The importance of habitat and life-history to extinction risk in sharks, skates, rays and chimaeras

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ELECTRONIC SUPPLEMENTARY MATERIAL

PHYLOGENETIC RELATIONSHIPS

Since a phylogenetic tree of chondrichthyans that includes all the species considered in our analysis is not available, a tree was built from topologies taken from different studies (Garland *et al.* 2005) (figure S1). The phylogenetic relationships among major groups of Chondrichthyes were taken from Naylor *et al.* (2005). Major relationships within Batoidea were according to McEachran *et al.* (1996) and McEachran & Aschliman (2004). Within Batoidea, the relationships among species of Myliobatiformes follow Dunn *et al.* (2003), with relationships within Dasyatidae according to Rosenberger (2001). Relationships among species of Rajiformes follow McEachran & Dunn (1998), with the clade of *Raja montagui*, *R. asterias* and *R. clavata* according to Tinti *et al.* (2003). Major relationships within Selachii are according to Naylor *et al.* (2005). The relationships within Squaliformes follow Shirai (1996) and Shirai & Nakaya (1990), and within Lamniformes follow Naylor *et al.* (1997). The relationships among the different families within Carcharhiniformes are according to Iglésias *et al.* (2005), and relationships within Carcharhinidae and Sphyrnidae follow Naylor (1992).

Relative branch lengths were determined from the calibrated phylogenetic tree of Shirai (1996) due to the absence of branch length data in most studies of chondrichthyan phylogeny. Branch lengths of a given taxon were set according to the appearance of its first fossil representative. The middle point between the ages of two adjacent nodes was used when the age of a node was unknown.

