Supporting Information

Appendix S1--Detailed Methods

Way Canguk bird sampling schedule

At Way Canguk each point sampled in a year was at least 200 m from the closest adjacent point. From 1998-2002 17 unburned and lightly burned points were visited 20-23 times each. All months were sampled and repeat counts were done at least one month after the previous count. In 2007 the same 17 points were visited at monthly intervals from January until June (Yustikasari 2008). In 2011 nearby points were sampled with the same methods in March and July (85 points total; Fig. 2; Table S1). We provide locations of sampling sites in Tables S1-2 to promote re-sampling. The full dataset will be archived at www.datadryad.org.

Estimating remoteness of North Sumatra transects

Remoteness was estimated by taking the straight line distance from the center of the transect to the nearest road in Google Earth Pro. Google Earth Pro enabled us to combine several road layers with recent satellite images. The combined road layers lined up with roads that were visible in satellite images, but the layers did not provide complete coverage of all roads in the satellite images. The road layers included three datasets of primary roads (major paved roads) from the Indonesian base map (Peta Dasar Indonesia; produced by the World Resources Institute and the Indonesian Ministry of Forestry; www.arcgis.com) and smaller regional roads in North Sumatra from Badan Informasi Geospatial (www.bakosurtanal.go.id). It was impossible to measure the exact remoteness (walking distance from the transect to the nearest road) because multiple small (and unmapped) trails were present at each sampling site.

Initiation of trapper interviews

Interviews were led by Indonesian research assistants. Trappers were selected opportunistically via introductions from acquaintances of the interviewers or by starting conversations with villagers and asking to talk to bird trappers. Given domestic trapping quotas, transport permit requirements, and regular trade of protected species, most bird trapping in Sumatra is illegal under Indonesian law (Shepherd 2006). Nonetheless, trapping laws are rarely enforced, and the

vast majority of trappers were happy to be interviewed as long as their identity was not made public.

Disturbance tolerance categories

We used six categories to describe species' tolerance to anthropogenic disturbance. Category 1 species are mostly sedentary species that inhabit the interior of undisturbed forests (rarely at edges) (e.g. Bronze-tailed Peacock-pheasant *Polyplectron chalcurum*). Category 2 species are sedentary and flocking species that mostly inhabit the interior of undisturbed forests, but they are regular near edges (e.g. Black-and-crimson Oriole *Oriolus cruentus*). Category 3 species include many flocking species that inhabit the interior and edge of undisturbed and disturbed (and secondary) forests (e.g. Black-capped White-eye *Zosterops atricapilla*). Category 4 species are mostly flocking species that occasionally inhabit the forest interior, but are more frequent in forest edges (e.g. Little Pied Flycatcher *Ficedula westermanni*). Category 5 species are found primarily in forest edges and in adjacent scrub as well as in tree plantations and even in gardens and parks (e.g. Rufous Woodpecker *Micropternus brachyurus*). Category 6 species are non-forest birds (e.g. Bar-winged Prinia *Prinia familiaris*).

Statistical analysis details

We modeled abundances of birds at Way Canguk over time as deriving from a negative binomial distribution, with random year-dependent dispersion parameter, K_j. We chose a year-dependent value for K to capture the differences in observers over the years which could result in different levels of over-dispersion. We assumed that the overall surveyed region of Way Canguk contained an unknown, true average abundance of individuals of each species in a given year, which we denote as lambda, and that all surveys in a year represented random samples of lambda. Thus, species *i* in year *j* at point *k* has an abundance, y_{ijk}, defined as:

$$y_{ijk} \sim \text{NegBin}(\lambda_{ij}, K_j)$$

where λ_{ij} represents the average abundance at Way Canguk for species *i* in year *j*. We modeled abundance as a log-linear function of year, such that:

$$\log(\lambda_{ij}) = \beta_{0,i} + \beta_{1,i}\,\text{year}_j$$

where the intercept was a hierarchical random variable derived from hyper-parameters for all species, $\beta_{0,i} \sim \text{Normal}(\mu_{\beta 0}, \sigma^2_{\beta 0})$, and the slope is hierarchically derived from a normal distribution with a single hyper-parameter for variance and a species-specific mean, $\beta_{1,i} \sim \text{Normal}(\mu_{\beta 1,i}, \sigma^2_{\beta 1})$.

We used a zero-inflated Poisson mixture for the North Sumatra data because of the large quantities of zero abundances from the transect surveys. Thus, for species *i* on transect *k*:

$$y_{ik} \sim \text{Poisson}(\lambda_{ik} \times z_{ik})$$

where lambda is the average abundance of species *i*on transect *k*, and z_{ik} is a binary indicator variable representing the presence ($z_{ik} = 1$) or absence ($z_{ik} = 0$) of species *i* on transect *k*. We simply modeled this zero-inflation as the function of a constant species-specific probability such that:

$$z_{ik} \sim \text{Bernoulli}(p_i)$$

where p_i is drawn from a hierarchical normal distribution with mean, μ_p, and variance, σ^2_p. We modeled the mean abundance of each species in North Sumatra as a function of the distance to the nearest road and elevation:

$$\log(\lambda_{ik}) = \beta_{0,i} + \beta_{1,i}\,\text{distance}_k + \beta_{2,i}\,\text{elevation}_k$$

Both the intercept, $\beta_{0,i}$, and slope for elevation, $\beta_{2,i}$, for each species were drawn from hierarchical normal distributions, while the slope for distance was hierarchically derived from a normal distribution with a single hyper-parameter for variance and a species-specific mean, $\beta_{1,i} \sim \text{Normal}(\mu_{\beta 1,i}, \sigma^2_{\beta 1})$.

As noted in the Methods, we modeled the expected change in abundance over time (or distance from road) for species *i*, $\mu_{\beta 1,i}$, as a linear function of three variables representing distinct hypotheses:

$$\mu_{b1,i} = \alpha_0 + \alpha_1 \text{price}_i + \alpha_2 \text{disturbance tolerance}_i + \alpha_3 \text{body size}_i$$

Both the Way Canguk and the North Sumatra models were run individually with JAGS (Plummer 2003) inside R version 3.2.0 (R Core Team 2015) using the package ‘rjags’ (Plummer

2015). We used vague priors in all cases due to the generally unknown nature of abundance relationships of Sumatran avifauna. JAGS code for both models is provided in the supporting code files. Models were run with three independent chains for 75,000 MCMC iterations. A posterior sample was drawn from the final 20,000 iterations and thinned by 20. Convergence was evaluated using the Gelman-Rubin diagnostic (Gelman et al. 2013), with all parameters showing convergence with values less than 1.1 and approaching or equal to 1.0.

We independently evaluated fit of both models using posterior predictive checks on species-specific indices. Specifically, we derived predicted data values (y_{ijk} or y_{ik} for Way Canguk and North Sumatra) using modeled parameters for each posterior draw, and used these to calculate the overall mean abundance ($\overline{\lambda_i}$) and standard deviation of abundance (σ_i) for each species. Modeled means and standard deviations of abundances were compared via 95% BCI to observed means and standard deviations of abundance.

For Way Canguk, 95% BCI posterior predictions of mean abundance for each species across all years overlapped with observed means for 99% of species, and posterior standard deviations of abundance overlapped with observed for 85% of species (Fig. S1). For North Sumatra, 95% BCI posterior predictions of mean abundance overlapped with observed means for 100% of species, and posterior standard deviations of abundance overlapped with observed for 96% of species (Fig. S2).

Appendix S2. Way Canguk sampling localities (note that most, but not all, points are shown in Figure 1 for clarity).

Point ID	Coordinates
2A_N_1	5.66082° S, 104.40218° E
2A_N_2	5.65921° S, 104.40047° E
2A_N_3	5.65729° S, 104.39913° E
2A_N_4	5.65534° S, 104.39786° E
2A_N_5	5.65357° S, 104.39649° E
2A_N_6	5.65168° S, 104.3952° E
2C_N_1	5.65993° S, 104.40347° E
2C_N_1_2	5.65983° S, 104.40346° E
2C_N_10	5.64523° S, 104.39276° E
2C_N_2	5.65833° S, 104.40244° E
2C_N_2_2	5.6578° S, 104.40223° E
2C_N_3	5.65693° S, 104.4012° E
2C_N_3_2	5.65579° S, 104.40074° E
2C_N_4	5.6553° S, 104.4001° E
2C_N_4_2	5.65378° S, 104.3996° E
2C_N_5	5.65378° S, 104.39898° E
2C_N_5_2	5.65211° S, 104.39817° E
2C_N_6	5.65224° S, 104.39783° E
2C_N_6_2	5.65017° S, 104.39691° E
2C_N_7	5.65047° S, 104.39659° E
2C_N_8	5.6489° S, 104.39538° E
2C_N_9	5.64688° S, 104.39392° E
2E_N_1	5.65889° S, 104.4048° E
2E_N_10	5.64448° S, 104.3943° E
2E_N_2	5.65723° S, 104.40374° E
2E_N_3	5.6557° S, 104.40256° E
2E_N_4	5.65412° S, 104.4014° E

2E_N_5	5.65246° S, 104.40034° E
2E_N_6	5.6509° S, 104.39896° E
2E_N_7	5.6493° S, 104.39782° E
2E_N_8	5.64764° S, 104.3966° E
2E_N_9	5.64605° S, 104.39537° E
2G_N_1	5.65757° S, 104.40618° E
2G_N_10	5.64355° S, 104.39597° E
2G_N_2	5.65603° S, 104.40484° E
2G_N_3	5.65437° S, 104.40376° E
2G_N_4	5.65284° S, 104.40271° E
2G_N_5	5.65128° S, 104.40155° E
2G_N_6	5.64974° S, 104.40038° E
2G_N_7	5.64813° S, 104.39936° E
2G_N_8	5.64667° S, 104.39831° E
2G_N_9	5.64513° S, 104.39704° E
2I_N_1	5.65716° S, 104.40718° E
2I_N_2	5.65541° S, 104.40571° E
2I_N_3	5.65328° S, 104.40484° E
2I_N_4	5.65146° S, 104.40336° E
2I_N_5	5.64978° S, 104.40201° E
2I_N_6	5.64801° S, 104.40064° E
2K_N_1	5.6551° S, 104.40907° E
2K_N_2	5.65347° S, 104.40754° E
2K_N_3	5.65173° S, 104.4062° E
2K_N_4	5.64991° S, 104.40486° E
2K_N_5	5.64801° S, 104.40365° E
2K_N_6	5.64628° S, 104.40216° E
2Z_1	5.65841° S, 104.40565° E
2Z_2	5.65698° S, 104.40413° E
2Z_3	5.65507° S, 104.40309° E
2Z_4	5.65323° S, 104.40179° E

2Z_5	5.65143° S, 104.40034° E
2Z_6	5.64961° S, 104.39912° E
E_S_1	5.65766° S, 104.41244° E
E_S_1000	5.665° S, 104.418° E
E_S_1200	5.666° S, 104.419° E
E_S_2	5.65924° S, 104.41374° E
E_S_3	5.66082° S, 104.4149° E
E_S_4	5.66261° S, 104.4161° E
E_S_5	5.66405° S, 104.41719° E
G_S_1	5.65851° S, 104.41085° E
G_S_2	5.66011° S, 104.41204° E
G_S_3	5.66169° S, 104.41327° E
G_S_4	5.66329° S, 104.4144° E
G_S_5	5.66496° S, 104.41556° E
I_S_1	5.65962° S, 104.40933° E
I_S_1000	5.673° S, 104.408° E
I_S_2	5.6611° S, 104.41053° E
I_S_3	5.66266° S, 104.4116° E
I_S_4	5.66411° S, 104.41285° E
I_S_5	5.66576° S, 104.41392° E
K_S_1	5.66071° S, 104.40796° E
K_S_1000	5.668° S, 104.413° E
K_S_1200	5.669° S, 104.414° E
K_S_2	5.66214° S, 104.4092° E
K_S_200	5.662° S, 104.409° E
K_S_3	5.6638° S, 104.41026° E
K_S_4	5.66535° S, 104.41139° E
K_S_5	5.66701° S, 104.41261° E
K_S_600	5.665° S, 104.411° E
M_S_1	5.6617° S, 104.40648° E
M_S_1000	5.669° S, 104.412° E

