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Article

Identifying Métiers Using Landings Profiles: An Octopus-Driven Multi-Gear Coastal Fleet

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Abstract: The multi-gear coastal vessels in the Algarve (South Portugal) own licenses for various fishing gears. However, it is generally uncertain what gears they use, which is problematic as each individual gear is responsible for unique impacts on the resources and the environment. In this study, landing profiles identified for the multi-gear coastal fleet (2012–2016) were used as support in defining potential métiers using k-mean clustering analysis (CLARA) along with information from past studies on métiers. The results showed that more than 50% of the vessels were engaged in the octopus fishery year-round, using traps, while a small percentage (~13%) were entirely dedicated to clam dredging. In general, gillnets (21%) were used to target monkfish, hake and bastard soles, while trammel nets (6%) were used to target cuttlefish, with some vessels alternating the fishing gears (either seasonally or annually) according to target species. The method for the initial characterization of this fleet's métiers and its efficiency with limited data is discussed, as well as the utility of this segmentation in support of management advice.

Keywords: fishing métiers; landing profiles; multi-gear fleet; coastal fleet; fisheries management; Portugal

Supplementary Material

Table S1. Range Silhouette Class (SC) and the interpretation.

RANGE OF SC	INTERPRETATION
0.71-1.0	A strong structure has been found
0.51-0.70	A reasonable structure has been found
0.26-0.50	The structure is weak and could be artificial. Try additional methods of data analysis.
≤0.25	No substantial structure has been found

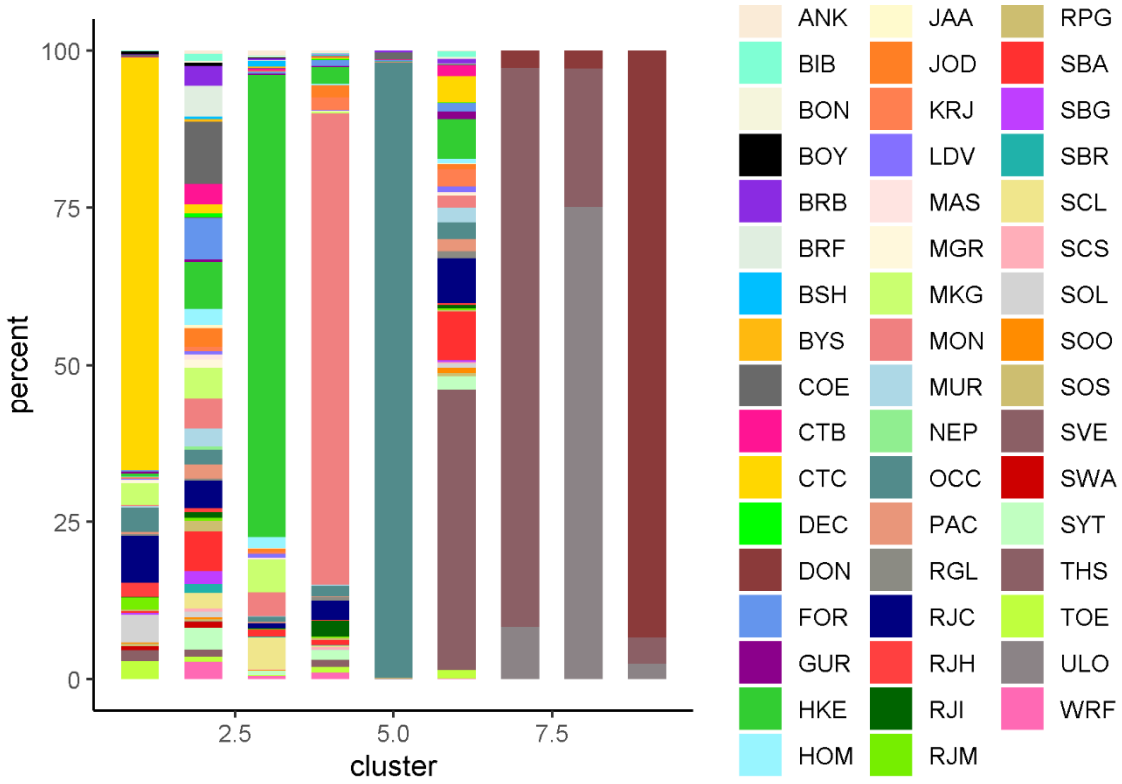

Figure S1. Clusters using quantity (kg) from landings data for the Algarve coastal multi-gear fishing fleet.