R CODES FOR THE ANALYSES

```
#Code for phylogenetic tree

cat("(((((((((((((Carcharhinus_galapagensis:0.0084,Carcharhinu
s_obscurus:0.0084,Carcharhinus_longimanus:0.0084,Prionace_glauca
:0.0084):0.0084,Carcharhinus_falciformis:0.017):0.0084,Carcharhi
nus_plumbeus:0.0254):0.0084,Carcharhinus_signatus:0.0338,(Carcha
rhinus_brachyurus:0.0169,Carcharhinus_brevipinna:0.0169):0.0169,
Carcharhinus_sorrah:0.0338,Carcharhinus_amblyrhynchos:0.0338,Car
```

```
charhinus_cautus:0.0338,Carcharhinus_porosus:0.0338,Carcharhinus
_limbatus:0.0338,Carcharhinus_tilstoni:0.0338,Carcharhinus_leuca
s:0.0338):0.0084,Carcharhinus_isodon:0.0422):0.0084,Carcharhinus
_acronotus:0.0506):0.0084,(Rhizoprionodon_taylori:0.0295,Rhizopr
ionodon_terraenovae:0.0295):0.0295,(Sphyrna_lewini:0.0295,Sphyrn
a_tiburo:0.0295):0.0295,Isogomphodon_oxyrhynchus:0.059,Negaprion
_brevirostris:0.059,Galeocerdo_cuvier:0.059):0.059,Furgaleus_mac
ki:0.118,(Mustelus_antarcticus:0.059,Mustelus_californicus:0.059
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akis_semifasciata:0.118):0.013,Galeorhinus_galeus:0.131):0.199,S
cyliorhinus_canicula:0.33):0.157,(((Isurus_oxyrinchus:0.1143,Car
charodon_carcharias:0.1143):0.1143,(Lamna_nasus:0.1143,Lamna_dit
ropis:0.1143):0.1143):0.1143,(Alopias_pelagicus:0.1715,Alopias_s
uperciliosus:0.1715):0.1715,Carcharias_taurus:0.343):0.144):0.11
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s_licha:0.1):0.086):0.3597,((Centrophorus_acus:0.113575,Centroph
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Deania_calcea:0.318):0.22715,((Squalus_acanthias:0.265,Squalus_b
lainvillei:0.265,Squalus_megalops:0.265,Squalus_mitsukurii:0.265
):0.265,(Squatina_californica:0.265,Squatina_guggenheim:0.265,Sq
uatina_occulta:0.265):0.265):0.0157):0.1313,Notorynchus_cepedian
us:0.677):0.004):0.04,((Torpedo_marmorata:0.118,Torpedo_californ
ica:0.118,Torpedo_torpedo:0.118):0.4245,(Pristis_perotteti:0.364
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ja_brachyura:0.076):0.076,Raja_binoculata:0.152,(Dipturus_chilen
sis:0.076,Dipturus_trachydermus:0.076):0.076):0.076,(Amblyraja_r
adiata:0.152,(Leucoraja_naevus:0.076,Leucoraja_ocellata:0.076,Le
ucoraja_erinacea:0.076):0.076):0.076):0.0958,(Rhinobatos_horkeli
i:0.085,Rhinobatos_productus:0.085):0.24):0.0198,(((Myliobatis_c
alifornicus:0.0271,Aetobatus_flagellum:0.0271,Rhinoptera_bonasus
:0.0271):0.04,((Dasyatis_pastinaca:0.01355,Dasyatis_americana:0.
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a_mucosa:0.03605,Trygonoptera_personata:0.03605):0.03605,(Urolop
hus_paucimaculatus:0.03605,Urolophus_lobatus:0.03605):0.03605):0
.1):0.1721):0.0198):0.1785):0.1785):0.279,(Chimaera_monstrosa:0.
609,(Callorhinchus_milli:0.592,Callorhinchus_capensis:0.592):0.0
17):0.391);",file="chondros",sep="\n")

treechon<-read.tree("chondros")



#Code to compute correlograms for

#Age at maturity (age)
```

```
correlogram.formula(age~subclass/cohort/order/family/genus)

#Growth completion rate (k)

correlogram.formula(k~subclass/cohort/order/family/genus)

#Longevity

correlogram.formula(longevity~subclass/cohort/order/family/genus
)

#Extinction risk (Fext)

correlogram.formula(Fext~subclass/cohort/order/family/genus)



#Code for phylogenetic models for

#Growth completion rate (k)

compar.gee(k~habitat+maturity.size,phy=treechon,family="Gamma"(l
ink="log"))

#Age at maturity (age)

compar.gee(age~habitat+maturity.size,phy=treechon,family="Gamma"
(link="log"))

#Longevity

compar.gee(longevity~habitat+maturity.size,phy=treechon,family="
Gamma"(link="log"))

#Extinction risk (Fext)

compar.gee(Fext~habitat+reproductive.mode+maturity.size,phy=tree
chon,family="Gamma"(link="log"))



#Code for taxonomy models for

#Growth completion rate (k)

summary(lme(log(k)~habitat+maturity.size,random=~1|subclass/coho
rt/order/family/genus/species))

#Age at maturity (age)
```

```
summary(lme(log(age)~habitat+maturity.size,random=~1|subclass/co
hort/order/family/genus/species))

#Longevity
summary(lme(log(longevity)~habitat+maturity.size,random=~1|subcl
ass/cohort/order/family/genus/species))

#Extinction risk (Fext)

summary(lme(log(Fext)~habitat+reproductive.mode,random=~1|subcla
ss/cohort/order/family/genus/species))

#Code to model extinction risk (Fext) by taxonomic order

compar.gee(Fext~order,phy=arbchon,family="Gamma"(link="log"))
```

FIGURES

Figure S1. Phylogenetic tree of Chondrichthyes (sharks, rays and chimaeras) used in the generalized estimating equation model to control for phylogenetic correlation. The tree is a composite from published partial trees (see References for phylogenetic relationships).

Figure S2. Correlogram of normalized Moran's *I* autocorrelation index of age at maturity, growth completion rate (von Bertalanffy's *k*), longevity and extinction risk ($F_{extinct}$) for taxonomic groups of the class Chondrichthyes (sharks, rays and chimaeras). Filled and empty circles represent significant ($p<0.05$) and non significant correlations, respectively. G = genus, F = family, O = order, C = cohort and S = subclass.

Figure S3. Relationship between age at maturity, growth completion rate and longevity (estimated as maximum observed age) with maximum body size in chondrichthyans from continental shelves (open circles), open ocean (grey circles) and deep sea (black circles). The axis for maximum size has a log scale to improve visualization.

Table S1. Life history and environmental data for 105 chondrichthyan species. m_{rep} = reproductive mode (O = oviparous; V_a, V_p, V_l, V_o, and V_h indicate adelphophagic, placental, lecithotrophic, oophagic, and histotrophic viviparity, respectively); s_{max} = maximum size; s_{mat} = size at maturity; k = growth completion rate from the von Bertalanffy growth model; a_{max} = maximum observed age; a_{mat} = age at maturity; l = litter size; i = interbirth interval; and $F_{extinct}$ = fishery mortality to drive a species to extinction. Sizes are given in total length except for those of the orders Myliobatiformes and Chimaeriformes, which correspond to disc width and fork length, respectively.