M_S_2	5.66323° S, 104.40763° E
M_S_3	5.66488° S, 104.4088° E
M_S_4	5.6665° S, 104.41008° E
M_S_400	5.66458924° S, 104.4087156° E
M_S_5	5.66803° S, 104.41108° E
O_S_1000	5.67002499° S, 104.41019149° E
O_S_1400	5.67297215° S, 104.41242459° E
O_S_200	5.66419839° S, 104.40618997° E
O_S_600	5.66714413° S, 104.4083193° E
Q_S_1200	5.66662252° S, 104.39897566° E
Q_S_400	5.66662252° S, 104.39897566° E
S_S_1200	5.673° S, 104.408° E
W_S_200	5.66662252° S, 104.39897566° E

Appendix S3. North Sumatra sampling localities.

transect ID	starting point coordinates	ending point coordinates	elevation (m above sea level)
2.AT.4to5	3.26972° N, 98.52809° E	3.26819° N, 98.52627° E	1018
2.AT.5to6	3.26819° N, 98.52627° E	3.26876° N, 98.52403° E	1044
3.AT.6to7	3.26876° N, 98.52403° E	3.26858° N, 98.52176° E	1069
3.AT.7to8	3.26858° N, 98.52176° E	3.26742° N, 98.51961° E	1088
1.KR.1to2	3.2258° N, 98.38131° E	3.2246° N, 98.37925° E	1484
1.KR.2to3	3.2246° N, 98.37925° E	3.2243° N, 98.37695° E	1495
2.KR.3to4	3.2243° N, 98.37695° E	3.22209° N, 98.37601° E	1518
2.KR.4to5	3.22209° N, 98.37601° E	3.22033° N, 98.37444° E	1571
3.KR.5to6	3.22033° N, 98.37444° E	3.22054° N, 98.37208° E	1595
4.KR.6to7	3.22054° N, 98.37208° E	3.22155° N, 98.36994° E	1606
5.KR.9to10	3.22074° N, 98.36536° E	3.22066° N, 98.36305° E	1619
4.KR.7to8	3.22155° N, 98.36994° E	3.22098° N, 98.36768° E	1624
5.KR.8to9	3.22098° N, 98.36768° E	3.22074° N, 98.36536° E	1626
9.KR.20to21	3.23674° N, 98.34646° E	3.23865° N, 98.34521° E	1482
9.KR.19to20	3.23491° N,	3.23674° N,	1522

	98.34783° E	98.34646° E	
6.KR.campto14	3.22854° N, 98.3583° E	3.2291° N, 98.35733° E	1550
8.KR.18to19	3.2341° N, 98.34988° E	3.23491° N, 98.34783° E	1554
6.KR.14to15	3.2291° N, 98.35733° E	3.2299° N, 98.35521° E	1568
8.KR.17to18	3.23208° N, 98.35101° E	3.2341° N, 98.34988° E	1583
7.KR.15to16	3.2299° N, 98.35521° E	3.23127° N, 98.3532° E	1587
7.KR.16to17	3.23127° N, 98.3532° E	3.23208° N, 98.35101° E	1594
10.KR.campto22	3.22854° N, 98.3583° E	3.22791° N, 98.35972° E	1530
10.KR.22to13	3.22791° N, 98.35972° E	3.22716° N, 98.36193° E	1568
11.KR.13to12	3.22716° N, 98.36193° E	3.22489° N, 98.36171° E	1596
11.KR.12to11	3.22489° N, 98.36171° E	3.22253° N, 98.36181° E	1603
12.KR.11to23	3.22253° N, 98.36181° E	3.21895° N, 98.36142° E	1619
12.KR.10to24	3.22066° N, 98.36305° E	3.21807° N, 98.35935° E	1627
13.KR.24to25	3.21807° N, 98.35935° E	3.21853° N, 98.35714° E	1630
13.KR.25to26	3.21853° N, 98.35714° E	3.21741° N, 98.35512° E	1644
14.KR.28to29	3.24048° N, 98.38534° E	3.24254° N, 98.38669° E	1373
14.KR.29to30	3.24254° N, 98.38669° E	3.2439° N, 98.38864° E	1379

15.KR.30to31	3.2439° N, 98.38864° E	3.24515° N, 98.39068° E	1384
15.KR.31to32	3.24515° N, 98.39068° E	3.24529° N, 98.39298° E	1401
16.KR.32to33	3.24529° N, 98.39298° E	3.24649° N, 98.39495° E	1433
16.KR.33to34	3.24649° N, 98.39495° E	3.24871° N, 98.39554° E	1475
17.KR.34to35	3.24871° N, 98.39554° E	3.25065° N, 98.39693° E	1511
17.KR.35to36	3.25065° N, 98.39693° E	3.25226° N, 98.39866° E	1559
21.KR.41to42	3.24997° N, 98.37147° E	3.25067° N, 98.36927° E	1362
20.KR.40to41	3.25129° N, 98.37354° E	3.24997° N, 98.37147° E	1379
19.KR.39to40	3.2529° N, 98.37515° E	3.25129° N, 98.37354° E	1395
18.KR.37to38	3.2545° N, 98.37955° E	3.25392° N, 98.37719° E	1400
18.KR.38to39	3.25392° N, 98.37719° E	3.2529° N, 98.37515° E	1401
1.S.1tosettlement	3.23645° N, 98.48923° E	3.23773° N, 98.48933° E	1575
2.S.2to3	3.23601° N, 98.49393° E	3.23619° N, 98.49625° E	1729
2.S.3to4	3.23619° N, 98.49625° E	3.23485° N, 98.49827° E	1777
1.B.1to2	3.19313° N, 98.57009° E	3.19477° N, 98.57182° E	1358
1.B.2to3	3.19477° N, 98.57182° E	3.19703° N, 98.57168° E	1373
2.B.3to4	3.19703° N, 98.57168° E	3.19848° N, 98.56989° E	1471

2.B.4to5	3.19848° N, 98.56989° E	3.2° N, 98.56817° E	1644
5.B.11to12	3.25265° N, 98.5381° E	3.25162° N, 98.53602° E	1144
5.B.10to11	3.25329° N, 98.52614° E	3.25265° N, 98.5381° E	1235
3.B.7to8	3.18809° N, 98.57826° E	3.1888° N, 98.58044° E	1364
4.B.8to9	3.1888° N, 98.58044° E	3.19003° N, 98.58253° E	1371
4.B.9to10	3.19003° N, 98.58253° E	3.25329° N, 98.52614° E	1374
3.B.6to7	3.18931° N, 98.57629° E	3.18809° N, 98.57826° E	1388
3.S.5to6	3.23072° N, 98.51073° E	3.23207° N, 98.50875° E	1541
4.S.6to7	3.23207° N, 98.50875° E	3.2344° N, 98.50818° E	1667
5.S.7to8	3.2344° N, 98.50818° E	3.23658° N, 98.50758° E	1803
2.BB.4to5	3.26439° N, 98.53416° E	3.26216° N, 98.5336° E	1032
2.BB.5to6	3.26216° N, 98.5336° E	3.26013° N, 98.53236° E	1075
3.BB.6to7	3.26013° N, 98.53236° E	3.25806° N, 98.5312° E	1131
3.BB.7to8	3.25806° N, 98.5312° E	3.25645° N, 98.52956° E	1197
4.BB.8to9	3.25645° N, 98.52956° E	3.25473° N, 98.52794° E	1262
4.BB.9to10	3.25473° N, 98.52794° E	3.25329° N, 98.52614° E	1326
5.BB.11to12	3.25265° N, 98.5381° E	3.25162° N, 98.53602° E	1144

5.BB.12to13	3.25162° N, 98.53602° E	3.25067° N, 98.53388° E	1208
6.BB.13to14	3.25067° N, 98.53388° E	3.2498° N, 98.53173° E	1269
7.BB.14to15	3.2498° N, 98.53173° E	3.24879° N, 98.52957° E	1336
7.BB.15to16	3.24879° N, 98.52957° E	3.24774° N, 98.52748° E	1411
8.BB.16to17	3.24774° N, 98.52748° E	3.24761° N, 98.52516° E	1490
8.BB.17to18	3.24761° N, 98.52516° E	3.24735° N, 98.52286° E	1623
1.SI.14to15	2.87314° N, 98.49424° E	2.87123° N, 98.49285° E	1673
2.SI.16to17	2.86898° N, 98.49266° E	2.86754° N, 98.49088° E	1691
1.SI.15to16	2.87123° N, 98.49285° E	2.86898° N, 98.49266° E	1693
21.KR.211to212	3.21692° N, 98.36205° E	3.21746° N, 98.35985° E	1626
22.KR.213to214	3.21691° N, 98.35767° E	3.21728° N, 98.35546° E	1626
21.KR.212to213	3.21746° N, 98.35985° E	3.21691° N, 98.35767° E	1632
22.KR.214to215	3.21728° N, 98.35546° E	3.21825° N, 98.35343° E	1646
23.KR.215to216	3.21825° N, 98.35343° E	3.21776° N, 98.35034° E	1666
23.KR.216to217	3.21776° N, 98.35034° E	3.21815° N, 98.34808° E	1690
24.KR.217to218	3.21815° N, 98.34808° E	3.21929° N, 98.34614° E	1707
24.KR.218to219	3.21929° N, 98.34614° E	3.21974° N, 98.34394° E	1715

25.KR.225to226	3.19803° N, 98.36567° E	3.19832° N, 98.36343° E	1502
25.KR.226to227	3.19832° N, 98.36343° E	3.19691° N, 98.36165° E	1540
26.KR.229to230	3.213° N, 98.36038° E	3.21072° N, 98.36001° E	1552
27.KR.230to231	3.21072° N, 98.36001° E	3.20858° N, 98.35911° E	1552
27.KR.231to232	3.20858° N, 98.35911° E	3.20896° N, 98.3569° E	1563
26.KR.228to229	3.21526° N, 98.36048° E	3.213° N, 98.36038° E	1583
28.KR.232to233	3.20896° N, 98.3569° E	3.20845° N, 98.35462° E	1586
29.KR.233to234	3.20845° N, 98.35462° E	3.20914° N, 98.35243° E	1612
34.KR.2.8to2.9	3.20434° N, 98.36424° E	3.20299° N, 98.36232° E	1487
33.KR.2.7to2.8	3.20568° N, 98.36608° E	3.20434° N, 98.36424° E	1488
34.KR.2.9to2.10	3.20299° N, 98.36232° E	3.20179° N, 98.36015° E	1525
33.KR.2.6to2.7	3.20728° N, 98.36779° E	3.20568° N, 98.36608° E	1526
32.KR.2.5to2.6	3.20945° N, 98.36687° E	3.20728° N, 98.36779° E	1550
31.KR.2.4to2.5	3.21155° N, 98.36596° E	3.20945° N, 98.36687° E	1557
31.KR.2.3to2.4	3.21378° N, 98.36635° E	3.21155° N, 98.36596° E	1569
30.KR.2.2to2.3	3.21607° N, 98.36629° E	3.21378° N, 98.36635° E	1586
30.KR.2.1to2.2	3.21793° N, 98.36486° E	3.21607° N, 98.36629° E	1593

