Crab and Lobster Stock Assessments

2020-2023 Update

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Outline

- Summary of Fishery and Assessment Areas
- Landings
- Stock Assessment
- Ongoing work
- Data exploration

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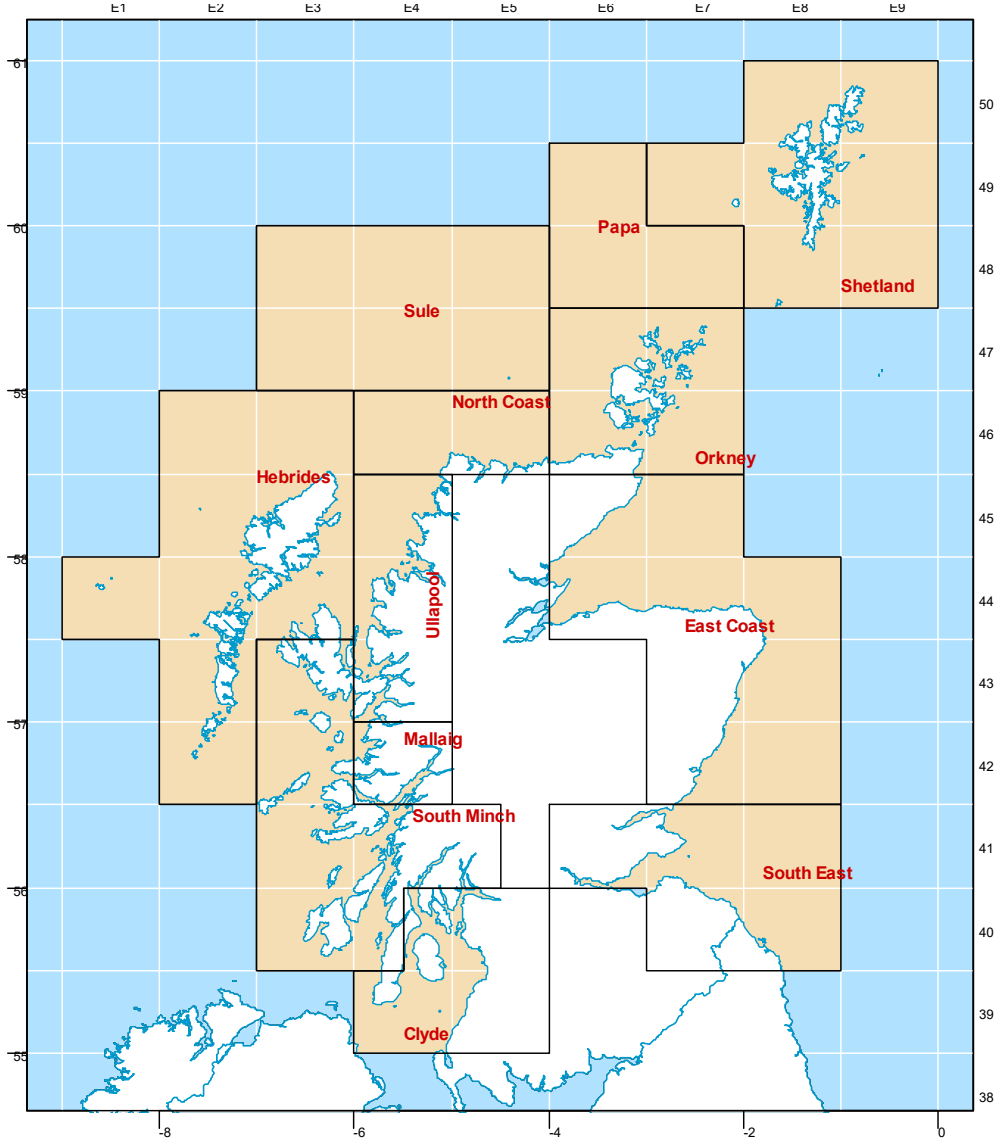
Crab and Lobster creel fishery

- The 4th most economically important fishery in Scotland in 2023 (£61 M)

