Table S1. Summary of models predicting IUCN threat status in 16 orders of mammal. The IUCN category (an ordinal variable from 1 to 5) was the dependent variable. The predictors were log range size ('logRS'), log body mass ('logMass'), human encroachment and impacts ('Encroach' and 'HII', see text for definitions), and the interaction between log range size and log mass ('RS * Mass'). In the table coefficient values and their significance (* $p < 0.05$, ** $p < 0.05$, *** $p < 0.001$) are given. Maximum likelihood values of φ (measuring spatial effects), λ' (measuring phylogenetic dependence) and γ (variation independent of space and phylogeny) are also reported. R^2 values refer to models for the 5-level ordinal threat score. AUC is a threshold independent measure of the models' ability to predict species binary threat status (see methods). Sens/Spec gives the value of both sensitivity and specificity as it applies to the predicted threat probability threshold used to categorize species as threatened or non-threatened (the threshold was set as the value where sensitivity = specificity). For order species richness see Fig 2.

	Models for IUCN threat status					Spatial & phylogenetic			Model fit & predictions		
Order	logRS	logMass	Encroach	HII	RS * Mass	λ′	φ	γ	R^2	AUC	Sens/Spec
DIDELPHIMORPHIA	-0.75***	0.14	1.10	-0.04	0.77***	0.00	0.00	1.00	0.60	0.98	0.96
PERAMELEMORPHIA	-1.11***	1.32*	0.58	-0.20	1.30	0.00	0.00	1.00	0.81	0.92	0.82
DASYUROMORPHIA	-0.92***	0.66***	-1.05	0.01	0.13	0.10	0.62	0.28	0.50	0.84	0.78
DIPROTODONTIA	-1.08***	0.22	1.91	0.02	0.17	0.00	0.00	1.00	0.46	0.87	0.77
CINGULATA	-1.16*	0.98	0.88	-0.01	1.64	0.00	0.00	1.00	0.53	0.52	0.50
AFROSORICIDA	-1.30***	0.91***	1.26	0.07	-0.50	0.00	0.00	1.00	0.64	0.91	0.80
MACROSCELIDEA	-0.69**	1.25***	3.62	-0.07	-0.98***	0.99	0.00	0.01	0.96	1.00	1.00
EULIPOTYPHLA	-0.99***	0.31***	0.57	0.02	-0.08	0.02	0.91	0.07	0.52	0.97	0.91
CHIROPTERA	-0.77***	0.19**	-1.14*	0.05	-0.01	0.08	0.69	0.23	0.45	0.94	0.87
PERISSODACTYLA	-0.60	0.23	-0.60	0.08	2.57	0.00	0.00	1.00	0.24	-	0.32
CARNIVORA	-0.86***	0.57***	1.42	-0.04***	-0.29**	0.26	0.01	0.73	0.44	0.88	0.80
CETARTIODACTYLA	-0.96***	0.34*	1.69*	-0.09***	-0.16	0.08	0.81	0.11	0.40	0.86	0.78
PRIMATES	-1.08***	0.95***	0.74	0.02	-0.08	0.66	0.00	0.34	0.44	0.91	0.84
SCANDENTIA	-0.58*	-0.01	-1.44	-0.03	-0.35	0.01	0.99	0.00	0.84	0.90	0.90
RODENTIA	-0.77***	0.20***	0.01	0.00		0.02	0.81	0.17	0.41	0.92	0.83
LAGOMORPHA	-0.78***	0.13	0.07	0.00	0.18	0.00	0.00	1.00	0.53	0.93	0.85

Table S2 Summary of models for predicting log body mass in mammals based on phylogenetic and spatial information. In the first set of analyses φ and λ were estimated individually, in the second set of analysis they were co-estimated to yield estimates of λ', φ and γ. The superscripts denote likelihood ratio tests of whether the λ and φ statistics are different from 0 (first value) or 1 (second value). ns = not significant; * P < 0.05; ** P< 0.01; *** P < 0.001). R is a measure of the predictive ability of the phylogenetic model using the randomization method described in the text. 'N' gives total number of species in taxon, 'N missing' the number of species without body mass

