

Supporting Information for

Shifting drivers and predictable corridors of an illegal wildlife trade network.

George Olah, Rodrigo León-Pérez, Alex J. Berryman, Gregory P. Asner, Robert Heinsohn

Corresponding author: George Olah

Email: george.olah@anu.edu.au

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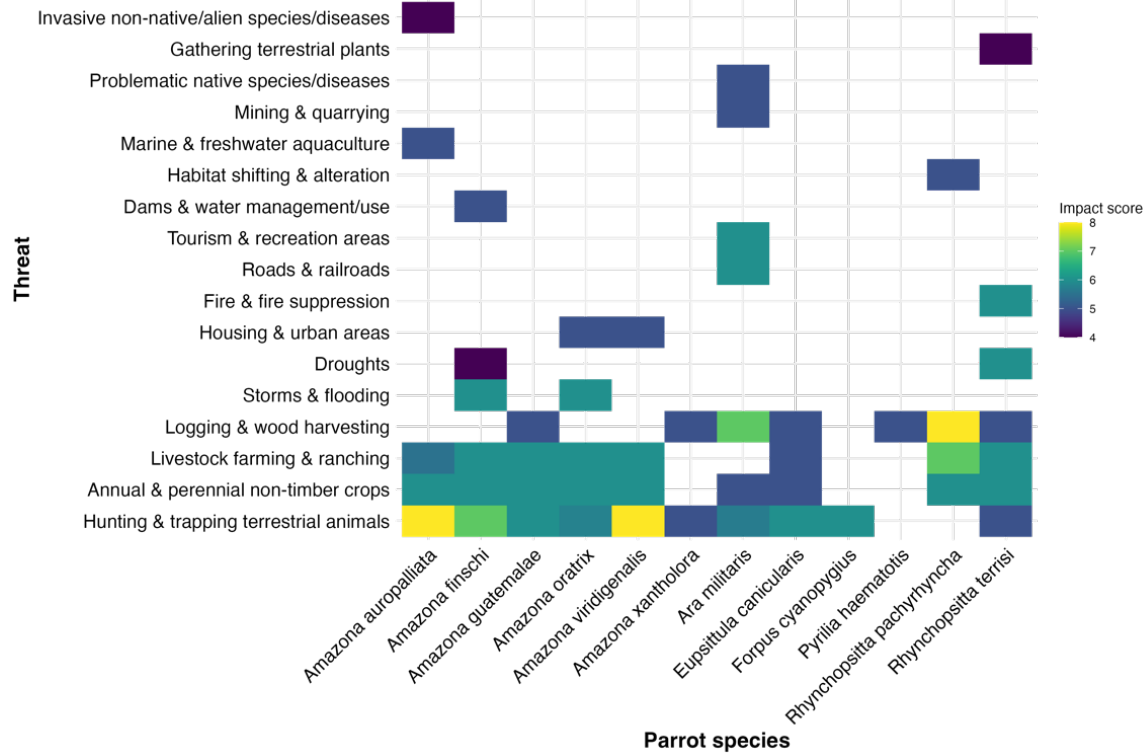


Figure S1. Threat impact intensity across parrot species.

Heatmap of threat impact scores for each of the 20 native Mexican parrot species. Colors indicate average impact intensity, with darker shades corresponding to lower impact scores. Threats are ordered from least to most prevalent among the species.

