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SI.1. Literature review

Methods

To evaluate the prevailing approach to sugar glider baiting among practitioners and variance in trapping outcomes, we performed a review of the literature using Google Scholar in October 2022. We used combinations of the following keywords: sugar glider, *Petaurus notatus*, *Petaurus breviceps*, and trap, trapping, bait or lure. Supplementary publications were added manually if not detected by these keywords. We included recently split sugar glider species *P. breviceps* and *P. notatus* [1] but excluded congeners. A total of 140 publications were screened, and 35 of these baited sugar gliders.

Inclusion criteria for our meta-analysis required that:

- The study must have trapped or attempted to trap *P. notatus*
- The study must have reported data on number of *P. notatus* captures or individuals and total trap nights (or number of traps and a specified duration), or at a minimum reported mean capture rate (defined as number of individual gliders/trap nights) or mean trap success (defined as number of total captures/trap nights) for *P. notatus*
- Bait type was reported

Sixteen publications (comprising a total of 26 unique studies) reported bait type, trap nights, the count of individuals captured or total captures. We conducted a meta-analysis on these data comparing the incidence rates of unique captures and trap success among studies. We studied incidence rates because they provide overall rates that account for within-study variance, and the approach suited the available data. To explain heterogeneity, we included moderators: bait type, year, trap type, minimum trap height, maximum trap height and habitat connectivity (2-level factor: continuous; fragmented). We tested for multicollinearity and retained all moderators. We first fit a random-effects meta-regression without moderators to obtain mean incidence rates for capture rates and trapping success respectively. We next fit a maximum likelihood multi-meta-regression (yi = effect size, vi= sampling variances) to evaluate first the contribution of bait and second, the contribution of all moderators to explaining variability in incidence rates. We resampled for 1000 permutations to avoid type one error[2]. We used model-averaging and sum of model weights to identify the most influential parameters on effect heterogeneity. Analyses were undertaken in *R 4.1.0* R Core [3] using packages *metafor 3.8-1* [4] and *MuMIn 1.43.17*[5].

Results

35 publications were reviewed that baited or lured sugar gliders, spanning years 1947-2022. All studies targeting sugar gliders used a honey-based bait or lure (either as honey, honey and oats, honey and bread, honey and sugar or honey, peanut butter and oats). Similarly, 92% of non-target studies that attracted sugar gliders included variations of honey-based baits, with one substituting golden syrup and two other studies including linseed or vanilla oils. Sugar gliders consumed animal protein baits (including sardines, dog food and non-toxic foxoff meat) in one study targeting brush-tailed phascogales [6]. 97% of publications did not provide citations or rationale for bait choices in the methods. There were no comparisons of bait types and efficacy of trapping sugar gliders across the literature. Only one study reported overall detection probabilities, which were calculated with an occupancy capture-recapture analysis [7].

Meta-analyses of incidence rates

26 unique experiments from a total of 16 publications were included in meta-analyses. 20 experiments were included in the analysis of capture incidence rates (Table S1) and 17 experiments were included in the analysis of trap success (Table S2). Three experiments from two studies were removed from the multi-meta-regression as they had incomplete moderators. Variations in bait had poor explanatory power for heterogeneity in incidence rates of either trap success (Q=1030.72, df = 10, p <0.0001, I^2 = 98.01%, T^2=0.41) or capture rates (Q=260.94, df = 14, p <0.0001, I^2 = 95.85%, T^2=0.87). All baits were honey-based and 81.5% of experiments also used a liquid honey-water lure.

Our meta-analyses showed that the overall incidence rate for trap success was 0.08 (95% CI 0.05-0.13, I^2 = 99.7%, p <0.01; Figure S1) and 0.02 for the capture rate (95% CI 0.01-0.03, I^2 = 97.4%, p <0.01; Figure S2). There was significant heterogeneity between studies but bait was not a top moderator nor increased capture likelihood (Table S4; Table S6). Model averaging showed that habitat connectivity explained the most variance in capture rates, and that the likelihood of capturing more unique sugar gliders increased in fragmented forests (Table S3; Table S4). Captures of unique gliders also increased with minimum trap height (Table S3) but has not increased over time (years 1980-2022). Similarly, trapping success increased with fragmented habitat and minimum trap height (Table S5; Table S6) but has overall decreased slightly over four decades of research (Table S5; Table S6). Trap nights, however, was a top moderator for trapping success in conjunction with habitat and year, and these together accounted for the most variance in trapping success (Table S5).

