SUPPLEMENT METHODS

Text S1. Historical data collection

Monitoring between 1967 and 1980 took place intermittently, offering valuable baseline information that commenced just before exploitation ceased (Hirth & Carr 1970, Frazier 1976, Gibson 1979). In 1980, an annual standardized track count protocol was introduced. Between 1980 and 1994, surveys were carried out by a single warden and/or visiting scientists, who surveyed the West Grande Terre beaches four times monthly and other beach groups opportunistically. From 1994 to 2018, extra logistical support and staffing (through a research officer, 2–4 rangers, and volunteer support) facilitated a protocol of monitoring all West Grande Terre beaches and Settlement Beach a minimum of four times monthly, with other groups sampled approximately monthly. Some of the beach groups were often sampled from a boat due to their inaccessibility and logistical constraints. The survey protocol for West Grande Terre and other remote beaches was usually but not always met. Over time at Settlement Beach however, surveys far exceeded their intended sampling rate and records were collected near-daily and exclusively on-foot by 2000, providing the most consistent and reliable nesting data and allowing for a more detailed investigation of seasonality.

Track differentiation post-2000

From 2000 onwards, greater emphasis was placed on distinguishing nesting attempts from each other. Previously grouped as "tracks with digging" (TD), digging attempts were split into three new classifications – "very fresh nest sure" (VFNS), "very fresh nest unsure" (VFNU) and "very fresh no nest" (VFNN). Using these classifications in our analysis was problematic however, as the boat surveys on more remote beaches meant that this level of precision was not possible atoll-wide. As such, TD were used to estimate nesting attempts, and the more precise "very fresh nest sure" and "very fresh nest unsure" were included in the TD category. All nesting classifications, including VFNS, VFNU and VFNN, are summarised below.

- TD "tracks with digging": Digging recorded (whether a nest was observed or not), a classification used until 2000.
- VFNS "very fresh nest sure": A more precise subset of TD used after 2000. Used when the observer was sure a nest had been fully excavated and a clutch deposited.
- VFNU "very fresh nest unsure": Another more precise subset of TD used after 2000, this time when the observer was unsure whether a nest had been had been fully excavated and a clutch deposited. These were few in number and often likely to be nests (SIF pers. obs.), thus were treated as such.
- VFNN "very fresh no nest": The final subset of TD used after 2000, used when digging occurred but no clutch was deposited.
- ESBO "emergence stopped by obstacle": no evidence of digging, as the female's emergence was stopped by an obstacle such as a log or cliff erosion forcing her to return to the sea.
- HM ("half-moon"): no evidence of digging or disturbance.

Data cleaning and inconsistencies

Track count data from December 1980 to December 2018 were analysed. Several large gaps in sampling were exhibited pre-2000 due primarily to logistical difficulties, and this coupled with the lack of distinction between track with digging (TD) classifications, a feature also of data from Settlement Beach in 2000, led to its exclusion from more detailed sampling and seasonality analysis.

While it was intended for all beaches to be sampled at a minimum of once per month from 2000 onwards, due to logistical difficulties more remote beach groups in particular (Dune d'Messe (DDM); Dune Jean-Louis (DJL); Cinq Cases (CC); North (northern beaches)) sometimes went significantly longer between monitoring. Sections from 2000 onwards where the time between sampling periods exceeded 3 months are listed below:

- WGT (1): 26/12/2014–08/05/2015
- DDM (3): 12/01/2013–24/04/2013; 05/09/2016–11/05/2017; 23/01/2018–27/04/2018
- DJL (4): 12/01/2013–24/04/2013; 23/02/2016–01/06/2016; 05/09/2016–11/05/2017; 14/11/2018–20/03/2018
- CC (9): 10/05/2001–18/09/2001; 19/04/2009–21/07/2009; 16/03/2010–30/06/2010; 20/11/2013–15/07/2014; 22/12/2014–22/05/2015; 21/12/2015–02/04/2016; 26/09/2016–17/01/2017; 17/01/2017–02/05/2017; 19/01/2018/17/05/2018
- North 1 (6): 13/01/2005–12/01/2006; 15/12/2009–22/04/2010; 14/02/2014–20/05/2014; 09/09/2014–09/12/2014; 18/12/2014–25/03/2015; 26/09/2016–29/12/2016
- North 2 (8): 14/02/2014–20/05/2014; 09/09/2014–09/12/2014; 18/12/2014–25/03/2015; 25/03/2015–22/09/2015; 30/11/2015–15/03/2016; 15/03/2016–11/07/2016; 16/08/2016–07/04/2017; 27/04/2017–07/08/2017
- SETT (0): No significant gaps