	λ	φ	λ'	φ	γ	R	N	N missing
AFROSORICIDA	$0.89^{***.ns}$	$0.00^{ns.***}$	0.89	0.00	0.11	0.66	36	4
CARNIVORA	$0.97^{***.***}$	$0.00^{ns.***}$	0.97	0.00	0.03	0.85	226	19
CETARTIODACTYLA	$0.99^{***.**}$	$0.05^{ns.***}$	0.94	0.04	0.02	0.79	200	18
CHIROPTERA	$0.90^{***.***}$	$0.05^{ns.***}$	0.86	0.00	0.15	0.89	885	209
CINGULATA	$0.62^{ns.ns}$	$0.00^{ns.***}$	0.48	0.34	0.18	0.71	20	0
DASYUROMORPHIA	$1.00^{***.ns}$	$0.32^{**.***}$	0.67	0.34	0.00	0.83	60	5
DIDELPHIMORPHIA	$1.00^{***.ns}$	$0.00^{ns.***}$	1.00	0.00	0.00	0.85	61	1
DIPROTODONTIA	$0.98^{***.**}$	$0.25^{**.***}$	0.74	0.12	0.15	0.86	108	2
EULIPOTYPHLA	$0.92^{***.ns}$	$0.00^{ns.***}$	0.92	0.00	0.08	0.84	345	98
LAGOMORPHA	$0.92^{***.*}$	$0.04^{ns.***}$	0.88	0.02	0.10	0.89	79	21
MACROSCELIDEA	$1.00^{***.ns}$	$0.00^{ns.***}$	1.00	0.00	0.00	0.76	15	1
PERISSODACTYLA	$0.99^{***.ns}$	$0.00^{ns.***}$	0.99	0.00	0.01	0.71	16	1
PERAMELEMORPHIA	$0.00^{ns.***}$	$0.00^{ns.***}$	0.00	0.00	1.00	0.00	18	2
PRIMATES	$1.00^{***.ns}$	$0.00^{ns.***}$	1.00	0.00	0.00	0.96	228	10
RODENTIA	$0.98^{***.***}$	$0.18^{ns.***}$	0.81	0.06	0.13	0.91	1870	329
SCANDENTIA	$0.85^{ns.ns}$	$0.00^{ns.ns}$	0.84	0.00	0.16	0.73	19	3

Supplementary Figures

Fig S1. Predicted Order level threat probabilities for assessed species on the original 5-point ordinal scale of IUCN threat categories. This scale ranges from "Least Concern", 1, to "Critically Endangered", 5. For final analyses levels 3-5 were collapsed into one ("threatened"). Results for Perissodactyla not shown as this Order contained no data-deficient species

Figure S2. Explanatory and discriminative power of the fitted models of threat status for assessed species (based on linear models assuming multinomial errors, see Methods). The outputs of these models are the probabilities of being within each of the 5 IUCN states. From these we calculated the probability that each species was threatened (states 3-5) or not (states 1-2), to generate probabilities comparable with those in Figs 1 and 2. For other details see Fig 1.

Figure S3. Prediction of threats for individual mammal orders for assessed species (based on linear models assuming multinomial errors, see Methods). For details, see Fig 2 and S2.

Figure S4. Explanatory and discriminative power of the fitted models of threat status for assessed species (based on a 50% threat probability threshold set at IUCN ordinal threat level 2 rather than 2.5; see Methods). For other details see Fig 1.

Figure S5. Prediction of threats for individual mammal orders for assessed species (based on a 50% threat probability threshold set at IUCN ordinal threat level 2 rather than 2.5; see Methods). For other details see Fig 2.