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Figure S1. Forest plot for sugar glider trapping success across studies over time. Effect sizes are incidence rates (log-transformed) (i.e. capture events/ trap nights). The squares represent the mean values and the bars represent 95% confidence intervals of the effect sizes. The combined effect of all studies is represented by the diamond.

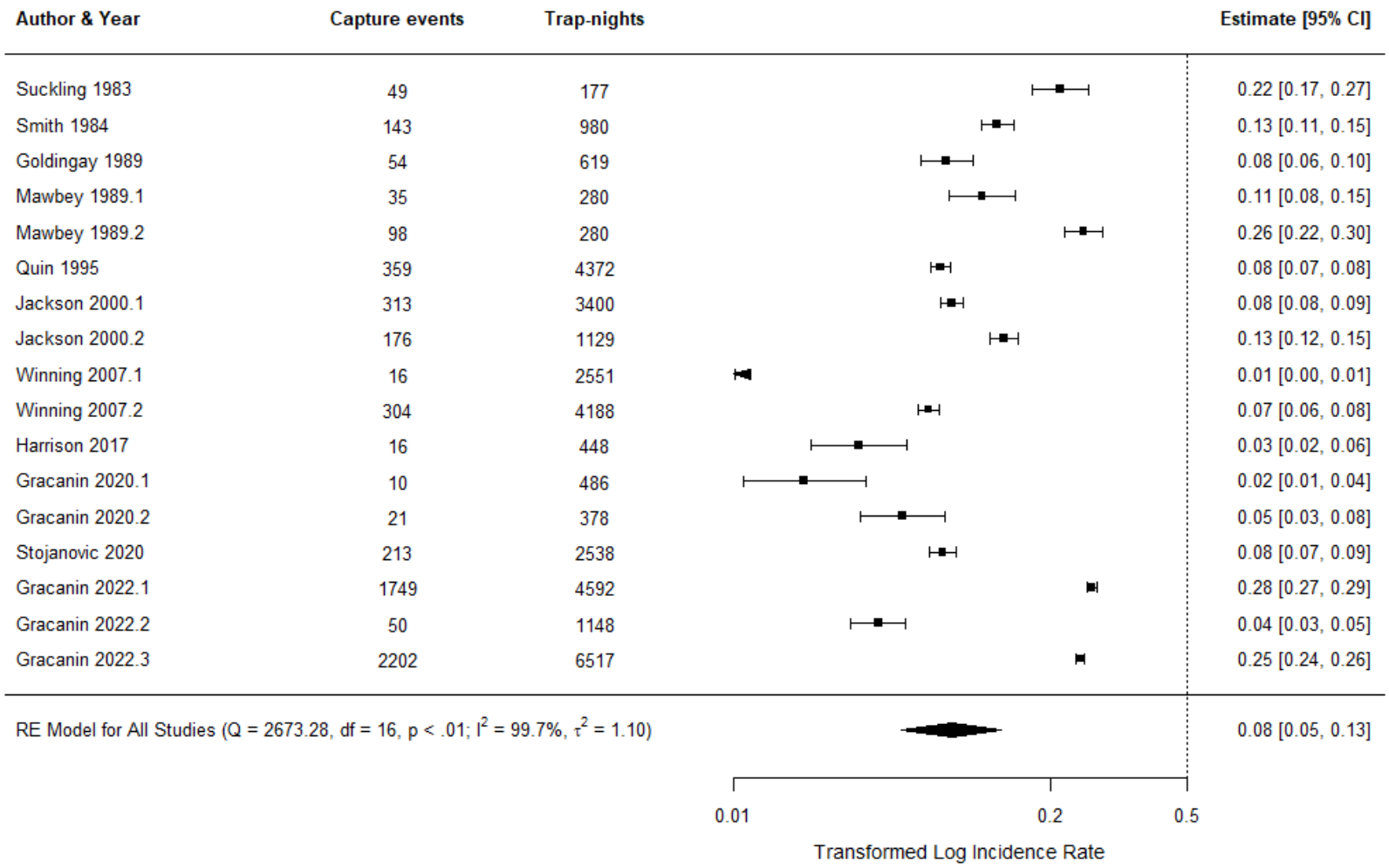

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Figure S2. Forest plot for sugar glider capture rates across studies over time. Effect sizes are incidence rates (log-transformed) (i.e. individuals captured/ trap nights). The squares represent the mean values and the bars represent 95% confidence intervals of the effect sizes. The combined effect of all studies is represented by the diamond.