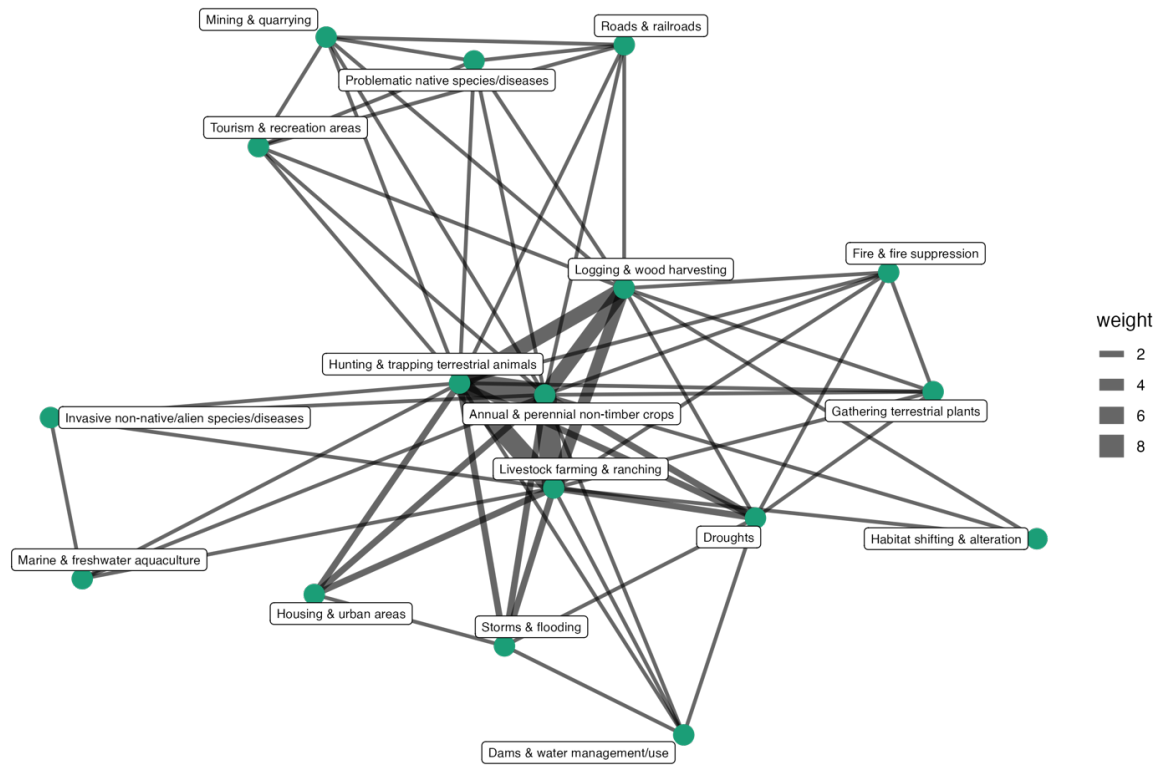


Figure S2. Network of co-occurring threats to Mexican parrots.

Nodes in the network represent individual threats classified by the IUCN Threats Classification Scheme. Edges connect threats that affect the same parrot species, with thicker edges representing a stronger co-occurrence (i.e. a higher number of species affected by both threats).