- No EU TAC regulations or national quotas

- Main regulatory mechanism is Minimum Landing Size (MLS) – spatial variations

Crab and Lobster assessment units in Scotland



-12 Management Units

- Based on the landings reporting system

Landings into Scotland

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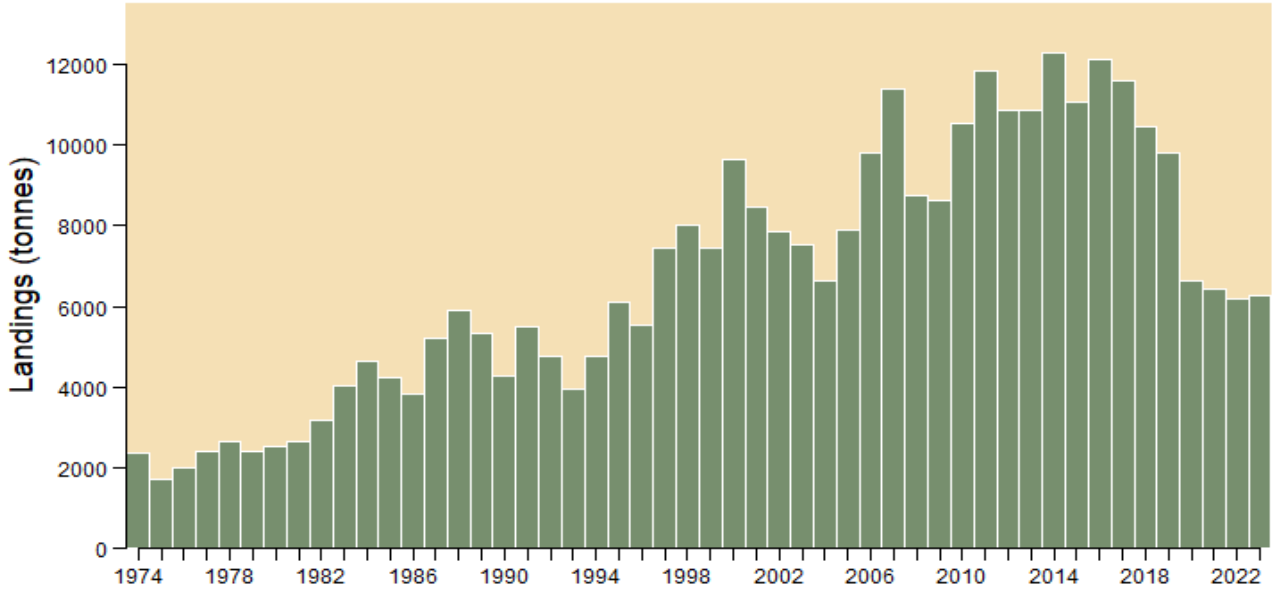
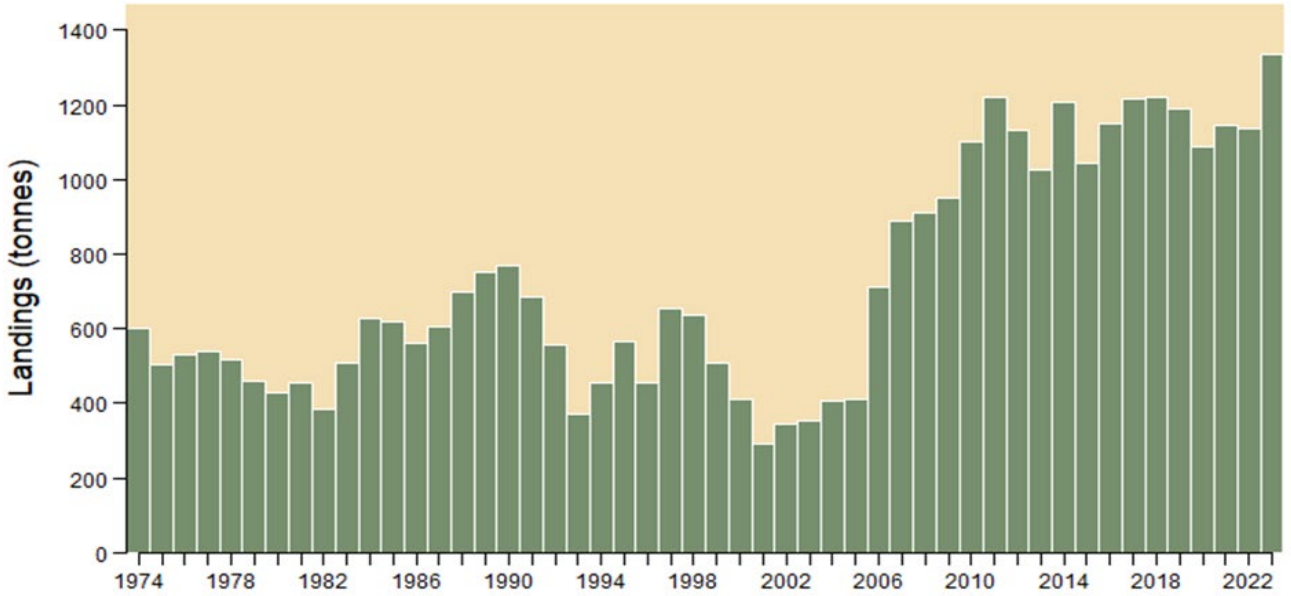


