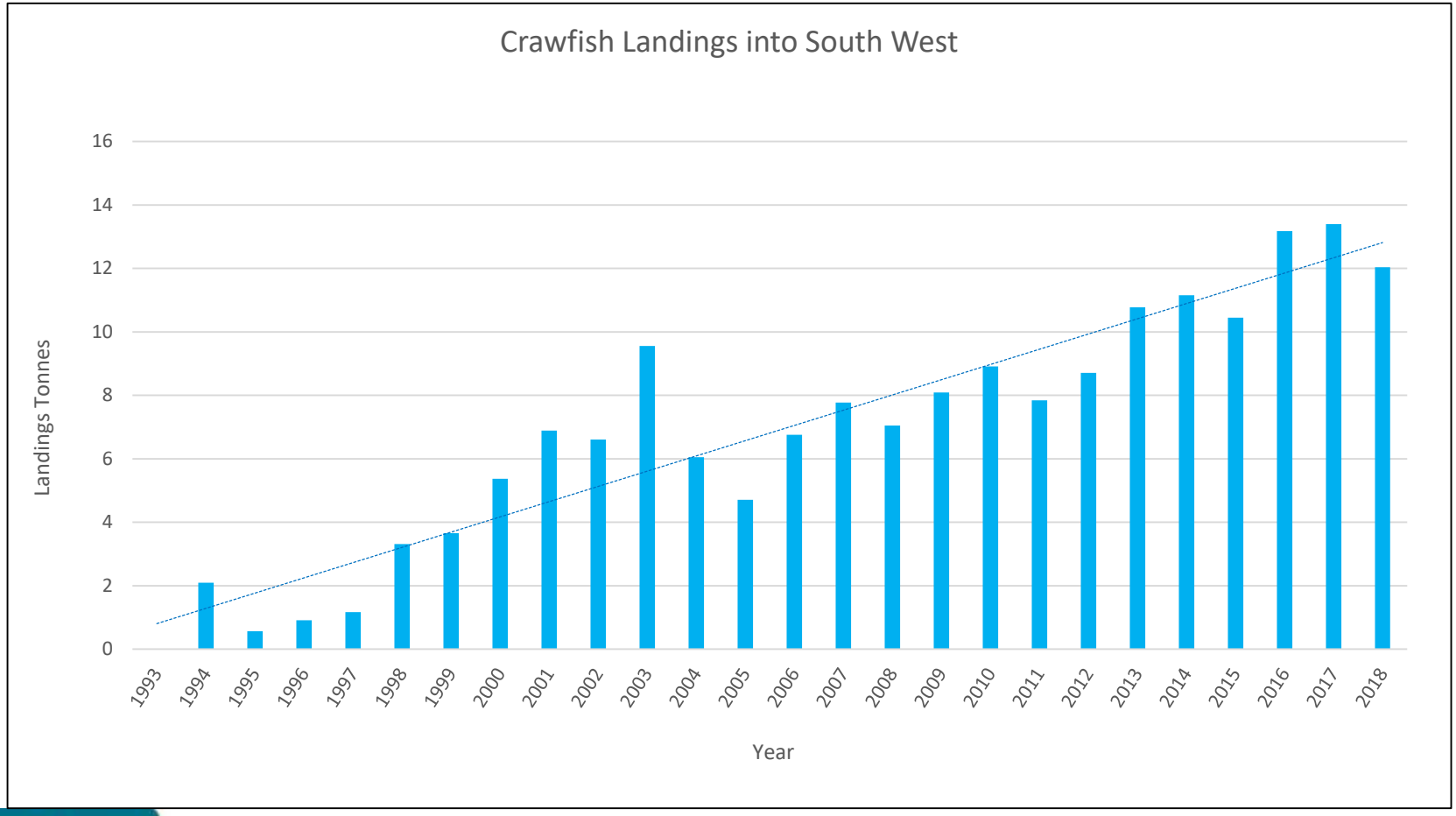
Sarah Clark
Deputy Chief Officer

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 - 2018



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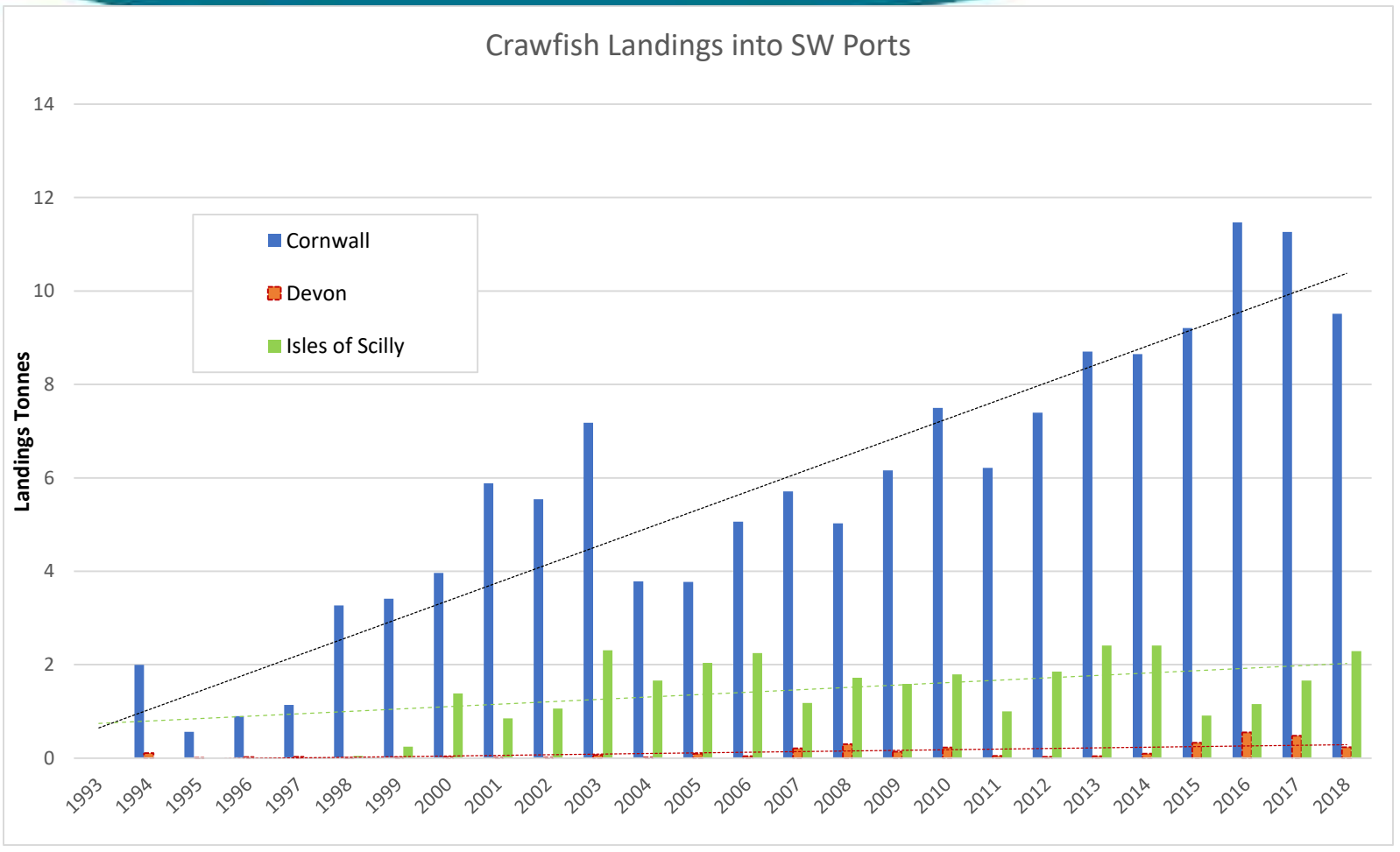
Crawfish Landings 1994 -2018