Text S2. Mortimer et al. (2011) method revision

While the last population study at Aldabra (Mortimer et al. 2011) used "tracks with digging per month" as a measure of nesting attempts, in the current study we used an interpolation method similar to Godley et al. (2001), where the periods between surveys were filled with the average of the prior and following survey. Consequently, results differ from (and typically offer slightly lower estimates than) Mortimer et al. (2011) – who adopted a "mean surveys per month" approach – particularly at more remote sites.

Text S3. 'Phenology' R package version 7.3 and seasonality statistics

With start and end dates for each season fixed to 1st December and 30th November, respectively, based on previous assessments of seasonality on West Grande Terre and Settlement Beach (Mortimer 2012), nesting attempt was modelled with two sigmoid equations. The inflexion points of the sigmoidal curves are estimated at days P_1 and P_2, with slopes S_1 and S_2, respectively, with parameters K_1 and K_2 that allow asymmetry between the two sigmoidal curves. In this way, total clutches laid across the season could be modelled and a peak nesting date drawn, despite incomplete data. With peak nesting dates obtained for each season 2000 to 2018 through the phenology model, a further GAM was constructed, modelling peak nesting date as a function of nesting season (1–365 days, n = 39).

SUPPLEMENT TABLES & FIGURES

Table S1. Sampling effort across the green turtle nesting beaches of Aldabra Atoll between January 2000 and December 2019 based on total surveys, number of years in which surveying took place, mean (and SD) numbers of counts conducted, and months per year surveyed. Produced akin to Mortimer et al. (2011), who produced the same table for periods 1981–1995 (total counts 7597) and 1995–2008 (total counts 21,600), excluding WGT beaches 1–14, which are separated, and the nesting success column which is based on Mortimer (1988).

Sampling effort 2000–2019								
				Mean # (SD) per year sampled				
Beach group	Beach ID	Total Surveys	Years	Counts	(SD)	Months	(SD)	Nesting success based on Mortimer (1988)
WGT	1	644	20	32.2	7.4	10.9	1.7	1.65
WGT	2	770	20	38.5	7.8	11.6	1.0	1.65
WGT	3	733	19	38.6	7.9	11.6	1.0	1.65
WGT	4	731	19	38.5	8.0	11.6	1.0	1.65
WGT	5	734	19	38.6	7.9	11.6	1.0	1.65
WGT	6	734	19	38.6	7.9	11.6	1.0	1.65
WGT	7	730	19	38.4	8.0	11.6	1.0	1.65
WGT	8	734	19	38.6	8.0	11.6	1.0	1.65
WGT	9	734	19	38.6	8.0	11.6	1.0	1.65
WGT	10	763	20	38.2	8.0	11.6	1.0	1.65
WGT	11	756	20	37.8	8.2	11.6	1.0	1.65
WGT	12	761	20	38.1	8.0	11.6	1.0	1.65
WGT	13	766	20	38.3	7.9	11.6	1.0	1.65
WGT	14	765	20	38.3	7.9	11.6	1.0	1.65
WGT	15	777	20	38.9	8.1	11.6	1.0	1.65
WGT	15.5	755	20	37.8	8.3	11.6	1.0	1.65
WGT	16	767	20	38.4	7.7	11.6	1.0	1.65
WGT	17	770	20	38.5	7.6	11.6	1.0	1.65
WGT	17.5	750	20	37.5	8.4	11.6	1.0	1.65
WGT	18	765	20	38.3	7.6	11.6	1.0	1.65
WGT	19	749	20	37.5	7.4	11.5	1.1	1.65
WGT	20	745	20	37.3	7.3	11.5	1.1	1.65
WGT	21	742	20	37.1	7.4	11.5	1.1	1.65
WGT	22	459	19	24.2	12.9	9.3	3.0	1.65
DDM	23	205	20	10.3	5.0	8.4	3.0	1.65
DDM	24	238	20	11.9	3.7	9.8	1.8	1.65
DDM	25	245	20	12.3	3.8	9.8	1.8	1.65