Brown crab



Lobster

Landings into Scotland

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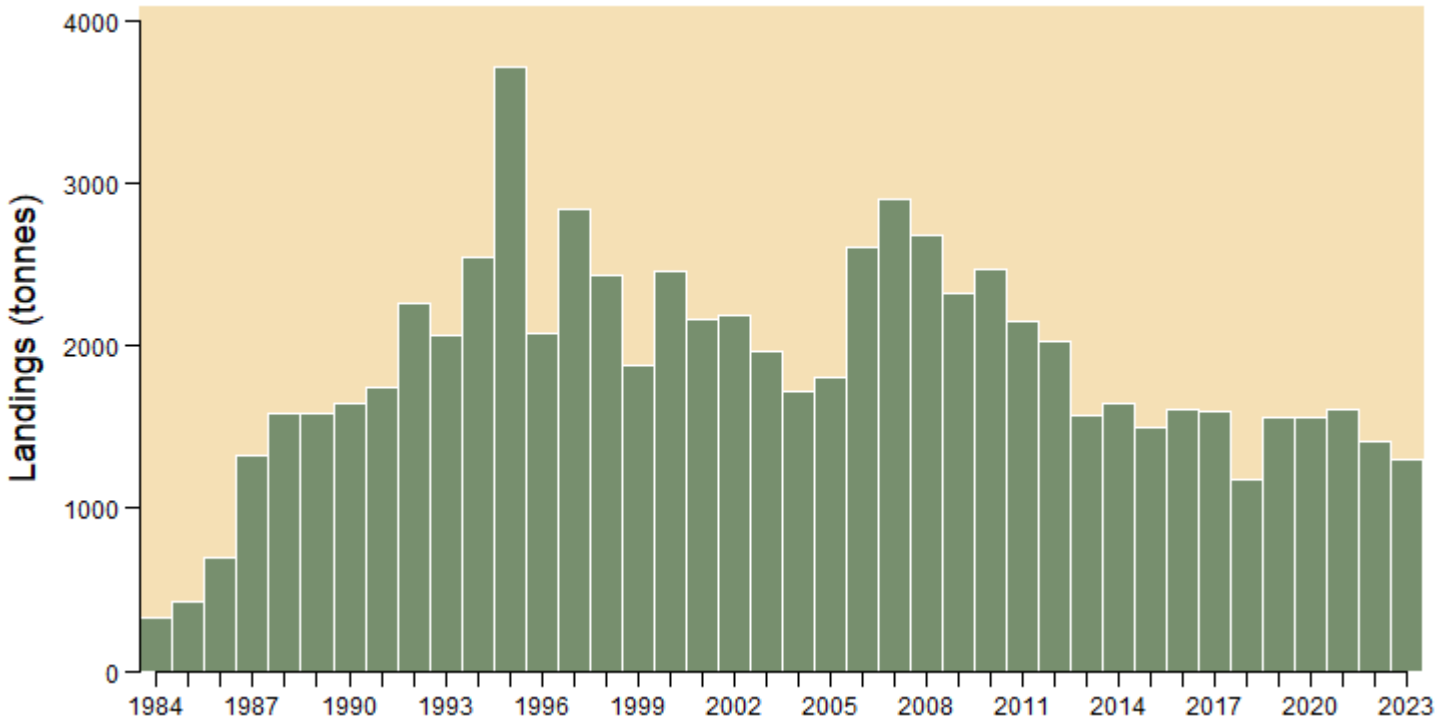

Velvet crab

Landings by Assessment Unit – Brown crab

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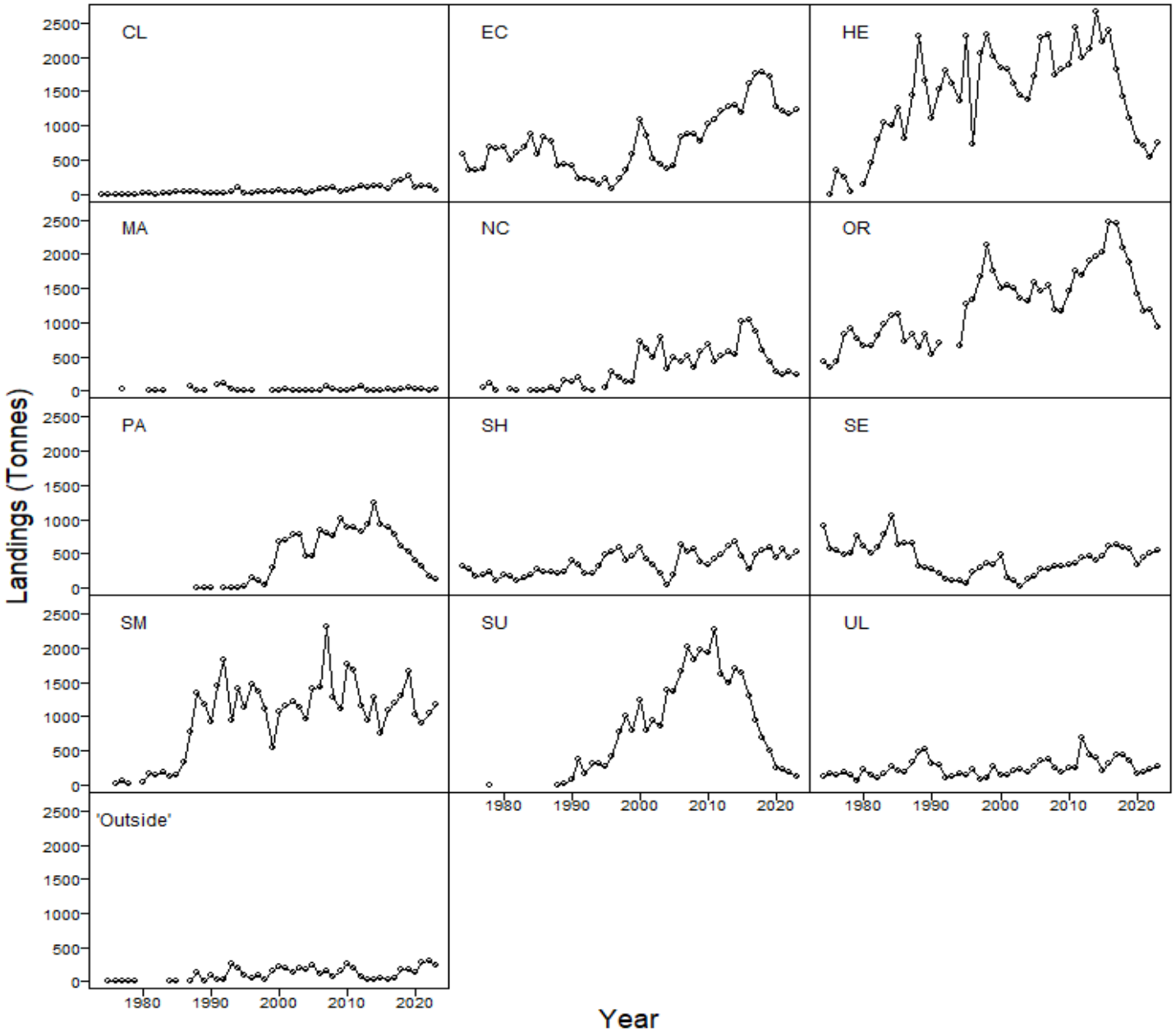