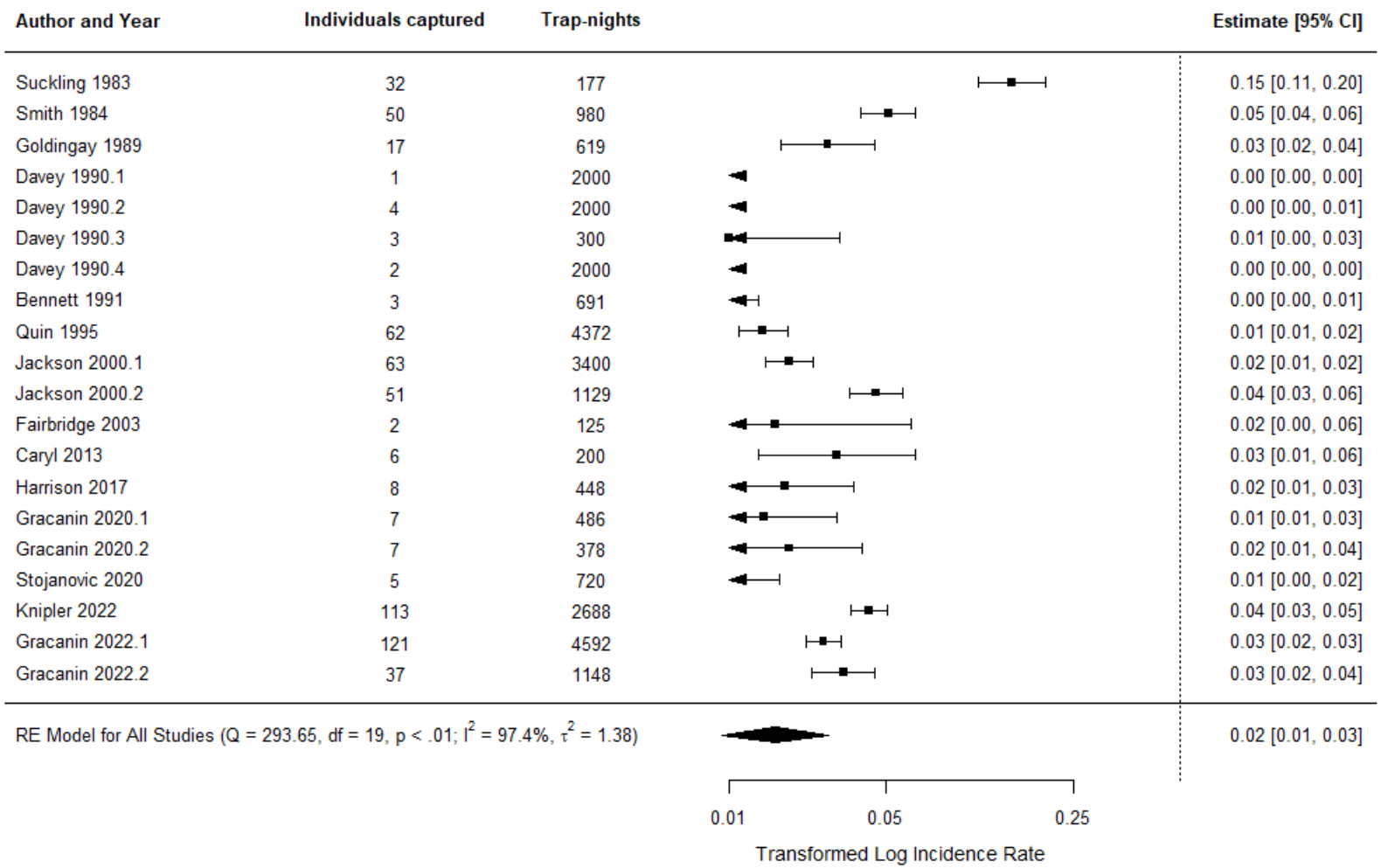

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Table S1. List of studies used in meta-analysis of capture rates of sugar gliders. Inclusion criteria were: total number of individuals captured, trap-nights and mean capture rate and bait type. Data presented is for sugar glider individuals captured only, regardless of the study target species. Experiments within studies that compared habitat or survey methods (i.e. trap types) were assigned unique ID's and analysed separately.

Study ID	Exp #	Year	Bait	Individuals captured	Trap-nights	Mean capture rate	Trap type	Trap height minimum	Trap height maximum	Habitat	State	Target species
Suckling 1983 [1]	1	1983	honey; oats	32	177	0.181	wire-cage	3	6	fragmented	VIC	sugar glider
Smith 1984 [2]	1	1984	honey; sugar	50	980	0.051	Elliot A	3	5	continuous	NSW	sugar glider
Goldingay 1987[3]	1	1987	honey	17	619	0.027	Elliot A	1	2	continuous	NSW	small mammals
Davey 1990[4]	1	1990	honey; oats; peanut butter	1	2000	0.001	Elliot A	0	0	continuous	NSW	arboreal mammals
	2	1990	honey; oats; peanut butter	4	2000	0.002	Elliot A	2	10	continuous	NSW	arboreal mammals
	3	1990	honey; oats; peanut butter	3	300	0.010	wire-cage	1	25	continuous	NSW	arboreal mammals
	4	1990	honey; oats; peanut butter	2	2000	0.001	hair-trap	0	0	continuous	NSW	arboreal mammals
