Walking on their own legs: unassisted population growth of agoutis reintroduced to restore seed dispersal in an Atlantic Forest reserve

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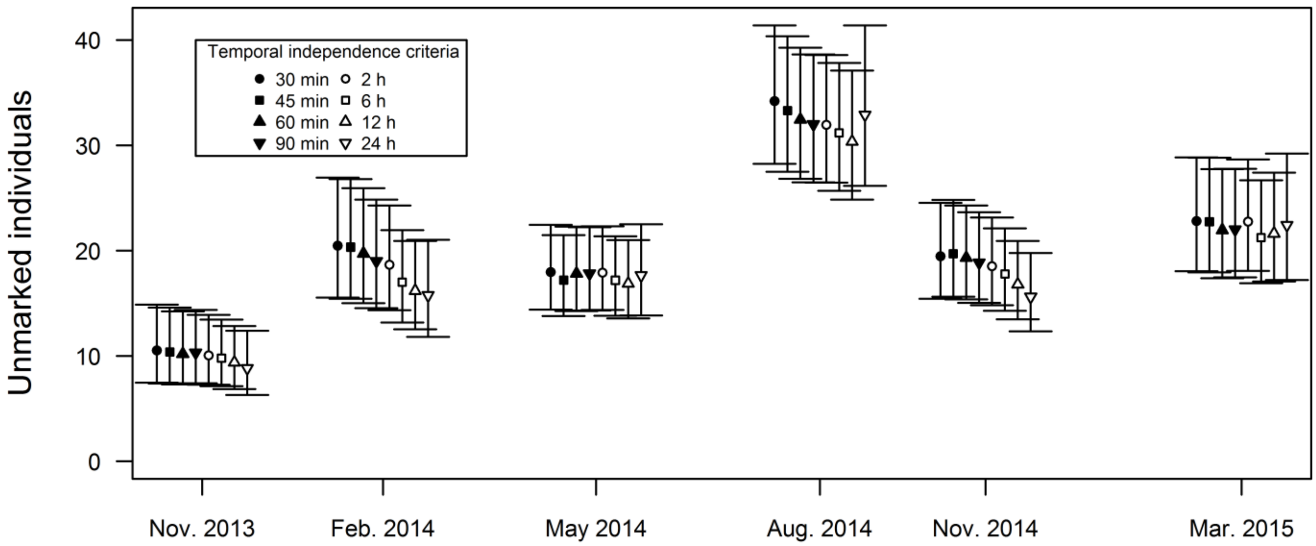

FIG. S1 The encounter history of the robust design Poisson-log normal mixed-effects mark–resight model consists of the number of resights per interval (i.e. individuals are sampled with replacement). Thus, encounter histories can vary widely over a range of temporal independence criteria, with stricter criteria systematically reducing resighting rate estimates. We conducted a sensitivity analysis to assess whether various independence criteria would influence abundance estimates. We pooled photographic records using a range of independence criteria (0.5, 1, 1.5, 2, 6, 12 and 24 hours), and ran simple models with the number of unmarked individuals varying over time and all other parameters kept constant. We verified that choice of independence criteria did not influence abundance estimates, and carried out subsequent analyses using the standard 60-minute criterion.

TABLE S1 Summary of all red-rumped agouti *Dasyprocta leporina* individuals released in Tijuca National Park, Brazil (Fig. 1) during 2009–2016, with name, sex and origin of individual, release date and method, release pen, current status, and place, cause and month of death. Individuals for which no release dates are provided died in the release pen, or were removed for veterinary care and died in captivity. In total, 17 females and 14 males were released; 20 were released through soft-release, and 11 through hard-release. All individuals released received food supplementation in the wild.