Landings by Assessment Unit – Lobster

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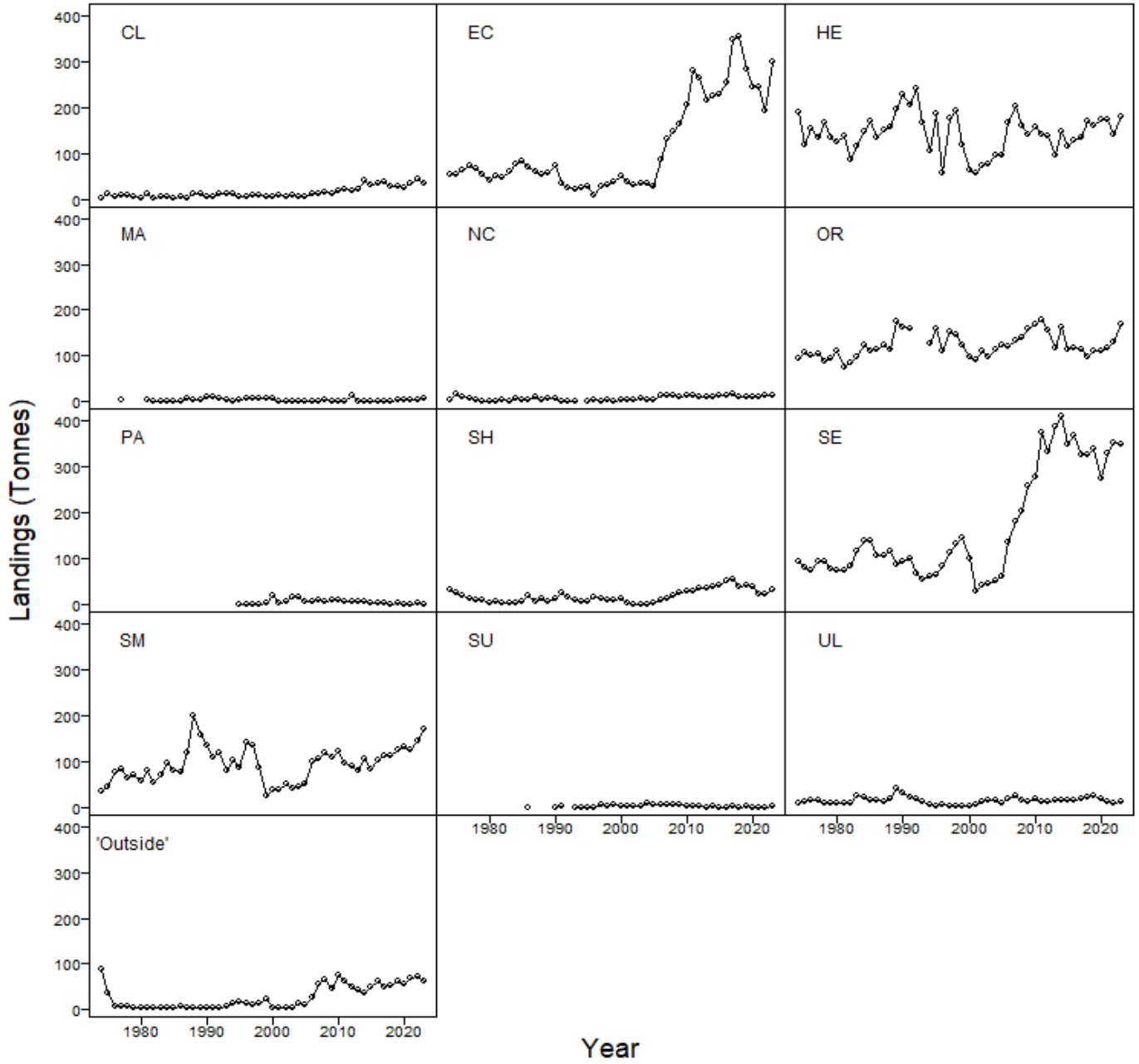