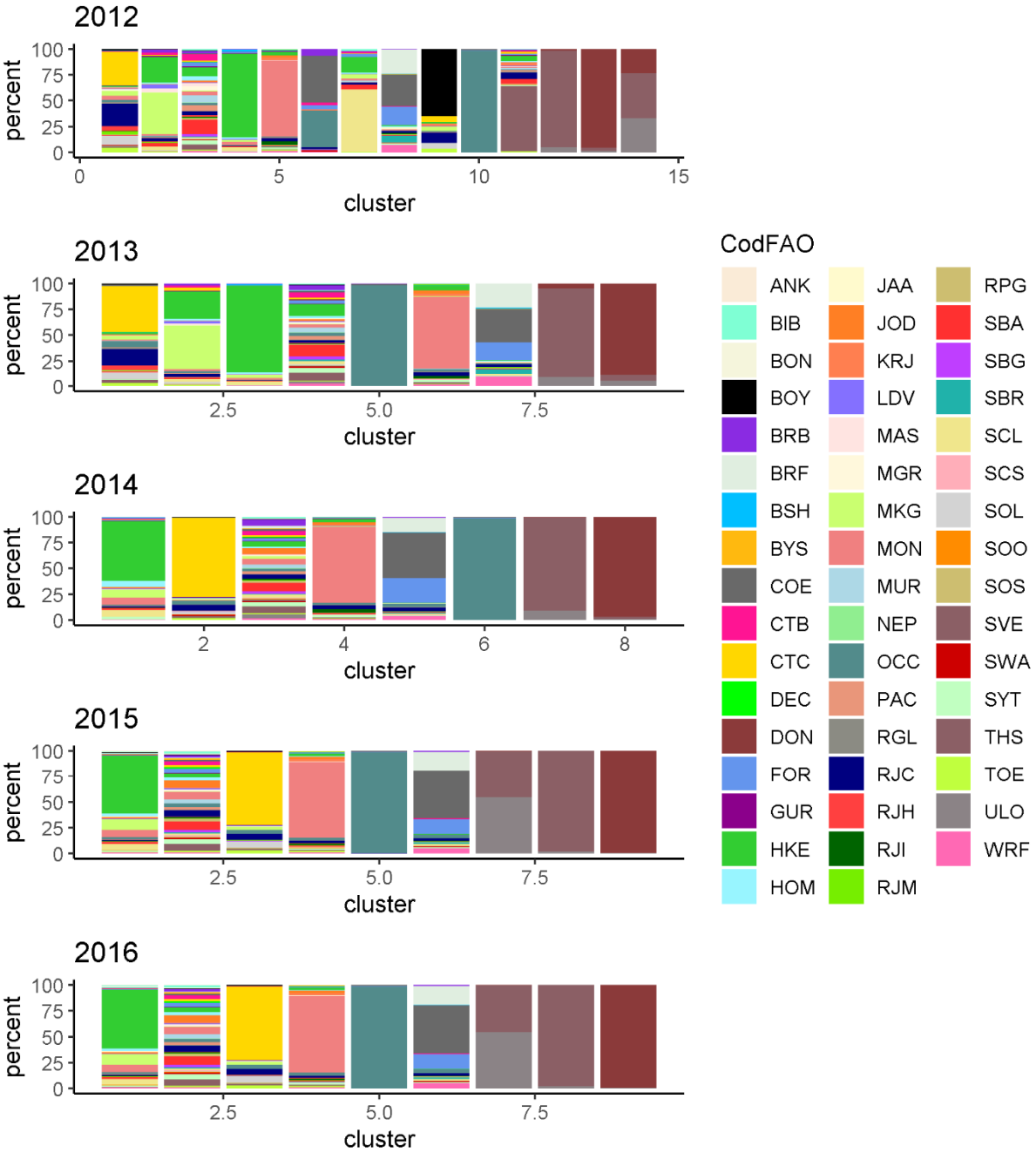

Figure S2. Clusters using quantity (kg) from landings data for the Algarve coastal multi-gear fishing fleet per year from 2012 to 2016. FAO codes are defined in Annex Table S2.