Name	Sex	Origin*	Release date	Release method	Release pen	Current status	Place of death	Cause of death	Month of death
Cinza	Female	CdS	1 Feb. 2010	Soft-release	1	Deceased	Wild	Unknown	July 2010
Verde	Male	CdS	1 Feb. 2010	Soft-release	1	Unknown			
Branca	Female	CdS	8 Feb. 2010	Soft-release	1	Deceased	Wild	Unknown	Aug. 2012
Azul	Female	CdS	8 Feb. 2010	Soft-release	1	Deceased	Wild	Dog attack	June 2013
Laranja	Male	CdS	8 Feb. 2010	Soft-release	1	Unknown			
Prata	Male	CdS	26 Apr. 2010	Soft-release	1	Deceased	Wild	Unknown	Mar. 2011
Amarelo	Male	CdS	26 Apr. 2010	Soft-release	1	Unknown			
Negra	Female	CdS	7 June 2010	Soft-release	1	Unknown			
Mangueira	Female	CdS	15 Mar. 2011	Soft-release	1	Deceased	Wild	Unknown	July 2013
Portela	Female	CdS	15 Mar. 2011	Soft-release	1	Unknown			
Bella	Female	CdS	27 July 2011	Soft-release	1	Deceased	Wild	Unknown	July 2013
Cid Jr.	Male	PML	14 May 2012	Soft-release	1	Unknown			
Loki	Male	PML	9 Aug. 2012	Hard-release	1	Deceased	Wild	Dog attack	Aug. 2012
Florinha II	Female	CdS	3 Dec. 2012	Hard-release	1	Deceased	Wild	Unknown	Jan. 2013
Jackie	Female	CdS	3 Dec. 2012	Hard-release	1	Unknown			
Prata Jr.	Male	CdS	3 Dec. 2012	Hard-release	1	Unknown			
Brazuca	Female	CdS	15 Mar. 2013	Hard-release	1	Deceased	Wild	Unknown	Apr. 2013
Atchim	Female	CdS	15 Mar. 2013	Hard-release	1	Deceased	Wild	Unknown	Apr. 2013
Botafogo	Female	CdS	15 Mar. 2013	Hard-release	1	Deceased	Wild	Dog attack	May 2013
Juju	Female	CdS	12 June 2014	Hard-release	2	Deceased	Captivity	Unknown	July 2014
Alice	Female	CdS	12 June 2014	Soft-release	1	Deceased	Wild	Unknown	June 2014
Delta	Female	CdS	12 June 2014	Soft-release	1	Unknown			
Jane	Female	CdS	12 June 2014	Soft-release	2	Unknown			
Tag	Female	CdS	12 June 2014	Soft-release	2	Unknown			

Darwin	Male	CdS	12 June 2014	Hard-release	1	Deceased	Wild	Unknown	June 2014
Jimmy	Male	CdS	12 June 2014	Hard-release	1	Deceased	Wild	Dog attack	June 2014
Wallace	Male	CdS	12 June 2014	Hard-release	2	Deceased	Wild	Unknown	Feb. 2015
Playboy	Male	CdS	12 June 2014	Soft-release	1	Deceased	Wild	Unknown	June 2014
Roland	Male	CdS	12 June 2014	Soft-release	1	Deceased	Wild	Unknown	Aug. 2014
Hash	Male	CdS	12 June 2014	Soft-release	2	Deceased	Wild	Collar injuries	June 2014
Ulisses	Male	CdS	12 June 2014	Soft-release	2	Unknown			
Anon 01	Female	CdS				Deceased	Release Pen	Collar injuries	Oct. 2009
Anon 02	Female	CdS				Deceased	Release Pen	Dog attack	Apr. 2010
Florinha	Female	CdS				Deceased	Captivity	Collar injuries	July 2011
Anon 09	Female	CdS				Deceased	Release Pen	Unknown	May 2014
Anon 03	Male	CdS				Deceased	Release Pen	Hypothermia	Apr. 2010
Dumb	Male	CdS				Deceased	Release Pen	Conspecific aggression	Feb .2011
Anon 04	Male	CdS				Deceased	Release Pen	Unknown	Apr. 2011
Anon 05	Male	CdS				Deceased	Release Pen	Unknown	Apr. 2011
Cid	Male	CdS				Deceased	Release Pen	Unknown	July 2011
Anon 06	Male	CdS				Deceased	Release Pen	Conspecific aggression	Dec. 2011
Brat	Male	CdS				Deceased	Captivity	Unknown	Jan. 2012
Anon 07	Male	PML				Deceased	Captivity	Unknown	May 2012
Anon 08	Male	CdS				Deceased	Release Pen	Conspecific aggression	May 2014

*Two urban parks contributed individuals for reintroduction: CdS, Campo de Santana; PML, Palacete Modesto Leal

TABLE S2 Summary of agouti live-trapping sessions, with start and end dates, duration, total number of captures, number of individuals captured, and number of unmarked individuals captured.