Landings by ICES Rectangle – Brown crab

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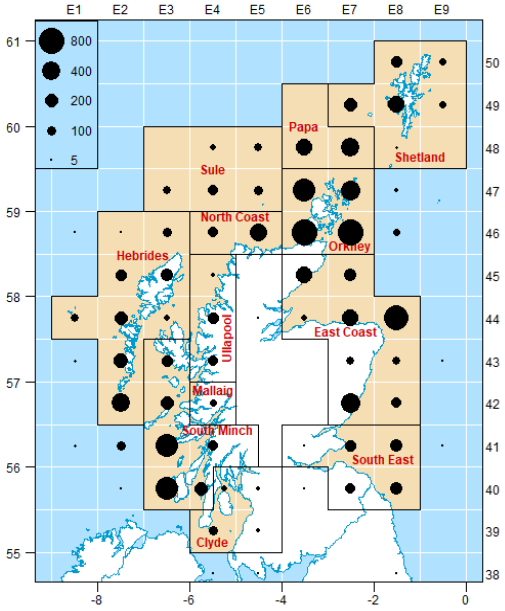
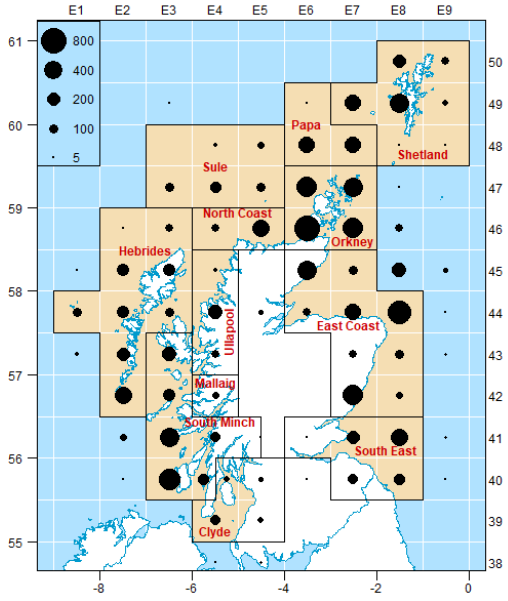
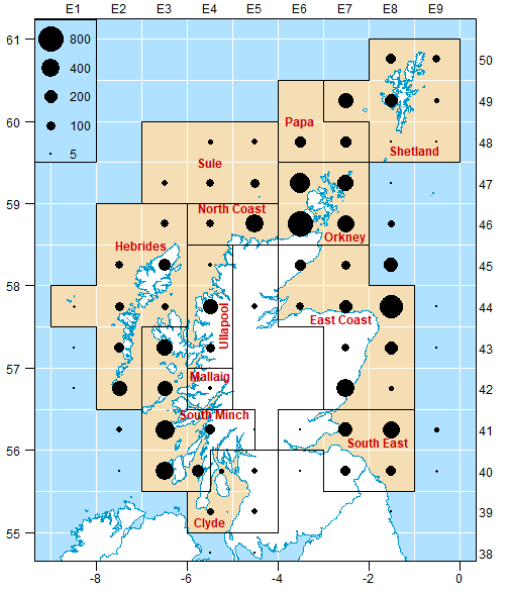


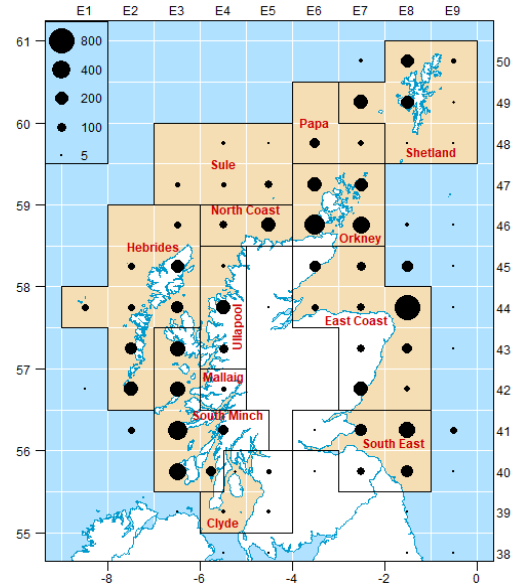
2020



2021



2022



2023

Landings by ICES Rectangle - Lobster

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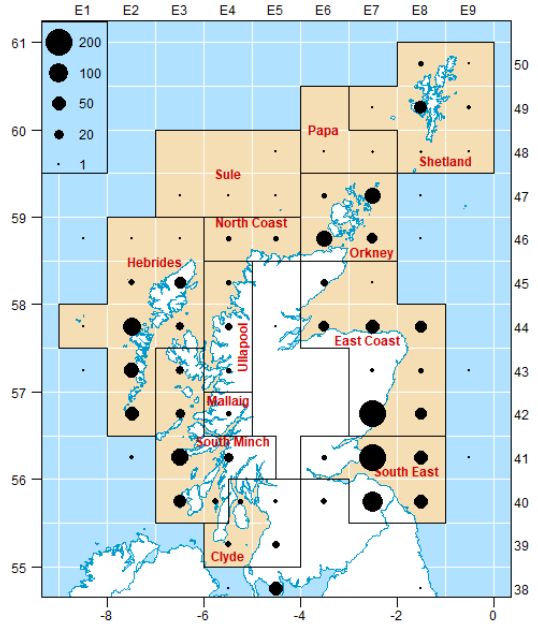
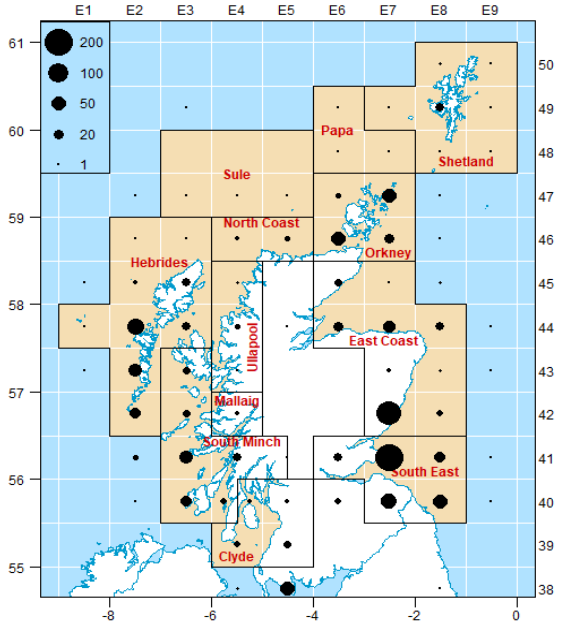
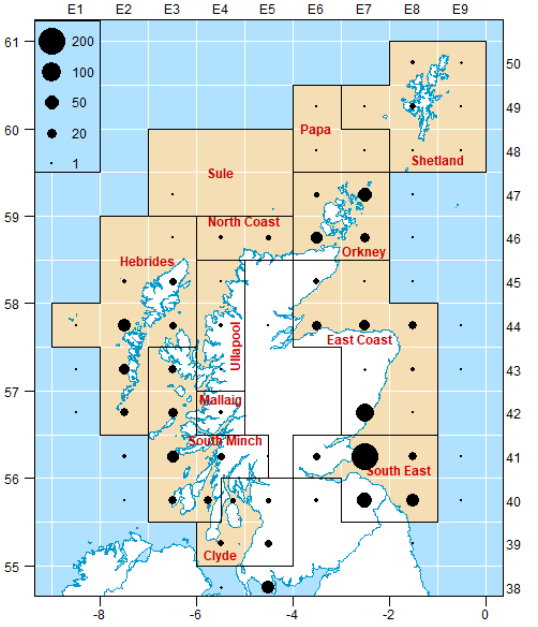


