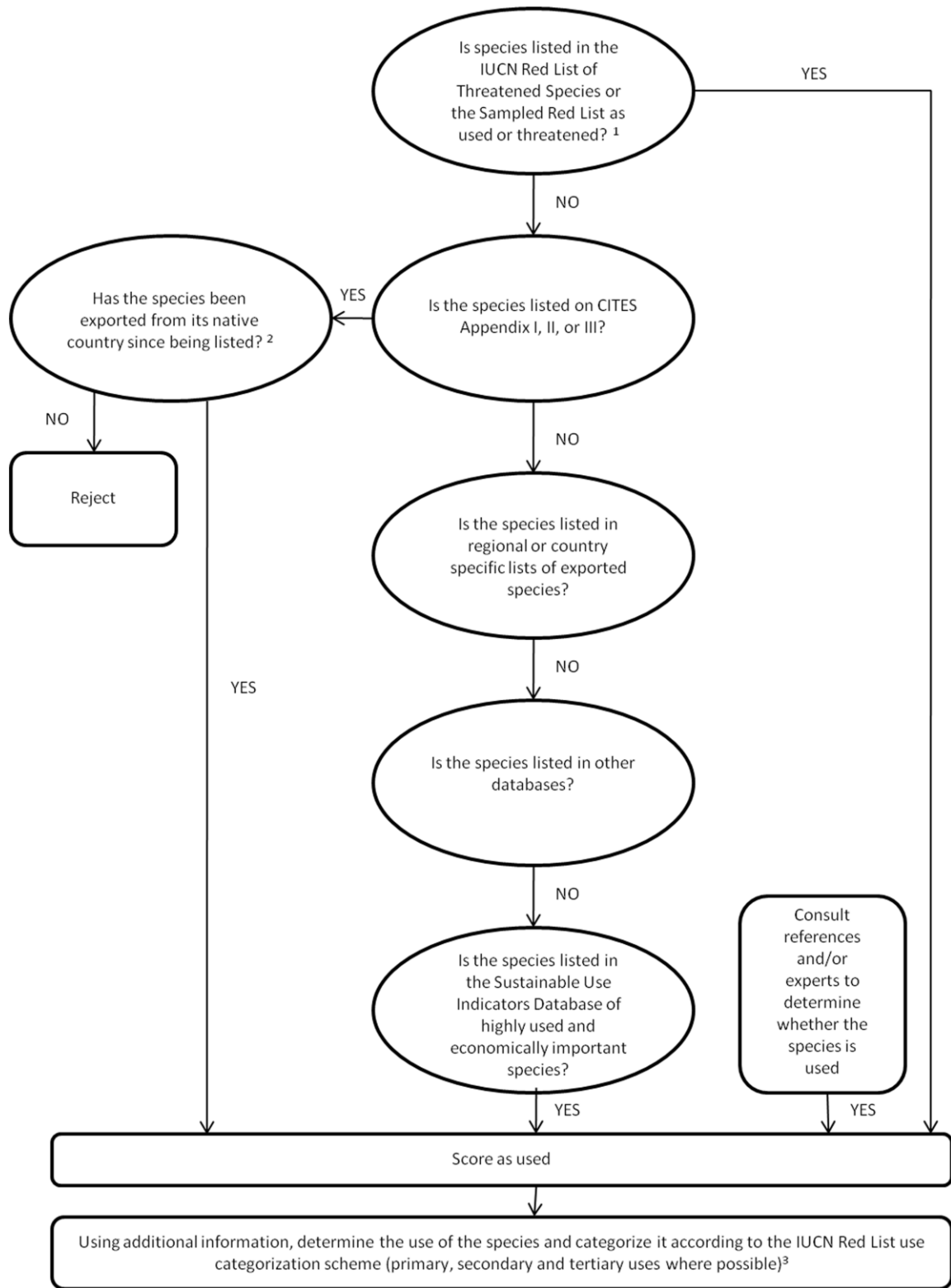# Use it or lose it: measuring trends in wild species subject to substantial use

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SUPPLEMENTARY MATERIAL 1 Decision tree used to code whether a species listed in the Living Planet Index (LPI) is utilized

Is species listed in the IUCN Red List of Threatened Species or the Sampled Red List as used or threatened? [1] — YES →

NO ↓

Is the species listed on CITES Appendix I, II, or III?