Figure S1

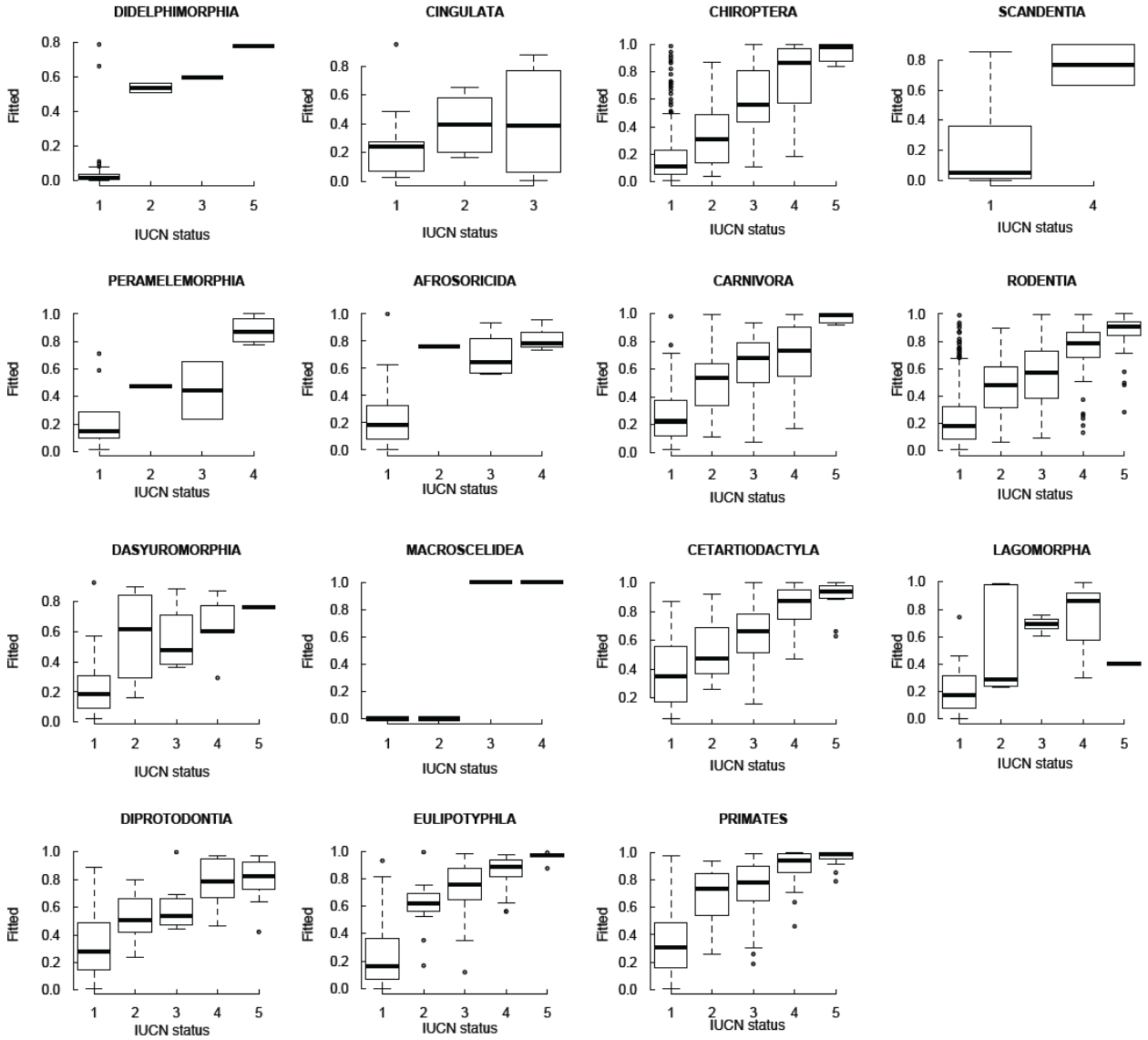

DIDELPHIMORPHIA
CINGULATA
CHIROPTERA
SCANDENTIA
PERAMELEMORPHIA
AFROSORICIDA
CARNIVORA
RODENTIA
DASYUROMORPHIA
MACROSCELIDEA
CETARTIODACTYLA
LAGOMORPHA
DIPROTODONTIA
EULIPOTYPHLA
PRIMATES
Fitted
IUCN status