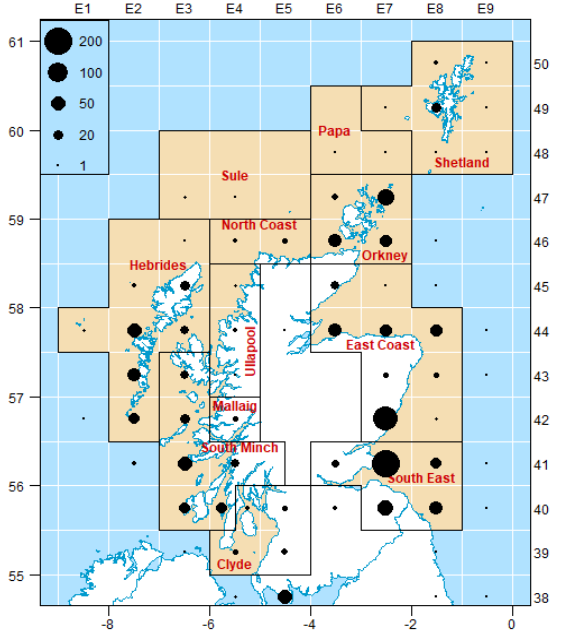
2020



2021



2022



2023

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Stock Assessments

Assessment data sources

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- Official landings data

- Marine Directorate Sampling Programme
  - Numbers at length
  - Size composition
  - Sex composition

- Biological parameters
- Discard data not collected regularly
- Scallop/trawl surveys indicators

		Growth parameters		Length-Weight relationship		Terminal group Fishing effort	Natural Mortality	Source
		K	L_∞	a	b	F	M	
Cancer pagurus								
	Males	0.197	220	0.000059	3.214	0.5	0.1	Chapman, 1994
	Females	0.172	220	0.000302	2.8534	0.5	0.1	Chapman, 1994
Shetland	Males	0.188	246	0.00008	3.166	0.406	0.242	Tallack, 2002
Shetland	Females	0.224	227	0.00024	2.895	0.174	0.256	Tallack, 2002
Homarus gammarus								
	Males	0.11	173.4	0.000126	3.36	0.5	0.1	Chapman, 1994
	Females	0.13	150	0.000919	2.922	0.5	0.1	Chapman, 1994
Shetland	Males	0.112	188	0.0017	2.797	0.316	0.1	Mouat *et al.*, 2006
Shetland	Females	0.136	184	0.0004	3.123	0.452	0.1	Mouat *et al.*, 2006

Sampling – Length distributions (2020-2023)