DDM	26	280	20	14.0	4.6	9.9	1.8	1.65
DDM	27	214	20	10.7	4.5	8.6	2.2	1.65
DDM	28	209	20	10.5	4.4	8.5	2.1	1.65
DJL	29	215	20	10.8	4.5	8.7	2.5	1.65
DJL	30	222	20	11.1	4.3	8.8	2.3	1.65
DJL	31	234	20	11.7	4.3	9.2	2.2	1.65
DJL	32	286	20	14.3	5.4	9.7	2.1	1.65
DJL	33	267	20	13.4	5.2	9.5	2.0	1.65
DJL	34	268	20	13.4	5.2	9.5	2.1	1.65
DJL	35	265	20	13.3	5.3	9.4	2.2	1.65
DJL	36	261	20	13.1	5.3	9.3	2.3	1.65
CC	37	224	20	11.2	5.2	7.9	2.0	1.65
CC	38	251	20	12.6	5.4	8.6	1.9	1.65
CC	38.5	235	20	11.8	5.4	8.2	2.2	1.65
CC	39	226	20	11.3	5.0	8.1	2.0	1.65
North	40	348	20	17.4	12.4	8.3	3.9	2.9
North	41	383	20	19.2	10.8	9.6	2.7	2.9
North	42	393	20	19.7	10.7	9.8	2.7	2.9
North	43	386	20	19.3	10.7	9.7	2.8	2.9
North	43.5	358	20	17.9	12.0	8.7	3.7	2.9
North	44	365	20	18.3	11.7	8.8	3.6	2.3
North	45	359	20	18.0	11.9	8.7	3.7	2.3
North	46	367	20	18.4	11.6	8.9	3.5	2.3
North	55	268	18	14.9	8.7	9.1	2.9	2.3
SETT	47	5622	20	278.8	88.3	12.0	0.0	1.65
Total beach surveys		30,828						

Table S2. Estimated number of green turtle clutches, and relative percentage contribution, of each nesting group to overall seasonal (Dec–Nov) clutch numbers at Aldabra Atoll. Clutch estimates obtained from "tracks with digging" via ratios calculated by **Mortimer (1988)**–1.65 for beach groups WGT, DDM, DJL, CC and SETT beaches, 2.9 for North beaches 40–43 and 2.3 for North beaches 43.5–46 and 55. Dec 1980–Nov 2008 data provided by Jeanne Mortimer and SIF, data from December 2008 provided by SIF.