← YES — Has the species been exported from its native country since being listed? [2]

NO ↓ → Reject

YES ↓

NO ↓

Is the species listed in regional or country specific lists of exported species?

NO ↓

Is the species listed in other databases?

NO ↓

Is the species listed in the Sustainable Use Indicators Database of highly used and economically important species?

Consult references and/or experts to determine whether the species is used

YES ↓   YES ↓

Score as used

↓

Using additional information, determine the use of the species and categorize it according to the IUCN Red List use categorization scheme (primary, secondary and tertiary uses where possible)[3]

[1] A new version of the Red List utilization module is being released, which will provide more specific and detailed information on the scale and scope of use and the severity of the threat intentional use poses to species. These data are already coded

as part of the global bird assessment. The assessments for other species provide information on whether the species is used (in the case of birds, mammals, amphibians and some freshwater and marine fish) or threatened by use (for remaining classes) and this information forms the basis of the analysis presented in this study.

[2] CITES-listed species not in trade since being listed are currently coded as 'not in use' on the precautionary assumption that if a species has a CITES export quota but no permits have been registered it is unlikely that there is an international market for this species. This does not exclude the possibility of national or local-level use or illegal trade, and more information is needed on each of these species before they can be included in the list of 'used' species.

[3] The IUCN Utilization Classification Scheme consists of 17 categories of end use and was extracted from the report on a use classification workshop held at UNEP-WCMC in June 2008 (http://intranet.iucn.org/webfiles/doc/SSC/RedList/AuthorityF/utilization.rtf).

Datasets used include:

IUCN Red List
The IUCN Red List database includes 12,378 species, all classified as in use and/or threatened by use. It includes species in the global bird, mammal and amphibian assessments, the sampled Red List of marine and freshwater fish, plus additional phyla and classes considered to be threatened by use, including reptiles, molluscs and plants.

CITES
The CITES trade database, managed by UNEP-WCMC on behalf of the CITES Secretariat, currently holds 7 million records of trade in wildlife and 50,000 scientific names of taxa listed by CITES. More than 500,000 records of trade in CITES-listed species of wildlife are reported annually.
Species were classified as 'used' if the CITES database recorded permits being issued between 1992 and 2006.

Regional or country-specific lists of species
EU Annex 4 lists non-CITES listed species in trade that the EU are actively monitoring.

Other

Avibase (World Bird Database) contains >5 million records about 10,000 species and 22,000 subspecies of birds, including distribution information and taxonomy.

FAO Forestry Country Profiles database contains facts and information on forests, forestry and non-wood forest products for some 200 countries and regions.

International Tropical Timber Organization (ITTO) promotes the conservation and sustainable management, use and trade of tropical forest resources. The annual review statistics database contains information on forest products and trade.

Center for International Forestry Research (CIFOR) manages an extensive database on the use and trade of forest products.

FAO's Non-Wood Forest Product News (1994–2005)

The Sea Around Us project (University of British Columbia) collates catch time series on all fish and crustacean species landed worldwide.

FishBase is a global information system containing data on nearly all known fish species, including whether they are used by humans.

SUPPLEMENTARY MATERIAL 2 Tables S1–S5 include species and population numbers in each of the datasets used to generate trends in the Utilized Species and Harvest Indices.

TABLE S1 Species and population numbers in the utilized species database shown by vertebrate class, and in the utilized freshwater, marine and terrestrial species datasets shown by zone (temperate/tropical) and vertebrate class. Because some species occur in more than one system, the total number of species and populations in the Utilized Species database does not necessarily equal the sum total of species and populations in the Freshwater, Marine and Terrestrial datasets.