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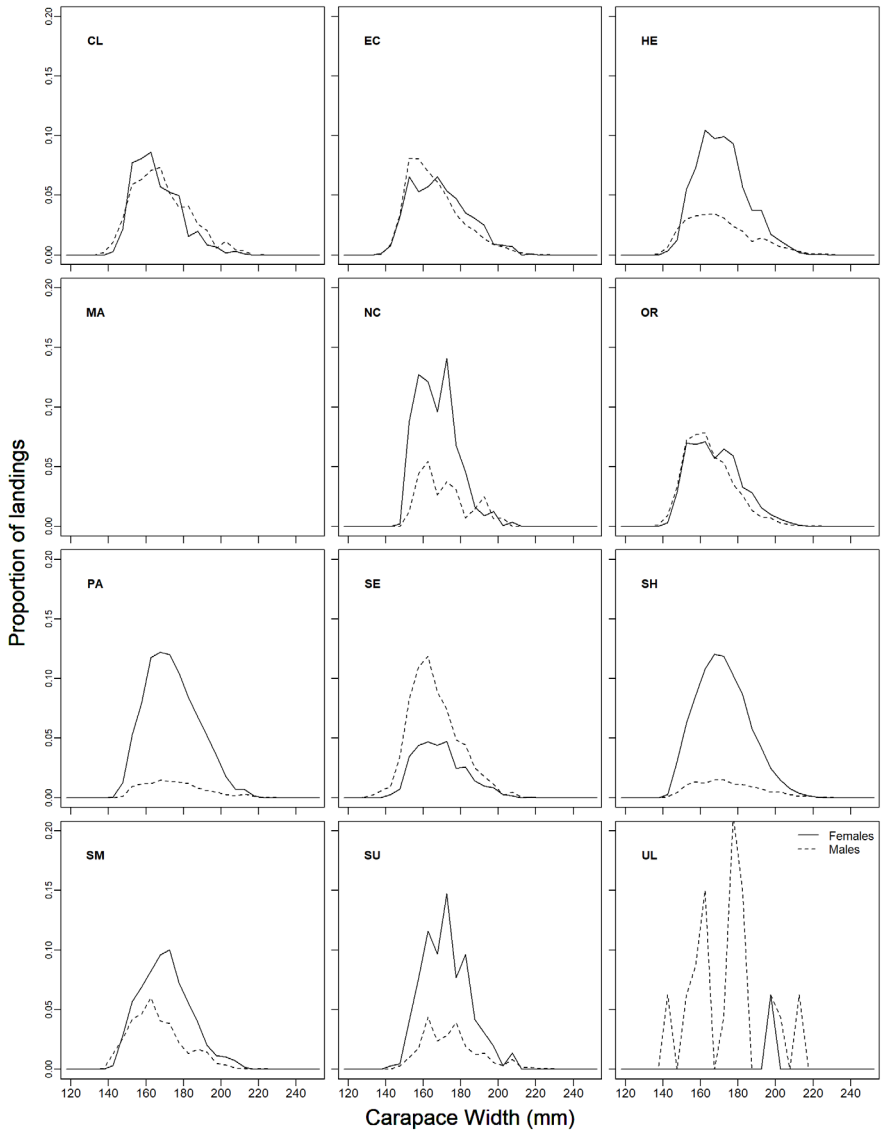
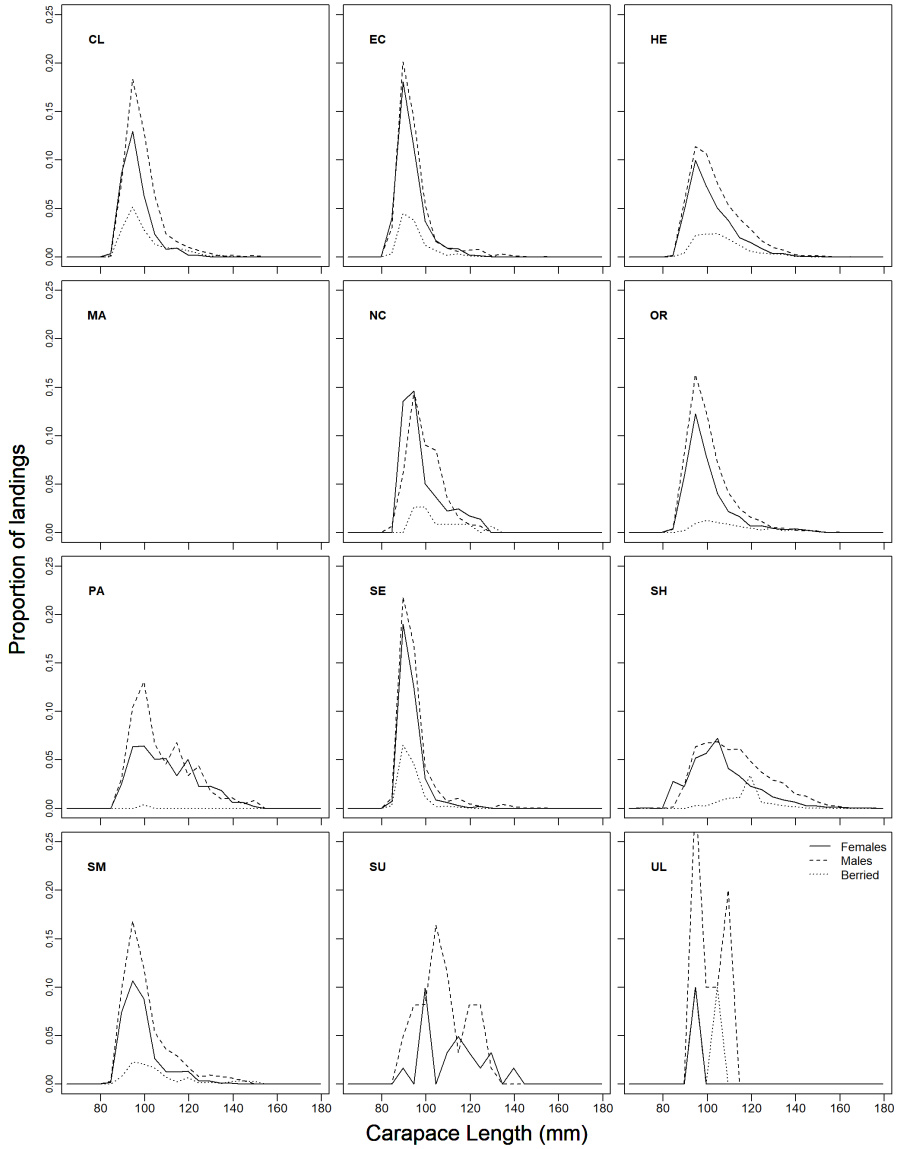
Brown crab