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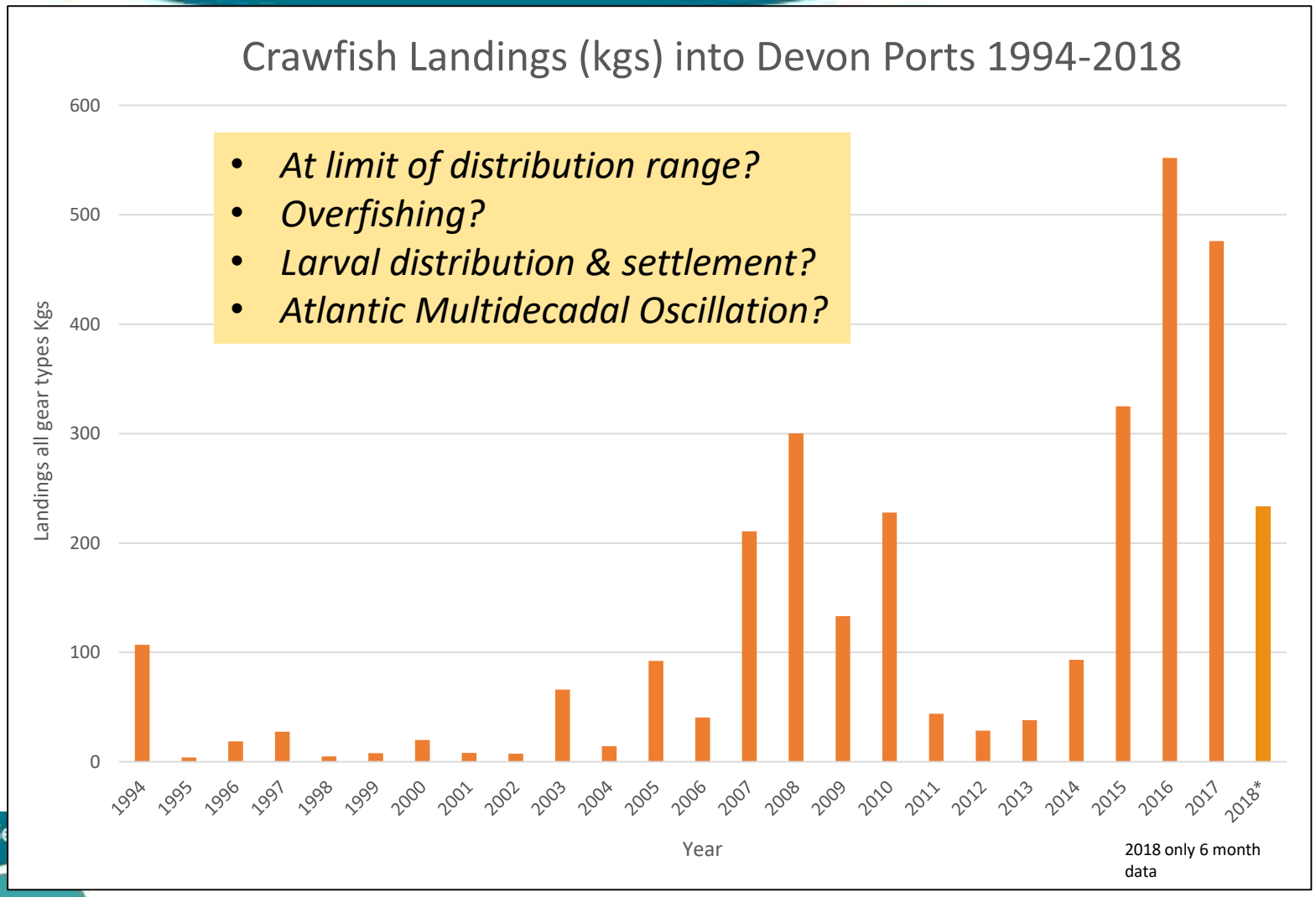
Crawfish Landings in Devon Ports 1994 -2018



- *At limit of distribution range?*
- *Overfishing?*
- *Larval distribution & settlement?*
- *Atlantic Multidecadal Oscillation?*