1.SB.1to2	3.24374° N, 98.53056° E	3.24373° N, 98.52829° E	1411
1.SB.2to3	3.24373° N, 98.52829° E	3.24351° N, 98.52608° E	1488
2.SB.3to4	3.24351° N, 98.52608° E	3.24356° N, 98.52384° E	1597
7.SI.37to38	2.78735° N, 98.47681° E	2.78586° N, 98.47514° E	1564
6.SI.36to37	2.78857° N, 98.47875° E	2.78735° N, 98.47681° E	1572
6.SI.35to36	2.78815° N, 98.48097° E	2.78857° N, 98.47875° E	1578
5.SI.34to35	2.78876° N, 98.48312° E	2.78815° N, 98.48097° E	1583
5.SI.33to34	2.78915° N, 98.48531° E	2.78876° N, 98.48312° E	1585
7.SI.38to39	2.78586° N, 98.47514° E	2.78494° N, 98.47307° E	1556
11.SI.8to9	2.78052° N, 98.51589° E	2.78034° N, 98.51815° E	1651
11.SI.7to8	2.7819° N, 98.51396° E	2.78052° N, 98.51589° E	1655
8.SI.1to2	2.79165° N, 98.50409° E	2.78998° N, 98.50568° E	1658
8.SI.2to3	2.78998° N, 98.50568° E	2.78869° N, 98.5077° E	1660
10.SI.6to7	2.78389° N, 98.51265° E	2.7819° N, 98.51396° E	1661
9.SI.3to4	2.78869° N, 98.5077° E	2.78741° N, 98.50969° E	1663
10.SI.5to6	2.78598° N, 98.51146° E	2.78389° N, 98.51265° E	1663
9.SI.4to5	2.78741° N, 98.50969° E	2.78598° N, 98.51146° E	1664

12.SI.26to27	2.80362° N, 98.49134° E	2.80561° N, 98.4902° E	1662
13.SI.28to29	2.80642° N, 98.48806° E	2.80716° N, 98.48593° E	1662
13.SI.29to30	2.80716° N, 98.48593° E	2.8092° N, 98.48487° E	1663
14.SI.30to31	2.8092° N, 98.48487° E	2.80887° N, 98.48255° E	1665
12.SI.27to28	2.80561° N, 98.4902° E	2.80642° N, 98.48806° E	1667
14.SI.31to32	2.80887° N, 98.48255° E	2.80917° N, 98.48039° E	1667
17.SI.47to48	2.81606° N, 98.48025° E	2.81606° N, 98.47785° E	1696
17.SI.46to47	2.81686° N, 98.48233° E	2.81606° N, 98.48025° E	1702
16.SI.45to46	2.81841° N, 98.48406° E	2.81686° N, 98.48233° E	1705
15.SI.42to43	2.81502° N, 98.48902° E	2.81721° N, 98.4882° E	1708
15.SI.43to44	2.81721° N, 98.4882° E	2.81832° N, 98.48626° E	1708
16.SI.44to45	2.81832° N, 98.48626° E	2.81841° N, 98.48406° E	1709
3.SI.11to12	2.87311° N, 98.50046° E	2.87351° N, 98.49814° E	1647
3.SI.10to11	2.87203° N, 98.50253° E	2.87311° N, 98.50046° E	1649
4.SI.12to13	2.87351° N, 98.49814° E	2.87454° N, 98.49606° E	1655
4.SI.13to14	2.87454° N, 98.49606° E	2.87314° N, 98.49424° E	1663
18.SI.18to19	2.8334° N, 98.4849° E	2.83152° N, 98.48359° E	1651

18.SI.19to20	2.83152° N, 98.48359° E	2.82932° N, 98.48275° E	1693
21.SI.past25	2.81799° N, 98.48326° E	2.81733° N, 98.48309° E	1695
21.SI.24to25	2.8202° N, 98.48365° E	2.81799° N, 98.48326° E	1700
20.SI.23to24	2.82248° N, 98.48393° E	2.8202° N, 98.48365° E	1711
19.SI.21to22	2.82699° N, 98.48333° E	2.8248° N, 98.48389° E	1720
20.SI.22to23	2.8248° N, 98.48389° E	2.82248° N, 98.48393° E	1722
19.SI.20to21	2.82932° N, 98.48275° E	2.82699° N, 98.48333° E	1723
3.SBU.6to7	2.94866° N, 98.42241° E	2.95058° N, 98.42274° E	1567
3.SBU.5to6	2.94647° N, 98.42181° E	2.94866° N, 98.42241° E	1583
2.SBU.4to5	2.94453° N, 98.42277° E	2.94647° N, 98.42181° E	1594
2.SBU.3to4	2.94346° N, 98.42483° E	2.94453° N, 98.42277° E	1607
1.SBU.2to3	2.94162° N, 98.42596° E	2.94346° N, 98.42483° E	1640
1.SBU.1to2	2.94063° N, 98.42796° E	2.94162° N, 98.42596° E	1654
4.SBU.8to9	2.9384° N, 98.42781° E	2.93625° N, 98.42825° E	1699
4.SBU.9to10	2.93625° N, 98.42825° E	2.93402° N, 98.42798° E	1766
5.SBU.10to11	2.93402° N, 98.42798° E	2.93322° N, 98.426° E	1844
6.SBU.12to13	2.93355° N, 98.42371° E	2.93553° N, 98.42487° E	1872

6.SBU.11to12	2.93322° N, 98.426° E	2.93355° N, 98.42371° E	1875
9.SBU.18to19	2.95049° N, 98.43022° E	2.95263° N, 98.43042° E	1583
9.SBU.17to18	2.94816° N, 98.42969° E	2.95049° N, 98.43022° E	1634
8.SBU.16to17	2.9459° N, 98.42963° E	2.94816° N, 98.42969° E	1665
7.SBU.15to16	2.94384° N, 98.43042° E	2.9459° N, 98.42963° E	1683
7.SBU.14to15	2.94161° N, 98.43002° E	2.94384° N, 98.43042° E	1722

Appendix S4. Research questions for semi-structured interviews with bird trappers in Sumatra.

Alias penangkap_____

Tanggal_____

Lokasi_____

Nama interviewer_____

Nomor penangkap interviewed sama sama (kalau tidak sendiri)_____

BEING A TRAPPER ***MENJADI PENANGKAP BURUNG***

How long have you been a trapper? ***Sudah berapa lama Anda menjadi penangkap/ pemikat burung?***

How/Why did you become a trapper? Please rank all applicable reasons from most important to least important. ***Mengapa Anda menjadi perangkap/ pemikat burung? Silahkan urutkan alasan dari yang paling penting .***

A. Sudah menjadi Tradisi bisnis keluarga (Orang-tua dan Kakek/Nenek adalah pedagang juga) (traditional family business) ***B. Untuk memperoleh Pendapatan/ Uang***(to make money) ***C. Keamanan pekerjaan***(job security) ***D. Tidak ada pilihan lain*** (no other options) ***E. Kesenangan pribadi padaburung*** Personal interest in birds and wildlife ***F. Yang lain (Silahkandijelaskan)*** Other, please specify

What do you like about working as a trapper? ***Apakah yang Anda sukai dari pekerjaan ini? Mengapa?***

And what do you not like about it? ***Dan apa yang tidak anda sukai dari pekerjaan menangkap/ memikat burung?***

TRAPPING***PENANGKAPAN***

How often do you search for birds? Please give the minimum and maximum number of days you may go trapping in one week. ***Seberapa sering pergi cari/ memikat burung?Berapa kali? Mohon informasi berapa kali anda pergi memikat burung dalam seminggu, paling banyak dan paling sedikit?***

Where do you trap birds (habitat type)? ***Dimana Anda menangkap burung? Apakah di hutan, kebun atau sawah?***

On which trails to you usually search for birds? Can you please describe the location of these trails? ***Pada Jalur yang mana Anda biasa mencari burung? Dapatkah Anda menjelaskan lokasi jalur tersebut?***

Can you please estimate the number of trappers that use those trails per week? **Dapatkah Anda memperkirakan jumlah pemikat burung yang masuk di jalur tersebut dalam seminggu?**

How much area do you cover each day? How many km? ***Berapa luas kawasan yang Anda jelajahi untuk mencari burung setiap hari? Berapa kilometer jelajahi setiap hari, paling banyak dan paling sedikit?***

Do you stay in the forest overnight? If so how often? ***Bila Anda mencari burung, apakah menginap di hutan? Kalau ya, berapa sering?***

Who owns the land where you trap? Do you ever have to ask for permission from the land owner to trap? ***Siapa pemilik kawasan di mana Anda mencari burung? apakah Anda pernah meminta izin kepada pemilik kawasan tersebut?***

Do you know of any species that are used for traditional medicine, religious release, or song competitions? **Apakah Anda tahu jenis burung yang digunakan untuk obat tradisional, upacara keagamaan atau kontes kicau?**

TRENDS OF TARGET SPECIES

Generally, do you think that the bird trade in Sumatra has increased or decreased and why? **Menurut Anda, apakah *Umumnya, perdagangan burungmeningkat atau menurun? Dan mengapa***

In general, is it getting harder to find birds? **Secara *Umum, apakah semakin lebih sulit untuk menemukan burung tersebut? Kalau Ya, mengapa?***(If yes, why?)

Approximately how many birds do you catch per week? **Kira-kira berapa banyak burung yang tertangkap dalam seminggu, *paling banyak dan paling sedikit*?**

So you can catch X birds per month (multiplied by 4)? **Jadi, Anda dapat mengangkap sekitar …. Burung dalam sebulan? (Dikalikan 4 minggu)**

So that is Y birds per year (multiplied by 12)? **Jadi, Anda dapat menangkap sekitar….burung dalam setahun? (Dikalikan 12 bulan)**

SELLING ***PENJUALAN***

What do you do with your birds? ***Apa yang Anda lakukan dengan burung-burung milikAnda?***

Please choose all that apply and/or rank the choices. **(<u>Silahkan pilih jika semua benar dan urutkan pilihan Anda</u>)**

A. Sell to middle men **(Di Jual ke pengumpul burung.)** B. Sell directly to markets. if so , please specify which market**. (Di Jual langsung ke pasar, jika ya, pasar yang mana?** C. Sell to directly to customer **(Langsung dijual kepada konsumen)** D. Give to friends **(Diberikan kepada teman)** E. Keep for personal use **(Dipelihara sendiri)**

Approximately how many birds do you sell per week? **Kira-kira berapa banyak burung yang Anda jual dalam seminggu?**

So you can sell X birds per month (multiplied by 4)? **Jadi, Anda dapat menjual sekitar…. Burung dalam sebulan? (Dikalikan 4 minggu)**

So that is Y birds per year (multiplied by 12)? **Jadi, Anda dapat menjual sekitar….burung dalam setahun? (Dikalikan 12 bulan)**

Which markets do the birds go to? ***Ke pasar mana burung-burung Anda dijual?***

Generally, what are the price trends for the bird trade within the last 5-10 years? ***Umumnya, bagaimanakah kecenderungan harga perdagangan burung dalam kurun waktu 5-10 tahun terakhir?***
Mengapa?

What trapping methods do you use for the following species [show photos] ? Do you particularly target this species or do you opportunistically catch it? Do you target another species after the population of this one decreases? How many do you catch per month (over time)? How far do you have to go to catch the species? Does the pair or whole family group enter the cage/get stuck in the lime, or is only one individual bird usually fooled? What are the price trends of this species over time? Percent mortality? Use?