Figure S2

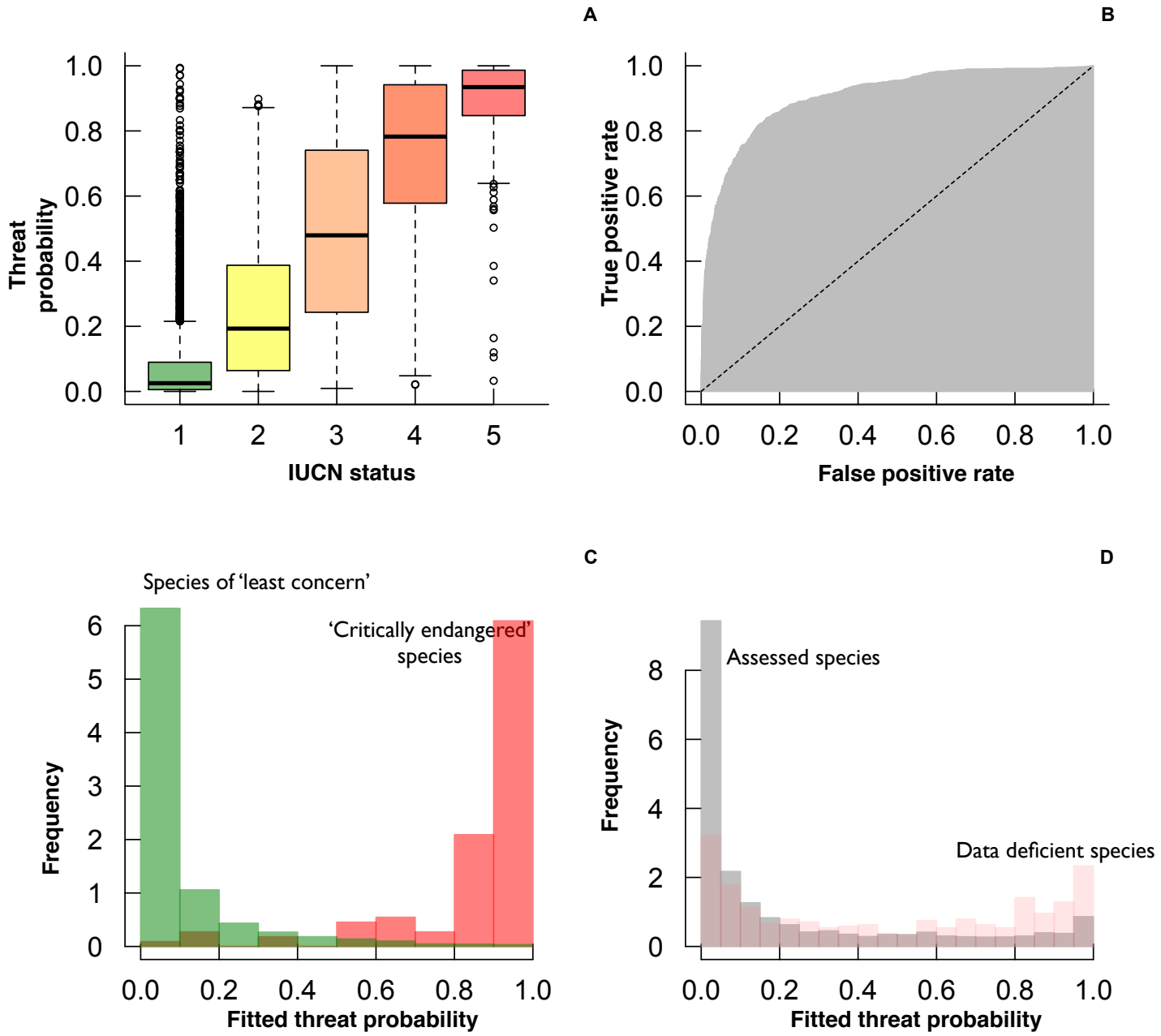
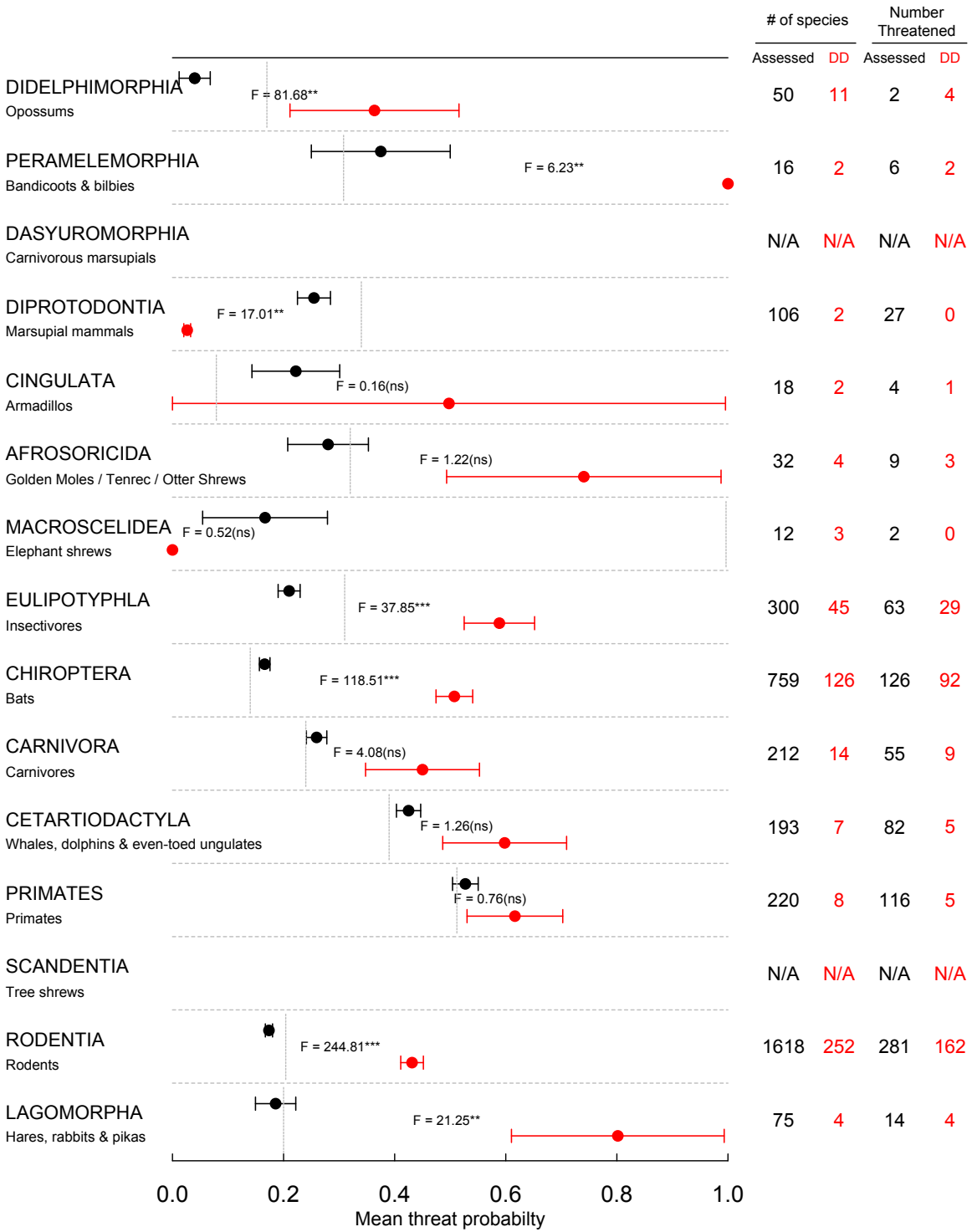