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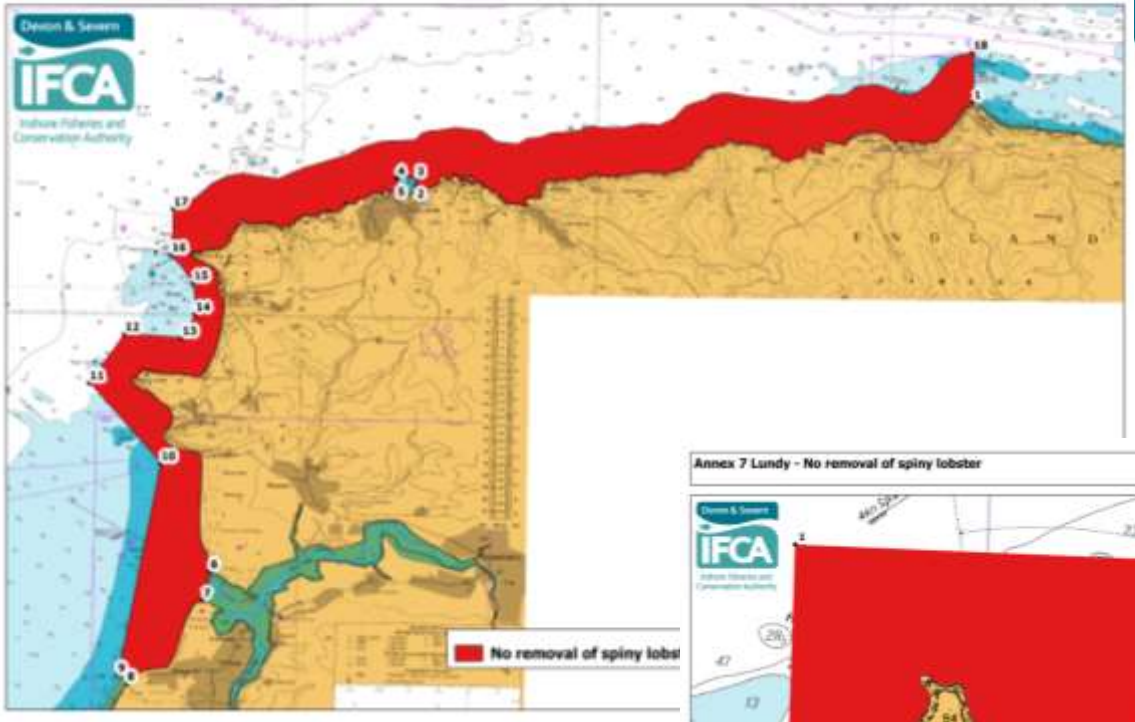
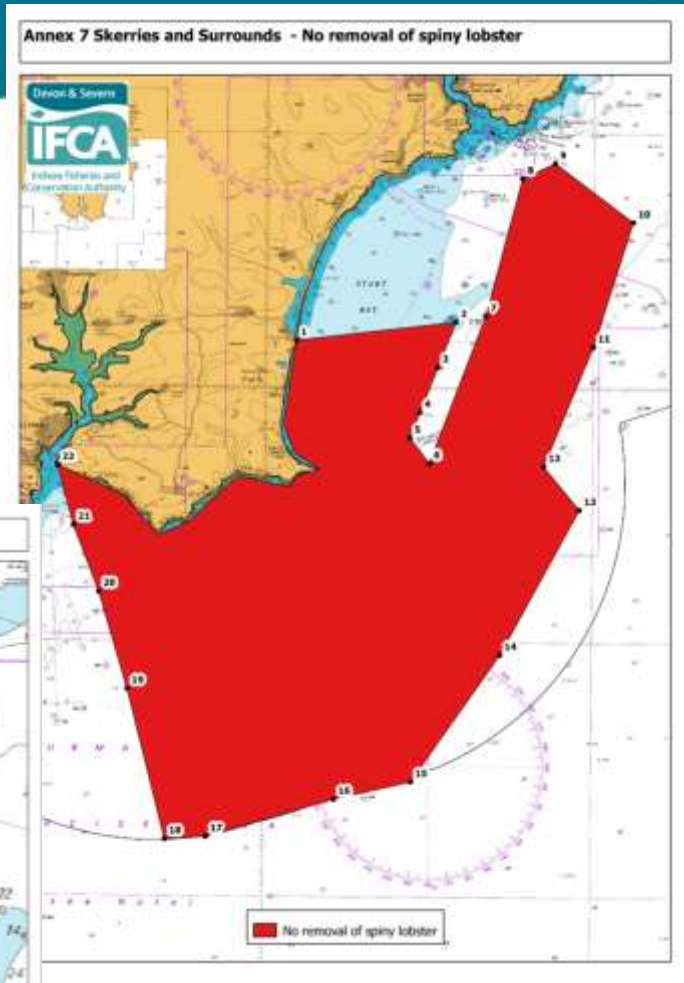
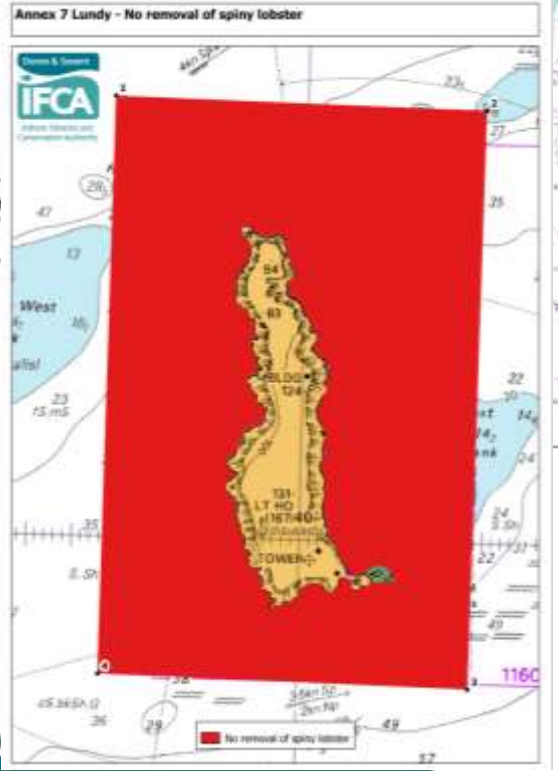
D&S IFCA Spatial Restrictions – No Removal of Spiny Lobster







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Management along Atlantic Coast - France

Summary of Information provided by Lucile Toulhoat - Comité National des Pêches Maritimes et des Elevages Marins, presented at the Mid-Channel Conference in March 2019:

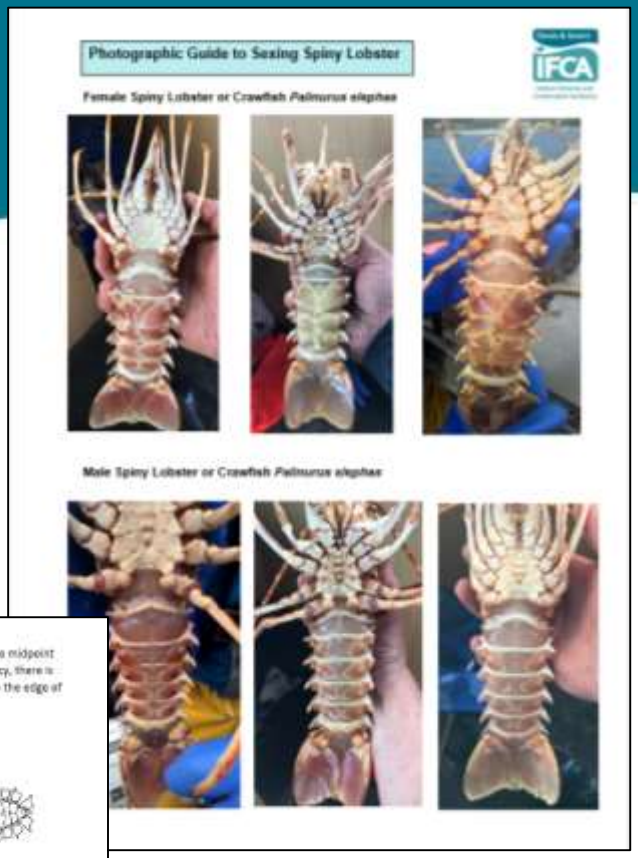
- *Stock decline - in 1975 - 400 tonnes landed, stabilized at around 200 tonnes for about 20 years and then dropped to the current level of 20-30 tonnes per year (<10,000 individuals)*
- *Valuable commercial species: 45-50 € / kg on average*
- *No TAC or catch quota. Catches are subject to the fishers' possession of a professional crustacean license but can be landed as a bycatch for non- licenced vessels*
- *A management plan was developed in 2000 with the industry – increased MCRS to 110mm; 3 month closure (January to March); later a ban on landing berried lobsters and areas where fishing is not allowed*
- *Since 2013 -2014 – large number of juveniles seen*
- *Stock recovery may be due to management introduced and/or environmental conditions*
- *Juveniles may reached MCRS in 2019/2020 and there is a need to regulate landings more strictly to achieve good stock status and sustainable exploitation*
- *New measure being introduced in 2019 is to put rings on each crawfish landed (both targeted and bycatch/recreational) to better document catches, improve compliance of existing regulations and potentially introduce a quota on the rings given to fishers*