Bennett 1991[5]	1	1991	honey; oats; peanut butter	3	691	0.004	wire-cage	NA	NA	NA	VIC	arboreal mammals
Quin 1995[6]	1	1995	honey; sugar	62	4372	0.014	multiple	3	5	continuous	NSW	sugar glider and squirrel glider
Jackson 2000[7]	1	2000	honey; oats	63	3400	0.019	wire-cage	4	4	continuous	QLD	sugar glider and mahogany glider
	2	2000	honey; oats	51	1129	0.045	wire-cage	4	4	fragmented	QLD	sugar glider and mahogany glider
Fairbridge 2003[8]	1	2003	honey; oats; peanut butter; sardines; dried fruit; dog food	2	125	0.016	Elliot A	0	0	fragmented	VIC	brush-tailed phascogale
Caryl 2013[9]	1	2013	honey; oats; peanut butter	6	200	0.030	Elliot A	4	4	fragmented	VIC	sugar glider
Harrison 2017[10]	2	2018	honey; oats; peanut butter	8	448	0.018	multiple	1.5	5	continuous	VIC	leadbeaters possum
Gracanin 2020[11]	1	2020	honey; oats; peanut butter	7	490	0.014	camera-trap	0	0	fragmented	NSW	sugar glider
	2	2020	honey; oats; peanut butter	7	374	0.019	camera-trap	2	2	fragmented	NSW	sugar glider
Stojanovic 2020[12]	2	2021	honey; oats; peanut butter	5	720	0.007	Mawbey	5	20	continuous	TAS	sugar glider
Gracanin 2022[13]	1	2022	honey; oats; peanut butter	121	4592	0.026	camera-trap	2	2	fragmented	NSW	sugar glider and bush rat
Gracanin 2022[14]	2	2022	honey; oats; peanut butter	37	1148	0.032	Elliot A	2	2	fragmented	NSW	sugar glider and bush rat
Knipler 2022[15]	1	2022	honey; oats; peanut butter	113	2688	0.042	multiple	2	2	fragmented	NSW	sugar glider