Table S2. The class, family, species (Spp), FAO codes (CodFAO) and the quantity (t) and value (10^5 €) per year.

Class Family	Spp	Cod FAO	2012 (t)	2012 (10^5 €)	2013 (t)	2013 (10^5 €)	2014 (t)	2014 (10^5 €)	2015 (t)	2015 (10^5 €)	2016 (t)	2016 (10^5 €)
Actinopterygii												
Congridae	*Conger conger*	COE	54.23	1.43	51.93	1.36	62.92	1.69	54.37	1.47	50.39	1.50
Lophidae	*Lophius piscatorius*	MON	132.91	6.92	114.39	6.41	150.83	8.74	146.81	8.97	76.50	4.95
Merlucciidae	*Merluccius merluccius*	HKE	134.69	3.54	151.27	3.86	107.84	3.59	126.64	3.70	108.48	3.18

Soleidae	*Microchirus variegatus*	MKG	39.93	3.56	38.97	3.39	20.50	1.84	23.92	2.19	26.62	2.77
Cephalopoda			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Octopodidae	*Octopus vulgaris*	OCC	617.41	28.16	1151.43	37.50	895.18	46.40	734.01	40.06	661.45	37.22
Sepiidae	*Sepia officinalis*	CTC	31.54	1.44	49.81	1.74	50.34	1.70	29.15	1.20	30.87	1.41
Bivalvia			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Donacidae	*Donax* spp.	DON	49.11	1.23	64.22	1.60	34.81	0.86	38.83	0.97	33.53	0.83
Matridae	*Spisula solida*	ULO	32.85	0.25	21.55	0.16	30.90	0.23	90.93	0.68	143.51	1.08
Veneridae	*Chamelea gallina*	SVE	122.13	1.83	115.89	1.75	161.80	2.43	226.40	3.40	39.35	0.59