Order Family	Species	Common name	Habitat	m_{rep}	s_{max} (cm)	s_{mat} (cm)	k	a_{max} (yr)	a_{mat} (yr)	l	i (yr)	$F_{extinct}$	Source
SUBCLASS: ELASMOBRANCHII													
Cohort: Selachii													
Carchariniformes													
Carcharhinidae	*Carcharhinus acronotus*	blacknose shark	shelf	V_p	132.4	102.4	0.266	19	3.8	3.9	2	0.197	1-4
	Carcharhinus amblyrhynchos	gray reef shark	shelf	V_p	190	125	0.294	12	6	4.1	2	0.174	5, 6
	Carcharhinus brachyurus	copper shark	shelf	V_p	275	206.1	0.049	34.5	20.9	16.6	2	0.145	7-11
	Carcharhinus brevipinna	spinner shark	shelf	V_p	294.1	217	0.1	19	9	8.5	2	0.209	4, 12-15
	Carcharhinus cautus	nervous shark	shelf	V_p	133	100.7	0.198	16.4	6	4.2	2	0.177	16
	Carcharhinus falciformis	silky shark	oceanic	V_p	305	225	0.148	17.9	9	6.5	2	0.209	17-19
	Carcharhinus galapagensis	Galapagos shark	shelf	V_p	300	227.5	0.172	15	7.8	8.7	2	0.232	5, 20
	Carcharhinus isodon	finetooth shark	shelf	V_p	159.6	123	0.244	8	4.3	4	2	0.192	21, 22
	Carcharhinus leucas	bull shark	shelf	V_p	300.2	225	0.076	28	18	9.9	2	0.126	4, 23-26
	Carcharhinus limbatus	blacktip shark	shelf	V_p	191	160	0.21	10	6.5	4.6	2	0.182	4, 27-30
	Carcharhinus longimanus	oceanic whitetip shark	oceanic	V_p	285	183.3	0.101	14	5.5	6.1	2	0.240	31-33
	Carcharhinus obscurus	dusky shark	shelf	V_p	357.2	279.3	0.043	34	20.5	10	3	0.110	34-38
	Carcharhinus plumbeus	sandbar shark	shelf	V_p	226.5	176	0.093	22.4	11.4	7.9	2	0.181	39-42
	Carcharhinus porosus	smalltail shark	shelf	V_p	128	70	0.076	24	6	4.5	1	0.278	43, 44
	Carcharhinus signatus	night shark	oceanic	V_p	260	202.5	0.114	31.7	10	11.1	2	0.217	45, 46
	Carcharhinus sorrah	spottail shark	shelf	V_p	151.8	95	0.34	7	2.5	3.1	1	0.355	47, 48
	Carcharhinus tilstoni	Australian blacktip shark	shelf	V_p	196	115	0.14	12	3.5	3	1	0.295	47, 48
	Galeocerdo cuvier	tiger shark	shelf	V_l	410	333.5	0.184	22.5	10	31.5	2	0.317	4, 35, 49-52
	Isogomphodon oxyrhynchus	daggernose shark	shelf	V_p	160	115	0.121	20	6.5	5	2	0.192	53, 54
	Negaprion brevirostris	lemon shark	shelf	V_p	293.6	239	0.06	20	12.7	7.4	2	0.158	55-57
	Prionace glauca	blue shark	oceanic	V_p	341.8	206.5	0.146	14	5	30	1	0.637	58-61
	Rhizoprionodon taylori	Australian sharpnose shark	shelf	V_p	78.4	57.5	1.013	7	1	4.5	1	0.893	62-64
	Rhizoprionodon terraenovae	Atlantic sharpnose shark	shelf	V_p	108.9	78.5	0.56	10.2	2.3	4.4	1	0.540	65, 66
Scyliorhinidae	*Scyliorhinus canicula*	lesser-spotted catshark	shelf	O	71	57	0.15	12	7.6	45.5	1	0.497	67-71