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Table S2. List of studies used in meta-analysis of trapping success of sugar gliders. Inclusion criteria were: total number of captures (capture events), trap-nights and mean trapping success and bait type. Data presented is for sugar glider captures only, regardless of the study target species. Experiments within studies that compared habitat or survey methods (i.e. trap types) were assigned unique ID's and analysed separately.

Study ID	Exp #	Year	Bait	Capture events	Trap-nights	Mean trap success	Trap type	Trap height minimum	Trap height maximum	Habitat	State	Target species (common name)
Suckling 1983 [1]	1	1983	honey; oats	49	177	0.277	wire-cage	3	6	fragmented	VIC	sugar glider
Smith 1984[2]	1	1984	honey; sugar	143	980	0.146	Elliot A	3	5	continuous	NSW	sugar glider
Goldingay 1987[3]	1	1987	honey	54	619	0.087	Elliot A	1	2	continuous	NSW	small mammals
Mawbey 1989[16]	1	1989	honey; oats	35	280	0.125	Elliot A	2	20	fragmented	TAS	sugar glider
	2	1989	honey; oats	98	280	0.350	Mawbey	2	20	fragmented	TAS	sugar glider
Quin 1995[6]	1	1995	honey; sugar	359	4372	0.082	multiple	3	5	continuous	NSW	sugar glider and squirrel glider
Jackson 2000[7]	1	2000	honey; oats	313	3400	0.092	wire-cage	4	4	continuous	QLD	sugar glider and mahogany glider
	2	2000	honey; oats	176	1129	0.160	wire-cage	4	4	fragmented	QLD	sugar glider and mahogany glider
Winning 2007[17]	1	2007	honey; oats; peanut butter	16	2551	0.006	Elliot A	3	5	NA	NSW	sugar glider and squirrel glider
	2	2007	honey; oats; peanut butter	304	4188	0.073	Winning King	3	5	NA	NSW	sugar glider and squirrel glider
Harrison 2017[10]	2	2018	honey; oats; peanut butter	16	448	0.036	multiple	1.5	5	continuous	VIC	leadbeaters possum
Gracanin 2020[11]	1	2020	honey; oats; peanut butter	10	490	0.020	camera-trap	0	0	fragmented	NSW	sugar glider
	2	2020	honey; oats; peanut butter	21	374	0.056	camera-trap	2	2	fragmented	NSW	sugar glider
Stojanovic 2020[12]	1	2021	honey; oats; peanut butter	213	2538	0.084	camera-trap	5	20	continuous	TAS	sugar glider
Gracanin 2022[13]	1	2022	honey; oats; peanut butter	1749	4592	0.381	camera-trap	2	2	fragmented	NSW	sugar glider and bush rat
Gracanin 2022[14]	2	2022	honey; oats; peanut butter	50	1148	0.044	Elliot A	2	2	fragmented	NSW	sugar glider and bush rat
Gracanin 2022[18]	3	2022	honey; oats; peanut butter; vanilla	2202	6517	0.338	camera-trap	2	2	fragmented	NSW	arboreal and semi-arboreal mammals

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Table S3. Multi-model inference table for the multivariate analysis of the meta-analysis incidence rate (log-transformed) effect size for capture rates across sugar glider studies (years 1983-2022). The top five models are shown.

