

Shrinking of fishes exacerbates impacts of global ocean changes on marine ecosystems

Method

Dynamic Bioclimate Envelope Model (DBEM)

As a first step, we predicted the current (1970-2000) distribution map of each species an algorithm described in [1,2]. This algorithm estimates the relative abundance of a species on a 30' latitude x 30' longitude grid of the world ocean. Input parameters for DBEM include the species' maximum and minimum depth limits, northern and southern latitudinal range limits, an index of association to major habitat types (seamounts, estuaries, inshore, offshore, continental shelf, continental slope and the abyssal) and known occurrence boundaries. The parameter values of each species, which are posted on the *Sea Around Us* Project website (<http://www.seaaroundus.org/distribution/search.aspx>), were derived from data in online databases, mainly FishBase (www.fishbase.org). Jones *et al.*³ compared the predicted species distribution from this algorithm with empirically observed occurrence records and found that the algorithm has high predictive power, and that its skills are comparable with other commonly used species distribution modelling approach for marine species such as Maxent⁴ and Aquamap⁵.

As a second step, we used DBEM to identify the 'environmental preference profiles' of the studied species, defined by outputs from the Earth System Models, including sea water temperature (bottom and surface), depth, salinity, distance from sea-ice and habitat types. Preference profiles are defined as the suitability of each of these environmental conditions to each species, with suitability calculated by overlaying environmental data (1970-2000) with maps of relative abundance of the species⁶. For example, for each species, DBEM calculated a temperature preference profile for the adult and pre-recruit phases based on the relative abundance and the computed recruitment strength of the species. Sea surface temperature is then

used for temperature preference profiles for pre-recruit phase while bottom temperature is applied to preference profiles for adult demersal species.

The model represents individual growth of fish using a growth function:

$$W_t = W_\infty [1 - e^{-K(t-t_0)}]^{1/(1-a)} \quad \text{eq. S1}$$

$$W_\infty = \left(\frac{H}{k}\right)^{\frac{1}{1-a}} \quad \text{eq. S2}$$

$$K = k \cdot (1 - a) \quad \text{eq. S3}$$

where $a = 0.7$, $H = g \cdot [\text{O}_2] \cdot e^{-j/T}$ and $k = h \cdot e^{-i/T}$ in which T is environmental temperature, j and $i = E_a/R$ with E_a and R representing the activation energy and Boltzmann constant in the Arrhenius equation ⁷ (Figure S1). k is the coefficient for the catabolic term of the growth equation which is independent of oxygen supply ⁸.

We set values of j based on empirically estimated metabolic scaling exponents. Meta-analysis of the resting metabolic rate of teleosts suggests that the within-species Q_{10} of temperature ranges from 0.45 to 3.41, with a median of 2.4 ⁹. We assume that the resting metabolic rate represents metabolic demand for basic body functions and maintenance. Thus, we calculated a i in the Arrhenius equation for catabolism that would result in the reported Q_{10} over a wide temperature range (with median of the temperature preference profiles of the studied species that ranges between 1 – 28°C) of approximately 8. Given that anabolism is considered to be less temperature sensitive than catabolism ¹⁰ and based on the fact that the slope of the regression between $\log(K)$ and $\log(W_\infty)$ among different populations of a species is ≈ 0.7 ⁸, we estimate that j should be ≈ 4.5 . We tested the effect of alternative values of a , i , and j on the simulation for Atlantic cod to examine the sensitivity of the results to these parameters.

The mean values of the coefficients g and h were derived from asymptotic weight (W_∞), von Bertalanffy growth parameter K , the average environmental temperature (T) and oxygen concentration $[O_2]$ estimated from the predicted current distribution and the average T and $[O_2]$ within their distribution (weighted by the relative abundance of the species). Parameter values for asymptotic (L_∞) and K were obtained from FishBase (www.fishbase.org). W_∞ was then calculated from the length-weight conversion:

$$W_\infty = a \cdot L_\infty^b$$

where a and b are the length-weight conversion parameters obtained from FishBase. In a few cases where published values of a and b were not available, we assumed that W_∞ (in g) scales isometrically (i.e., $b = 3$) with L_∞ (in cm) and $a = 0.01$, which approximately corresponds to the fusiform shape of a cod (*Gadus morhua*; www.fishbase.org). In any case, the parameter a is a scaling factor and its value does not affect the projected change in body weight. The model then simulates the population dynamics and changes in relative abundance on each spatial cell given changes in annual average sea water temperature (surface and bottom), ocean current, salinity, oxygen concentration and sea-ice concentration projected by the Earth System Models.

Carrying capacity is expressed as a function of expected biomass per recruit and recruitment. Expected biomass per recruit was determined by a size-based population model⁷. The size-transition matrix (X), a matrix of probabilities of an individual growing from a particular body-size class to other size classes in a time step (year), was computed from [11]:

$$\theta_{y,l',l} = \exp \left[-\frac{(\bar{l}_l - [l_\infty(1 - e^{-K}) + \bar{l}_l e^{-K}])^2}{2\sigma^2} \right] \quad \text{and}$$

$$X_{l',l} = \frac{\theta_{l',l}}{\sum_{l'} \theta_{l',l}}$$

where l_∞ is the asymptotic length, l and l' are adjacent length classes, y is age of fish, σ is the variation in growth which is assumed to have a coefficient of variation of 20% and is independent of length and age. The biomass per recruit (BPR) was calculated from:

$$BPR = \sum_y \sum_l \bar{W}_l \cdot X_{l',l} \cdot e^{-M}$$

where \bar{W} is mean weight of the fish in length class l . Natural mortality rate (M) was predicted from Pauly's empirical equation ¹²:

$$\log M = 0.2107 - 0.0824 \cdot \log W_{inf} + 0.6757 \cdot \log K + 0.4627 \cdot \log T'$$

where T' is temperature in degree Celsius.