Sphyrnidae	*Sphyrna lewini*	scalloped hammerhead	shelf	V_p	331	223	0.156	18.6	5.8	20.1	1	0.540	72-77
	Sphyrna tiburo	bonnethead shark	shelf	V_p	104	82.3	0.18	6.5	2.9	10	1	0.673	78
Triakidae	*Furgaleus macki*	whiskery shark	shelf	V_l	150	126	0.369	11.5	6.5	19	2	0.36	79, 80
	Galeorhinus galeus	school shark	shelf	V_l	164.5	131.1	0.105	36.2	12.6	24.9	3	0.216	10, 81-87
	Mustelus antarcticus	gummy shark	shelf	V_l	175	112	0.086	16	6.4	16	1	0.434	85, 88
	Mustelus californicus	gray smoothhound	shelf	V_p	125	70	0.218	9	2.5	9.5	1	0.737	89, 90
	Mustelus canis	dusky smoothhound	shelf	V_p	132	102	0.292	16	4.4	9.5	1	0.481	91, 92
	Mustelus henlei	brown smoothhound	shelf	V_p	100	57	0.225	13	2.5	4.5	1	0.479	89, 90
	Mustelus lenticulatus	spotted estuary smoothhound	shelf	V_l	137	99.6	0.119	19.5	7.5	10.7	1	0.337	93, 94
	Mustelus manazo	starspotted dogfish	shelf	V_l	107	67.9	0.124	10	4	7.5	1	0.457	95, 96
	Mustelus mustelus	smoothhound	shelf	V_p	164	132.5	0.06	24	13.5	11.5	1	0.221	97, 98
	Triakis semifasciata	leopard shark	shelf	V_l	145	105	0.073	25	10	15	1	0.300	90, 99, 100
Hexanchiformes													
Hexanchidae	*Notorynchus cepedianus*	broadnose sevengill shark	shelf	V_l	291	231	0.291	28.5	16	88.5	2	0.268	101, 102
Lamniformes													
Alopiidae	*Alopias pelagicus*	pelagic thresher	oceanic	V_o	365.2	287	0.085	28.5	8.6	2	1	0.145	103
	Alopias superciliosus	bigeye thresher	oceanic	V_o	422	341.1	0.092	21	12.9	2	1	0.118	104, 105
Lamnidae	*Carcharodon carcharias*	great white shark	shelf	V_o	600	445	0.065	40	12.5	6	2	0.146	106, 107
	Isurus oxyrinchus	shortfin mako	oceanic	V_o	385	273	0.05	21	15	12.5	3	0.148	108-110
	Lamna ditropis	salmon shark	oceanic	V_o	257.3	199.7	0.17	20	7.5	4.5	1	0.241	111,112
	Lamna nasus	porbeagle	oceanic	V_o	324.3	245.2	0.07	26	13	4	1	0.160	110, 113, 114
Odontaspididae	*Carcharias taurus*	sand tiger shark	shelf	V_a	269.5	221.7	0.136	12	6.9	2	2	0.085	10, 115
Orectolobiformes													
Rhincodontidae	*Rhincodon typus*	whale shark	oceanic	V_l	1370	900	0.026	40	27.4	300	2	0.210	116, 117
Squaliformes													
Centrophoridae	*Centroselachus crepidater*	longnose velvet dogfish	deep	V_l	99.5	82	0.072	57	20	6	2	0.104	118
	Centrophorus acus	needle dogfish	deep	V_l	160.8	157.5	0.155	--	20	5	2	0.101	107, 119
	Centrophorus granulosus	gulper shark	deep	V_l	128	90	0.134	25	12.2	1	2	0.037	120, 121
	Centrophorus squamosus	leafscale gulper shark	deep	V_l	145	128	0.025[a]	70	44	8.1	2.5	0.064	122, 123
	Deania calcea	birdbeak dogfish	deep	V_l	119	105	0.077	35	25	13	4	0.096	124, 125
Dalatiidae	*Dalatias licha*	kitefin shark	deep	V_l	182	120	0.198	18.4	6.8	12	3	0.242	126, 107
Etmopteridae	*Etmopterus baxteri*	giant lanternshark	deep	V_l	88	61.5	0.038	57	30	11	3	0.087	107, 127
	Etmopterus spinax	velvet belly	deep	V_l	46	34	0.22[a]	7	5	6.8	2	0.267	128-130
Squalidae	*Squalus acanthias*	piked dogfish	shelf	V_l	110	78.5	0.089	30	12.5	8	2	0.155	131-136
	Squalus blainvillei	longnose spurdog	deep	V_l	92	57.5	0.102	15	5.1	4	2	0.181	137, 138
	Squalus megalops	shortnose spurdog	deep	V_l	78.2	50	0.032	32	15	3	2	0.094	139, 140
	Squalus mitsukurii	shortspine spurdog	deep	V_l	91	69	0.041	27	15	3.6	2	0.103	141
Squatiniformes													
Squatinidae	*Squatina californica*	Pacific angel shark	shelf	V_l	118	100	0.162	35	10	6	1	0.223	142, 143
	Squatina guggenheim	angular angel shark	shelf	V_l	92	72	0.275	12	4	5.5	3	0.180	144
	Squatina occulta	hidden angel shark	shelf	V_l	131	110	0.129	21	10	6	4	0.119	144
Cohort: Batoidea													