Season	WGT Total (%)	DDM Total (%)	DJL Total (%)	CC Total (%)	North 1 Total (%)	North 2 Total (%)	SETT Total (%)	All beaches Total
1980–81	1203.9 (30.0)	249.1 (6.2)	1121.8 (27.9)	110.6 (2.8)	629.8 (15.7)	274.8 (6.8)	427.6 (10.6)	4017.6
1981–82	2290.3 (49.8)	274.2 (6.0)	943.6 (20.5)	110.9 (2.4)	370.2 (8.0)	392.2 (8.5)	221.2 (4.8)	4602.7
1982–83	5286.7 (74.3)	203.9 (2.9)	584.9 (8.2)	0.0 (0.0)	550.3 (7.7)	263.3 (3.7)	227.6 (3.2)	7116.6
1983–84	7468.8 (83.2)	332.7 (3.7)	332.7 (3.7)	0.0 (0.0)	378.6 (4.2)	238.7 (2.7)	221.8 (2.5)	8973.4
1984–85	1767.0 (53.3)	331.8 (10.0)	382.4 (11.5)	0.0 (0.0)	377.6 (11.4)	238.0 (7.2)	221.2 (6.7)	3318.1
1985–86	4965.8 (68.8)	331.8 (4.6)	1088.5 (15.1)	0.0 (0.0)	377.6 (5.2)	238.0 (3.3)	221.2 (3.1)	7222.9
1986–87	4007.0 (55.5)	405.8 (5.6)	1546.4 (21.4)	0.0 (0.0)	417.4 (5.8)	550.4 (7.6)	294.2 (4.1)	7221.2
1987–88	4055.8 (52.3)	562.4 (7.3)	1743.3 (22.5)	37.9 (0.5)	498.1 (6.4)	574.6 (7.4)	286.4 (3.7)	7758.4
1988–89	5548.8 (55.6)	995.5 (10.0)	1990.9 (20.0)	110.6 (1.1)	629.3 (6.3)	476.1 (4.8)	221.2 (2.2)	9972.4
1989–90	2875.8 (39.4)	995.5 (13.6)	1990.9 (27.3)	110.6 (1.5)	629.3 (8.6)	476.1 (6.5)	221.2 (3.0)	7299.3
1990–91	2875.8 (39.4)	995.5 (13.6)	1990.9 (27.3)	110.6 (1.5)	629.3 (8.6)	476.1 (6.5)	221.2 (3.0)	7299.3
1991–92	4997.6 (51.2)	998.2 (10.2)	1996.4 (20.5)	110.9 (1.1)	631.0 (6.5)	477.4 (4.9)	550.3 (5.6)	9761.8
1992–93	6083.3 (55.0)	995.5 (9.0)	1990.9 (18.0)	110.6 (1.0)	629.3 (5.7)	476.1 (4.3)	774.2 (7.0)	11,059.9
1993–94	6083.3 (55.0)	995.5 (9.0)	1990.9 (18.0)	110.6 (1.0)	629.3 (5.7)	476.1 (4.3)	774.2 (7.0)	11,059.9
1994–95	5778.5 (54.8)	629.4 (6.0)	2550.6 (24.2)	76.1 (0.7)	429.5 (4.1)	342.2 (3.3)	732.1 (7.0)	10,538.3
1995–96	5444.5 (55.7)	371.5 (3.8)	1968.8 (20.1)	9.4 (0.1)	702.8 (7.2)	451.7 (4.6)	829.1 (8.5)	9777.8
1996–97	6534.9 (60.7)	480.6 (4.5)	1693.3 (15.7)	75.2 (0.7)	660.7 (6.1)	584.6 (5.4)	731.8 (6.8)	10,761.0
1997–98	5517.3 (60.1)	269.4 (2.9)	1554.2 (16.9)	117.3 (1.3)	590.2 (6.4)	290.4 (3.2)	834.5 (9.1)	9173.3
1998–99	5548.8 (55.6)	995.5 (10.0)	1990.9 (20.0)	110.6 (1.1)	629.3 (6.3)	476.1 (4.8)	221.2 (2.2)	9972.4
1999–00	4276.7 (62.3)	70.6 (1.0)	942.4 (13.7)	37.6 (0.6)	885.7 (12.9)	26.1 (0.4)	627.6 (9.1)	6866.6