A
B
Threat probability
IUCN status
True positive rate
False positive rate
C
D
Species of 'least concern'
'Critically endangered' species
Frequency
Fitted threat probability
Assessed species
Data deficient species

Figure S3



	# of species		Number Threatened	
	Assessed	DD	Assessed	DD
DIDELPHIMORPHIA Opossums	50	11	2	4
PERAMELEMORPHIA Bandicoots & bilbies	16	2	6	2
DASYUROMORPHIA Carnivorous marsupials	N/A	N/A	N/A	N/A
DIPROTODONTIA Marsupial mammals	106	2	27	0
CINGULATA Armadillos	18	2	4	1
AFROSORICIDA Golden Moles / Tenrec / Otter Shrews	32	4	9	3
MACROSCELIDEA Elephant shrews	12	3	2	0
EULIPOTYPHLA Insectivores	300	45	63	29
CHIROPTERA Bats	759	126	126	92
CARNIVORA Carnivores	212	14	55	9
CETARTIODACTYLA Whales, dolphins & even-toed ungulates	193	7	82	5
PRIMATES Primates	220	8	116	5
SCANDENTIA Tree shrews	N/A	N/A	N/A	N/A
RODENTIA Rodents	1618	252	281	162
LAGOMORPHA Hares, rabbits & pikas	75	4	14	4