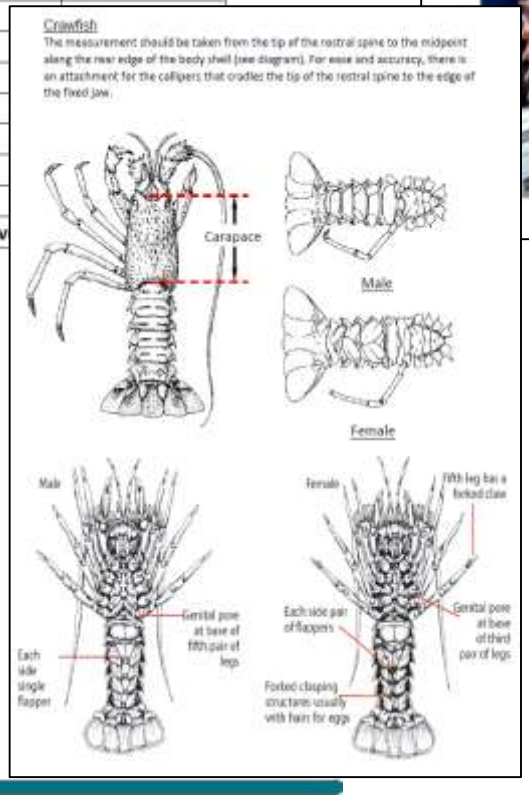
D&S IFCA Research: Crawfish Surveys with Industry

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.
- Three fishermen actively recording data.