Start date	End date	Duration (days)	Total no. of captures	No. of individuals captured	No. of unmarked individuals captured
22 July 2013	26 July 2013	5	9	5	3
4 Nov. 2013	8 Nov. 2013	5	2	2	1
3 Feb. 2014	7 Feb. 2014	5	3	3	2
5 May 2014	16 May 2014	12	2	2	1
18 Aug. 2014	29 Aug. 2014	12	20	8	5
3 Nov. 2014	14 Nov. 2014	12	1	1	1
2 Mar. 2015	13 Mar. 2015	12	1	1	1
Total		63	38	22	14

TABLE S3 We assumed closure within each 6-day primary interval but we were also interested in assessing if each 30-day survey could also be considered to be closed. To evaluate whether the population was statistically closed within resighting surveys we compared two robust design Poisson-log normal mixed-effects mark–resight model structures, namely, open and closed structures. The open structure modelled U as a function of each primary interval, and estimated transition parameters (ϕ, γ'', γ') for every interval. The closed structure modeled U as a function of each survey, and fixed transition parameters for all intervals except the ones between surveys (ϕ was fixed as 1, γ' and γ'' as 0). In both structures resighting rates α were modelled as interval-dependent, and σ, ϕ, γ' and γ'' were modelled as constant. The closed structure was most likely, and therefore we kept it in further analyses.

Model structure	k	AICc	ΔAICc	w_i	Deviance
Closed	40	1,109.77	0.00	> 0.999	1004.14
Open	64	1,133.39	23.62	< 0.001	925.39

TABLE S4 Details of the 18 agoutis captured using Tomahawk traps, with each individual's name, origin, sex, age at marking, and month of marking.

Name	Origin	Sex	Age at marking	Month of marking
Primo	Wild-born	Male	Young	July 2013
Chico	Wild-born	Male	Young	July 2013
Anathema	Wild-born	Female	Adult	July 2013
Neguinha	Wild-born	Female	Young	Nov. 2013
Lili	Wild-born	Female	Adult	Feb. 2014
Luna	Wild-born	Female	Adult	Feb. 2014
Malu	Wild-born	Female	Young	May 2014
Bjork	Wild-born	Female	Young	Aug. 2014
Grey	Wild-born	Female	Young	Aug.2014
Luke	Wild-born	Male	Adult	Aug. 2014
Maia	Wild-born	Female	Young	Aug. 2014
Lolita	Wild-born	Female	Young	Aug. 2014
Sol	Wild-born	Female	Adult	Nov. 2014
Kanayeva	Wild-born	Female	Young	Mar. 2015
Bella	Captivity	Female	Adult	July 2013
Negra	Captivity	Female	Adult	Nov. 2013
Roland	Captivity	Male	Adult	Aug. 2014
Wallace	Captivity	Male	Adult	Aug. 2014

TABLE S5: Details of 30 6-day primary intervals of five resighting surveys, with interval dates, number of records, total number of camera trap days (*eff*), spatial variance (i.e. variance between stations) of *eff* (*eff var*), the proportion of records that were unidentifiable (*rloss*), and the spatial variance of *rloss* (*rloss var*)

Interval dates	No. of records	*eff*	*eff var*	*rloss*	*rloss var*
15–20 Nov. 2013	43	96	8.96	0.19	0.04
21–26 Nov. 2013	47	96	8.71	0.13	0.01
27 Nov. –2 Dec. 2013	75	114	7.94	0.08	0.02
3–8 Dec. 2013	84	120	8.36	0.17	0.04
9–14 Dec. 2013	65	115	8.38	0.17	0.04
7–12 Feb. 2014	65	126	8.59	0.06	0.03
13–18 Feb. 2014	103	126	8.59	0.08	0.01
19–24 Feb. 2014	94	126	8.59	0.17	0.02
25 Feb. –2 Mar. 2014	75	114	9.07	0.07	0.00
3–8 Mar. 2014	123	126	8.59	0.10	0.04
17–22 May 2014	145	139	7.05	0.08	0.01
23–28 May 2014	111	168	4.77	0.14	0.01
29 May–3 June 2014	130	180	3.07	0.22	0.03
4–9 June 2014	134	174	3.95	0.09	0.02
10–15 June 2014	172	173	3.63	0.13	0.03
29 Aug. –3 Sep. 2014	215	166	4.78	0.17	0.05
4–9 Sep. 2014	197	172	3.61	0.16	0.05
10–15 Sep. 2014	151	166	4.09	0.17	0.02
16–21 Sep. 2014	187	171	3.34	0.24	0.07
22–27 Sep. 2014	143	151	5.63	0.23	0.04
14–19 Nov. 2014	149	192	1.09	0.13	0.02
20–25 Nov. 2014	125	185	1.62	0.20	0.05
26 Nov. –1 Dec. 2014	136	198	0.00	0.25	0.09
2–7 Dec. 2014	99	198	0.00	0.28	0.07
8–13 Dec. 2014	125	195	0.27	0.31	0.08
13–18 Mar. 2015	152	192	1.09	0.14	0.05
19–24 Mar. 2015	124	192	0.78	0.27	0.07
25–30 Mar. 2015	141	198	0.00	0.21	0.07
31 Mar. –5 Apr. 2015	149	198	0.00	0.30	0.07
6–11 Apr. 2015	160	198	0.00	0.21	0.11