Index	Description	Zone	Class	No. species	No. populations
Utilized species	Based on trends in species that are utilized by humans		Amphibian	40	118
			Bird	865	3,543
			Fish	303	1,177
			Mammal	261	1,201
			Reptile	32	175
			Total	*1,501*	*6,214*
Utilized freshwater species	Based on trends in utilized species that are found in a broad range of temperate and tropical freshwater habitats	Temperate	Amphibian	21	81
			Bird	148	1,056
			Fish	83	599
			Mammal	10	36
			Reptile	8	21
			Total temperate	*270*	*1,793*
		Tropical	Amphibian	8	17
			Bird	106	316
			Fish	45	68
			Mammal	5	13
			Reptile	12	49
			Total tropical	*176*	*463*
			Total freshwater	*446*	*2,256*

Utilized marine species	Based on trends in utilized species that are found in a broad range of temperate and tropical marine habitats	Temperate	Amphibian	0	0
			Bird	94	737
			Fish	143	400
			Mammal	35	158
			Reptile	3	24
			Total temperate	*275*	*1,319*
		Tropical	Amphibian	0	0
			Bird	44	120
			Fish	55	111
			Mammal	10	29
			Reptile	7	71
			Total tropical	*116*	*331*
			Total marine	*388*	*1,650*
Utilized terrestrial species	Based on trends in utilized species that are found in a broad range of temperate and tropical terrestrial habitats	Temperate	Amphibian	5	7
			Bird	369	879
			Fish	0	0
			Mammal	66	478
			Reptile	3	7
			Total temperate	**443**	**1,371**
		Tropical	Amphibian	9	13
			Bird	207	420
			Fish	0	0
			Mammal	135	497
			Reptile	1	1
			Total tropical	*352*	*931*
			Total terrestrial	*795*	*2,302*

TABLE S2 Species and population numbers for species that are used as food for humans, hunted for sport by humans, or used as pets, shown by vertebrate class, and in the utilized freshwater, marine and terrestrial species datasets shown by zone (temperate/tropical) and vertebrate class. Because some species occur in more than one system, the total number of species and populations in the database of all species used for food or sport hunting or as pets does not necessarily equal the sum total of species and populations in the freshwater, marine and terrestrial datasets.

Index	Description	Zone	Class	Food		Hunting		Pets	
				No. species	No. populations	No. species	No. populations	No. species	No. populations
Species used for specific purposes	Based on trends in species that are utilized by humans for food or hunting or as pets		Amphibian	14	51	5	11	24	77
			Bird	390	2,322	285	1,867	766	3,123
			Fish	279	1,091	114	743	73	205
			Mammal	204	913	100	750	39	197
			Reptile	5	123	10	52	5	22
			Total	*892*	*4,500*	*514*	*3,423*	*907*	*3,624*
Freshwater species used for specific purposes	Based on trends in species that are utilized by humans for food, for sport hunting or as pets and are found in a broad range of temperate and tropical freshwater habitats	Temperate	Amphibian	7	36	3	8	14	57
			Bird	100	854	100	900	132	965
			Fish	68	538	53	532	28	126
			Mammal	6	25	0	0	0	0
			Reptile	4	10	1	1	6	13
			Total temperate	*185*	*1,463*	*156*	*1,441*	*180*	*1,161*
		Tropical	Amphibian	4	11	32	144	4	6
			Bird	62	220	0	0	95	284
			Fish	32	54	20	34	23	28
			Mammal	4	12	0	0	0	0
			Reptile	6	12	1	1	1	2
			Total tropical	*108*	*309*	*53*	*179*	*123*	*320*
			Total freshwater	*293*	*1,772*	*209*	*1,620*	*303*	*1,481*