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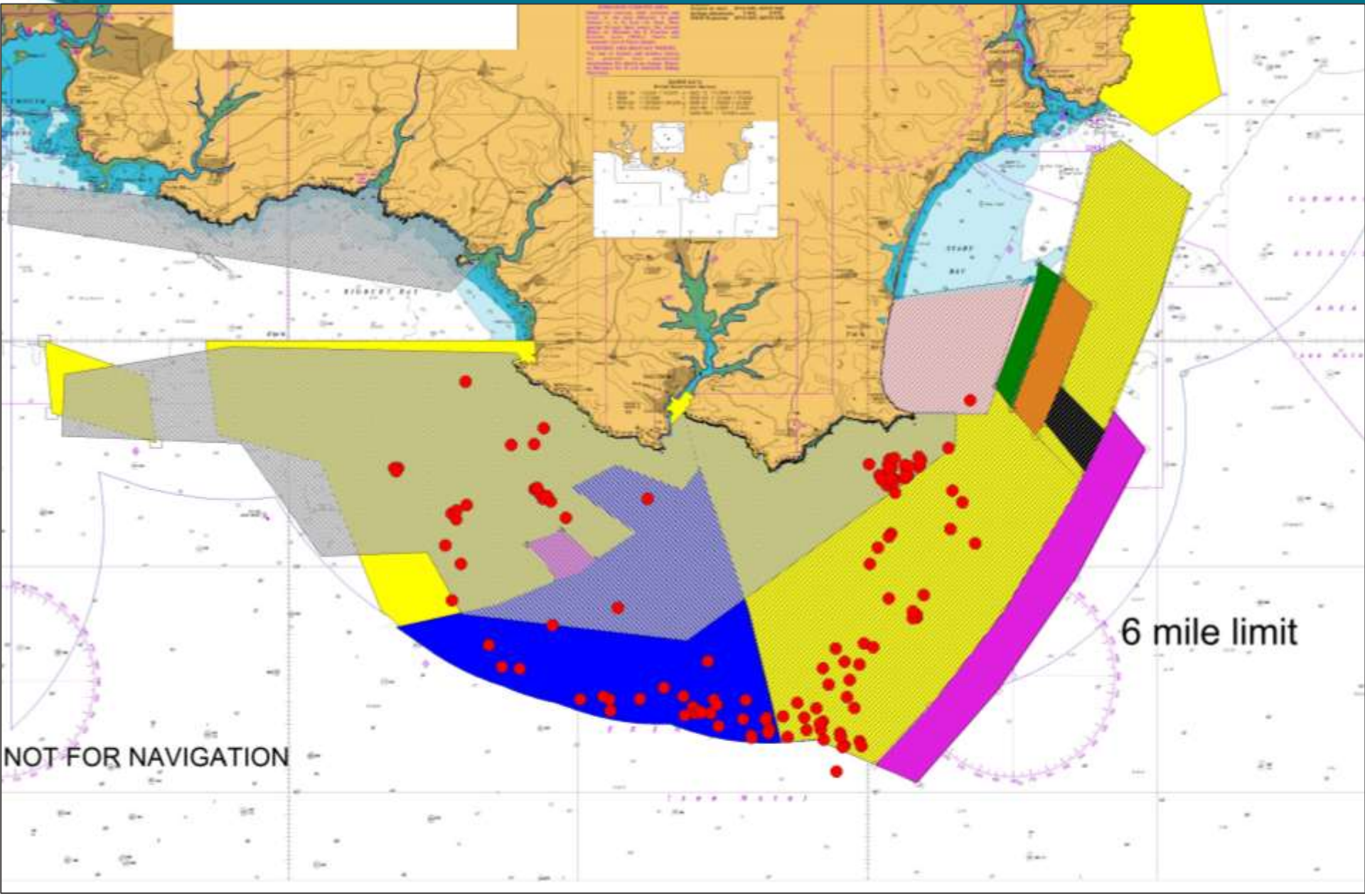
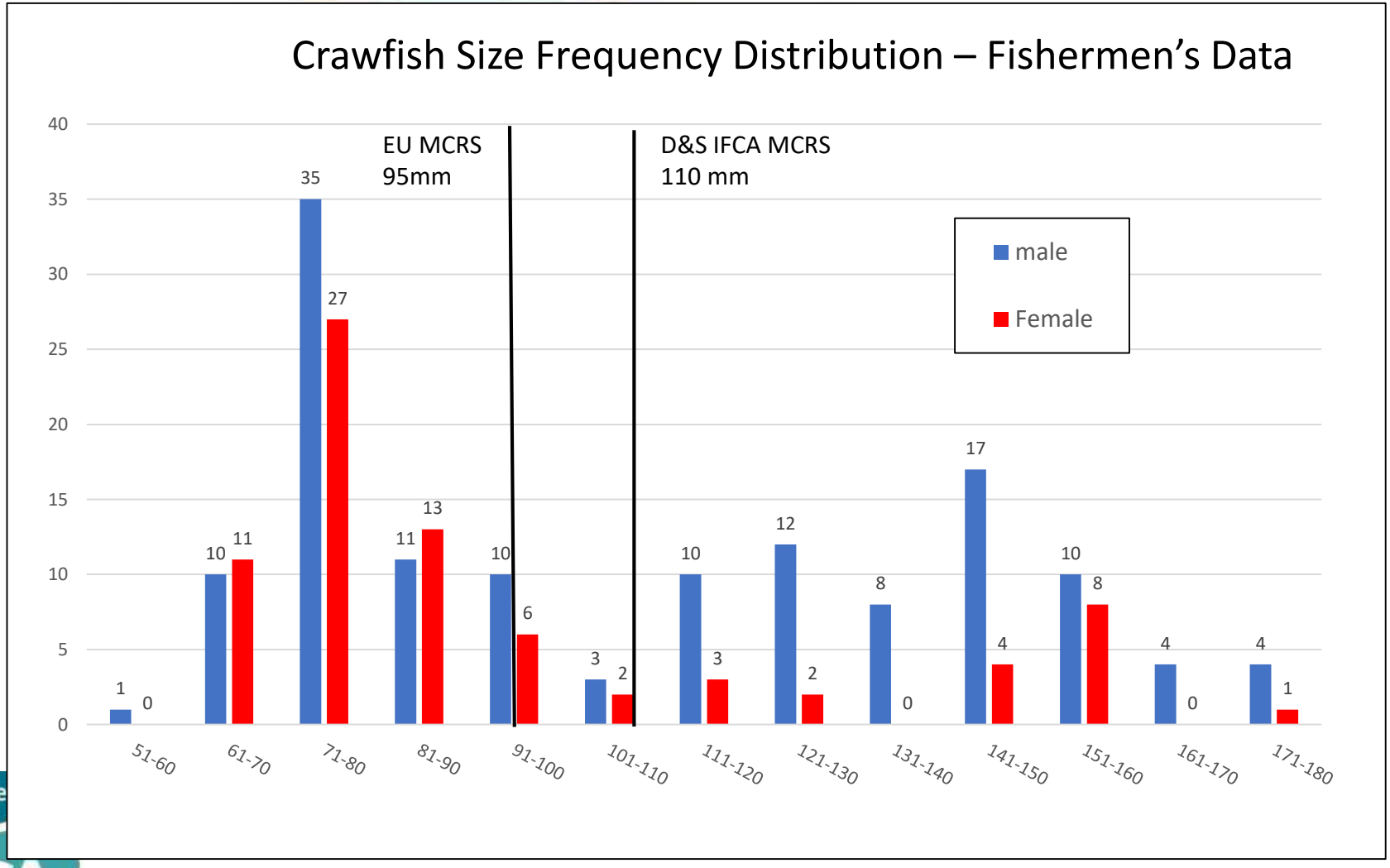
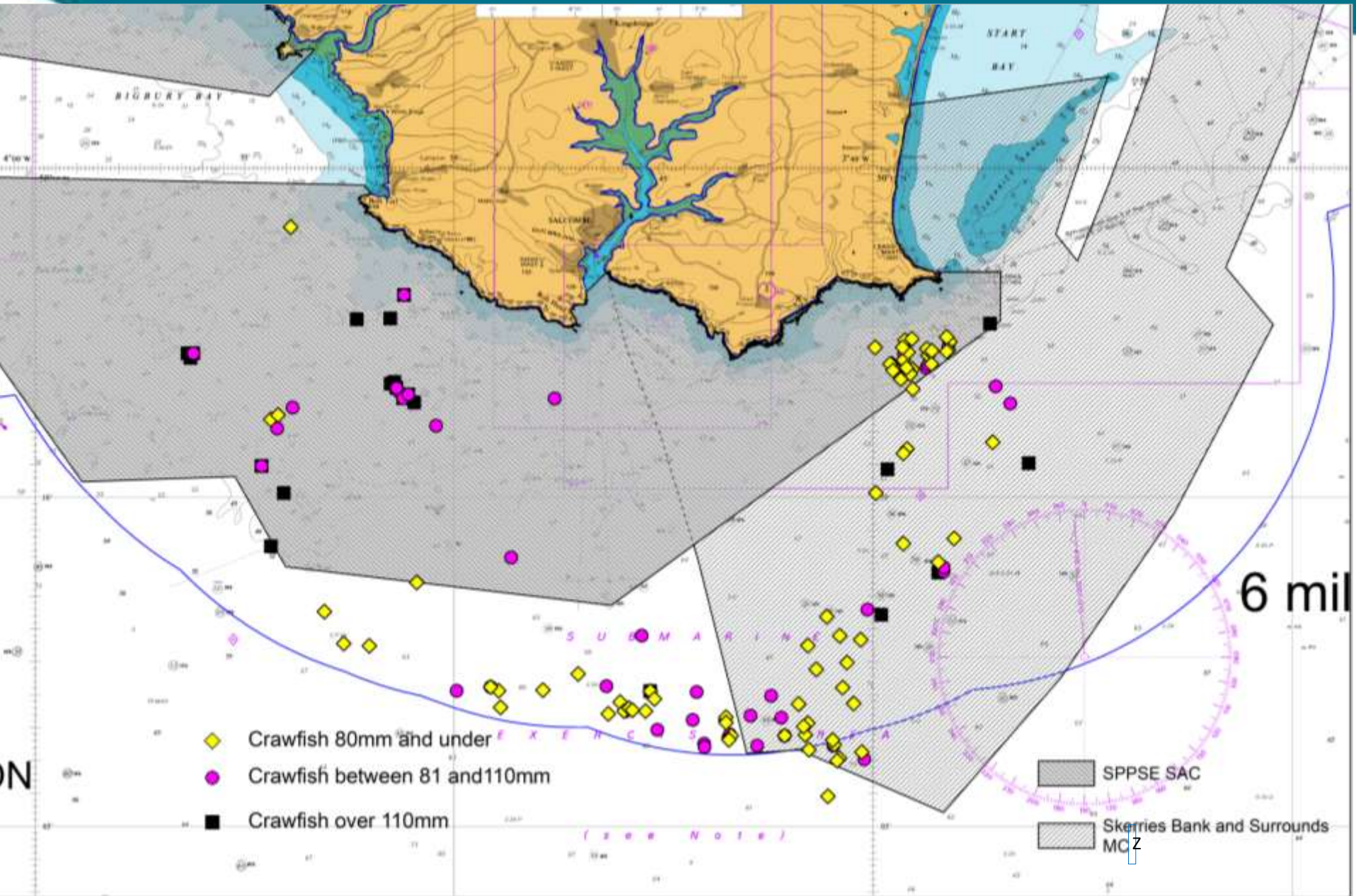
Fishermen's Data – Location of Recorded Catches from Three Vessels