Myliobatiformes													
Dasyatidae	*Dasyatis americana*	southern stingray	shelf	V_h	200	77.5	0.2[a]	18	5.5	4.2	1	0.283	145, 146
	Dasyatis chrysonota	blue stingray	shelf	V_h	71.9	50	0.07	10	7	6.2	1	0.289	147, 148
	Dasyatis dipterura	diamond stingray	shelf	V_h	83	57.3	0.05	28	9.5	2	1	0.138	149
	Dasyatis pastinaca	common stingray	shelf	V_h	51	24	0.089	10	3.7	6.2	1	0.448	150, 151
	Pteroplatytrygon violacea	pelagic stingray	oceanic	V_h	96	45	0.41	24	3	4.5	1	0.428	152, 153
Myliobatidae	*Aetobatus flagellum*	longheaded eagle ray	shelf	V_h	150	90	0.111	16	6	3.5	1	0.215	154, 155
	Myliobatis californicus	bat ray	shelf	V_h	140	88.1	0.099	24	5	3.8	1	0.282	156, 157
Rhinopteridae	*Rhinoptera bonasus*	cownose ray	shelf	V_h	104.8	77.7	0.097	15.5	6	1	1	0.085	158-160
Urolophidae	*Trygonoptera mucosa*	western shovelnose stingaree	shelf	V_h	36.9	25.3	0.241	16	5	1.1	1	0.093	161
	Trygonoptera personata	masked stingaree	shelf	V_h	31.1	22.8	0.143	14	4	1.2	1	0.101	161
	Urolophus lobatus	lobed stingaree	shelf	V_h	27.7	20.1	0.369	14	3	1.3	1	0.102	162
	Urolophus paucimaculatus	sparsely-spotted stingaree	shelf	V_h	29.8	20.4	0.237	12	4	2.5	1	0.241	163, 164
Pristiformes													
Pristidae	*Pristis perotteti*	large-tooth sawfish	shelf	V_l	430	300	0.089	30	10	7.3	2	0.183	165-167
Rajiformes													
Rajidae	*Amblyraja radiata*	thorny skate	shelf	O	105	91.7	0.13	16	11	31	1	0.336	168- 170
	Bathyraja albomaculata	white-dotted skate	shelf	O	76.2	59.4	0.09	17	10	--	1	--	171, 172
	Bathyraja parmifera	Alaska skate	shelf	O	119	93	0.087	17	10	--	1	--	173
	Bathyraja trachura	roughtail skate	deep	O	91	74	0.08	17	14.5	--	1	--	174
	Dipturus batis	common skate	shelf	O	235	130.8	0.057	50	11	--	1	--	175
	Dipturus chilensis	beaked skate	shelf	O	168	106	0.084	22.5	14	48.2	1	0.304	176, 177
	Dipturus innominatus	New Zealand smooth skate	shelf	O	240	112.2	0.095	24	13	--	1	--	178
	Dipturus nasutus	New Zealand rough skate	shelf	O	118	59.1	0.16	9	5.7	--	1	--	178
	Dipturus pullopunctatus	slime skate	shelf	O	113.7	99.1	0.05	18	12.5	--	1	--	179
	Dipturus trachydermus	roughskin skate	deep	O	253	215	0.079	26	17	48.7	1	0.259	180
	Leucoraja erinacea	little skate	shelf	O	54	40	0.352	8	4	30	1	0.769	181, 182
	Leucoraja naevus	cuckoo ray	shelf	O	72	59	0.108	14	9	90	1	0.501	175, 183
	Leucoraja ocellata	winter skate	shelf	O	100	76	0.059	29	11.5	35	1	0.333	182, 184-186
	Malacoraja senta	smooth skate	shelf	O	66	40.5	0.125	14	5.7	--	1	--	187, 188
	Raja asterias	starry ray	shelf	O	64	56.1	0.454	6.3	3.7	73	1	1.043	189, 190
	Raja binoculata	big skate	shelf	O	203.9	90	0.09	26	8	1260	1	0.858	191, 192
	Raja brachyura	blonde ray	shelf	O	109	83.6	0.129	8	5.5	90	1	0.768	193, 194
	Raja clavata	thornback ray	shelf	O	104.4	66.2	0.091	10	5.6	142	1	0.843	194, 195, 196
	Raja microocellata	small-eyed ray	shelf	O	87.5	58	0.086	9	5	57.5	1	0.754	195
	Raja miraletus	brown ray	shelf	O	71.7	35	0.172	8.2	2.3	61	1	1.522	197, 198
	Raja montagui	spotted ray	shelf	O	74	56.8	0.204	7	4.6	60	1	0.831	192-195
	Raja rhina	longnose skate	shelf	O	132.2	83	0.04	26	10	--	1	--	191
	Raja texana	roundel skate	shelf	O	63	53.7	0.229	9	5.8	--	1	--	199
	Raja undulata	undulate ray	shelf	O	100	76.2	0.11	13	9	--	1	--	200,201