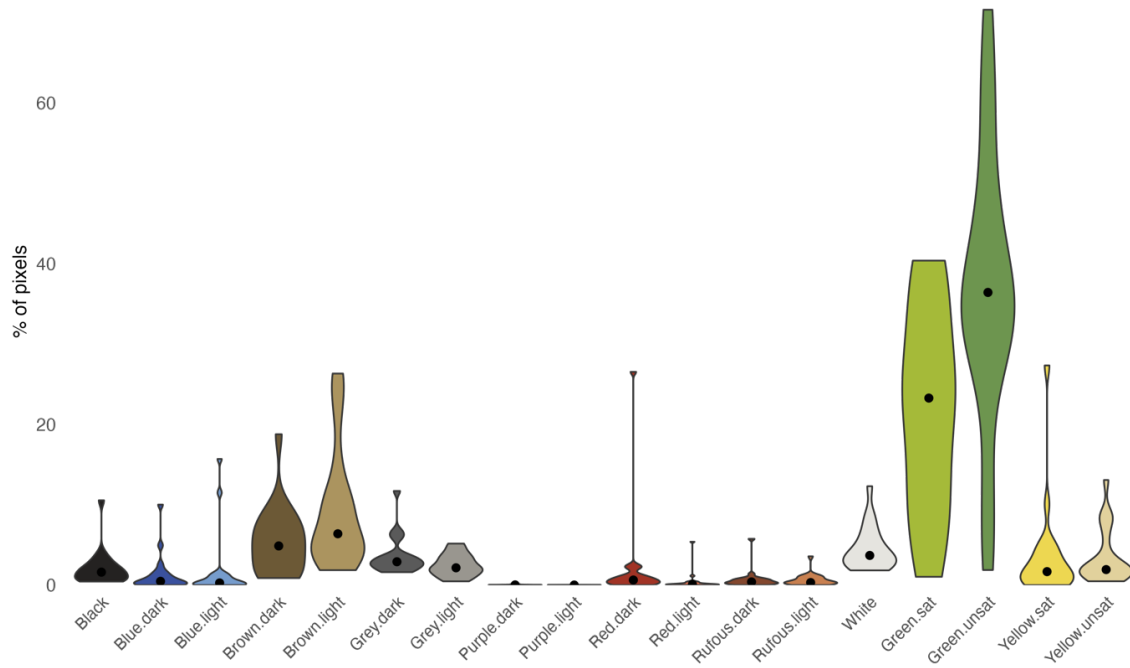


Figure S3. Bird color distribution across Mexican parrot species.

Violin plots showing the distribution of the percentage of body coverage for 18 different color categories across all 20 native species. These data were used to calculate the enjoyable metric in the CRAAVED models. Black points indicate the median coverage for each color.

Table S1. Confiscation data and conservation status of native Mexican parrots.

Data are presented for 20 parrot species native to Mexico.

Scientific name	English name	Spanish name	Endemic to Mexico	IUCN RedList status	National status	Population trend	Conf. (1997–2008)	Conf. (2009–2019)	Conf. (2020–2024)	Total conf.
<i>Amazona albifrons</i>	White-fronted Amazon	Loro frente blanca		LC	Pr	Increasing	1607	611	159	2377
<i>Amazona auropalliata</i>	Yellow-naped Amazon	Loro nuca amarilla		CR	P	Decreasing	98	134	31	263
<i>Amazona autumnalis</i>	Red-lored Amazon	Loro cachete amarillo		LC	A	Decreasing	974	1282	275	2531
<i>Amazona finschi</i>	Lilac-crowned Amazon	Loro corona lila	E	EN	P	Decreasing	284	389	40	713
<i>Amazona guatemalae</i>	Northern Mealy Amazon	Loro corona azul		NT	P	Decreasing	138	193	36	367
<i>Amazona oratrix</i>	Yellow-headed Amazon	Loro cabeza amarilla		EN	P	Decreasing	255	450	67	772
<i>Amazona viridigenalis</i>	Red-crowned Amazon	Loro tamaulipeco	E	EN	P	Decreasing	126	96	16	238
<i>Amazona xantholora</i>	Yellow-lored Amazon	Loro yucateco	E	LC	A	Decreasing	95	40	3	138
<i>Ara macao</i>	Scarlet Macaw	Guacamaya roja		LC	P	Decreasing	207	280	37	524
<i>Ara militaris</i>	Military Macaw	Guacamaya verde		VU	P	Decreasing	547	780	167	1494
<i>Bolborhynchus lineola</i>	Barred Parakeet	Perico barreteado		LC	A	Stable	137	13	0	150
<i>Brotogeris jugularis</i>	Orange-chinned Parakeet	Perico ala amarilla		LC	A	Decreasing	199	13	7	219
<i>Eupsittula astec</i>	Aztec Parakeet	Perico pecho sucio		LC	Pr	Decreasing	13	19	59	91
<i>Eupsittula canicularis</i>	Orange-fronted Parakeet	Perico frente naranja		VU	Pr	Decreasing	4269	4304	99	8672
<i>Forpus cyanopygius</i>	Mexican Parrotlet	Perico catarina	E	NT	Pr	Decreasing	29	41	0	70
<i>Pionus senilis</i>	White-crowned Parrot	Loro corona blanca		LC	A	Decreasing	127	124	13	264
<i>Psittacara holochlorus</i>	Green Parakeet	Perico mexicano		LC	A	Decreasing	370	184	3	557
<i>Pyrilia haematotis</i>	Brown-hooded Parrot	Loro cabeza oscura		LC	P	Decreasing	0	4	0	4
<i>Rhynchopsitta pachyrhyncha</i>	Thick-billed Parrot	Cotorra-serrana occidental	E	EN	P	Decreasing	76	16	1	93
<i>Rhynchopsitta terrisi</i>	Maroon-fronted Parrot	Cotorra-serrana oriental	E	EN	P	Decreasing	24	4	2	30