TABLE S6 Encounter histories from 14 agoutis used as input for robust design Poisson-log normal mixed-effects mark–resight model analysis. Each cell represents the number of independent photographic records over an interval. Blank cells denote that an individual was not yet marked, or was known to be absent from the population (as a result of removal, mortality or emigration). +0 denotes an absence of records of an individual that was known to be available for resighting. An encounter was assigned +0 only when the primary interval was immediately after the individual was captured. −0 denotes an absence of records of an individual and uncertainty regarding its fate. The double periods (..) denote an interval in which an individual was not yet marked, or was known to be deceased. Individual X is not included in Table S2 because it was never captured. However, it had distinct collar and ear marks before any surveys or wild markings took place, and therefore we knew that it was a released individual and could identify it in all surveys.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Anathema	03	01	02	−0	01	03	05	05	04	07	04	02	08	01	04	03	06	02	06	04	11	07	04	02	04	05	05	03	04	03
Bjork	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+0	05	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Grey	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	05	03	01	01	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Kanayeva	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	09	02	02	01	06
Lili	..	..	..	..	..	+0	02	01	−0	01	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Luke	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	04	−0	06	06	05	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Luna	..	..	..	..	..	02	02	03	03	04	02	−0	−0	07	07	02	03	01	01	02	02	05	05	03	04	07	02	08	09	10
Maia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+0	−0	−0	2	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Malu	..	..	..	..	..	..	..	..	..	..	07	11	04	07	06	02	07	02	05	04	−0	1	1	−0	−0	05	02	01	01	01
Negra	05	10	06	04	07	05	08	05	−0	06	05	09	01	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Sol	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+0	-0	01	-0	-0	-0	-0	-0	-0	-0
Wallace	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	01	03	02	−0	02	04	01	−0	−0	01	..	..	..	..	..
X	02	03	05	08	05	06	04	03	−0	06	06	04	05	08	08	08	05	05	05	−0	09	06	03	03	05	01	02	02	−0	05
Lolita	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0	−0
Unmark.	25	27	56	58	41	45	74	61	63	87	106	69	80	96	104	148	125	100	112	90	98	77	86	61	63	102	78	93	87	98
Marked Unid.	0	0	0	0	0	0	0	0	0	0	3	1	4	3	4	6	9	6	5	3	6	3	2	2	9	2	0	3	3	3
Unidentif.	8	6	6	14	11	4	8	16	5	12	12	15	28	12	23	36	31	26	44	33	19	25	34	28	39	21	33	29	44	34

TABLE S7 Robust design Poisson-log normal mixed-effects mark–resight modelling of α. Models with ΔAICc<2 were kept for the subsequent step, modelling of σ (Table S7). See Table 1 for a summary of model notation.