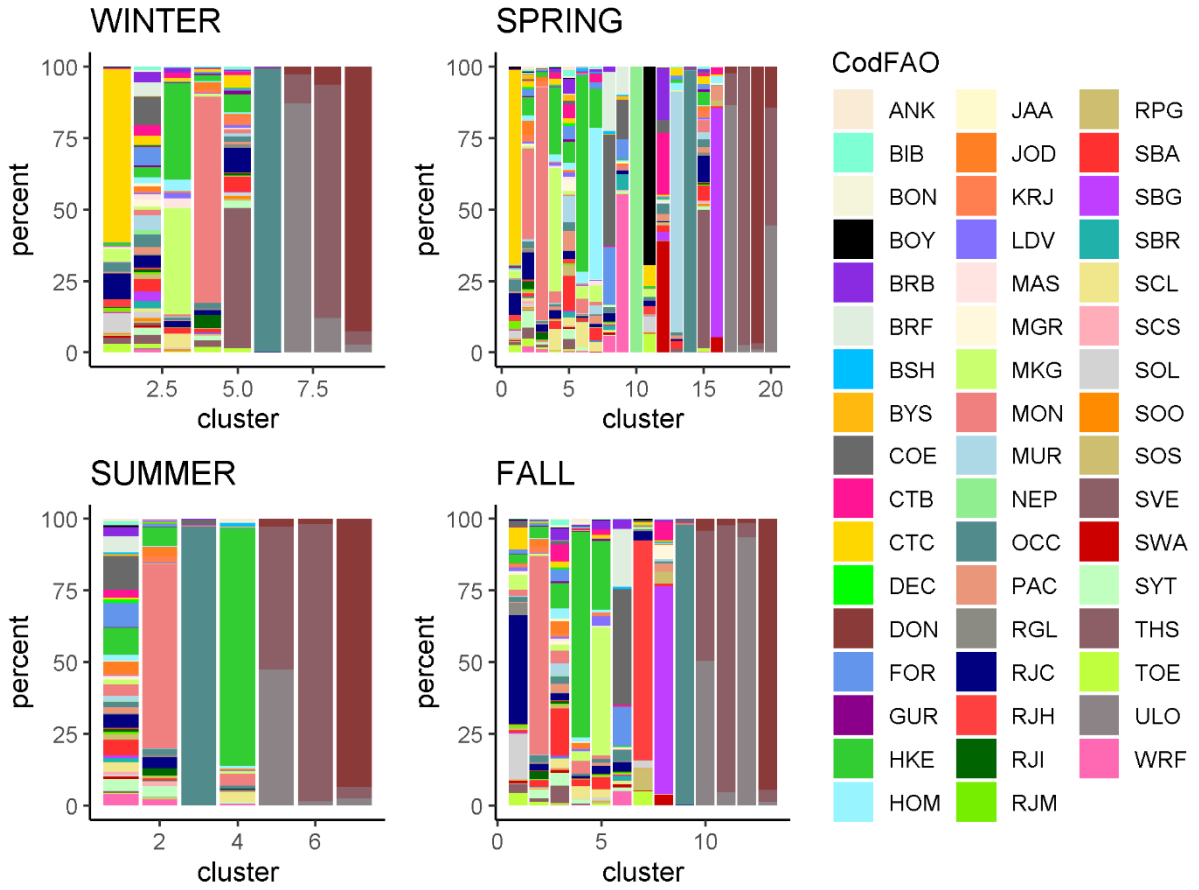

Figure S3. Clusters using quantity (kg) from landings data for the Algarve coastal multi-gear fishing fleet per year for Winter, Spring, Summer and Fall. FAO codes are defined in Annex Table S3.

Table S3. The class, family, species (Spp), FAO codes (CodFAO) and the quantity (q) and value (v) per season [Win = Winter; Spr = Spring; Sum = Summer; Fall].

Class Family	Spp	CodFAO	Win (t)	Win (10^5 €)	Spr (t)	Spr (10^5 €)	Sum (t)	Sum (10^5 €)	Fall (t)	Fall (10^5 €)
Actinopterygii										
Lophidae	*Lophius piscatorius*	MON	47.41	3.60	287.93	13.83	156.67	10.55	129.43	8.00
Merlucciidae	*Merluccius merluccius*	HKE	76.44	2.64	102.42	3.06	303.53	8.08	146.53	4.09

Soleidae	*Microchirus* spp.	THS	83.25	6.95	24.93	2.25	5.36	0.63	31.37	3.11
	Microchirus variegatus	MKG	66.68	5.49	25.48	2.31	13.77	1.44	44.02	4.51
Cephalopoda			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Octopodidae	*Octopus vulgaris*	OCC	1099.55	49.44	1148.46	55.09	1011.59	48.17	799.90	36.65
Sepiidae	*Sepia officinalis*	CTC	94.69	3.72	79.21	2.81	4.13	0.23	13.69	0.73
Bivalvia			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Donacidae	*Donax* spp.	DON	82.31	2.04	43.74	1.09	39.94	1.00	54.50	1.36
Matridae	*Spisula solida*	ULO	93.90	0.71	46.45	0.35	86.13	0.65	93.26	0.70
Veneridae	*Chamelea gallina*	SVE	72.75	1.10	83.28	1.25	368.93	5.53	140.62	2.11
Gastropoda			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Muricidae	*Bolinus brandaris*	BOY	0.68	0.12	5.29	0.76	5.69	0.92	0.97	0.21
Malacostraca			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nephoridae	*Nephrops norvegicus*	NEP	5.33	3.81	1.94	0.93	1.90	0.99	1.74	0.92