Lobster



Length Cohort Analysis (LCA) (Jones, 1984)

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- Age determination is difficult in crustacean species

- LCA based on commercial catch size composition is used

- Estimates of fishing mortality (F) at length and stock biomass

Brown crab

Relationship between F and F_{MSY} in Assessments - PROVISIONAL

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Assessment period		F (Fishing Mortality) 2009-2012	2013-2015	2016-2019	2020-23	
Clyde	Males	?	✗	✗	✗	Above F_{MSY}
	Females	?	✗	o	✗	Above F_{MSY}
Hebrides	Males	✓	o	✗	o	At F_{MSY}
	Females	✗	✗	✗	✗	Above F_{MSY}
North Coast	Males	✓	✗	✗	?	Unknown
	Females	✓	✗	✗	?	Unknown
Papa	Males	✓	✓	✓	✓	Below F_{MSY}
	Females	✓	o	✓	✓	Below F_{MSY}
Shetland	Males	?	✗	?	?	Unknown
	Females	?	?	?	?	Unknown
Sule	Males	o	✗	✗	?	Unknown
	Females	✗	✗	✗	?	Unknown

Assessment period		F (Fishing Mortality) 2009-2012	2013-2015	2016-2019	2020-23	
East Coast	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✗	✗	✗	o	At F_{MSY}
Mallaig	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown
Orkney	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✗	✗	o	✗	Above F_{MSY}
South East	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✗	✗	✗	o	At F_{MSY}
South Minch	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✗	✗	✗	o	At F_{MSY}
Ullapool	Males	?	?	✗	?	Unknown
	Females	?	?	o	?	Unknown

Lobster
Relationship between F and F_{MSY} in Assessments - PROVISIONAL

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Assessment period		F (Fishing Mortality) 2009-2012	2013-2015	2016-2019	2020-23
Clyde	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	✗	✗	✗	✗ Above F_{MSY}
Hebrides	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	✓	✓	✓	○ At F_{MSY}
North Coast	Males	?	?	?	? Unknown
	Females	?	?	?	? Unknown
Papa	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	✓	✓	✓	✓ Below F_{MSY}
Shetland	Males	✓	✗	✗	✗ Above F_{MSY}
	Females	✗	✗	✗	✗ Above F_{MSY}
Sule	Males	?	?	?	? Unknown
	Females	?	?	?	? Unknown

Assessment period		F (Fishing Mortality) 2009-2012	2013-2015	2016-2019	2020-23
East Coast	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	✗	✗	○	✗ Above F_{MSY}
Mallaig	Males	?	?	?	? Unknown
	Females	?	?	?	? Unknown
Orkney	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	○	○	✓	✓ Below F_{MSY}
South East	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	✗	✗	✗	✗ Above F_{MSY}
South Minch	Males	✗	✗	✗	✗ Above F_{MSY}
	Females	✗	✗	✗	✓ Below F_{MSY}
Ullapool	Males	?	?	?	? Unknown
	Females	?	?	?	? Unknown

Velvet Crab
Relationship between F and F_{MSY} in Assessments - PROVISIONAL

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Assessment period		F (Fishing Mortality) 2009-2012	2013-2015	2016-2019	2020-23	
Clyde	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✗	✗	✗	✗	Above F_{MSY}
Hebrides	Males	✓	✓	o	✓	Below F_{MSY}
	Females	✗	✗	✗	o	At F_{MSY}
North Coast	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown
Papa	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown
Shetland	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown
Sule	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown

Assessment period		F (Fishing Mortality) 2009-2012	2013-2015	2016-2019	2020-23	
East Coast	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✗	✗	✗	✗	Above F_{MSY}
Mallaig	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown
Orkney	Males	✗	✗	✗	o	At F_{MSY}
	Females	✗	✗	✗	✗	Above F_{MSY}
South East	Males	?	o	o	✓	Below F_{MSY}
	Females	?	✗	✗	o	At F_{MSY}
South Minch	Males	✗	✗	✗	✗	Above F_{MSY}
	Females	✓	✗	✗	✗	Above F_{MSY}
Ullapool	Males	?	?	?	?	Unknown
	Females	?	?	?	?	Unknown

Crab and lobster – Ongoing Work

- Assessments updated on a triennial basis
- Results of latest assessment (2020-2023) being processed
- Survey analysis (scallop by-catch and IBTS) – spatial distribution of brown crab update
- LBI update

Berried Lobster Seasonality

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Area	Percentage of Berried Females																							
	2018				2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CL		39	8	11	28	23	6	30			9	20		21	29	16		18	4	35		13	1	36
EC	18	19	9		9	17	20	6			11	15	8	22	1	10	9	23	0	42	8	18	0	19
HE		19	9	9	15	16	9	27			15	15		12	11	4		25	15	22		6	10	7
NC												19			1									
OR	18	25	11	15		15	6	16	28		7	11		21	5	10	12	33	7		21	8	3	
PA			0	0		0	0	2	0		0	0			0	0	4							
SE	21	25	11		16	21	17	15	17		18			29		15		29	9	38	8	17	4	24
SH				11		0	0	0				11		2		13				2				1
SM	16	6	2	6	14	23	4	31			9		7	15	7	7	8	30		17	14		4	16
SU																						0		
UL							0																	

Note: Blank spaces represent insufficient data (less than 30 samples)

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Thank you