Model	k	AICc	ΔAICc	w_i	Deviance	Included
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,087.38	0.00	0.221	1,054.25	Yes
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	16	1,087.45	0.07	0.214	1,051.87	Yes
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,088.29	0.91	0.141	1,055.15	Yes
$\alpha_{(eff+rloss+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,089.94	2.56	0.062	1,059.22	No
$\alpha_{(rloss+captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,090.10	2.72	0.057	1,059.37	No
$\alpha_{(rloss+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,090.54	3.16	0.046	1,059.81	No
$\alpha_{(eff+rloss+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,090.71	3.33	0.042	1,059.98	No
$\alpha_{(rloss+captv+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,090.79	3.41	0.040	1,057.65	No
$\alpha_{(eff+rloss)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,090.91	3.53	0.038	1,062.57	No
$\alpha_{(rloss+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,091.21	3.83	0.033	1,062.86	No
$\alpha_{(eff+rloss+captv)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,091.27	3.89	0.032	1,060.54	No
$\alpha_{(eff+rloss+captv+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,092.12	4.73	0.021	1,058.98	No
$\alpha_{(rloss)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	12	1,092.13	4.75	0.021	1,066.13	No
$\alpha_{(rloss+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,092.61	5.23	0.016	1,064.26	No
$\alpha_{(rloss+captv)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,093.22	5.84	0.012	1,064.87	No
$\alpha_{(rloss+captv+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,094.44	7.06	0.006	1,063.71	No
$\alpha_{(captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,107.11	19.73	<0.001	1,078.76	No
$\alpha_{(captv+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,107.40	20.02	<0.001	1,076.67	No
$\alpha_{(age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,109.03	21.65	<0.001	1,080.68	No
$\alpha_{(eff+captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,109.49	22.11	<0.001	1,078.76	No
$\alpha_{(time)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	40	1,109.77	22.38	<0.001	1,004.14	No
$\alpha_{(eff+captv+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,109.80	22.42	<0.001	1,076.66	No
$\alpha_{(sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	12	1,110.85	23.47	<0.001	1,084.85	No
$\alpha_{(eff+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,111.31	23.93	<0.001	1,080.60	No
$\alpha_{(captv)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	12	1,111.38	24.00	<0.001	1,085.38	No
$\alpha_{(age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	12	1,111.50	24.12	<0.001	1,085.50	No
$\alpha_{(.)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	11	1,111.88	24.50	<0.001	1,088.20	No
$\alpha_{(time+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	41	1,112.11	24.73	<0.001	1,003.00	No
$\alpha_{(captv+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,112.33	24.95	<0.001	1,083.98	No
$\alpha_{(time+captv)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	41	1,112.70	25.32	<0.001	1,003.58	No
$\alpha_{(eff+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,112.89	25.51	<0.001	1,084.56	No
$\alpha_{(eff+captv)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,113.63	26.25	<0.001	1,085.29	No
$\alpha_{(eff+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	13	1,113.65	26.27	<0.001	1,085.32	No
$\alpha_{(eff)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	12	1,113.82	26.44	<0.001	1,087.85	No
$\alpha_{(time+captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	42	1,113.90	26.52	<0.001	1,001.24	No
$\alpha_{(eff+captv+age)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	14	1,114.64	27.26	<0.001	1,083.93	No

TABLE S8 Robust design Poisson-log normal mixed-effects mark–resight modelling of σ. Models with ΔAICc<2 were kept for the subsequent step, modelling of ϕ (Table S9). See Table 1 for a summary of model notation.

Model	k	AICc	ΔAICc	w_i	Deviance	Included
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(.)}\gamma_{(.)}$	16	1,086.77	0.00	0.189	1,051.19	Yes
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,087.38	0.61	0.139	1,054.25	Yes
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	16	1,087.45	0.68	0.135	1,051.87	Yes
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(.)}\gamma_{(.)}$	17	1,087.65	0.87	0.122	1,049.59	Yes
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,088.29	1.52	0.089	1,055.15	Yes
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(eff\ var+rloss\ var)}\phi_{(.)}\gamma_{(.)}$	17	1,089.00	2.22	0.062	1,050.94	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(rloss\ var)}\phi_{(.)}\gamma_{(.)}$	16	1,089.20	2.43	0.056	1,053.63	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(eff\ var)}\phi_{(.)}\gamma_{(.)}$	16	1,089.24	2.47	0.055	1,053.66	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(eff\ var)}\phi_{(.)}\gamma_{(.)}$	17	1,089.67	2.90	0.044	1,051.62	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(eff\ var+rloss\ var)}\phi_{(.)}\gamma_{(.)}$	18	1,089.79	3.02	0.042	1,049.23	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(eff\ var+rloss\ var)}\phi_{(.)}\gamma_{(.)}$	17	1,090.01	3.24	0.037	1,051.96	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(eff\ var)}\phi_{(.)}\gamma_{(.)}$	16	1,090.68	3.90	0.027	1,055.10	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(surv)}\phi_{(.)}\gamma_{(.)}$	20	1,097.71	10.94	<0.001	1,052.04	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(surv)}\phi_{(.)}\gamma_{(.)}$	21	1,098.03	11.26	<0.001	1,049.74	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(surv)}\phi_{(.)}\gamma_{(.)}$	20	1,098.13	11.35	<0.001	1,052.45	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(0)}\phi_{(.)}\gamma_{(.)}$	14	1,109.72	22.94	<0.001	1,078.99	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(0)}\phi_{(.)}\gamma_{(.)}$	15	1,111.08	24.31	<0.001	1,077.95	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(0)}\phi_{(.)}\gamma_{(.)}$	14	1,116.91	30.13	<0.001	1,086.18	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(time)}\phi_{(.)}\gamma_{(.)}$	44	1,146.24	59.46	<0.001	1,026.30	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(time)}\phi_{(.)}\gamma_{(.)}$	44	1,147.14	60.36	<0.001	1,027.20	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(time)}\phi_{(.)}\gamma_{(.)}$	45	61,045.75	59,958.98	<0.001	60,922.09	No