Marine species used for specific purposes	Based on trends in species that are utilized by humans for food, for sport hunting or as pets and are found in a broad range of temperate and tropical marine habitats	Temperate	Amphibian	0	0	0	0	0	0
			Bird	63	538	34	215	66	593
			Fish	138	392	58	144	16	38
			Mammal	32	135	16	68	2	7
			Reptile	3	24	2	21	0	0
			Total temperate	*233*	*1,089*	*108*	*448*	*84*	*638*
		Tropical	Amphibian	0	0	0	0	0	0
			Bird	26	68	11	27	33	92
			Fish	58	107	17	33	10	13
			Mammal	10	29	2	15	1	1
			Reptile	7	71	3	29	0	0
			Total tropical	*94*	*275*	*31*	*104*	*43*	*106*
			Total marine	*327*	*1,364*	*139*	*552*	*127*	*744*
Terrestrial species used for specific purposes	Based on trends in species that are utilized by humans for food, for sport hunting or as pets and are found in a broad range of temperate and tropical terrestrial habitats	Temperate	Amphibian	1	1	2	3	3	4
			Bird	150	513	154	536	333	792
			Fish	0	0	0	0	0	0
			Mammal	37	252	39	379	10	43
			Reptile	2	6	0	0	3	7
			Total temperate	*190*	*772*	*195*	*918*	*349*	*846*
		Tropical	Amphibian	3	3	16	45	6	10
			Bird	61	129	0	0	193	397
			Fish	0	0	0	0	0	0
			Mammal	117	460	43	288	26	146
			Reptile	0	0	0	0	0	0
			Total tropical	*181*	*592*	*59*	*333*	*225*	*553*
			Total terrestrial	*371*	*1,364*	*254*	*1,251*	*574*	*1,399*

TABLE S3 Species and population numbers in the substantially used species database, shown by vertebrate class. Species and population numbers for vertebrates in the substantially used freshwater, marine and terrestrial species datasets are shown by zone (temperate/tropical) and vertebrate class. Because some species occur in more than one system, the total number of species and populations in the substantially used species database does not necessarily equal the sum total of species and populations in the freshwater, marine and terrestrial datasets. Only species in evidence categories 3, 4 or 5 are included.

Index	Description	Zone	Class	No. species	No. populations
Substantially used species	Based on trends where evidence exists that species are substantially utilized by humans (based on scale of trade or volume of harvest at local, national, regional and international levels)		Amphibian	0	0
			Bird	27	124
			Fish	77	322
			Mammal	65	508
			Reptile	18	146
			Total	*187*	*1,100*
Substantially used freshwater species	Based on trends in freshwater species found in a broad range of temperate and tropical habitats, where evidence exists that they are substantially utilized by humans (based on scale of trade or volume of harvest at local, national, regional and international levels)	Temperate	Amphibian	0	0
			Bird	9	51
			Fish	2	51
			Mammal	2	9
			Reptile	3	9
			Total temperate	*16*	*120*
		Tropical	Amphibian	0	0
			Bird	2	13
			Fish	1	2
			Mammal	1	5
			Reptile	11	48
			Total tropical	*15*	*68*
			Total freshwater	*31*	*188*

Substantially used marine species	Based on trends in marine species found in a broad range of temperate and tropical habitats, where evidence exists that they are substantially utilized by humans (based on scale of trade or volume of harvest at local, national, regional and international levels)	Temperate	Amphibian	0	0
			Bird	3	26
			Fish	52	212
			Mammal	3	31
			Reptile	3	24
			Total temperate	*61*	*293*
		Tropical	Amphibian	0	0
			Bird	2	4
			Fish	30	57
			Mammal	1	1
			Reptile	5	65
			Total tropical	*38*	*127*
			Total marine	*99*	*420*
Substantially used terrestrial species	Based on trends in terrestrial species found in a broad range of temperate and tropical habitats, where evidence exists that they are substantially utilized by humans (based on scale of trade or volume of harvest at local, national, regional and international levels)	Temperate	Amphibian	0	0
			Bird	6	13
			Fish	0	0
			Mammal	25	256
			Reptile	0	0
			Total temperate	**31**	**269**
		Tropical	Amphibian	0	0
			Bird	8	17
			Fish	0	0
			Mammal	34	206
			Reptile	0	0
			Total tropical	*42*	*223*
			Total terrestrial	*73*	*492*

TABLE S4 Species and population numbers in the utilized Arctic species database, shown by system (freshwater, marine, terrestrial) and vertebrate class. There are no amphibian or reptile species in the utilized Arctic species database.