Teknik penangkapan seperti apa yang Anda gunakan? Apakah Anda hanya membuat perangkap untuk satu jenis burung target, ataukah tidak ada target? Apakah anda mencari jenis pengganti jika burung yang ditargetkan berkurang? Berapa banyak yang dapat kamu tangkap per-bulan(dalam rentang waktu; misalnya 5 tahun)? Seberapa Jauh Anda berusaha mendapatkan suatu jenis? Apakah satu atau semuanya dari kelompok burung yang datang tersebut terperangkap/ terjerat? Bagaimana tren harga jenis burung ini (dalam rentang waktu; misalnya 5 tahun)? bagaimana persentase kematian burung? Untuk apa alasan pembeli burung tersebut?

teknik penangkapan
khusus atau tidak
jenis pengganti
jumlah / bulan
berapa jauh berusaha (km atau jam)
ekor / kelompok
harga (Rp)
persent yang mati (tulis perangkap, jl., atau rumah)
untuk apa (pelihara, obat, makan, kontes, lepas agama)

OTHER ISSUES ***HAL LAIN***

Do you also hunt animals in the forest? **Apakah anda juga menjerat/ menangkap hewan lain di hutan?**

If so what kind? Mammals, birds, frogs, snakes, etc. **Jenis apa? Mamalia, burung (ayam hutan, merpati, burung hantu, lain), katak, ular, dsb**

Why do you hunt them? For food, medicine, to sell? **Untuk apa menangkap hewan tersebut? Untuk dimakan, atau obat, atau dijual? Kalau dijual, unutk apa?**

Do you collect any other forest products from the area (timber, plants, mushrooms, honey, etc.)? If so what are they used for? **Apakah Anda mengumpulkan hasil hutan yang lain seperti tanaman, jamur, madu, getah dsb? Jika ya, untuk diapakan?**

How often to people from outside the village come to catch birds? **Seberapa sering orang luar kampung(bukan penduduk sekitar) datang memikat/ menangkap burung disana?**

What species do they target? **Jenis apa yang dicari mereka (beda dari yang Anda dicari)?**

How long do they spend in the forest? **Berapa lama mereka di hutan untuk itu?**

Do you think trapping has any effect on the number of birds in the forest? **Apakah menurut Anda penangkapan burung berdampak pada jumlah burung yang ada di hutan?**

If so, which species seem most resilient? **Kalau ya, jenis apa yang Nampak bertahan (masih banyak sesudah penangkapan)?**

Which species seem most sensitive? **Jenis apa yang terlihat sensitive? Terpengaruh keberadaannya karena adanya penangkapan?**

Are any other factors (for example, deforestation, pesticides) affecting bird populations in your area? **Apakah ada faktor lain atau permasalahan (contohnya penebangan hutan, pestisida) yang berdampak pada burung di kawasan Anda?**

How do the effects of trapping on bird populations compare to other factors? **Bagaimana dampak penangkapan burung bila dibandingkan dengan faktor lain (tersebut di atas) apakah lebih kuat?**

Has the number of bird trappers in your area increased, decreased, or stayed the same over the last five years? **Apakah jumlah penangkap burung ditempat anda meningkat, berkurang, atau masih sama seperti 5-10 tahun terakhir?**

Where do new trappers come from? **Darimana para pemikat/penangkap bahru datang? Mereka orang tua atau anak mudah? Lokal atau dari luar?**

Are your children interested in being trappers/traders? **Apakah Anak-anak Anda tertarik untuk menjadi penangkap atau pedagang burung?**

Would you like your children to continue trapping and why? **Apakah Anda mengharapkan anak-anak dan cucu-cucu melanjutkan pekerjaan sebagai penangkap burung?**

If there was an alternative source of income, I would prefer: **Kalau ada sumber pendapatan atau penghasilan yang lain, Saya lebih suka:**
Farmer **(Petani)** Forestry **(petugas Kehutanan)** Mining **(pegawai Pertambangan)** Restaurant/ Hotels **(pekerja Rumah Makan / hotel)** Factory **(buruh Pabrik)** Cleaner **(petugas Kebersihan)** Study at University **(Belajar (di Universitas)** Other **(Lainnya.....) _____**

Do you know of any efforts by the government to restrict trade? **Apakah anda tahu upaya Pemerintah Indonesia untuk mengurangi perdagangan?**

Would you need a permit to trap birds? **Apakah Anda perlu izin untuk menangkap burung?**

Did the outbreak of Avian Flu in 2003 have an impact on the demand for the number (and species) of birds you trap? **Apakah kejadian wabah flu- burung pada tahun 2003, berdampak pada permintaan baik pada jumlah (dan jenis) yang anda tangkap?**

Have you ever been ill or injured from working in the trade? **Apakah anda pernah sakit atau terluka dari bekerja dalam penangkapan dan perdagangan burung?**

And if YES, what caused it? (eg, injury in the forest, bird flu, bites, scratches) ***Kalau YA, karena apa? (eg, sakit di hutan, terserang flu- burung, dipatuk, digaruk) dan bagaiman sering?***

RESPONDENT INFORMATION ***INFORMASI RESPONDEN***
Dapatkah saya menanyakan umur dan asal anda? (Could I please ask your age and ethnic origin?)

Jeniskelamin: Umur:_____tahun_____
Male (Laki-Laki) Female (Perempuan)

Suku: Anda berasaldarimana?

1. Java 2. Sumatra
   Aceh
   Sumatra Utara
   Sumatra Barat
   Sumatra Selatan
3. Indo-Cina 4. Kalimantan 5. NusaTengara 7. Yang lain

Education Level (Tingkat Pendidikan) OPTIONAL:
1. SD 2. SMP 3. SMA 4. Universitas

What proportion of the household income comes from trapping? **Seberapa besar (persentase) pendapatan rumahtangga dari memikat/ menangkap burung?**

Please give your approximate monthly income (OPTIONAL). **Bagaimana perkiraan jumlah pendapatan rumahtangga selain dari memikat?**

Terima Kasih untuk waktu dan bantuannya

Appendix S5. Species of which photographs were shown to trappers during interviews.

English name	Scientific name
Hoogerwerf's Pheasant	*Lophura hoogerwerfi*
Bronze-tailed Peacock-Pheasant	*Polyplectron chalcurum*
Spotted Dove	*Spilopelia chinensis*
Zebra Dove	*Geopelia striata*
Scops Owl sp.	*Otus sp.*
Wreathed Hornbill	*Rhyticeros undulatus*
Fire-tufted Barbet	*Psilopogon pyrolophus*
Black-browed Barbet	*Psilopogon oorti*
wood pecker sp.	*Dinopium sp.*
Blue-crowned Hanging Parrot	*Loriculus galgulus*
Red-breasted Parakeet	*Psittacula alexandri*
Long-tailed Parakeet	*Psittacula longicauda*
Long-tailed Shrike	*Lanius schach*
Blyth's Shrike-babbler	*Pteruthius aeralatus*
Black-naped Oriole	*Oriolus chinensis*
Common Green Magpie	*Cissa chinensis*
Sumatran Treepie	*Dendrocitta occipitalis*
Slender-billed Crow	*Corvus enca*
Cinereous Tit	*Parus cinereus*
Straw-headed Bulbul	*Pycnonotus zeylanicus*
Black-headed Bulbul	*Pycnonotus atriceps*
Ruby-throated Bulbul	*Pycnonotus dispar*
Scaly-breasted Bulbul	*Pycnonotus squamatus*
Sooty-headed Bulbul	*Pycnonotus aurigaster*
Orange-spotted Bulbul	*Pycnonotus bimaculatus*
Yellow-vented Bulbul	*Pycnonotus goiavier*
Ochraceous Bulbul	*Alophoixus ochraceus*
Sunda Bulbul	*Ixos virescens*
Bar-winged Prinia	*Prinia familiaris*

Ashy Tailorbird	*Orthotomus ruficeps*
Sumatran Laughingthrush	*Garrulax bicolor*
Sunda Laughingthrush	*Garrulax paliatus*
Chestnut-capped Laughingthrush	*Garrulax mitratus*
Black Laughingthrush	*Garrulax lugubris*
Silver-eared Mesia	*Leiothrix argentauris*
Long-tailed Sibia	*Heterophasia picaoides*
Asian Fairy-bluebird	*Irena puella*
Asian Glossy Starling	*Aplonis panayensis*
Common Hill Myna	*Gracula religiosa*
Javan Myna	*Acridotheres javanicus*
Common Myna	*Acridotheres tristis*
Daurian Starling	*Agropsar sturninus*
Oriental Magpie-Robin	*Copsychus saularis*
White-rumped Shama	*Copsychus malabaricus*
Greater Green Leafbird	*Chloropsis sonnerati*
Sumatran Leafbird	*Chloropsis media*
Blue-masked Leafbird	*Chloropsis venusta*
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*
Baya Weaver	*Ploceus philippinus*
Pin-tailed Parrotfinch	*Erythrura prasina*
Scaly-breasted Munia	*Lonchura punctulata*
Chestnut Munia	*Lonchura atricapilla*
White-headed Munia	*Lonchura maja*
Java Sparrow	*Lonchura oryzivora*

Appendix S6. JAGS Bayesian modeling code for Way Canguk and North Sumatra

1. Model code in the BUGS language for Way Canguk analysis of change in abundance over time

```
# Negative Binomial Model

model {

  # Priors

  for(j in 1:n.year) {

    K[j] ~ dunif(0,100)

  }

  alpha0 ~ dnorm(0, 0.001)

  alpha1 ~ dnorm(0, 0.001)

  alpha2 ~ dnorm(0, 0.001)

  alpha3 ~ dnorm(0, 0.001)

  sigma.alpha ~ dgamma(0.001, 0.001)

  tau.alpha <- pow(sigma.alpha, -2)

  mu.beta0 ~ dnorm(0, 0.001)

  sigma.beta0 ~ dgamma(0.001, 0.001)

  tau.beta0 <- pow(sigma.beta0, -2)


# species-level trend

  for(k in 1:n.species) {

    beta0[k] ~ dnorm(mu.beta0, tau.beta0)

    beta1[k] ~ dnorm(mu.beta1[k], tau.alpha)
```

```
    mu.beta1[k] <- alpha0 + alpha1*price[k] + alpha2*disturb[k] +
alpha3*size[k]


# year-level trend
    for(j in 1:n.year) {
      log(mu.year[j,k]) <- beta0[k] + beta1[k]*year[j]
      p[j,k] <- K[j] / (K[j] + mu.year[j,k])

      # point-level data
      for(i in 1:n.point[j]) {
        y[i,j,k] ~ dnegbin(p[j,k], K[j])
      }
    }
  }
} # end model
```

2. Model code in the BUGS language for North Sumatra analysis of change in abundance with distance

```
# Zero-inflated Poisson

model {

  # Priors

  alpha0 ~ dnorm(0, 0.01)

  alpha1 ~ dnorm(0, 0.01)

  alpha2 ~ dnorm(0, 0.01)

  alpha3 ~ dnorm(0, 0.01)

  sigma.alpha ~ dunif(0.001, 1000)

  tau.alpha <- pow(sigma.alpha, -2)


  mu.beta0 ~ dunif(-10, 10)

  sigma.beta0 ~ dunif(0.001, 100)

  tau.beta0 <- pow(sigma.beta0, -2)


  mu.beta2 ~ dunif(-10, 10)

  sigma.beta2 ~ dunif(0.001, 100)

  tau.beta2 <- pow(sigma.beta2, -2)


  mu.p ~ dunif(-10, 10)

  sigma.p ~ dunif(0.001, 100)

  tau.p <- pow(sigma.p, -2)
```

```
  # Model for North Sumatra (change in abundance over space)
  # species-level trend
  for(k in 1:n.species) {
    beta0[k] ~ dnorm(mu.beta0, tau.beta0)
    beta1[k] ~ dnorm(mu.beta1[k], tau.alpha)
    mu.beta1[k] <- alpha0 + alpha1*price[k] + alpha2*disturb[k] +
alpha3*size[k]
    beta2[k] ~ dnorm(mu.beta2, tau.beta2)

    logit.p[k] ~ dnorm(mu.p, tau.p)
    logit(p[k]) <- logit.p[k]

    # transect trend
    for(i in 1:n.int) {
      log(mu.int[i,k]) <- beta0[k] + beta1[k]*distance[i] + beta2[k]*elev[i]
      z[i,k] ~ dbern(p[k])
      y[i,k] ~ dpois(z[i,k] * mu.int[i,k])
    }
  }
} # end model
```

Appendix S7. Species specific parameter estimates, Way Canguk.