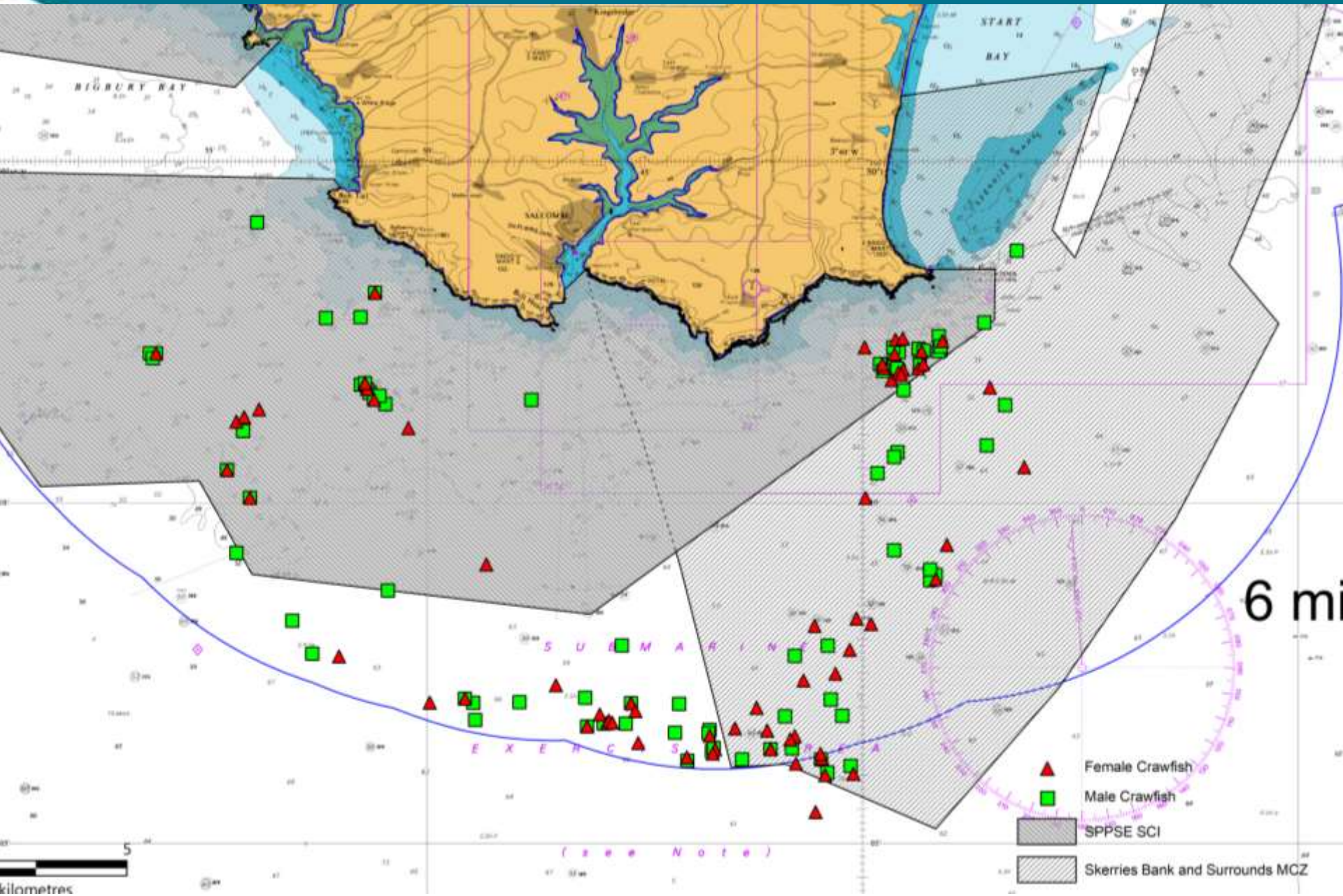
Fishermen's Data – Size Distribution of Recorded Crawfish Catches