TABLE S9 Robust design Poisson-log normal mixed-effects mark–resight modelling of ϕ. Models with ΔAICc<2 were kept for the subsequent step, modelling of γ (Table S10). See Table 1 for a summary of model notation.

Model	k	AICc	ΔAICc	w_i	Deviance	Included
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(.)}$	17	1,083.66	0.00	0.106	1,045.61	Yes
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(.)}$	16	1,084.24	0.58	0.080	1,048.66	Yes
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(.)}$	17	1,084.34	0.68	0.076	1,046.29	Yes
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(.)}$	18	1,084.57	0.91	0.068	1,044.01	Yes
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age+sex)}\gamma_{(.)}$	18	1,084.90	1.24	0.057	1,044.34	Yes
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(.)}$	16	1,085.15	1.49	0.051	1,049.57	Yes
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(.)}$	17	1,085.45	1.79	0.043	1,047.39	Yes
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(.)}$	18	1,085.58	1.92	0.041	1,045.02	Yes
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(captv+age)}\gamma_{(.)}$	18	1,085.81	2.16	0.036	1,045.25	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(age+sex)}\gamma_{(.)}$	19	1,085.84	2.18	0.036	1,042.74	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(.)}$	17	1,086.36	2.70	0.028	1,048.30	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(captv+age)}\gamma_{(.)}$	17	1,086.36	2.70	0.028	1,048.31	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(captv+age)}\gamma_{(.)}$	18	1,086.49	2.84	0.026	1,045.93	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(captv+age+sex)}\gamma_{(}$	19	1,086.61	2.95	0.024	1,043.51	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(captv+age)}\gamma$	19	1,086.75	3.09	0.023	1,043.65	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(.)}\gamma_{(.)}$	16	1,086.77	3.11	0.022	1,051.19	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(captv+age+sex)}\gamma_{(.)}$	18	1,087.12	3.46	0.019	1,046.56	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(captv+age)}\gamma_{(.)}$	17	1,087.27	3.61	0.018	1,049.21	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(captv+age+sex)}\gamma_{(.)}$	19	1,087.29	3.63	0.017	1,044.19	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,087.38	3.72	0.017	1,054.25	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	16	1,087.45	3.79	0.016	1,051.87	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(captv+age+s}$	20	1,087.58	3.92	0.015	1,041.91	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(.)}\gamma_{(.)}$	17	1,087.65	3.99	0.014	1,049.59	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(captv)}\gamma_{(.)}$	17	1,087.67	4.01	0.014	1,049.61	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(captv+age+sex)}\gamma_{(.)}$	18	1,088.03	4.37	0.012	1,047.47	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(captv)}\gamma_{(.)}$	16	1,088.24	4.58	0.011	1,052.66	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(.)}\gamma_{(.)}$	15	1,088.29	4.63	0.010	1,055.15	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(captv)}\gamma_{(.)}$	17	1,088.35	4.69	0.010	1,050.29	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(captv)}\gamma_{(.)}$	18	1,088.57	4.91	0.009	1,048.01	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(sex)}\gamma_{(.)}$	17	1,088.80	5.14	0.008	1,050.75	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(captv+sex)}\gamma_{(.)}$	18	1,088.98	5.32	0.007	1,048.42	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(captv)}\gamma_{(.)}$	16	1,089.15	5.49	0.007	1,053.57	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(sex)}\gamma_{(.)}$	16	1,089.38	5.72	0.006	1,053.80	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(sex)}\gamma_{(.)}$	17	1,089.48	5.83	0.006	1,051.43	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(captv+sex)}\gamma_{(.)}$	17	1,089.53	5.87	0.006	1,051.48	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(captv+sex)}\gamma_{(.)}$	18	1,089.66	6.00	0.005	1,049.10	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(sex)}\gamma_{(.)}$	18	1,089.71	6.05	0.005	1,049.15	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(captv+sex)}\gamma_{(}$	19	1,089.92	6.26	0.005	1,046.82	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(sex)}\gamma_{(.)}$	16	1,090.29	6.63	0.004	1,054.71	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(captv+sex)}\gamma_{(.)}$	17	1,090.44	6.78	0.004	1,052.38	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(surv)}\gamma_{(.)}$	20	1,091.87	8.21	0.002	1,046.19	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(surv)}\gamma_{(.)}$	19	1,092.35	8.69	0.001	1,049.24	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(surv)}\gamma_{(.)}$	20	1,092.55	8.89	0.001	1,046.87	No