English name	Scientific name	Trend*	Mean coefficient (95% credible interval)	SD
A. Trend (beta)				
Crested Partridge	*Rollulus rouloul*		-0.043 (-0.244 to 0.131)	0.095
Great Argus	*Argusianus argus*	+	0.203 (0.157 to 0.248)	0.023
Crested Serpent Eagle	*Spilornis cheela*		-0.147 (-0.364 to 0.035)	0.101
Wallace's Hawk-Eagle	*Nisaetus nanus*		-0.218 (-0.488 to 0.029)	0.129
Common Emerald Dove	*Chalcophaps indica*	+	0.205 (0.092 to 0.329)	0.06
Green Imperial Pigeon	*Ducula aenea*	-	-0.146 (-0.235 to -0.067)	0.043
Mountain Imperial Pigeon	*Ducula badia*		-0.025 (-0.251 to 0.172)	0.109
Greater Coucal	*Centropus sinensis*		-0.01 (-0.135 to 0.109)	0.062
Raffles's Malkoha	*Rhinortha chlorophaea*		0.02 (-0.028 to 0.066)	0.024
Red-billed Malkoha	*Zanclostomus javanicus*		-0.043 (-0.248 to 0.141)	0.098
Chestnut-breasted Malkoha	*Phaenicophaeus curvirostris*		-0.03 (-0.128 to 0.062)	0.048
Plaintive Cuckoo	*Cacomantis merulinus*	-	-0.185 (-0.367 to -0.033)	0.086
Square-tailed Drongo-Cuckoo	*Surniculus lugubris*		-0.009 (-0.107 to 0.079)	0.047
Indian Cuckoo	*Cuculus micropterus*		-0.047 (-0.153 to 0.045)	0.049
Barred Eagle-Owl	*Bubo sumatranus*		0.055 (-0.128 to 0.228)	0.09
Diard's Trogon	*Harpactes diardii*	+	0.259 (0.128 to 0.403)	0.07
Scarlet-rumped Trogon	*Harpactes duvaucelii*		0.041 (-0.053 to 0.129)	0.047
Rufous-collared Kingfisher	*Actenoides concretus*	+	0.249 (0.133 to 0.381)	0.064
White-crowned Hornbill	*Berenicornis comatus*		0.027 (-0.168 to 0.214)	0.095
Rhinoceros Hornbill	*Buceros rhinoceros*	+	0.064 (0.003 to 0.121)	0.03
Wreathed Hornbill	*Rhyticeros undulatus*		-0.072 (-0.149 to 0.004)	0.04
Golden-whiskered Barbet	*Psilopogon chrysopogon*	+	0.196 (0.14 to 0.255)	0.029
Red-crowned Barbet	*Psilopogon rafflesii*		0.085 (-0.108 to 0.273)	0.097

	Psilopogon			
Red-throated Barbet	*mystacophanos*	+	0.247 (0.186 to 0.312)	0.032
Blue-eared Barbet	*Psilopogon duvaucelii*	+	0.245 (0.104 to 0.396)	0.074
Brown Barbet	*Caloramphus fuliginosus*		0.06 (-0.026 to 0.142)	0.043
White-bellied				
Woodpecker	*Dryocopus javensis*		-0.066 (-0.305 to 0.143)	0.112
Rufous Woodpecker	*Micropternus brachyurus*		0.007 (-0.189 to 0.188)	0.095
Buff-necked Woodpecker	*Meiglyptes tukki*		0.004 (-0.108 to 0.113)	0.056
Blue-crowned Hanging				
Parrot	*Loriculus galgulus*	-	-0.185 (-0.39 to -0.019)	0.095
Blue-rumped Parrot	*Psittinus cyanurus*	-	-0.169 (-0.289 to -0.067)	0.056
Long-tailed Parakeet	*Psittacula longicauda*	-	-0.347 (-0.525 to -0.199)	0.083
	Cymbirhynchus			
Black-and-red Broadbill	*macrorhynchos*		0.043 (-0.127 to 0.207)	0.084
Black-and-yellow				
Broadbill	*Eurylaimus ochromalus*		-0.007 (-0.056 to 0.039)	0.024
Malayan Banded Pitta	*Hydrornis irena*		0.023 (-0.024 to 0.067)	0.023
Hooded Pitta	*Pitta sordida*		0.09 (-0.101 to 0.278)	0.095
Green Iora	*Aegithina viridissima*	+	0.231 (0.147 to 0.323)	0.044
Scarlet Minivet	*Pericrocotus speciosus*		-0.042 (-0.202 to 0.103)	0.078
Dark-throated Oriole	*Oriolus xanthonotus*	+	0.055 (0.007 to 0.102)	0.025
Sumatran Drongo	*Dicrurus sumatranus*		-0.15 (-0.336 to 0.005)	0.088
Greater Racket-tailed				
Drongo	*Dicrurus paradiseus*	+	0.097 (0.061 to 0.132)	0.018
Black-naped Monarch	*Hypothymis azurea*		0.069 (-0.025 to 0.158)	0.047
Asian Paradise Flycatcher	*Terpsiphone paradisi*	+	0.14 (0.029 to 0.252)	0.057
Crested Jay	*Platylophus galericulatus*		-0.048 (-0.222 to 0.106)	0.083
Black Magpie	*Platysmurus leucopterus*	+	0.087 (0.043 to 0.129)	0.021
Slender-billed Crow	*Corvus enca*	-	-0.145 (-0.278 to -0.03)	0.064
Black-headed Bulbul	*Pycnonotus atriceps*	-	-0.146 (-0.316 to -0.004)	0.081
Ruby-throated Bulbul	*Pycnonotus dispar*		-0.005 (-0.06 to 0.049)	0.027

Olive-winged Bulbul	*Pycnonotus plumosus*		0.009 (-0.188 to 0.2)	0.101
Cream-vented Bulbul	*Pycnonotus simplex*	+	0.12 (0.071 to 0.167)	0.025
Asian Red-eyed Bulbul	*Pycnonotus brunneus*	-	-0.106 (-0.174 to -0.042)	0.033
Grey-cheeked Bulbul	*Alophoixus bres*	+	0.148 (0.048 to 0.247)	0.051
Yellow-bellied Bulbul	*Alophoixus phaeocephalus*	+	0.293 (0.199 to 0.4)	0.05
Buff-vented Bulbul	*Iole olivacea*		0.15 (-0.006 to 0.303)	0.08
Streaked Bulbul	*Ixos malaccensis*		0.138 (-0.029 to 0.31)	0.086
Bar-winged Prinia	*Prinia familiaris*	-	-0.229 (-0.363 to -0.112)	0.065
Rufous-tailed Tailorbird	*Orthotomus sericeus*	+	0.184 (0.104 to 0.271)	0.043
Ashy Tailorbird	*Orthotomus ruficeps*		0.101 (-0.041 to 0.246)	0.071
Chestnut-backed Scimitar Babbler	*Pomatorhinus montanus*	+	0.324 (0.198 to 0.473)	0.07
Pin-striped Tit-Babbler	*Macronus gularis*	+	0.237 (0.18 to 0.294)	0.029
Rufous-crowned Babbler	*Malacopteron magnum*	+	0.194 (0.109 to 0.283)	0.044
Black-capped Babbler	*Pellorneum capistratum*	+	0.109 (0.04 to 0.175)	0.035
Black Laughingthrush**	*Garrulax lugubris*		0.107 (-0.092 to 0.288)	0.095
Asian Fairy-bluebird	*Irena puella*		-0.016 (-0.095 to 0.057)	0.039
Velvet-fronted Nuthatch	*Sitta frontalis*		0.101 (-0.09 to 0.287)	0.097
Common Hill Myna	*Gracula religiosa*		-0.022 (-0.077 to 0.03)	0.027
Oriental Magpie-Robin	*Copsychus saularis*		-0.073 (-0.223 to 0.067)	0.075
White-rumped Shama	*Copsychus malabaricus*	-	-0.324 (-0.519 to -0.169)	0.09
Verditer Flycatcher	*Eumyias thalassinus*		0.094 (-0.063 to 0.243)	0.079
White-crowned Forktail	*Enicurus leschenaulti*		0.077 (-0.033 to 0.182)	0.055
Yellow-rumped Flycatcher	*Ficedula zanthopygia*		0.032 (-0.152 to 0.204)	0.091
Greater Green Leafbird	*Chloropsis sonnerati*		-0.04 (-0.193 to 0.095)	0.073
Lesser Green Leafbird	*Chloropsis cyanopogon*	+	0.162 (0.052 to 0.281)	0.057
Blue-winged Leafbird	*Chloropsis cochinchinensis*		-0.033 (-0.112 to 0.039)	0.038

Crimson-breasted Flowerpecker	*Prionochilus percussus*		0.071 (-0.128 to 0.27)	0.099
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*		0.093 (-0.069 to 0.249)	0.081
Ruby-cheeked Sunbird	*Chalcoparia singalensis*	+	0.174 (0.046 to 0.307)	0.066
Brown-throated Sunbird	*Anthreptes malacensis*		0.058 (-0.096 to 0.206)	0.079
B. Intercept (beta)				
Crested Partridge	*Rollulus rouloul*		-5.138 (-6.655 to -3.855)	0.725
Great Argus	*Argusianus argus*		-3.052 (-3.607 to -2.516)	0.284
Crested Serpent Eagle	*Spilornis cheela*		-4.443 (-5.719 to -3.306)	0.617
Wallace's Hawk-Eagle	*Nisaetus nanus*		-5.517 (-7.506 to -3.947)	0.918
Common Emerald Dove	*Chalcophaps indica*		-5.591 (-7.068 to -4.376)	0.688
Green Imperial Pigeon	*Ducula aenea*		-1.386 (-1.841 to -0.898)	0.238
Mountain Imperial Pigeon	*Ducula badia*		-6.128 (-8.193 to -4.462)	0.945
Greater Coucal	*Centropus sinensis*		-4.081 (-5.14 to -3.164)	0.508
Raffles's Malkoha	*Rhinortha chlorophaea*		-1.656 (-2.116 to -1.196)	0.235
Red-billed Malkoha	*Zanclostomus javanicus*		-5.498 (-7.196 to -4.067)	0.807
Chestnut-breasted Malkoha	*Phaenicophaeus curvirostris*		-3.092 (-3.816 to -2.385)	0.362
Plaintive Cuckoo	*Cacomantis merulinus*		-3.177 (-4.013 to -2.373)	0.414
Square-tailed Drongo-Cuckoo	*Surniculus lugubris*		-3.261 (-3.997 to -2.575)	0.368
Indian Cuckoo	*Cuculus micropterus*		-3.026 (-3.731 to -2.345)	0.35
Barred Eagle-Owl	*Bubo sumatranus*		-6.041 (-7.959 to -4.439)	0.886
Diard's Trogon	*Harpactes diardii*		-6.488 (-8.355 to -4.97)	0.867
Scarlet-rumped Trogon	*Harpactes duvaucelii*		-3.624 (-4.477 to -2.865)	0.405
Rufous-collared Kingfisher	*Actenoides concretus*		-6.006 (-7.693 to -4.663)	0.771
White-crowned Hornbill	*Berenicornis comatus*		-5.894 (-7.711 to -4.356)	0.861
Rhinoceros Hornbill	*Buceros rhinoceros*		-2.769 (-3.327 to -2.193)	0.294
Wreathed Hornbill	*Rhyticeros undulatus*		-2.209 (-2.776 to -1.662)	0.285