Table S2. Threats affecting native parrot species in Mexico.

The table lists threat categories as defined by the IUCN Threats Classification Scheme and shows the number and percentage of 20 native Mexican parrot species affected by each.

Threats	n species	% species
Hunting & trapping terrestrial animals	10	50
Annual & perennial non-timber crops	9	45
Livestock farming & ranching	8	40
Logging & wood harvesting	7	35
Droughts	2	10
Housing & urban areas	2	10
Storms & flooding	2	10
Dams & water management/use	1	5
Fire & fire suppression	1	5
Gathering terrestrial plants	1	5
Habitat shifting & alteration	1	5
Invasive non-native/alien species/diseases	1	5
Marine & freshwater aquaculture	1	5
Mining & quarrying	1	5
Problematic native species/diseases	1	5
Roads & railroads	1	5
Tourism & recreation areas	1	5

Table S3. Geographic and species-specific hotspots of the Mexican parrot trade.

The table shows the top three states by total and per-year average confiscation numbers for each of the three study periods. Also shown are the three most disproportionately selected parrot species for each period, along with the top three states where those particular species were confiscated.

Period	State	Confiscated (total)	Confiscated (per year)	Species	#1 state (total n)	#2 state (total n)	#3 state (total n)
1997–2008	Oaxaca	1,642	137	<i>Bolborhynchus lineola</i>	Federal District (28)	Puebla (25)	San Luis Potosí (22)
	Sinaloa	1,423	119	<i>Ara macao</i>	Federal District (38)	Quintana Roo (35)	Chiapas (18)
	Federal District	495	41	<i>Amazona viridigenalis</i>	Nuevo León (30)	Tamaulipas (20)	Baja California Sur (16)
2009–2019	Oaxaca	2,819	256	<i>Ara macao</i>	Federal District (42)	Morelos (39)	Quintana Roo (34)
	Federal District	1,214	110	<i>Amazona auropalliata</i>	Federal District (42)	Chiapas (40)	Puebla (15)
	Jalisco	961	87	<i>Amazona viridigenalis</i>	Federal District (12)	Guanajuato (10)	Tamaulipas (10)
2020–2024	Federal District	363	73	<i>Ara macao</i>	Baja California (15)	Federal District (13)	Chiapas (4)
	Michoacan	112	22	<i>Amazona auropalliata</i>	Federal District (20)	Chiapas (8)	Mexico (2)
	Morelos	68	14	<i>Amazona viridigenalis</i>	San Luis Potosí (7)	Federal District (6)	Michoacan (1), Nuevo León (1), Morelos (1)
1997–2024	Oaxaca	4,508	161				
	Federal District	2,072	74				
	Sinaloa	1,936	69				
	Jalisco	1,356	48				

Table S4. Sociodemographic drivers of parrot confiscations.

Results from single-term logistic regression models (GLM) correlating state-level sociodemographic indicators with the number of confiscated parrots for each study period.