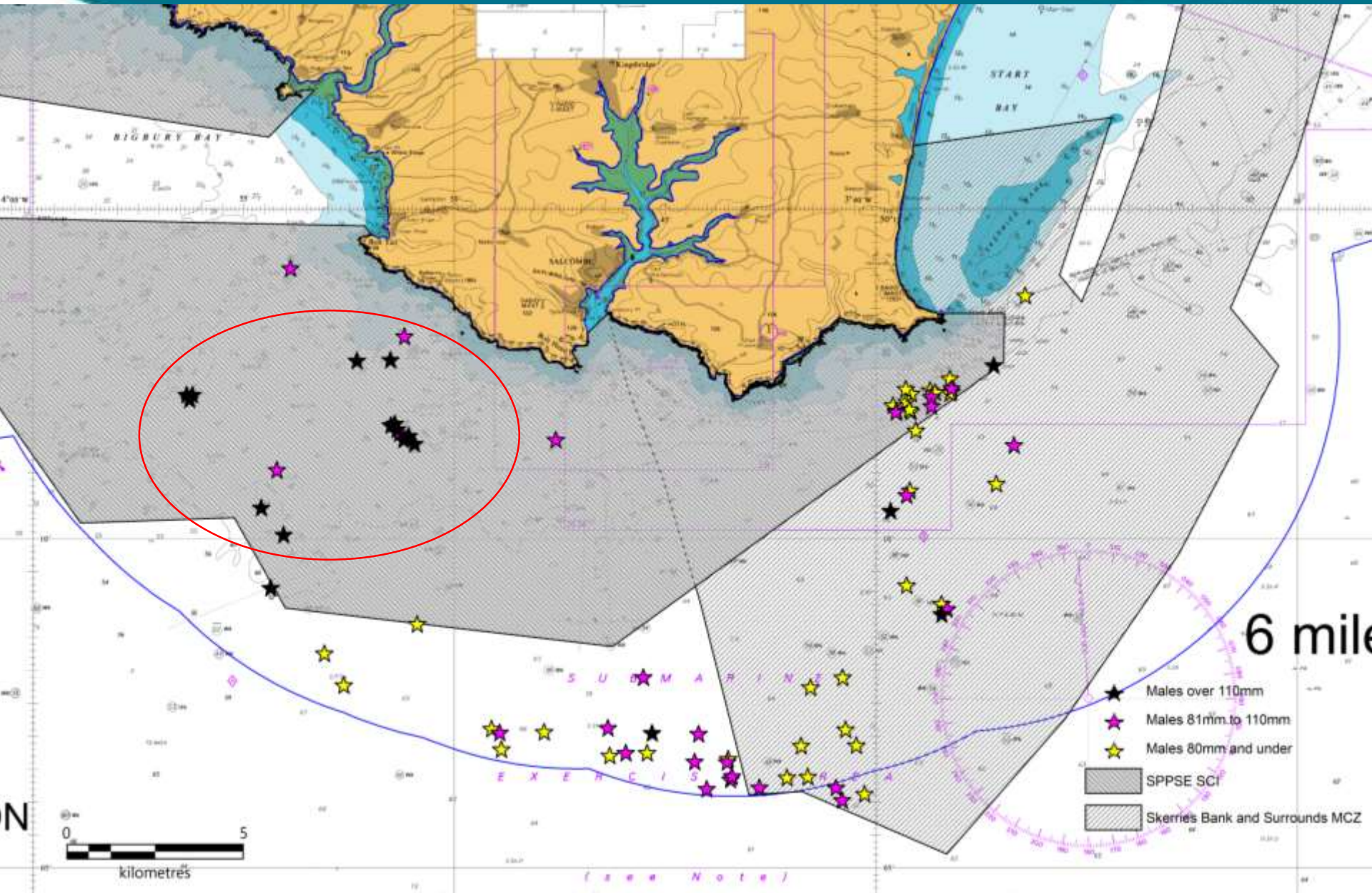
Fishermen's Data – Location of Different Size Ranges of Crawfish Caught



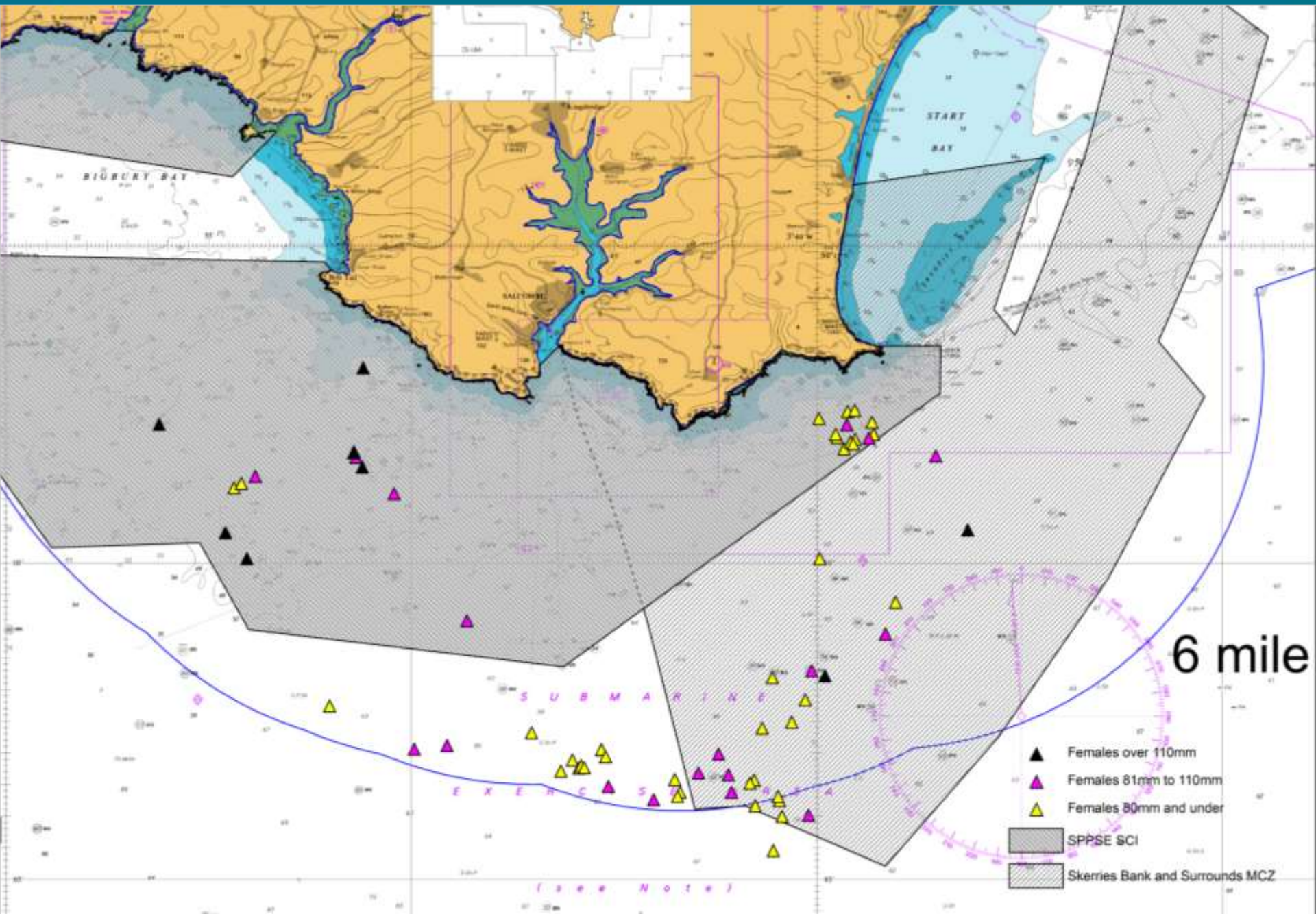
Fishermen's Data – Location of Male and Female Crawfish caught



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 - in and outside 6nm
- min/max 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

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

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Workshop 11th April 2019

Overall Management Objectives

- Managing fishery and conservation features together
- Developing a localised, co-ordinated and precautionary approach to management
- Need to avoid boom and bust fishery
- Consistent management across South West

Existing Research

- Catch Data gathered by three fishermen in South Devon
- Seasearch sightings and surveys with Devon and Severn and Cornwall IFCA
- 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?