Golden-whiskered Barbet	*Psilopogon chrysopogon*	-3.813 (-4.544 to -3.157)	0.353
Red-crowned Barbet	*Psilopogon rafflesii*	-6.705 (-8.855 to -4.922)	1.03
Red-throated Barbet	*Psilopogon mystacophanos*	-4.213 (-5.034 to -3.456)	0.4
Blue-eared Barbet	*Psilopogon duvaucelii*	-6.595 (-8.439 to -5.011)	0.886
Brown Barbet	*Caloramphus fuliginosus*	-3.728 (-4.548 to -2.965)	0.408
White-bellied Woodpecker	*Dryocopus javensis*	-5.963 (-7.975 to -4.284)	0.944
Rufous Woodpecker	*Micropternus brachyurus*	-5.72 (-7.547 to -4.229)	0.833
Buff-necked Woodpecker	*Meiglyptes tukki*	-3.869 (-4.822 to -3.058)	0.45
Blue-crowned Hanging Parrot	*Loriculus galgulus*	-3.613 (-4.594 to -2.726)	0.473
Blue-rumped Parrot	*Psittinus cyanurus*	-1.813 (-2.363 to -1.23)	0.285
Long-tailed Parakeet	*Psittacula longicauda*	-1.345 (-1.939 to -0.761)	0.295
Black-and-red Broadbill	*Cymbirhynchus macrorhynchos*	-5.591 (-7.283 to -4.228)	0.778
Black-and-yellow Broadbill	*Eurylaimus ochromalus*	-1.366 (-1.782 to -0.928)	0.221
Malayan Banded Pitta	*Hydrornis irena*	-1.684 (-2.119 to -1.237)	0.23
Hooded Pitta	*Pitta sordida*	-6.731 (-8.841 to -4.988)	0.995
Green Iora	*Aegithina viridissima*	-4.979 (-6.118 to -3.969)	0.548
Scarlet Minivet	*Pericrocotus speciosus*	-4.403 (-5.604 to -3.366)	0.563
Dark-throated Oriole	*Oriolus xanthonotus*	-2.188 (-2.664 to -1.708)	0.241
Sumatran Drongo	*Dicrurus sumatranus*	-3.508 (-4.449 to -2.684)	0.448
Greater Racket-tailed Drongo	*Dicrurus paradiseus*	-1.404 (-1.809 to -0.984)	0.211
Black-naped Monarch	*Hypothymis azurea*	-3.987 (-4.865 to -3.149)	0.434
Asian Paradise Flycatcher	*Terpsiphone paradisi*	-5.089 (-6.397 to -3.997)	0.611
Crested Jay	*Platylophus galericulatus*	-4.585 (-5.852 to -3.529)	0.597
Black Magpie	*Platysmurus leucopterus*	-2.016 (-2.463 to -1.553)	0.233
Slender-billed Crow	*Corvus enca*	-2.657 (-3.35 to -1.974)	0.353

Black-headed Bulbul	*Pycnonotus atriceps*	-3.293 (-4.134 to -2.468)	0.429
Ruby-throated Bulbul	*Pycnonotus dispar*	-1.655 (-2.136 to -1.155)	0.254
Olive-winged Bulbul	*Pycnonotus plumosus*	-6.251 (-8.282 to -4.579)	0.965
Cream-vented Bulbul	*Pycnonotus simplex*	-2.707 (-3.241 to -2.193)	0.267
Asian Red-eyed Bulbul	*Pycnonotus brunneus*	-1.255 (-1.688 to -0.797)	0.228
Grey-cheeked Bulbul	*Alophoixus bres*	-4.837 (-5.954 to -3.811)	0.552
Yellow-bellied Bulbul	*Alophoixus phaeocephalus*	-5.546 (-6.892 to -4.402)	0.634
Buff-vented Bulbul	*Iole olivacea*	-6.316 (-8.135 to -4.767)	0.875
Streaked Bulbul	*Ixos malaccensis*	-6.576 (-8.581 to -4.927)	0.936
Bar-winged Prinia	*Prinia familiaris*	-1.593 (-2.157 to -1.013)	0.292
Rufous-tailed Tailorbird	*Orthotomus sericeus*	-4.56 (-5.57 to -3.656)	0.488
Ashy Tailorbird	*Orthotomus ruficeps*	-5.404 (-7.001 to -4.102)	0.727
Chestnut-backed Scimitar Babbler	*Pomatorhinus montanus*	-6.814 (-8.797 to -5.253)	0.912
Pin-striped Tit-Babbler	*Macronus gularis*	-3.832 (-4.53 to -3.165)	0.351
Rufous-crowned Babbler	*Malacopteron magnum*	-4.775 (-5.874 to -3.8)	0.517
Black-capped Babbler	*Pellorneum capistratum*	-3.489 (-4.204 to -2.796)	0.36
Black Laughingthrush	*Garrulax lugubris*	-6.855 (-8.932 to -5.033)	0.992
Asian Fairy-bluebird	*Irena puella*	-2.611 (-3.207 to -2.025)	0.304
Velvet-fronted Nuthatch	*Sitta frontalis*	-6.798 (-9.069 to -4.991)	1.046
Common Hill Myna	*Gracula religiosa*	-1.587 (-2.038 to -1.131)	0.231
Oriental Magpie-Robin	*Copsychus saularis*	-3.986 (-5.071 to -3.069)	0.504
White-rumped Shama	*Copsychus malabaricus*	-1.744 (-2.343 to -1.1)	0.32
Verditer Flycatcher	*Eumyias thalassinus*	-5.713 (-7.365 to -4.297)	0.793
White-crowned Forktail	*Enicurus leschenaulti*	-4.479 (-5.574 to -3.513)	0.523
Yellow-rumped Flycatcher	*Ficedula zanthopygia*	-5.895 (-7.729 to -4.375)	0.861
Greater Green Leafbird	*Chloropsis sonnerati*	-4.158 (-5.26 to -3.178)	0.531
Lesser Green Leafbird	*Chloropsis cyanopogon*	-5.178 (-6.498 to -4.033)	0.626

Blue-winged Leafbird	*Chloropsis cochinchinensis*	-2.451 (-3 to -1.893)	0.283
Crimson-breasted Flowerpecker	*Prionochilus percussus*	-6.609 (-8.881 to -4.873)	1.019
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*	-5.907 (-7.609 to -4.478)	0.815
Ruby-cheeked Sunbird	*Chalcoparia singalensis*	-5.761 (-7.307 to -4.415)	0.728
Brown-throated Sunbird	*Anthreptes malacensis*	-5.446 (-6.987 to -4.108)	0.737

*In section A, + and – signs in the trend column show species that increased or decreased significantly over time, respectively; the other species showed no significant changes.

**Black Laughingthrush is normally a montane species. We heard the species at Way Canguk and made a recording of its song.

Appendix S8. Species specific parameter estimates, North Sumatra. Bronze-tailed Peacock-Pheasant was significantly more common away from roads; the other species showed no significant changes.

English name	Scientific name	Mean coefficient (95% credible interval)	SD
A. Trend (beta)			
Bronze-tailed Peacock-Pheasant	*Polyplectron chalcurum*	0.31 (0.026 to 0.6)	0.144
Mountain Imperial Pigeon	*Ducula badia*	0.362 (-0.146 to 0.874)	0.26
Fire-tufted Barbet	*Psilopogon pyrolophus*	0.124 (-0.048 to 0.284)	0.083
Black-browed Barbet	*Psilopogon oorti*	-0.044 (-0.324 to 0.189)	0.13
Greater Yellownape	*Chrysophlegma flavinucha*	-0.023 (-0.473 to 0.384)	0.219
Black-and-crimson Oriole	*Oriolus cruentus*	0.086 (-0.112 to 0.288)	0.103
Sumatran Drongo	*Dicrurus sumatranus*	0.157 (-0.005 to 0.312)	0.078
Common Green Magpie	*Cissa chinensis*	0.08 (-0.208 to 0.349)	0.141
Sumatran Treepie	*Dendrocitta occipitalis*	0.109 (-0.136 to 0.364)	0.126
Cinereous Tit	*Parus cinereus*	-0.033 (-0.352 to 0.312)	0.167
Orange-spotted Bulbul	*Pycnonotus bimaculatus*	0.086 (-0.169 to 0.362)	0.132
Ochraceous Bulbul	*Alophoixus ochraceus*	0.014 (-0.237 to 0.24)	0.119
Sunda Bulbul	*Ixos virescens*	0.115 (-0.076 to 0.335)	0.101
Mountain Leaf Warbler	*Phylloscopus trivirgatus*	0.09 (-0.031 to 0.214)	0.062
Hill Prinia	*Prinia superciliaris*	-0.072 (-0.542 to 0.405)	0.243
Spot-necked Babbler	*Stachyris striolata*	0.082 (-0.167 to 0.311)	0.117
Sunda Laughingthrush	*Garrulax paliatus*	0.09 (-0.057 to 0.245)	0.075
Chestnut-capped Laughingthrush	*Garrulax mitratus*	0.167 (-0.04 to 0.348)	0.097

Black Laughingthrush	*Garrulax lugubris*	0.109 (-0.112 to 0.316)	0.109
Long-tailed Sibia	*Heterophasia picaoides*	0.13 (-0.203 to 0.432)	0.162
Black-capped White-eye	*Zosterops atricapilla*	0.094 (-0.075 to 0.294)	0.091
Rufous-browed Flycatcher	*Anthipes solitaris*	0.138 (-0.094 to 0.373)	0.115
Large Niltava	*Niltava grandis*	0.123 (-0.078 to 0.296)	0.092
Indigo Flycatcher	*Eumyias indigo*	0.052 (-0.201 to 0.282)	0.123
Snowy-browed Flycatcher	*Ficedula hyperythra*	0.069 (-0.093 to 0.235)	0.081
Little Pied Flycatcher	*Ficedula westermanni*	-0.008 (-0.219 to 0.207)	0.107
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*	-0.069 (-0.41 to 0.294)	0.176
B. Trend (Intercept)			
Bronze-tailed Peacock-Pheasant	*Polyplectron chalcurum*	-1.401 (-1.949 to -0.796)	0.298
Mountain Imperial Pigeon	*Ducula badia*	-2.077 (-4.188 to -0.228)	1.046
Fire-tufted Barbet	*Psilopogon pyrolophus*	-0.337 (-0.797 to 0.063)	0.218
Black-browed Barbet	*Psilopogon oorti*	-0.943 (-1.762 to -0.209)	0.388
Greater Yellownape	*Chrysophlegma flavinucha*	-1.225 (-2.441 to -0.167)	0.596
Black-and-crimson Oriole	*Oriolus cruentus*	-1.582 (-2.248 to -0.811)	0.369
Sumatran Drongo	*Dicrurus sumatranus*	-0.178 (-0.526 to 0.164)	0.176
Common Green Magpie	*Cissa chinensis*	-1.912 (-3.989 to -0.01)	1.033
Sumatran Treepie	*Dendrocitta occipitalis*	-0.875 (-1.649 to -0.187)	0.377
Cinereous Tit	*Parus cinereus*	-1.528 (-2.865 to -0.245)	0.692
Orange-spotted Bulbul	*Pycnonotus bimaculatus*	-1.082 (-3.042 to 0.495)	0.906
Ochraceous Bulbul	*Alophoixus ochraceus*	-1.988 (-4.489 to 0.147)	1.203
Sunda Bulbul	*Ixos virescens*	-2.061 (-4.584 to -0.047)	1.196
Mountain Leaf Warbler	*Phylloscopus*	0.443 (0.27 to 0.612)	0.088