System	Class	No. species	No. populations
Freshwater	Bird	19	34
	Fish	13	72
	Mammal	1	3
	Total freshwater	*33*	*109*
Marine	Bird	16	147
	Fish	39	98
	Mammal	15	41
	Total marine	*70*	*286*
Terrestrial	Bird	29	110
	Fish	0	0
	Mammal	15	158
	Total terrestrial	*44*	*268*
	Total	*147*	*663*

TABLE S5 Species and population numbers in the Arctic Harvest Index database, shown by system (marine, terrestrial) and vertebrate class. No harvest data were available for freshwater species.

System	Class	No. species	No. populations
Marine	Fish	6	11
	Total marine	*6*	*11*
Terrestrial	Bird	4	17
	Mammal	10	45
	Total terrestrial	*14*	*62*
	Total	*20*	*73*

SUPPLEMENTARY MATERIAL 3 95% confidence intervals (CI) for each of the indices (1970–2007).

Index	1970	1975	1980	1985	1990	1995	2000	2005	2007
Utilized species	1.00	1.05	1.05	0.97	0.94	0.95	0.87	0.85	0.86
Lower 95% CI	1.00	1.00	1.00	0.91	0.87	0.87	0.79	0.76	0.77
Upper 95% CI	1.00	1.09	1.11	1.04	1.01	1.03	0.96	0.95	0.97
Utilized freshwater species	1.00	1.06	1.13	1.01	0.95	1.01	0.89	0.93	0.97
Lower 95% CI	1.00	1.00	1.03	0.90	0.82	0.86	0.74	0.75	0.78
Upper 95% CI	1.00	1.13	1.23	1.15	1.10	1.20	1.09	1.16	1.23
Utilized marine species	1.00	1.06	1.08	1.01	0.96	0.96	0.87	0.83	0.83
Lower 95% CI	1.00	0.97	0.96	0.88	0.83	0.81	0.72	0.67	0.66
Upper 95% CI	1.00	1.15	1.19	1.14	1.10	1.13	1.05	1.03	1.04
Utilized terrestrial species	1.00	1.02	0.97	0.90	0.91	0.87	0.84	0.78	0.79
Lower 95% CI	1.00	0.95	0.89	0.83	0.83	0.78	0.75	0.69	0.68
Upper 95% CI	1.00	1.09	1.04	0.98	0.99	0.96	0.94	0.90	0.93
Species used for food	1.00	1.04	1.06	0.96	0.92	0.91	0.82	0.79	0.83
Lower 95% CI	1.00	0.99	0.99	0.89	0.85	0.82	0.72	0.69	0.72
Upper 95% CI	1.00	1.09	1.13	1.04	1.01	1.01	0.92	0.92	0.97
Species used for sport hunting	1.00	1.11	1.25	1.17	1.18	1.18	1.09	1.07	1.14
Lower 95% CI	1.00	1.05	1.15	1.06	1.05	1.02	0.92	0.89	0.94
Upper 95% CI	1.00	1.18	1.36	1.30	1.33	1.37	1.31	1.30	1.42
Species used as pets	1.00	1.09	1.07	0.99	0.95	0.99	0.93	0.89	0.91
Lower 95% CI	1.00	1.04	0.98	0.88	0.84	0.86	0.80	0.75	0.77
Upper 95% CI	1.00	1.15	1.17	1.11	1.08	1.13	1.08	1.04	1.08
Substantially used species	1.00	1.00	1.03	1.01	1.02	1.03	0.98	1.16	1.11
Lower 95% CI	1.00	0.91	0.90	0.86	0.85	0.84	0.77	0.81	0.75
Upper 95% CI	1.00	1.11	1.19	1.20	1.24	1.29	1.26	1.72	1.68
Utilized Arctic species	1.00	1.11	1.29	1.44	1.54	1.78	1.61	1.69	1.83
Lower 95% CI	1.00	0.95	1.08	1.18	1.23	1.41	1.26	1.29	1.38
Upper 95% CI	1.00	1.29	1.55	1.76	1.92	2.25	2.07	2.21	2.44