Model	df	AICc	delta	weight
Habitat + Trap height (min)	4	62.49	0	0.28
Habitat + Trap height (min) + Year	5	64.03	1.54	0.13
Habitat	3	64.08	1.59	0.13
Habitat + Bait	7	64.84	2.35	0.09
Habitat + Trap nights + Trap height (min)	5	65.55	3.06	0.06

Table S4. Model-averaged (full-average) co-efficients of moderators on the meta-analysis incidence rate (log-transformed) effect size for capture rates across sugar glider studies (years 1983 – 2022). Intercept is Continuous Habitat, centred on the year 1983. Signif. codes 0 '***', 0.1 '.'

Moderators	Estimate	Std.Error	z value	Pr(>z)
Intercept	-4.7870	0.796	6.017	<2e-16 ***
factor(Habitat)fragmented	1.2380	0.665	1.861	0.0627 .
Trapheight_min	0.1993	0.213	0.937	0.349
Year	-0.0041	0.013	0.32	0.749
factor(Bait)honey; oats	-0.0662	0.380	0.174	0.862
factor(Bait)honey; oats; peanut butter	-0.2277	0.674	0.338	0.735
factor(Bait)honey; oats; peanut butter; sardines; dried fruit; dog food	-0.2854	0.911	0.313	0.754
factor(Bait)honey; sugar	-0.0050	0.331	0.015	0.988
N_trapnights	0.0000	0.000	0.208	0.835
Trapheight_max	-0.0006	0.021	0.03	0.976
factor(trap)Elliot A	0.0001	0.017	0.003	0.997
factor(trap)hair-trap	-0.0008	0.055	0.016	0.988
factor(trap)Mawbey	-0.0002	0.033	0.005	0.996
factor(trap)multiple	0.0002	0.021	0.009	0.993
factor(trap)wire-cage trap	0.0003	0.025	0.014	0.989

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Table S5. Multi-model inference table for the multivariate analysis of the meta-analysis incidence rate (log-transformed) effect size for trapping success across sugar glider studies (years 1983-2022). The top five models are shown.

Model	df	AICc	delta	weight
Habitat + Trap nights + Year	5	38.7	0	0.47
Trap nights + Year	4	41.71	3.01	0.1
(Null)	2	42.37	3.67	0.08
Trap nights	3	43.31	4.61	0.05
Year	3	43.69	4.99	0.04

Table S6. Model-averaged (full-average) co-efficients of moderators on meta-analysis incidence rate (log-transformed) effect size for trapping success across sugar glider studies (years 1983 – 2022). Intercept is Continuous Habitat, centred on the year 1983. Signif. codes 0 '***'.

Moderators	Estimate	Std.Error	z value	Pr(>z)
Intercept	-2.4000	0.462	5.194	2e-07 ***
factor(Habitat)fragmented	0.4937	0.496	0.996	0.319
N_trapnights	0.0002	0.000	1.284	0.199
Year	-0.0229	0.019	1.213	0.225
Trapheight_min	0.0176	0.082	0.215	0.830
Trapheight_max	0.0033	0.014	0.228	0.819
factor(Bait)honey; oats	0.0004	0.028	0.015	0.988
factor(Bait)honey; oats; peanut butter	-0.0001	0.027	0.005	0.996
factor(Bait)honey; oats; peanut butter; vanilla	0.0009	0.046	0.019	0.985
factor(Bait)honey; sugar	0.0001	0.025	0.005	0.996
factor(trap)Elliot A	0.0000	0.012	0	1.000
factor(trap)Mawbey	0.0004	0.030	0.014	0.989
factor(trap)multiple	-0.0002	0.017	0.012	0.990
factor(trap)wire-cage trap	0.0001	0.014	0.009	0.992