	trivirgatus		
Hill Prinia	*Prinia superciliaris*	-0.921 (-3.317 to 0.941)	1.078
Spot-necked Babbler	*Stachyris striolata*	-2.057 (-4.204 to -0.176)	1.016
Sunda Laughingthrush	*Garrulax paliatus*	1.752 (1.372 to 2.091)	0.183
Chestnut-capped Laughingthrush	*Garrulax mitratus*	-0.292 (-0.817 to 0.177)	0.254
Black Laughingthrush	*Garrulax lugubris*	-1.994 (-4.176 to -0.095)	1.063
Long-tailed Sibia	*Heterophasia picaoides*	0.149 (-0.673 to 0.81)	0.377
Black-capped White-eye	*Zosterops atricapilla*	0.011 (-0.38 to 0.361)	0.19
Rufous-browed Flycatcher	*Anthipes solitaris*	-1.704 (-2.835 to -0.493)	0.628
Large Niltava	*Niltava grandis*	-1.034 (-1.563 to -0.438)	0.297
Indigo Flycatcher	*Eumyias indigo*	-1.172 (-2.187 to -0.252)	0.5
Snowy-browed Flycatcher	*Ficedula hyperythra*	-0.338 (-0.819 to 0.068)	0.227
Little Pied Flycatcher	*Ficedula westermanni*	-1.149 (-1.663 to -0.529)	0.287
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*	-1.931 (-4.389 to 0.185)	1.172
C. Occurrence (p)			
Bronze-tailed Peacock-Pheasant	*Polyplectron chalcurum*	0.73 (0.41 to 0.984)	0.161
Mountain Imperial Pigeon	*Ducula badia*	0.184 (0.013 to 0.822)	0.203
Fire-tufted Barbet	*Psilopogon pyrolophus*	0.574 (0.39 to 0.835)	0.112
Black-browed Barbet	*Psilopogon oorti*	0.473 (0.222 to 0.908)	0.173
Greater Yellownape	*Chrysophlegma flavinucha*	0.295 (0.088 to 0.802)	0.179
Black-and-crimson Oriole	*Oriolus cruentus*	0.681 (0.311 to 0.987)	0.191
Sumatran Drongo	*Dicrurus sumatranus*	0.65 (0.485 to 0.861)	0.096
Common Green Magpie	*Cissa chinensis*	0.166 (0.013 to 0.748)	0.187
Sumatran Treepie	*Dendrocitta occipitalis*	0.468 (0.231 to 0.88)	0.167

Cinereous Tit	*Parus cinereus*	0.326 (0.078 to 0.883)	0.216
Orange-spotted Bulbul	*Pycnonotus bimaculatus*	0.08 (0.009 to 0.349)	0.091
Ochraceous Bulbul	*Alophoixus ochraceus*	0.128 (0.006 to 0.718)	0.176
Sunda Bulbul	*Ixos virescens*	0.14 (0.005 to 0.74)	0.187
Mountain Leaf Warbler	*Phylloscopus trivirgatus*	0.87 (0.764 to 0.973)	0.054
Hill Prinia	*Prinia superciliaris*	0.058 (0.003 to 0.345)	0.097
Spot-necked Babbler	*Stachyris striolata*	0.179 (0.014 to 0.742)	0.186
Sunda Laughingthrush	*Garrulax paliatus*	0.045 (0.018 to 0.083)	0.017
Chestnut-capped Laughingthrush	*Garrulax mitratus*	0.356 (0.218 to 0.563)	0.087
Black Laughingthrush	*Garrulax lugubris*	0.182 (0.015 to 0.798)	0.2
Long-tailed Sibia	*Heterophasia picaoides*	0.075 (0.031 to 0.149)	0.031
Black-capped White-eye	*Zosterops atricapilla*	0.41 (0.287 to 0.565)	0.071
Rufous-browed Flycatcher	*Anthipes solitaris*	0.441 (0.11 to 0.962)	0.244
Large Niltava	*Niltava grandis*	0.677 (0.384 to 0.976)	0.165
Indigo Flycatcher	*Eumyias indigo*	0.374 (0.135 to 0.858)	0.186
Snowy-browed Flycatcher	*Ficedula hyperythra*	0.55 (0.37 to 0.808)	0.112
Little Pied Flycatcher	*Ficedula westermanni*	0.708 (0.405 to 0.978)	0.159
Orange-bellied Flowerpecker	*Dicaeum trigonostigma*	0.123 (0.005 to 0.694)	0.169

Appendix S9. Variance parameters from hierarchical Bayesian models of changes in bird abundance.

Parameter	Mean (95% credible interval)	SD
A. Way Canguk		
hyper-parameter sigma.alpha, variance	0.132 (0.105 to 0.166)	0.016
hyper-parameter sigma.beta0, variance	1.84 (1.52 to 2.23)	0.183
over-dispersion parameter K[1], variance - year1	0.117 (0.089 to 0.152)	0.016
over-dispersion parameter K[2], variance - year2	0.142 (0.106 to 0.19)	0.021
over-dispersion parameter K[3], variance - year3	0.097 (0.077 to 0.121)	0.011
over-dispersion parameter K[4], variance - year4	0.169 (0.107 to 0.262)	0.041
over-dispersion parameter K[5], variance - year5	0.221 (0.105 to 0.449)	0.089
over-dispersion parameter K[6], variance - year6	0.06 (0.05 to 0.072)	0.006
over-dispersion parameter K[7], variance - year7	12.4 (2.13 to 79.3)	18.2
B. North Sumatra		
hyper-parameter mu.beta0, mean (intercept)	0.322 (-1.704 to -0.437)	0.322
hyper-parameter mu.beta2, mean (elevation)	0.084 (-0.191 to 0.133)	0.084
hyper-parameter mu.p, mean (zero-inflation)	0.518 (-1.886 to 0.17)	0.518
hyper-parameter sigma.alpha, variance	0.051 (0.004 to 0.193)	0.051
hyper-parameter sigma.beta0, variance	0.289 (0.729 to 1.874)	0.289
hyper-parameter sigma.beta2, variance	0.085 (0.146 to 0.486)	0.085
hyper-parameter sigma.p, variance	0.429 (1.257 to 2.957)	0.429

Appendix S10. Statistical tests of the changes in (A) hours walked by trappers in search of the four most sensitive species in our study area in North Sumatra and (B) numbers of birds trapped per day.

model	AIC*c* weight	ΔAIC*c*	marginal R^2	conditional R^2	df
A. Hours walked by trappers over time					
Silver-eared mesia *Leiothrix argentauris*					
year	0.645	0	0.87	0.87	4
null	0.355	1.2	0	0	3
Common green magpie *Cissa chinensis*					
year	0.836	0	0.36	0.9	4
null	0.164	3.3	0	0	3
Sumatran laughingthrush *Garrulax bicolor*					
year	0.985	0	0.8	0.8	4
null	0.015	8.3	0	0	3
Chestnut-capped laughingthrush *Garrulax mitratus*					
year	0.85	0	0.46	0.64	4
null	0.15	3.5	0	0	3
B. Birds caught by trappers over time					
Silver-eared mesia *Leiothrix argentauris*					
year	0.956	0	0.55	0.73	4
null	0.044	6.1	0	0	3
Common green magpie *Cissa chinensis*					
null	0.806	0	0	0	3
year	0.194	2.8	0.21	0.77	4
Sumatran laughingthrush *Garrulax bicolor*					
null	0.7	0	0	0	3
year	0.3	1.7	0.18	0.7	4
Chestnut-capped laughingthrush *Garrulaxmitratus*					
null	0.557	0	0	0	3

year	0.443	0.5	0.13	0.7	4

Supporting References

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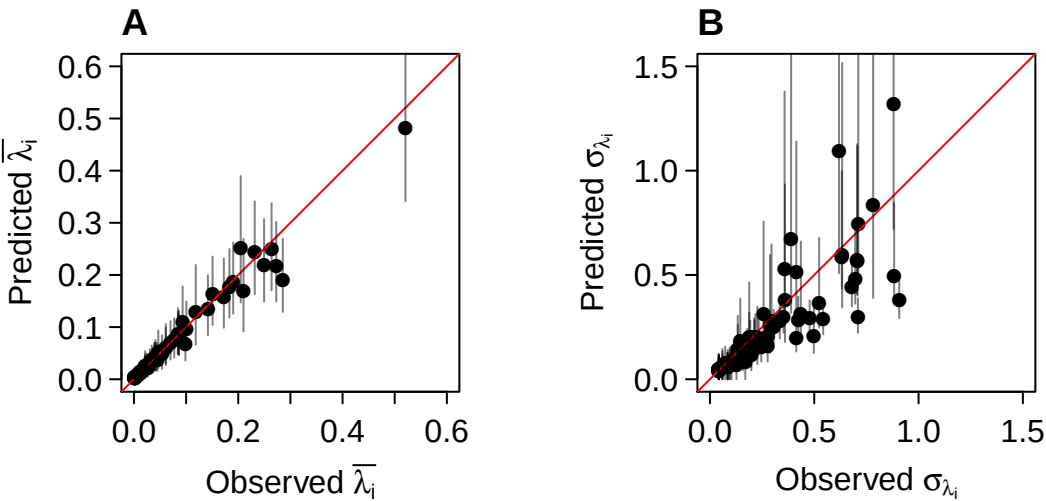
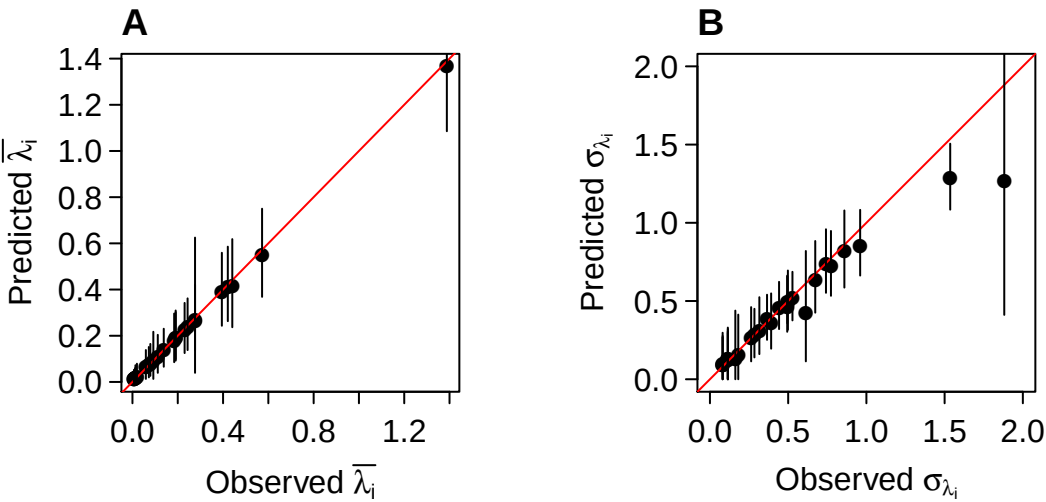
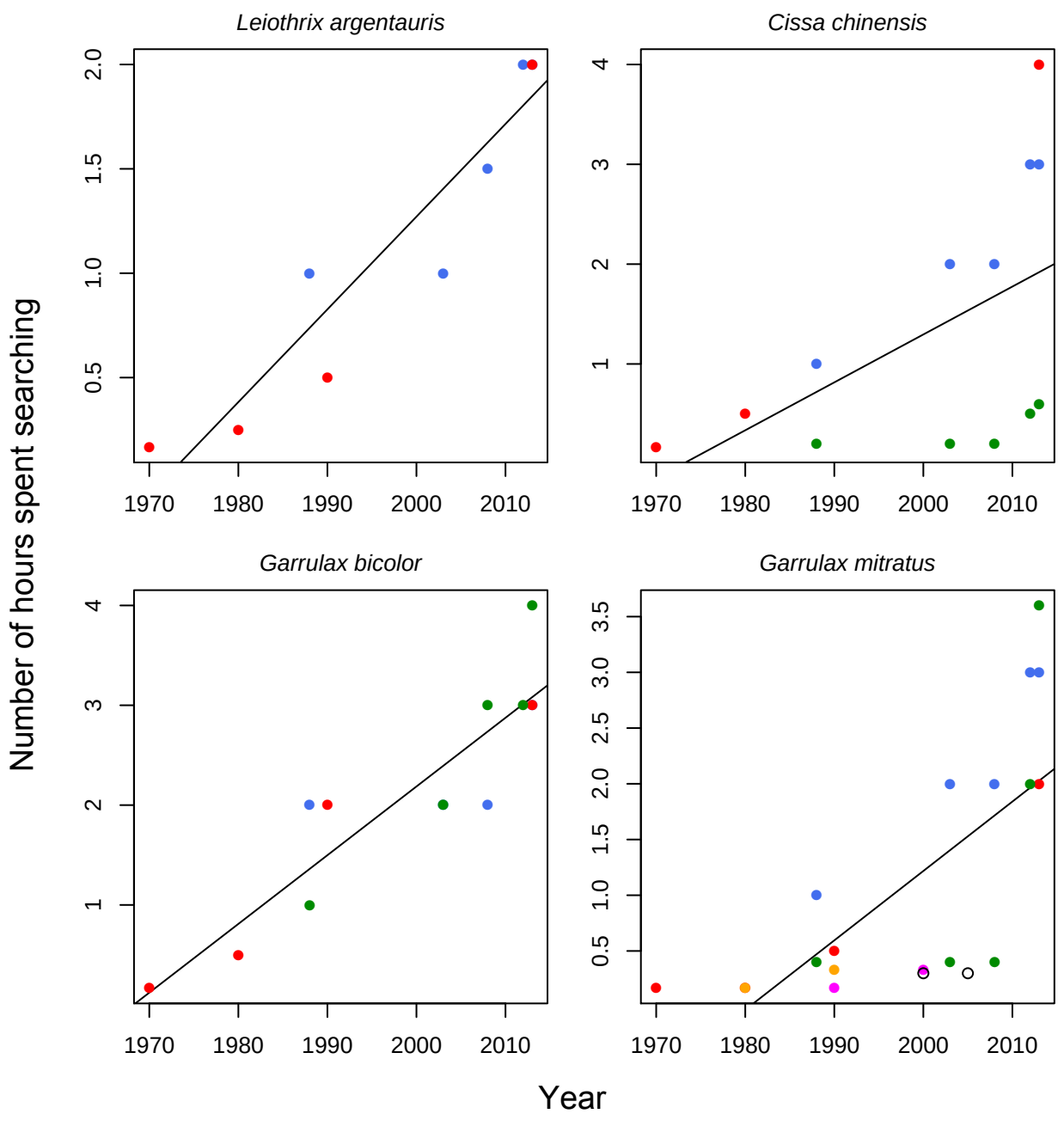