Group	Sociodemographic variables definition	A (1997–2008)		B (2009–2019)		C (2020–2024)	
		B	P	B	P	B	P
Marginalisation	Marginalisation index	0.35	0.1	0.25	0.311	-6.73	0.251
Population	Total population	<0.01	0.213	<0.01	0.013	<0.01	0.018
	Population living in localities with fewer than 5,000 inhabitants	0.01	0.471	<0.01	0.872	0.02	0.561
Education	Illiterate population aged 15 years and older	0.07	0.066	0.1	0.097	0.3	0.126
	Population aged 15 years and older without basic education	0.04	0.091	0.05	0.19	0.27	0.246
Poverty	Occupants in private homes without drainage or toilets	0.02	0.382	-0.04	0.516	0.24	0.487
	Occupants in private homes without electricity	0.1	0.094	-0.03	0.893	0.43	0.692
	Occupants in private homes without piped water	0.05	0.029	0.06	0.079	0.24	0.247
	Occupants in private homes with dirt floors	0.05	0.018	0.11	0.03	0.2	0.255
	Overcrowded private homes	0.03	0.224	0.03	0.361	0.08	0.472
	Employed population with incomes up to 2 minimum wages	0.01	0.542	<0.01	0.962	0.04	0.518

Significant *P*-values (< 0.05) are indicated in bold.

Table S5. Criminological models of parrot species trade selection.

The table presents results from models evaluating the importance of each CRAAVED component in predicting the likelihood of a species being traded. Results are shown for (A) full models with all components, and (B) best-fit models selected based on AIC. Both standard logistic regression (GLM) and phylogenetic generalized linear mixed models (PGLMM) were used. Results from PGLMM are provided as the average random effects variances for nested random effects (s2) with standard deviation (SD), and the coefficient of determination (R^2_{pred}). For each explanatory variable, the table includes the means of the estimates (B), the Z-scores for the fixed effects regression coefficients, and the P-values (< 0.05 are indicated in bold).

(A) Period	Variable	GLM		PGLMM				
		t	P	B	Z	P	s2	R ² _{pred}
1997–2008	Concealable	0.327	0.749	0.151	0.137	0.877	0.066 ± 0.015	-0.134
	Removable	0.361	0.724	0.080	0.118	0.891		
	Accessible	0.834	0.421	0.990	1.754	0.092		
	Abundance	0.368	0.719	0.021	0.017	0.895		
	Valuable	-0.095	0.926	-0.270	-0.550	0.586		
	Enjoyable	0.880	0.396	1.124	1.310	0.194		
	Disposable	1.141	0.276	1.105	2.319	0.029		
2009–2019	Concealable	-0.506	0.622	-0.259	-0.506	0.613	<0.001 ± 0	<0.001
	Removable	-0.927	0.372	-0.269	-0.927	0.354		
	Accessible	1.188	0.258	0.424	1.188	0.235		
	Abundance	-0.973	0.350	-0.388	-0.973	0.330		
	Valuable	-0.451	0.660	-0.148	-0.451	0.652		
	Enjoyable	3.724	0.003	1.109	3.724	<0.001		
	Disposable	3.712	0.003	1.155	3.712	<0.001		
2020–2024	Concealable	0.877	0.398	1.457	1.039	0.304	0.823 ± 0.185	0.263
	Removable	-0.647	0.530	-0.109	-0.129	0.722		
	Accessible	1.028	0.324	0.440	0.872	0.402		
	Abundance	0.914	0.379	1.579	1.440	0.170		
	Valuable	0.331	0.746	0.128	0.176	0.856		
	Enjoyable	1.181	0.261	0.367	0.405	0.686		
	Disposable	1.133	0.279	0.804	1.099	0.285		
(B) Period	Variable	GLM		PGLMM				
		t	P	B	Z	P	s2	R ² _{pred}
1997– 2008	Disposable	1.602	0.127	0.683	1.855	0.108	0.698 ± 0.16	-0.052
2009– 2019	Enjoyable	4.198	0.001	0.991	4.198	<0.001	<0.001 ± 0	<0.001
	Disposable	5.406	<0.001	1.276	5.406	<0.001		
2020– 2024	Abundance	2.052	0.056	1.062	2.166	0.041	0.745 ± 0.169	0.308
	Enjoyable	2.619	0.018	0.967	1.306	0.209		