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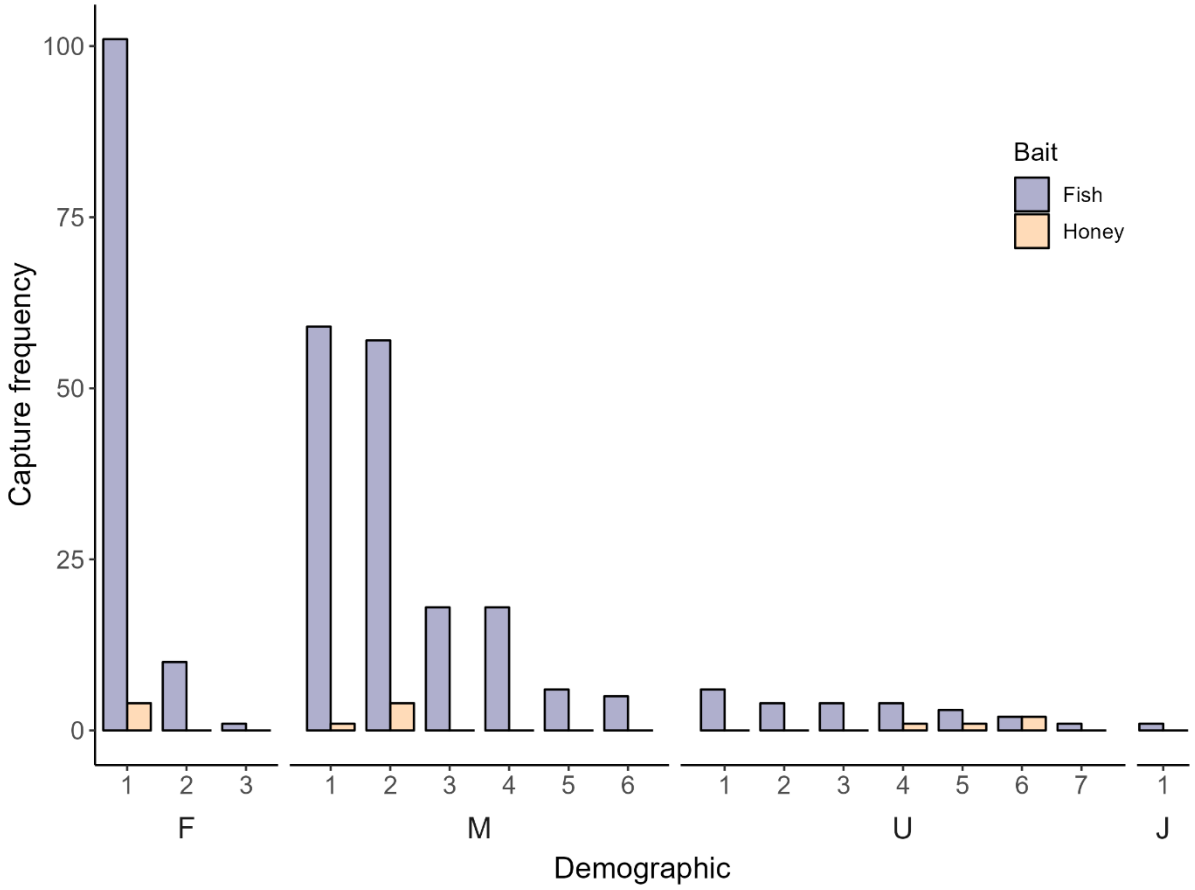

Figure S3. Comparison of capture frequency of sugar gliders at fish-baited (blue bars) and honey-baited (orange bars) camera-traps in SECR study in the Meehan Range, Tasmania. Data are ordered on the *x*-axis by demographic group (F= female; M= male; U = unknown; J = juvenile) and capture frequency of individuals (*n* = 17).

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SI2. Blind trial – identification of gliders

The technique to identify gliders to an individual level by unique pelage and facial features is new[1] and we verified our ability to distinguish unmarked individuals in a blind trial before proceeding with the study design. One author (DS) photographed 12 glider specimens from a museum collection from different frontal angles (27 ± 6 images per glider, 328 total images). Images were randomized and renamed in R and provided to a blind observer (GO) to identify in *digikam 7.0.0*. Gliders were identified to an individual level by headstripe shape, forehead scent glands, scars, and tail tip colour (black or white). Assigned identities were verified and 100% of gliders were correctly identified. Based on this outcome, we confidently employed spatially explicit capture-recapture techniques which relied on resighting of individuals.

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