$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(surv)}\gamma_{(.)}$	21	1,092.88	9.22	0.001	1,044.59	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(surv)}\gamma_{(.)}$	19	1,093.25	9.59	<0.001	1,050.15	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(surv+captv)}\gamma_{(.)}$	21	1,093.49	9.83	<0.001	1,045.21	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(surv+captv)}\gamma_{(.)}$	20	1,093.93	10.28	<0.001	1,048.26	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(surv+captv)}\gamma_{(.)}$	21	1,094.17	10.51	<0.001	1,045.89	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(surv+sex)}\gamma_{(.)}$	21	1,094.47	10.81	<0.001	1,046.19	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(surv+captv)}$	22	1,094.54	10.88	<0.001	1,043.61	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(surv+captv)}\gamma_{(.)}$	20	1,094.84	11.18	<0.001	1,049.17	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(surv+sex)}\gamma_{(.)}$	20	1,094.91	11.26	<0.001	1,049.24	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(surv+sex)}\gamma_{(.)}$	21	1,095.15	11.49	<0.001	1,046.87	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(surv+sex)}\gamma_{(.}$	22	1,095.52	11.86	<0.001	1,044.59	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(surv+sex)}\gamma_{(.)}$	20	1,095.82	12.16	<0.001	1,050.15	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(surv+captv+sex)}\gamma$	22	1,096.00	12.34	<0.001	1,045.07	No
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(surv+captv+sex)}\gamma_{(.)}$	21	1,096.41	12.75	<0.001	1,048.12	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(surv+captv+sex)}\gamma_{(.)}$	22	1,096.68	13.02	<0.001	1,045.75	No
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(surv+captv+}$	23	1,097.08	13.42	<0.001	1,043.47	No
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(surv+captv+sex)}\gamma_{(.)}$	21	1,097.31	13.66	<0.001	1,049.03	No

TABLE S10 Robust design Poisson-log normal mixed-effects mark–resight modelling of γ. See Table 1 for a summary of model notation.

