### Challenges in Monitoring and Managing Large Marine Fishes: Lessons from the Galápagos Archipelago



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## The Galápagos Marine Reserve (GMR)





#### BRUV: Baited remote underwater video

bait



## Sampling an archipelago

- 21 strata in 4 bioregions
- 45 sites, randomly selected
- 8 replicates per site
  (4 at 15 m; 4 at 25 m)
- 2 seasons







#### MASSEY UNIVERSITY Charles Darwi

### Spatial patterns in shark distributions





### Tiger shark (Galeocerdo cuvier)

- Highly migratory elsewhere (100s of km)
- Life-history and migration complicates conservation
- Juveniles are nocturnal bottom feeders; adults hunt larger prey, especially turtles

**Research questions:** 

- What are the movement patterns of tiger sharks in and around the Galápagos MR?
- What habitats/food resources are tiger sharks using during their different life-history stages?



Chapman et al. 2015





### Fin-mounted satellite tags (SPOT5)





## Three study sites

#### (two important turtle-nesting grounds)



At turtle-nesting sites, tiger sharks were

seen more often in the turtle nesting season



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20 sharks captured: 13 females, 7 males. 11 successfully sat. tagged.

Medium-to-large sharks (orange and red) spent most of their time within 5-10 km of the turtle-nesting beaches.

Small sharks (white) stayed near Cerro-Ballena where they were tagged.



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- Medium-to-large sharks (orange and red) spent most of their time within 5-10 km of the turtle-nesting beaches.
- Small sharks (white) stayed near Cerro-Ballena where they were tagged.
- Two female sharks left the GMR; both returned for turtle season.



# Tiger sharks at the Galápagos

- Galápagos provides
  - suitable habitats for all life history stages and reproduction
  - Abundant prey year-round, and especially in turtle nesting season
- Most tiger sharks were resident year-round. Those that left returned for turtle season.
- Galápagos Marine Reserve is a highly valuable site for tiger shark conservation







## Tiger sharks at the Galápagos





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				Satellite		Acoustic			
Shark ID	Tagging date	TL (cm)	Sex	days	% residency	Days	Days	No.	RI* (per
				transm	time	monitored	transm	detections	tagging site)
Bachas-Salinas									
TS1	30-Jan-2014	274	F	116	90.48	307	152	761	0.50
TS2	30-Jan-2014	251	F	210	74.83	79	19	150	0.24
TS3	30-Jan-2014	248	F	127	99.02	-	-	-	-
TS4	30-Jan-2014	383	F	333	82.78	262	111	438	0.42
TS5	11-Jun-2015	225	F	-		104	71	482	0.68
TS6	11-Jun-2015	240	F	67	98.48	104	47	185	0.45
	avg =	270.17 ± 23.49							
Cerro Ballena									
TS7	23-Jul-2014	140	F	-	-	180	41	140	0.23
TS8	23-Jul-2014	224	М	25	87.50	303	68	510	0.22
TS9	24-Jul-2014	234	F	26	100.00	271	16	82	0.06
TS10	24-Jul-2014	171	F	21	100.00	286	45	399	0.16
TS11	24-Jul-2014	260	F	115	100.00	-	-	-	-
TS12	7-Oct-2014	180	Μ	-	-	113	23	376	0.20
TS13	7-Oct-2014	180	Μ	-	-	195	93	1183	0.48
TS14	21-Feb-2015	206	F	58	78.12	74	10	23	0.14
TS15	21-Feb-2015	202	М	84	98.30	177	16	99	0.09
	avg =	199.67 ± 12.14							
Isabela-South									
TS16	22-Feb-2015	378	F	128	100.00	-	-	-	-
TS17	22-Feb-2015	282	F	14	100.00	58	1	1	-
TS18	22-Feb-2015	324	М	45	100.00	118	2	2	-
TS19	23-Feb-2015	286	М	66	95.61	-	-	-	-
TS20	23-Feb-2015	242	М	37	100.00	68	1	1	-
	avg =	302.40 ± 22.93							

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