Figure S4

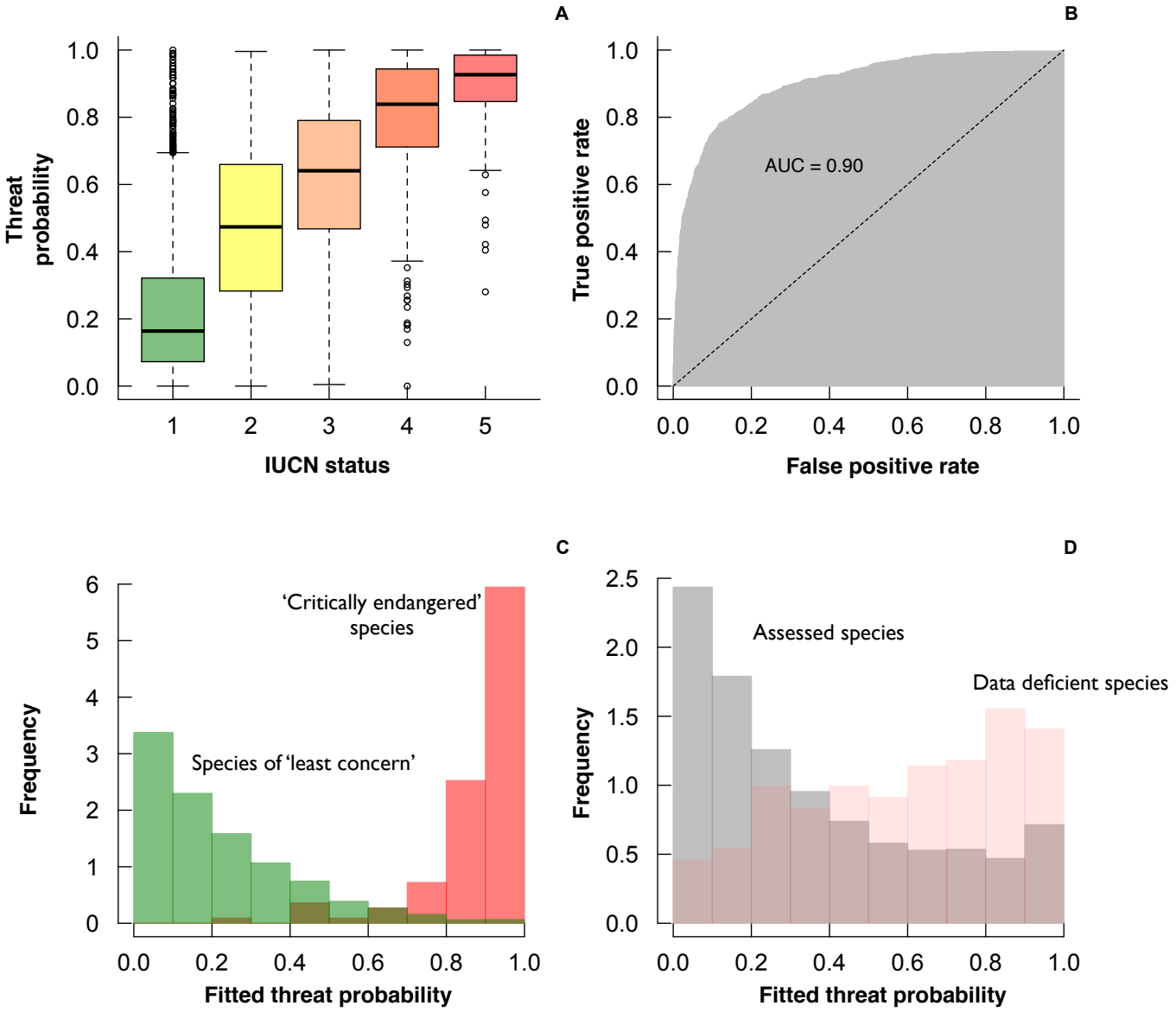
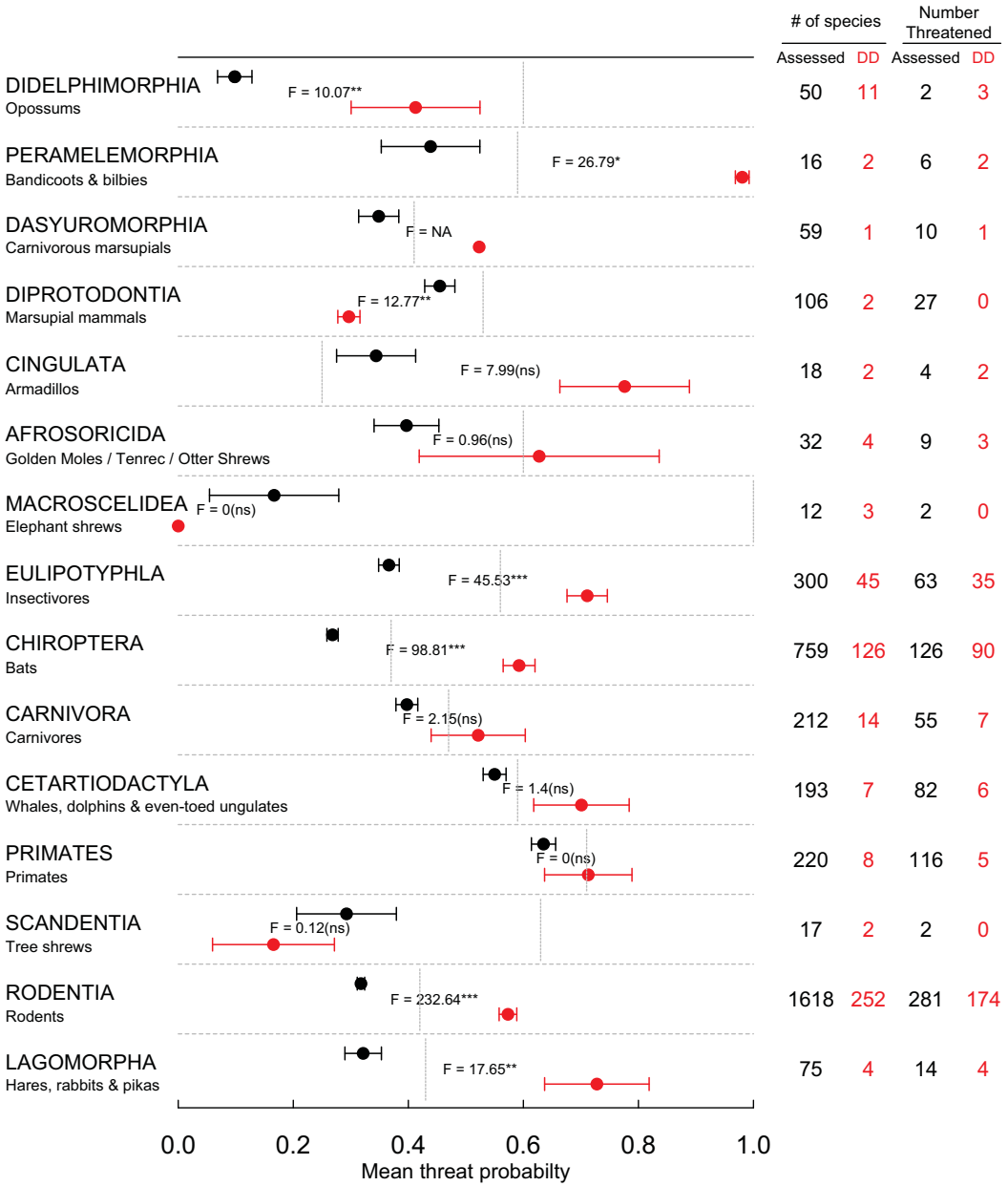