Model	k	AICc	ΔAICc	w_i	Deviance
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(.)}$	17	1,083.66	0.00	0.200	1,045.61
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(.)}$	16	1,084.24	0.58	0.149	1,048.66
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(.)}$	17	1,084.34	0.68	0.142	1,046.29
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(.)}$	18	1,084.57	0.91	0.127	1,044.01
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age+sex)}\gamma_{(.)}$	18	1,084.90	1.24	0.107	1,044.34
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(.)}$	16	1,085.15	1.49	0.095	1,049.57
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(.)}$	17	1,085.45	1.79	0.082	1,047.39
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(.)}$	18	1,085.58	1.92	0.076	1,045.02
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(surv)}$	21	1,090.96	7.30	0.005	1,042.67
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(surv)}$	21	1,091.64	7.98	0.004	1,043.35
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(surv)}$	22	1,092.00	8.34	0.003	1,041.07
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(surv)}$	20	1,092.31	8.65	0.003	1,046.63
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age+sex)}\gamma_{(surv)}$	22	1,092.34	8.68	0.003	1,041.41
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(surv)}$	21	1,092.74	9.08	0.002	1,044.46
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(surv)}$	22	1,093.02	9.36	0.002	1,042.09
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(surv)}$	21	1,094.01	10.35	0.001	1,045.72
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(0)}$	16	2,383.80	1,300.14	<0.001	2,348.22
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(0)}$	15	2,383.88	1,300.22	<0.001	2,350.74
$\alpha_{(eff+rloss+age+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(0)}$	14	2,384.21	1,300.55	<0.001	2,353.48
$\alpha_{(eff+rloss+captv+age+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(0)}$	16	2,385.24	1,301.58	<0.001	2,349.66
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age)}\gamma_{(0)}$	15	2,393.64	1,309.98	<0.001	2,360.50
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age)}\gamma_{(0)}$	14	2,394.15	1,310.49	<0.001	2,363.42
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(rloss\ var)}\phi_{(age+sex)}\gamma_{(0)}$	16	2,395.00	1,311.34	<0.001	2,359.42
$\alpha_{(eff+rloss+captv+sex)}\sigma_{(.)}\phi_{(age+sex)}\gamma_{(0)}$	15	2,395.48	1,311.82	<0.001	2,362.34

TABLE S11 Monetary costs involved in the reintroduction, post-release monitoring and population monitoring of agoutis. These costs do not include manpower; all work was conducted by employees of state-run research institutes and students. Approximately the same proportion of funding was received from private and state agencies. ‘

Item	Cost[1]		Type	Objective	Amount	Total[2]	
	USD	BRL				USD	BRL
Acclimatization pen (2 units)	4,060.00	14,000.00	Fixed	Reintroduction	1	4,060.00	14,000.00
Food supplementation	19.14	66.00	Per individual	Reintroduction	43	823.02	2,838.00
Tomahawk live traps (40 units)	1,508.00	5,200.00	Fixed	Reintroduction / Population monitoring	1	1,508.00	5,200.00
Aluminium branding iron (9 units)	201.84	696.00	Fixed	Reintroduction / Population monitoring	1	201.84	696.00
Weighing scale	87.00	300.00	Fixed	Reintroduction / Population monitoring	1	87.00	300.00
Ear tag applicator	87.00	300.00	Fixed	Reintroduction / Population monitoring	1	87.00	300.00
Dry ice	1.91	6.59	Per individual	Reintroduction / Population monitoring	57	108.87	375.41
Anaesthetic	1.45	5.00	Per individual	Reintroduction / Population monitoring	57	82.65	285.00
Antiseptic materials	1.45	5.00	Per individual	Reintroduction / Population monitoring	57	82.65	285.00
90% alcohol	0.97	3.34	Per individual	Reintroduction / Population monitoring	57	55.29	190.66
Ear tags	0.35	1.21	Per individual	Reintroduction / Population monitoring	57	19.95	68.79
Camera traps (33 units)	11,484.00	39,600.00	Fixed	Population monitoring	1	11,484.00	39,600.00
Car rental	348.00	1,200.00	Per survey	Population monitoring	7	2,436.00	8,400.00

Staff feeding	290.00	1,000.00	Per survey	Population monitoring	7	2,030.00	7,000.00
Batteries for camera traps	198.65	685.00	Per survey	Population monitoring	7	1,390.55	4,795.00
Trap bait	192.85	665.00	Per survey	Population monitoring	7	1,349.95	4,655.00
Fuel	72.50	250.00	Per survey	Population monitoring	7	507.50	1,750.00
Batteries for flashlights	47.91	165.21	Per survey	Population monitoring	7	335.37	1,156.45
Radio tracking gear	2,320.00	8,000.00	Fixed	Post-release monitoring	1	2,320.00	8,000.00
Radio collars	290.00	1,000.00	Per individual	Post-release monitoring	31	8,990.00	31,000.00
Battery for tracking gear	1.00	3.45	Per individual	Post-release monitoring	31	31.00	106.90
Total cost (2009–2015)						37,990.64	131,002.21
Annual cost						6,331.77	21,833.70

[1]USD converted from BRL at the rate of 20 June 2016.

[2] 'Per Individual' costs were multiplied by 31 (total number of released individuals), 43 (total number of individuals moved to release pens) or 57 (total number of individuals that were marked, captive or wild-born), as appropriate.