2000–01	10302.4 (65.8)	126.1 (0.8)	2621.8 (16.8)	219.7 (1.4)	462.8 (3.0)	85.7 (0.6)	1833.9 (11.7)	15,652.4
2001–02	4626.7 (58.4)	107.9 (1.4)	1567.6 (19.8)	17.6 (0.2)	396.2 (5.0)	57.0 (0.7)	1152.7 (14.5)	7925.6
2002–03	7016.1 (53.7)	460.6 (3.5)	2373.6 (18.2)	140.3 (1.1)	874.0 (6.7)	465.9 (3.6)	1724.9 (13.2)	13,055.3
2003–04	5615.5 (57.0)	433.9 (4.4)	1874.2 (19.0)	123.0 (1.3)	419.0 (4.3)	303.0 (3.1)	1077.6 (10.9)	9846.3
2004–05	7580.0 (64.8)	347.9 (3.0)	1879.1 (16.1)	67.6 (0.6)	303.1 (2.6)	58.5 (0.5)	1471.2 (12.6)	11,707.3
2005–06	8745.2 (59.6)	497.3 (3.4)	2348.8 (16.0)	115.5 (0.8)	355.0 (2.4)	362.6 (2.5)	2259.4 (15.4)	14,683.7
2006–07	7421.8 (51.6)	937.6 (6.5)	3032.4 (21.1)	74.2 (0.5)	426.7 (3.0)	346.5 (2.4)	2155.8 (15.0)	14,395.1
2007–08	10,071.8 (59.5)	410.3 (2.4)	3077.3 (18.2)	74.6 (0.4)	815.9 (4.8)	222.6 (1.3)	2252.1 (13.3)	16,924.5
2008–09	4442.1 (53.5)	178.2 (2.2)	1482.7 (17.9)	154.9 (1.9)	619.3 (7.5)	74.4 (0.9)	1351.5 (16.3)	8303.1
2009–10	7001.2 (49.6)	621.2 (4.4)	2760.0 (19.6)	43.9 (0.3)	837.1 (5.9)	232.2 (1.6)	2623.0 (18.6)	14,118.6
2010–11	6832.4 (51.6)	625.2 (4.7)	2477.9 (18.7)	56.7 (0.4)	489.7 (3.7)	77.8 (0.6)	2683.3 (20.3)	13,242.9
2011–12	9452.4 (58.1)	989.1 (6.1)	2907.3 (17.9)	193.9 (1.2)	457.8 (2.8)	100.2 (0.6)	2176.4 (13.4)	16,277.1
2012–13	10,300.0 (58.8)	857.3 (4.9)	2545.5 (14.5)	24.2 (0.1)	259.3 (1.5)	266.1 (1.5)	3264.9 (18.6)	17,517.2
2013–14	9342.7 (57.1)	1132.1 (6.9)	3148.5 (19.2)	48.5 (0.3)	256.6 (1.6)	105.9 (0.7)	2338.5 (14.3)	16,372.7
2014–15	11,194.2 (56.3)	511.8 (2.6)	2668.5 (13.4)	195.8 (1.0)	518.5 (2.6)	789.6 (4.0)	4013.9 (20.2)	19,892.3
2015–16	4375.2 (50.2)	150.9 (1.7)	256.7 (2.9)	88.8 (1.0)	291.0 (3.3)	753.5 (8.6)	2804.6 (32.2)	8720.6
2016–17	6651.5 (53.3)	594.9 (4.8)	1283.3 (10.3)	319.7 (2.6)	405.3 (3.3)	231.3 (1.9)	3001.2 (24.0)	12,487.3
2017–18	9917.3 (51.5)	657.6 (3.4)	2657.6 (13.8)	311.8 (1.6)	533.5 (2.8)	720.4 (3.7)	4475.8 (23.2)	19,273.9
2018–19	7096.7 (44.1)	1505.2 (9.3)	2286.7 (14.2)	210.0 (1.3)	441.4 (2.7)	774.4 (4.8)	3796.7 (23.6)	16,110.9

Table S3. Estimated population status and nesting trends over time of the major Western Indian Ocean beach groups.

Nesting site	Sampling period	% Beach sampled	Annual clutches	Estimated population status	Reference
Seychelles Is. (Aldabra and Assumption)					
ldabra	1980–2008	100%	~15,297	Increasing: 2.6%.yr^{-1}	Mortimer et al. (2011), Present Study
Assumption	NA	NA	1000–5000	NA	Mortimer (1984); JA Mortimer and Island Conservation Society unpublished data, Mortimer et al. (2011)
Comoros Is.					
Mayotte	1999–2007	~50%	~10,000	Stable: 0.9%.yr^{-1}	Bourjea et al. (2007)
Moheli	1999–2014	NA	12,000–18,000	Increasing: 1999–2006 (3.2%.yr^{-1}), Stable: 2007–2014	Bourjea et al. (2015a; 2015b)
Isles Eparces (Europa Is.)					
Europa	1982–2005 1984–2005	100% 26%	8750–30,363[a]	Increasing: 3%	Le Gall et al. (1986), Le Gall (1988), Lauret-Stepler et al. (2007)
Isles Eparces (Tromelin Is.)					
Tromelin	1982–1984 1986–2010	100% 100%	2100–3000 4417	Stable: exact rate NA	Le Gall (1988) Derville et al. (2015)

[a] Extrapolation by Mortimer et al. (2011) based on reported estimate of 750–1100 females and 2.8 clutches per female, Le Gall (1988).