A
B
C
D
Threat probability
IUCN status
True positive rate
False positive rate
AUC = 0.90
Frequency
'Critically endangered' species
Species of 'least concern'
Fitted threat probability
Assessed species
Data deficient species

Figure S5


# of species
Number Threatened
Assessed DD Assessed DD
DIDELPHIMORPHIA
Opossums
F = 10.07**
50 11 2 3
PERAMELEMORPHIA
Bandicoots & bilbies
F = 26.79*
16 2 6 2
DASYUROMORPHIA
Carnivorous marsupials
F = NA
59 1 10 1
DIPROTODONTIA
Marsupial mammals
F = 12.77**
106 2 27 0
CINGULATA
Armadillos
F = 7.99(ns)
18 2 4 2
AFROSORICIDA
Golden Moles / Tenrec / Otter Shrews
F = 0.96(ns)
32 4 9 3
MACROSCELIDEA
Elephant shrews
F = 0(ns)
12 3 2 0
EULIPOTYPHLA
Insectivores
F = 45.53***
300 45 63 35
CHIROPTERA
Bats
F = 98.81***
759 126 126 90
CARNIVORA
Carnivores
F = 2.15(ns)
212 14 55 7
CETARTIODACTYLA
Whales, dolphins & even-toed ungulates
F = 1.4(ns)
193 7 82 6
PRIMATES
Primates
F = 0(ns)
220 8 116 5
SCANDENTIA
Tree shrews
F = 0.12(ns)
17 2 2 0
RODENTIA
Rodents
F = 232.64***
1618 252 281 174
LAGOMORPHA
Hares, rabbits & pikas
F = 17.65**
75 4 14 4
0.0 0.2 0.4 0.6 0.8 1.0
Mean threat probabilty