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The use of fishers' Local Ecological Knowledge to reconstruct fish behavioural traits and fishers' perception of the conservation relevance of elasmobranchs in the Mediterranean Sea

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Fig. S1: Questionnaire template.

PERSONAL DATA

Name and surname (voluntary).....

Residence: City Province

Age and years of fishing experience

Fisheries

☐ Gill nets

☐ Bottom trawl

☐ Others

☐ Longline

☐ Otter beam trawl

.....

Targeted species:

Fishing frequency: Number of times/year

Questions

1. Have you ever fished, in the past or the present, sharks, skates or rays?

	PAST				PRESENT			
Sharks	<input type="checkbox"/>	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	YES	<input type="checkbox"/>	NO
Skates and Rays	<input type="checkbox"/>	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	YES	<input type="checkbox"/>	NO

2. In which areas have you fished in the past? (point in the map)

3. In which areas do you fish nowadays? If it has changed regarding the past, why?

4. Have the shark fisheries varied over time? In which way?

CATCHES

	1940-1960	1960-1980	1980-2000	2000-present
Total catches in the past regarding the present Personal assessment	Very abundant (more than 3 times in comparison to the present) <input type="checkbox"/>	Very abundant (more than 3 times in comparison to the present) <input type="checkbox"/>	Very abundant (more than 3 times in comparison to the present) <input type="checkbox"/>	Very abundant (more than 3 times in comparison to the present) <input type="checkbox"/>
	Abundant (twice more than in the present) <input type="checkbox"/>	Abundant (twice more than in the present) <input type="checkbox"/>	Abundant (twice more than in the present) <input type="checkbox"/>	Abundant (twice more than in the present) <input type="checkbox"/>
	They remain the same <input type="checkbox"/>	They remain the same <input type="checkbox"/>	They remain the same <input type="checkbox"/>	They remain the same <input type="checkbox"/>
	Less abundant <input type="checkbox"/>	Less abundant <input type="checkbox"/>	Less abundant <input type="checkbox"/>	Less abundant <input type="checkbox"/>
	No assessment <input type="checkbox"/>	No assessment <input type="checkbox"/>	No assessment <input type="checkbox"/>	No assessment <input type="checkbox"/>
Which ones used to be the most abundant species?	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)

5. Which shark species are not caught anymore, or have dramatically declined?

6. Are there any new shark species that have been caught nowadays, but not in the past? Which ones?

7. Have you noticed any change (increase or decrease) in the size of any shark species over time?

Specie	Increase	Decrease

8. Have the rays and skates' fisheries varied over time? In which way?

CATCHES

	1940-1960	1960-1980	1980-2000	2000-present
Total catches in the past regarding the present Personal assessment	Very abundant (more than 3 times <input type="checkbox"/> in comparison to the present)	Very abundant (more than 3 times <input type="checkbox"/> in comparison to the present)	Very abundant (more than 3 times <input type="checkbox"/> in comparison to the present)	Very abundant (more than 3 times <input type="checkbox"/> in comparison to the present)
	Abundant (twice <input type="checkbox"/> more than in the present)	Abundant (twice <input type="checkbox"/> more than in the present)	Abundant (twice <input type="checkbox"/> more than in the present)	Abundant (twice <input type="checkbox"/> more than in the present)
	<input type="checkbox"/> They remain the same	<input type="checkbox"/> They remain the same	<input type="checkbox"/> They remain the same	<input type="checkbox"/> They remain the same
	<input type="checkbox"/> Less abundant	<input type="checkbox"/> Less abundant	<input type="checkbox"/> Less abundant	<input type="checkbox"/> Less abundant
	<input type="checkbox"/> No assessment	<input type="checkbox"/> No assessment	<input type="checkbox"/> No assessment	<input type="checkbox"/> No assessment
Which ones used to be the most abundant species?	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)	1) 2) 3) 4) 5)