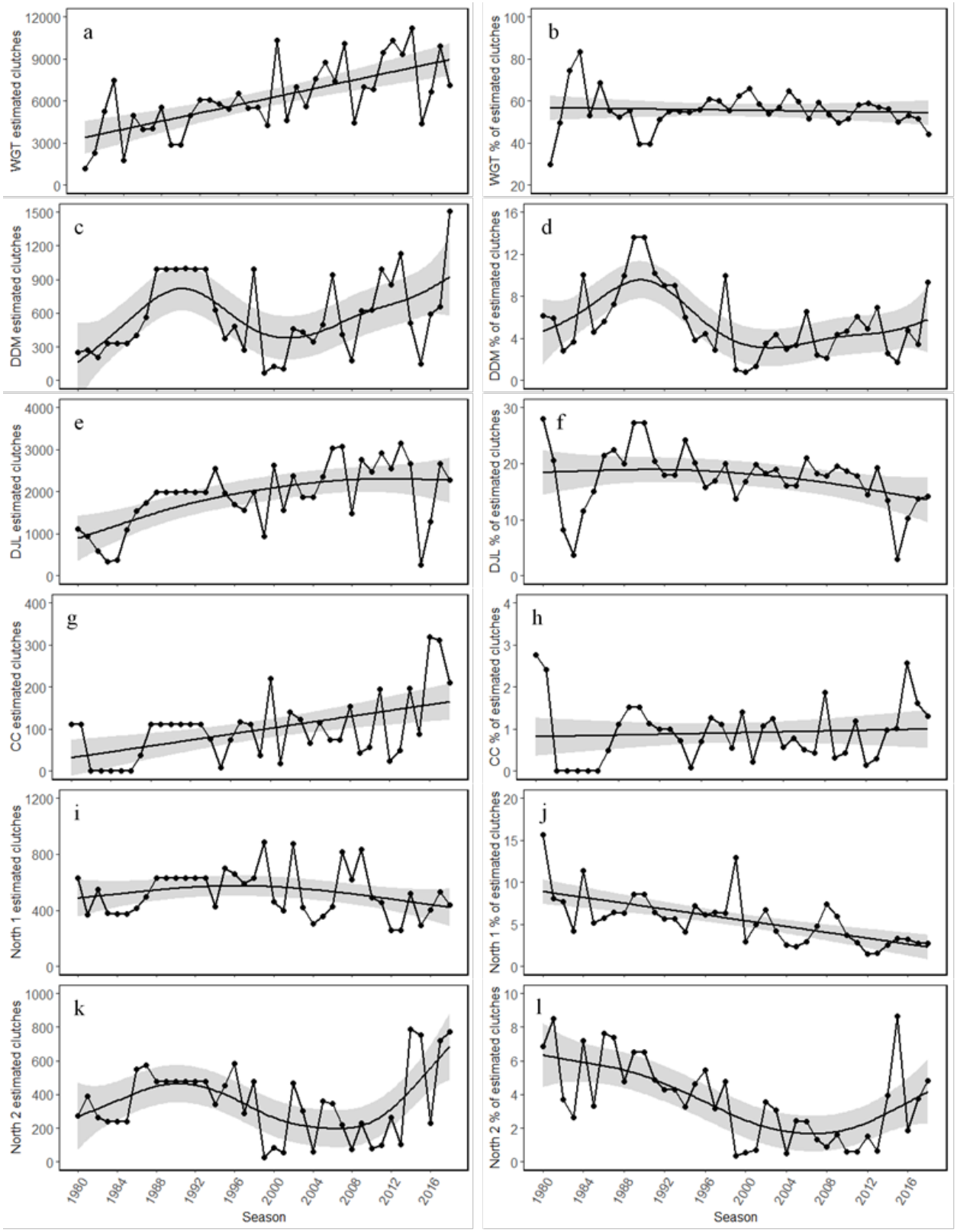

Fig S1. Estimated clutches (left) and percentages of total atoll clutches (right) of Aldabra Atoll's beach groups (excluding Settlement Beach) from 1980–2019 (39 seasons). Year refers to the first calendar year of the season (e.g. 1980 = Dec 1980–Nov 1981). Estimated clutches and relative contribution both taken from Table S2, and calculated via interpolation from SIF data. Beach group acronyms refer to, in order: WGT = West Grande Terre (a, b), DDM = Dune d'Messe (c, d), DJL = Dune Jean-Louis (e, f), CC = Cinq Cases (g, h), North = northern beaches, split during interpolation due to different nesting success ratios calculated by (Mortimer, 1988) (North 1 = north-eastern beaches [i, j], North 2 = north-western beaches [k, l]).

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