

Supplementary material

Environmental and individual effects on the behaviour and spawning movements of *Lethrinus nebulosus* on a coral reef

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Table S1. Lethrinid acoustic tracking studies

Behavioural variations with populations in relation to environmental and ecological factor

Species (<i>Lethrinus</i>)	Home range 95% (km ²)	Residency (<i>I_R</i>)	Diurnal variation	Tidal variation	Ontogenetic variation	Individual variation	Spawning movements	Habitat	Authors
<i>L. nebulosus</i> (<i>n</i> = 6)	-	0.02– 0.67%	Yes, more active during day	–	Possible – small fish disappeared	Yes	Possibly	No, but wind and human influences.	Chateau and Wantiez 2008
<i>L. nebulosus</i> (<i>n</i> = 84)	8.5	0.66	–	–	Yes residency, No home range	Yes	Yes	Mixed	Pillans <i>et al.</i> 2014
<i>L. harak</i> (<i>n</i> = 12)	0.02.6 ± 0.02.9	0.51	Yes, more active in day, different day and night locations	Yes, neap –low tide shift	Yes increased with size	Yes, some moved diurnally some didn't	Yes, full–last quarter, daily	Shallow back-reef	Taylor and Mills 2013
<i>L. obsoletus</i> (<i>n</i> = 6)	0.008 ± 0.01	0.97	Yes, more active in day,	None detected	None detected	Yes, diurnal pattern in some	None detected	Shallow back-reef	Taylor and Mills 2013
<i>L. miniata</i> (<i>n</i> = 60)	1.93 ± 0.27	<50%; <i>n</i> = 26; >5 days	Some, individual variability with depth	Monthly pattern, some fish	No	Yes, vertical movements in some	Not examined	Reef slope	Currey <i>et al.</i> 2014
<i>L. harak</i> (<i>n</i> = 6)	-	1	–	–	–	–	–	Mixed habitat	Honda <i>et al.</i> 2016
<i>L. atkinsoni</i> (<i>n</i> = 5)	-	0.95	–	–	–	–	–	Coral reef	Honda <i>et al.</i> 2016
<i>L. obsoletus</i> (<i>n</i> = 2)	-	0.71	–	–	–	–	–	Coral reef	Honda <i>et al.</i> 2016

Table S2. Selected detection details for *L. nebulosus* detected migrating from distant locations to spawning areas in the Mangrove Bay region

Tag ID	Start latitude	Date	Time	Finish latitude	Date	Time	Distance (km)	Days	Total hours	Rate (km h ⁻¹)
8139	-23.07	7-Oct-2011	08:46	-21.8957	22-Oct-2011	09:41	144	15	360.9167	0.398984
8139	-21.8957	7-Nov-2011	12:30	-23.07	19-Nov-2011	17:54	144	12	293.5667	0.490519
8139	-22.0863	2-Dec-2012	16:30	-22.99	5-Dec-2012	16:11	125	2	48.68333	2.567614
8139	-22.0011	2-Dec-2012	12:17	-22.0863	2-Dec-2012	16:25	9.5	0	4.133333	2.298387
8139	-22.0045	25-Dec-2013	09:34	-22.0879	25-Dec-2013	16:21	9.5	0	6.783333	1.400491
8162	-22.9996	31-Oct-2009	17:50	-21.9979	2-Dec-2009	19:19	121	2	49.65	2.437059
8162	-21.9839	14-Dec-2009	10:14	-22.9996	17-Dec-2009	12:13	125	3	73.98333	1.68957
8162	-22.6027	1-Dec-2010	15:44	-23.07	3-Dec-2010	23:38	57	2	55.9	1.019678
8168	-22.6027	9-Oct-2012	02:37	-22.0045	10-Oct-2011	09:14	71	1	30.56667	2.322792
8168	-22.9914	11-Nov-2012	15:46	-22.0863	11-Nov-2012	19:45	11	0	3.983333	2.761506
8168	-22.0128	2-Dec-2012	14:01	-22.6027	3-Dec-2012	20:30	71	1	30.48333	2.329142

Table S3. Biometric information and behavioural descriptions of individual *L. nebulosus* detected undertaking suspected spawning related activity at Ningaloo

Tag ID	Date tagged	Location tagged	Fork length (FL cm)	Behavioural details
8047	3-Dec-07	Lagoon	41	Resident lagoon. Exclusively in lagoon for more than two years, detected offshore in November 2008
8078	1-Dec-07	Lagoon	56	Non-resident, reappeared 11-Nov-2008 at NL2 only
8095	6-Dec-07	Reef slope	59	Non-resident, running ripe male. Detected again one year after tagging October–December 2008
8108	4-Nov-09	Reef slope	54.5	Resident slope. Detected at NL2 at quarter moons, present within minutes of Fish 8139 on 7-Nov-2011 and on the same day as Fish 8165.
8111	23-May-09	Lagoon	55	Resident lagoon exclusively. Detected at NL5 on 27-Oct-2009. Absent until 2011 when it returned to lagoon until late 2012.
8126	23-May-09	Lagoon	53	Resident lagoon. Detected at NL2 1-Dec-2010. Returned to lagoon April 2011
8139	9-Nov-09	Reef slope	53.5	Non-resident. Female. Reappeared 2011, 2012, 2013, including several years at NL2. Detected returning to Coral Bay before or after appearances at Mangrove/NL2. Present at NL2 at same time as 8108 and 8165 in 2011.
8162	6-Dec-07	Reef slope	67	Non-resident. Reappeared on reef slope 2 and 3 years later, appears at Coral Bay and Norwegian Bay in December 2009 and 2010.
8163	6-Dec-07	Reef slope	57	Non-Resident. Reappears on reef slope in 2009
8164	6-Dec-07	Reef slope	51	Non-resident. Male, running ripe when tagged. Reappeared in 2008 detected only at NL2, 26–28-Oct-2008
8165	6-Dec-07	Reef slope	54	Non-resident. Reappeared on reef slope in 2008, 2009, 2010 and 2011. Present at NL2 on 7-Nov-2011 within hours of 8139 and 8108.
8166	6-Dec-07	Reef slope	56	Non-resident. Reappeared October–December 2008 on reef slope.
8168	6-Dec-07	Reef slope	57	Non-resident. Reappears on reef slope in 2008, 2009, 2011, 2012. Also detected on Central Line as well as at North Line in 2012 (within hours of 8139).
8171	6-Dec-07	Reef slope	56	Resident in lagoon. Seasonally moves to reef slope in 2008, 2009. Detected at NL2 (=5?) on 16-Oct-2008.
8153	30-Nov-07	Lagoon	53	Resident in Lagoon. Consistently detected in lagoon except for several weeks in October–November of 2008 and 2009. Detected outside South Passage on return to Mangrove Bay in November 2008.

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