9. Which ray/skate species are not caught anymore, or have dramatically declined?

10. Are there any new ray/skate species that have been caught nowadays, but not in the past? Which ones?

11. Have you noticed any change (increase or decrease) in the size of any ray/skate species over time?

Specie	Increase	Decrease

12. In your opinion, has the way of fishing sharks, skates and rays changed over time? (Type of fishery, seasons...)

13. Are there seasons in which you caught more or fewer sharks and/or skates and rays? (Please indicate the season(s))

Species	Spring	Summer	Autumn	Winter

14. In your opinion, is this seasonality related to migratory movements? For which species do you think this is true?

15. According to your knowledge, how do the sharks, skates and rays move in your fishing area?

16. Have you ever seen or fished any time aggregation of sharks and/or skates/rays? Of which species?

17. Has the occurrence of such aggregations changed over time? For which species?

AGGREGATIONS

	1940-1960	1960-1980	1980-2000	2000-present
Species	<input type="checkbox"/> Never observed	<input type="checkbox"/> Never observed	<input type="checkbox"/> Never observed	<input type="checkbox"/> Never observed
	<input type="checkbox"/> Rarely	<input type="checkbox"/> Rarely	<input type="checkbox"/> Rarely	<input type="checkbox"/> Rarely
	<input type="checkbox"/> Frequently	<input type="checkbox"/> Frequently	<input type="checkbox"/> Frequently	<input type="checkbox"/> Frequently

18. Description of the aggregations: dimension, sex and abundance, in the past and present.

AGGREGATIONS

	1940-1960	1960-1980	1980-2000	2000-present
Species	<input type="checkbox"/> Few	<input type="checkbox"/> Few	<input type="checkbox"/> Few	<input type="checkbox"/> Few
	<input type="checkbox"/> Many (more than 10 specimens)	<input type="checkbox"/> Many (more than 10 specimens)	<input type="checkbox"/> Many (more than 10 specimens)	<input type="checkbox"/> Many (more than 10 specimens)
	<input type="checkbox"/> A lot of them (more than 50 specimens)	<input type="checkbox"/> A lot of them (more than 50 specimens)	<input type="checkbox"/> A lot of them (more than 50 specimens)	<input type="checkbox"/> A lot of them (more than 50 specimens)
	<input type="checkbox"/> Big	<input type="checkbox"/> Big	<input type="checkbox"/> Big	<input type="checkbox"/> Big
	<input type="checkbox"/> Medium	<input type="checkbox"/> Medium	<input type="checkbox"/> Medium	<input type="checkbox"/> Medium
	<input type="checkbox"/> Small	<input type="checkbox"/> Small	<input type="checkbox"/> Small	<input type="checkbox"/> Small
	<input type="checkbox"/> Males	<input type="checkbox"/> Males	<input type="checkbox"/> Males	<input type="checkbox"/> Males
	<input type="checkbox"/> No pregnant females	<input type="checkbox"/> No pregnant females	<input type="checkbox"/> No pregnant females	<input type="checkbox"/> No pregnant females
	<input type="checkbox"/> Pregnant females	<input type="checkbox"/> Pregnant females	<input type="checkbox"/> Pregnant females	<input type="checkbox"/> Pregnant females
	<input type="checkbox"/> Mixed	<input type="checkbox"/> Mixed	<input type="checkbox"/> Mixed	<input type="checkbox"/> Mixed

19. Could you indicate in which areas these aggregations occurred (map)? Inshore or offshore? Any location in particular?

20. In which period of the year?

21. Do you believe that sharks, rays and skates are important for the marine environment?

22. Do you believe that sharks, skates and rays are important for fisheries?

23. Do you think that is important to conserve sharks, skates and rays? If so, how would you do it?

Table S1. Percentage of interviewed fishers answering about the seasonality of each species for the different sampling points (Ancona (ANC), Chioggia (CHIO), Marano Lagunare (ML), Northern Istria (NI), Southern Istria (SI), Eastern Adriatic coast (EAC) and Montenegro (MON) in the Adriatic Sea, above the 25% threshold.