Workshop 11th April 2019
Some Unknowns

- Size at sexual maturity in SW England
- No stock assessments - necessary to provide catch limits
- Need to monitor presence of recruits to assess future fishery
- Growth increments – how long until the size class enters the fishery?
- Where are larvae coming from and where are they going to?
- Landings associated with all fishing gear type including recreational
- Catches - size/frequency distribution, year classes, length/weight relationships; male: female ratio
- Are there genetically different populations across the NE Atlantic?
- What are their habitat preferences including for food and shelter?
- What are the environmental, climatic and oceanographic factors that have aided recovery?
- Has a decrease in predators led to the increase in crawfish?
- Did 2013-2014 storms help larval dispersal into Devon and Dorset?
- Has deep water trawling had an impact on migrations?
- Areas without crawfish removal– will there be a 'spill over'?
- Can we draw on experiences from France, Wales, Ireland and Scotland?

Workshop 11th April 2019

Management Concerns/ Needs

- Larger crawfish are more fecund, but larger crawfish maintain their value
- Crawfish are not usually potted for (in Devon) – landable crawfish caught in nets, often as bycatch of other targeted fisheries e.g. monkfish
- Need to be able to distinguish between targeted and bycatch crawfish – landings data
- Could targeted pot or net fisheries deveop as recruits enter the fishery?
- Need to protect existing fishers who have a track record
- Local demand and entitlement to catch may increase
- Management needs to be applied nationally, and if possible co-ordinated regionally
- Does commercial diving for crawfish currently happen?
- Concern around removal of crawfish by recreational divers – 2 is too many – further restriction or prohibition?
- Should a ban on removal be extended to all SW MCZs where crawfish are a designated feature (already protected in D&S IFCA's District)?
- Impacts of tangle netting on rocky ground, especially within MPAs.
- 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)

Attendees suggestions for management

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.

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

Attendees suggestions for management

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)

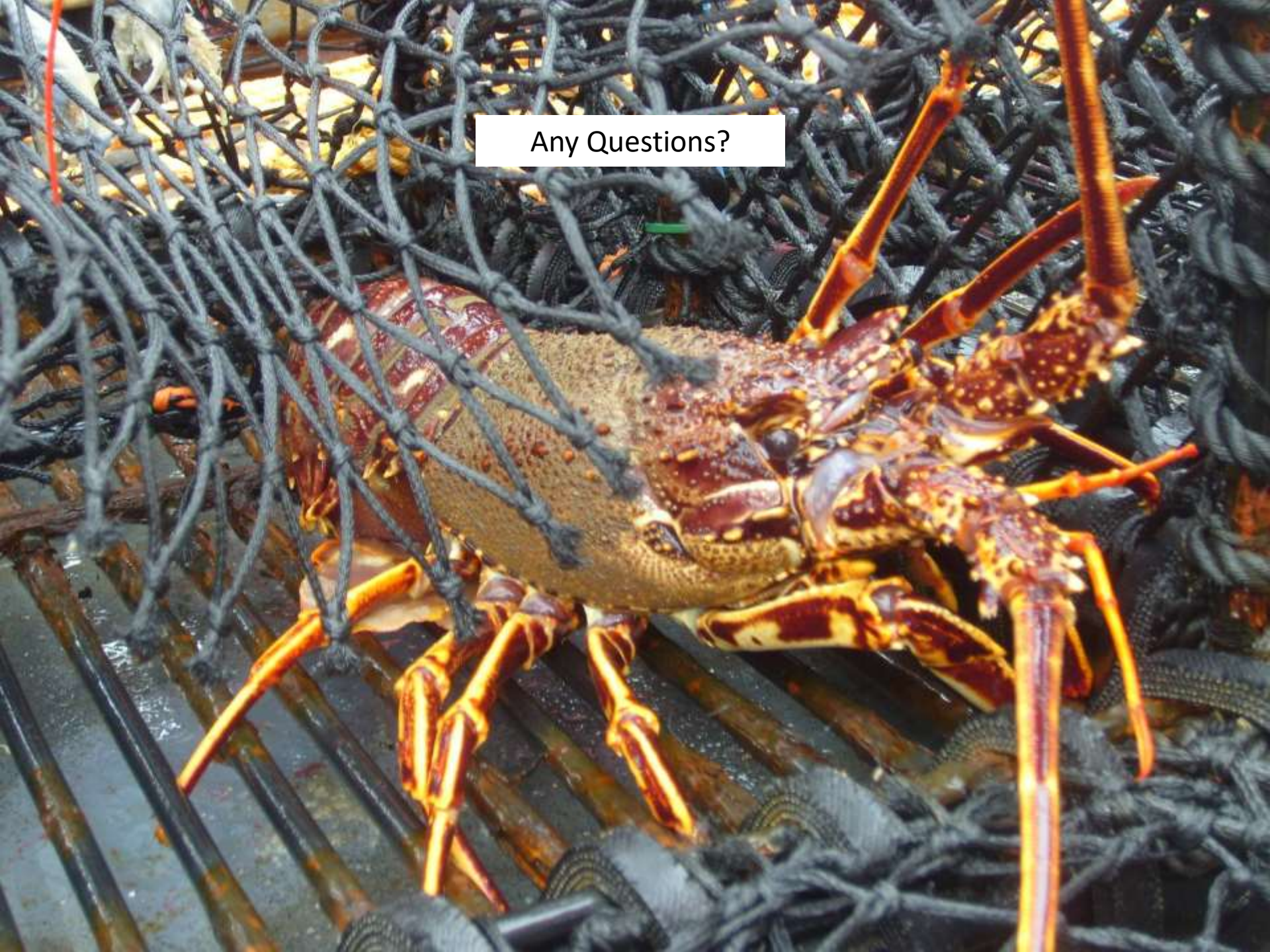
Catch

- 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 and encouraging more data collection
- On-board surveys of fishing vessels to gather morphometric data:

  **size frequency distribution; *carapace length : weight ratio; *morphometric/biometric measurements; *population analysis; *year classes/recruitment*
- Size of sexual maturity – size first showing eggs
- Tagging of crawfish to investigate movements/migration and growth increments – working with fishers. All IFCAs involved
- Population genetics research across the SW by Exeter University – samples of tissue taken
- Understanding life history and habitat preferences
- Sales notes data from MMO – further analysis of landings data
- Investigate past landings and historical information to determine track record information and understanding of the past fishery
- Effort level of commercial / recreational diving and crawfish removal
- Seasearch to extend dive surveys
- Investigate benefit of non-fished areas vs fished areas
- Cefas observers to take genetic samples and share catch data


Any Questions?