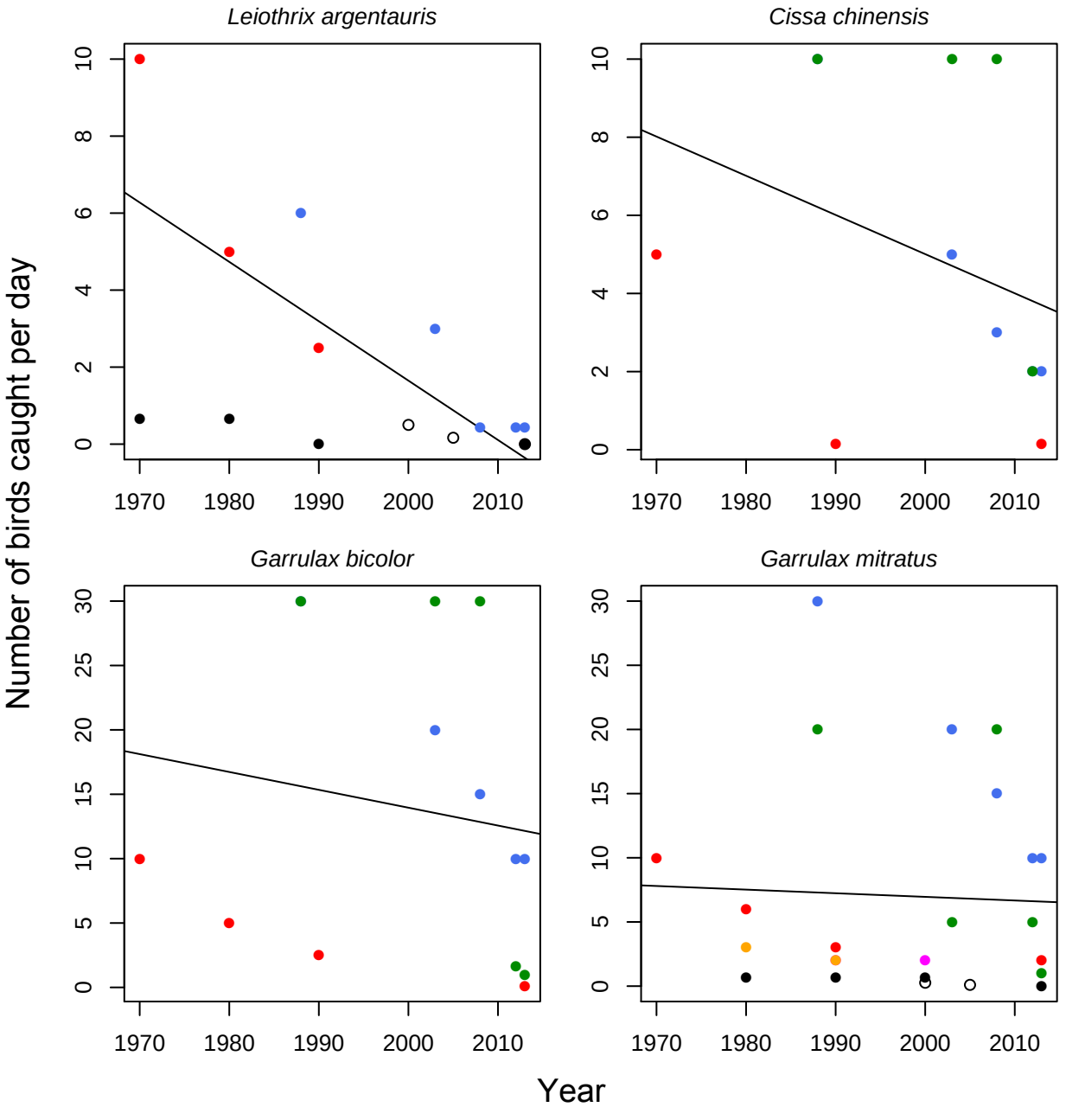
Appendix S11. Goodness-of-fit plots for Bayesian hierarchical models, Way Canguk.



Appendix S12. Goodness-of-fit plots for Bayesian hierarchical models, North Sumatra.

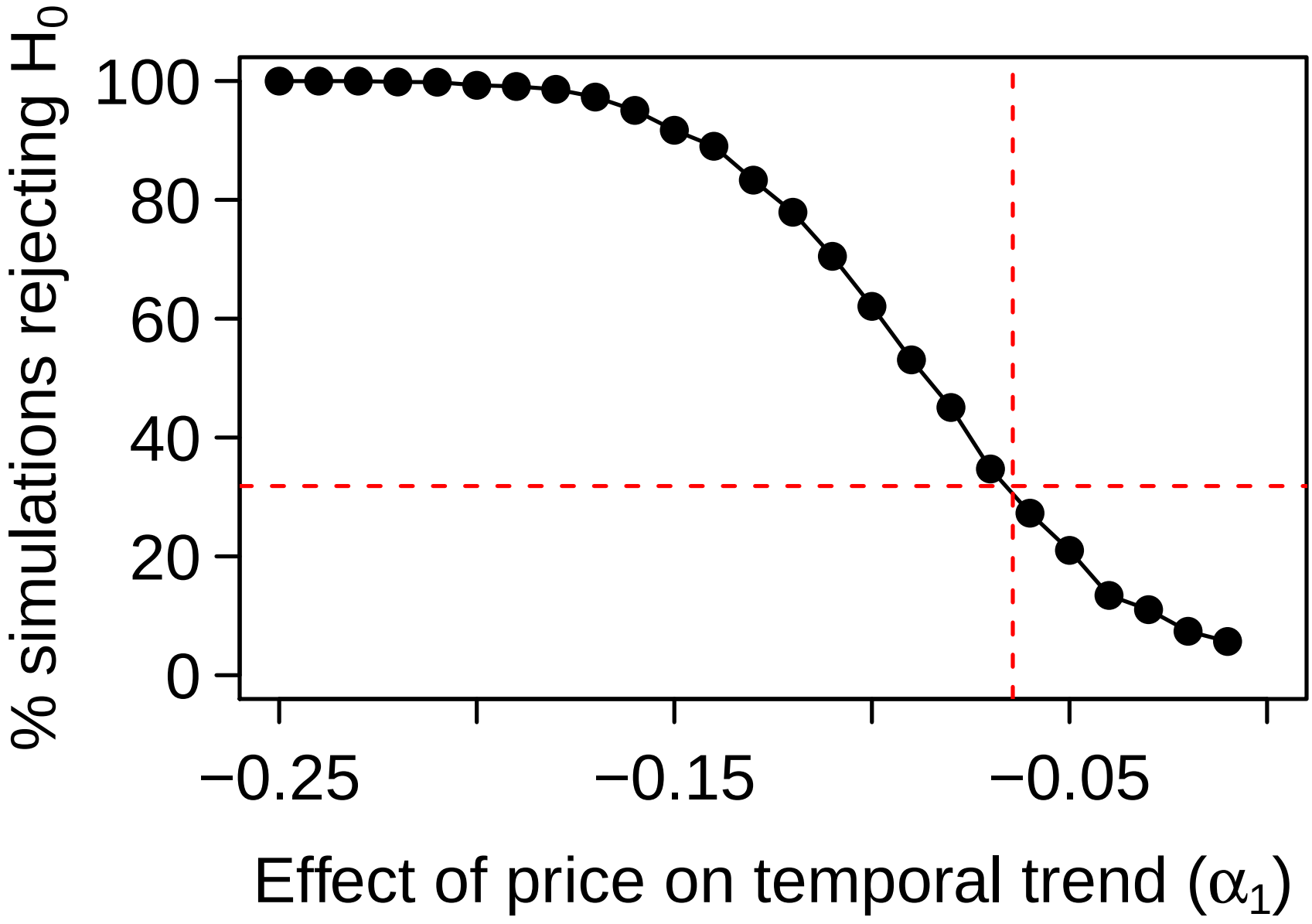

Leiothrix argentauris
Cissa chinensis
Garrulax bicolor
Garrulax mitratus
Number of hours spent searching
Year
1970
1980
1990
2000
2010
0.5
1.0
1.5
2.0
1
2
3
4
2.5
3.0
3.5

Appendix S13. Number of birds caught per day by trappers when searching for the species they ranked to be the most sensitive to trapping. Data point colors show different trappers.


Leiothrix argentauris
Cissa chinensis
Garrulax bicolor
Garrulax mitratus
Number of birds caught per day
Year
0
2
4
6
8
10
0
5
10
15
20
25
30
1970
1980
1990
2000
2010

Appendix S14. Time spent by trappers searching for the species they ranked to be the most sensitive to trapping. Data point colors show different trappers.

Appendix S15. A posteriori power analysis for Way Canguk evaluating the percent of simulations that rejected the null hypothesis (that there is no relationship between price and temporal trend) given varying true relationships of price to trend.



Appendix S16. A posteriori power analysis for North Sumatra evaluating the percent of simulations that rejected the null hypothesis (that there is no relationship between price and spatial trend) given varying true relationships of price to trend.