	ANC	CHIO	ML	NI	SI	EAC	MON
Total of fishers	15	12	13	23	21	8	10
<i>Mustelus</i> spp.	-	83	92	100	52	100	40
<i>M. aquila</i>	-	-	92	100	-	75	-
<i>Raja</i> spp.	53	33	85	75	62	100	50
<i>S. acanthias</i>	27	42	100	100	57	25	30
<i>S. stellaris</i>	-	-	62	60	-	-	-

Table S2. Percentage of interviewed fishers answering about the seasonality question of each species for the different sampling areas in other GSAs [Italy (ITA), Turkey (TUR), Spain (SPA)], above the 25% threshold.

GSA	9	9	22/28	11.2	16	6	19	10
Country	ITA	ITA	TUR	ITA (SAR)	ITA (SIC)	SPA	ITA(CAL)	ITA(CAL)
Tot. fishers	12	9	10	14	15	15	6	6
<i>Raja</i> spp.	40	33	44	57	-	-	-	-
<i>P. glauca</i>	-	33	-	-	-	28	50	-
<i>S. canicula</i>	-	-	-	42	-	-	-	-
<i>Torpedo</i> spp.	-	-	-	28	-	-	33	-
<i>Mustelus</i> spp.	-	-	-	-	40	-	-	-
<i>P. violacea</i>	-	-	-	-	-	42	-	-
<i>I. oxyrinchus</i>	-	-	-	-	-	-	-	33

Table S3. Percentage of interviewed fishers answering to each question (QN: question number) for each species indicating aggregation features in the Adriatic Sea during different time periods: B) 1960-1980; C) 1980-2000; D) 2000-Present.

	QN 17			QN 18A			QN 18B			QN 18C		
	1960-1980	1980-2000	2000-Present	1960-1980	1980-2000	2000-Present	1960-1980	1980-2000	2000-Present	1960-1980	1980-2000	2000-Present
<i>Mustelus</i> spp.	9	45	48	7	49	49	7	38	42	5	43	44
<i>S. acanthias</i>	5	30	35	4	22	26	4	17	20	5	17	19
<i>M. aquila</i>	4	22	23	2	19	16	2	15	13	2	10	9
<i>Raja</i> spp.	7	19	25	4	16	24	4	13	20	3	11	14

Table S4. Percentage of interviewed fishers answering to each question (QN: question number) for each species indicating aggregation features in other Mediterranean GSAs during different time periods: B) 1960-1980; C) 1980-2000; D) 2000-Present.

	QN 17			QN 18A			QN 18B			QN 18C		
	1960-1980	1980-2000	2000-Present	1960-1980	1980-2000	2000-Present	1960-1980	1980-2000	2000-Present	1960-1980	1980-2000	2000-Present
<i>Mustelus</i> spp.	9	9	7	8	9	4	7	8	3	6	6	4
<i>Raja</i> spp.	9	11	9	9	13	10	8	13	9	8	10	9
<i>S. canicula</i>	9	14	11	7	12	12	5	12	11	5	9	8

Table S5. Percentage of interviewed fishers answering to the questions related to aggregations (QN 17 and QN 18) in each GSA.

GSA	GSA 6	GSA 9	GSA 10	GSA 11	GSA 16	GSA 19	GSA 22/28
<i>Mustelus</i> spp.	-	8	-	-	84	8	
<i>Raja</i> spp.	-	25	13	13	36	-	13
<i>S. canicula</i>	23	27	-	23	27	-	-

Table S6. Percentage of fishing gears used by interviewed fishers in the different sampling areas.

	GSA 6	GSA 9	GSA 10	GSA 11	GSA 13	GSA 16	GSA 17	GSA 18	GSA 19	GSA 20	GSA 22	GSA 28
Gillnets (GNS)	0	40	30	34	41	17	29	17	31	8	45	0
Long Line (LLS)	11	21	25	35	5	20	8	25	31	33	45	50
Bottom trawl (OTB)	55	29	40	24	33	63	35	25	8	58	10	6
Mid-water Trawl (PTM)	7	0	0	0	0	0	10	17	0	0	0	6
Other beam trawl (TTB)	0	0	0	0	22	0	9	0	0	0	0	19
Other	27	9	5	7	0	0	10	17	31	0	0	19