Rhinobatiformes													
Rhinobatidae	*Rhinobatos horkelii*	Brazilian guitarfish	shelf	V_l	135	100.5	0.194	28	6.5	6	1	0.291	202, 203
	Rhinobatos productus	shovelnose guitarfish	shelf	V_l	130	99	0.016	11	7	9	1	0.334	204, 205
Torpediniformes													
Torpedinidae	*Torpedo californica*	Pacific electric ray	shelf	V_l	102	73.1	0.073	16	9	17	1	0.338	206
	Torpedo marmorata	spotted torpedo	shelf	V_l	63	44	0.088[a]	20	12.5	11	3	0.159	207, 208
	Torpedo torpedo	common torpedo	shelf	V_l	41	22	0.275[a]	10	4	3.4	1	0.300	209
SUBCLASS: HOLOCEPHALI													
Chimaeriformes													
Callorhinchidae	*Callorhinchus capensis*	Cape elephantfish	shelf	O	60	49.6	0.051	12	4.2	22	1	0.672	210-212
	Callorhinchus milii	elephant fish	shelf	O	97	71	0.224	15	4.5	13	1	0.532	213-215
Chimaeridae	*Chimaera monstrosa*	rabbit fish	deep	O	74	45.9	0.084	29.4	11.5	22[b]	1	0.299	211, 216, 217

[a] taken from the fecundity of *Callorhinchus capensis*. [b] calculated from equations 7 and 8 of source 218.

Table S2. Coefficients (standard error within brackets) of linear models relating the fishing mortality required to drive a population to extinction ($F_{extinct}$) with habitat and life history traits. $F_{extinct}$ was calculated with $a_{sel} = 0$. Habitat and reproductive mode coefficients are relative to deep-sea species and adelphophagic species, respectively. $*p \leq 0.05$, $**p \leq 0.01$, $***p \leq 0.001$.

Variables		Taxonomy	Phylogeny
Intercept		-3.153 (0.485)***	-2.643 (0.486)***
Habitat (oceanic)		0.803 (0.216)***	0.972 (0.139)***
(shelf)		0.593 (0.163)***	0.439 (0.134)**
Size at maturity		___	-0.002 (<0.001)***
Reproductive mode	(histotrophic)	0.714 (0.489)	0.435 (0.502)
	(lecitotrophic)	1.045 (0.472)*	1.135 (0.415)**
	(oophagic)	0.440 (0.529)	0.375 (0.353)
	(placental)	1.211 (0.484)*	1.035 (0.420)
	(oviparous)	1.855 (0.491)***	1.611 (0.440)**

Table S3. Coefficients (standard error within brackets) of linear models relating the fishing mortality required to drive a population to extinction ($F_{extinct}$) with habitat and life history traits. $F_{extinct}$ was calculated with a_{sel} = age at maturity. Habitat and reproductive mode coefficients are relative to deep-sea species and adelphophagic species, respectively. *$p \leq 0.05$, **$p \leq 0.01$, ***$p \leq 0.001$.

Variables		Taxonomy	Phylogeny
Intercept		-1.892 (0.599)**	-2.184 (0.477)**
Habitat (oceanic)		0.879 (0.258)**	0.751 (0.136)***
(shelf)		0.512 (0.202)*	0.352 (0.132)*
Size at maturity		___	-0.002 (<0.001)***
Reproductive mode	(histotrophic)	0.749 (0.613)	1.136 (0.493)
	(lecitotrophic)	1.731 (0.585)***	1.881 (0.408)***
	(oophagic)	0.862 (0.671)	0.765 (0.347)
	(placental)	1.469 (0.600)	1.622 (0.412)
	(oviparous)	2.548 (0.619)***	2.856 (0.431)***

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