Initial relative recruitment strength (R) is calculated from the initial relative abundance (A , normalized across the 30' x 30' degree resolution grid) and calculated biomass per recruit in each cell, as $BPR = c \cdot A/R$. where c is a constant that scales from relative abundance to absolute abundance. Thus, $R = c \cdot A/BPR$ and $A = BPR \cdot R/c$.

The model simulates changes in relative abundance of a species by:

$$\frac{dA_i}{dt} = \sum_{j=1}^N G_i + L_{ji} + I_{ji}$$

where A_i is the relative abundance of a 30' x 30' cell i , G is the intrinsic population growth and L_{ji} and I_{ji} are settled larvae and net immigrated adults from surrounding cells (j), respectively.

Intrinsic population growth is modeled by a logistic equation:

$$G_i = r \cdot A_i \cdot \left(1 - \frac{A_i}{A_{\infty,i}}\right)$$

where r is the intrinsic rate of population increase, A_{∞} is the carrying capacity calculated from the expected biomass per recruit and recruitment (see above). The model explicitly represents larval dispersal through ocean current with an advection-diffusion-reaction model (see [6,13] for details).

Thus, changes in ocean conditions will be transformed by the model into changes in life history, growth, carrying capacity, population growth, net migration, and thus, relative abundance of a species, in each cell it occupies. Given the projected changes in ocean conditions under climate change scenarios, the model simulates the annual changes in distribution of relative abundance of each species on the global 30' x 30' grid.

Scenarios of biogeochemical changes in the ocean

Our scenario of ocean conditions is based on outputs from the Earth System Model (ESM2.1)¹⁴ developed at the Geophysical Fluid Dynamic Laboratory (GFDL) of the US National Oceanic and Atmospheric Administration (NOAA) and the Earth System Model IPSL-CM4-LOOP¹⁵ developed by the French Institut Pierre Simon Laplace (IPSL). ESM2.1 is a dynamic atmosphere-ocean general circulation model¹⁶ coupled to a marine biogeochemistry model which includes major nutrients and three phytoplankton functional groups with variable stoichiometry¹⁷. The IPSL-CM4-LOOP model is a fully coupled climate and carbon cycle model

(e.g. see [15] and references therein). It consists of the Laboratoire de Météorologie Dynamique atmospheric model (LMDZ-4) with a horizontal resolution of about 3.6°x2.5° and 19 vertical levels, coupled to the OPA-8 ocean model with a horizontal resolution of 2° to 0.5° and 31 vertical levels and the LIM sea ice model. The terrestrial biosphere is represented by the global vegetation model ORCHIDEE and the marine carbon cycle is simulated by the PISCES model.

The scenario considered here is the IPCC's Special Report on Emission Scenario (SRES) A2, which assumes atmospheric CO₂ concentration to become around 860 ppm by 2100. We interpolated the original resolution of the model outputs on a 30' x 30' grid by using the nearest neighbour method. The outputs from the Earth System Models considered by the DBEM included sea bottom temperature, sea surface temperature, sea bottom oxygen concentration, surface current advection (horizontal), salinity and sea ice concentration. Annual average values of each variable were used. Delineation of ocean basin is based on the United Nations Food and Agriculture Organization Statistical Area (Figure S4).

Calculation of mean assemblage-level body weight

We calculated the mean (geometric) assemblage-level body weight from the predicted distribution and maximum body weight of the modelled fish species. We identified species that were predicted to occur in each 30' lat. x 30' lat. cell. We then calculated the mean (geometric) predicted maximum body weight in each cell weighted by the predicted relative abundance of each species (corrected by area of the grid cells) and their historically observed maximum catch. Fish body weights range over several orders of magnitude, thus geometric mean provides a better representation of the relative changes in body weight across the size spectrum of the assemblage. Historically observed maximum catch was calculated from time-series catch data (1950 to the

present) obtained from the United Nations Food and Agriculture Organization (FAO) and processed by the *Sea Around Us* project (www.seaaroundus.org). For each species, we calculated the average maximum annual catch from the mean of the five highest annual catches across the time-series. The mean assemblage-level body weight (W') at cell i was then calculated from:

$$W'_i = \frac{\sum_{j=1}^n \log(W_{\infty i,j}) \cdot Abd_{i,j} \cdot C_j}{\sum_{j=1}^n Abd_{i,j} \cdot C_j}$$

where $W_{\infty i,j}$ is maximum body weight of species j , Abd is the predicted relative abundance and C is the maximum catch (scaled to the area of each cell). The values of W'_i are calculated for each year from 1971 to 2060.

Calculation of latitudinal centroid shift

Latitudinal centroid (LC) of each species was calculated from:

$$LC = \frac{\sum_{i=1}^n Lat_i \cdot Abd_i}{\sum_{i=1}^n Abd_i}$$

where Lat_i is the latitude of the centre of the spatial cell (i), Abd is the predicted relative abundance in the cell (corrected by area of the grid cells), and n is the total number of cells. Range shift was then calculated from difference between the latitudinal centroid of the projected and reference years. Shift in distance (km) was then calculated from:

$$Distance\ shift = \cos^{-1} \left[\sin \left(Lat_m \cdot \frac{\pi}{180} \right) \cdot \sin \left(Lat_n \cdot \frac{\pi}{180} \right) + \cos \left(Lat_m \cdot \frac{\pi}{180} \right) \cdot \cos \left(Lat_n \cdot \frac{\pi}{180} \right) \right] \cdot 6378.2$$

Supplementary figures

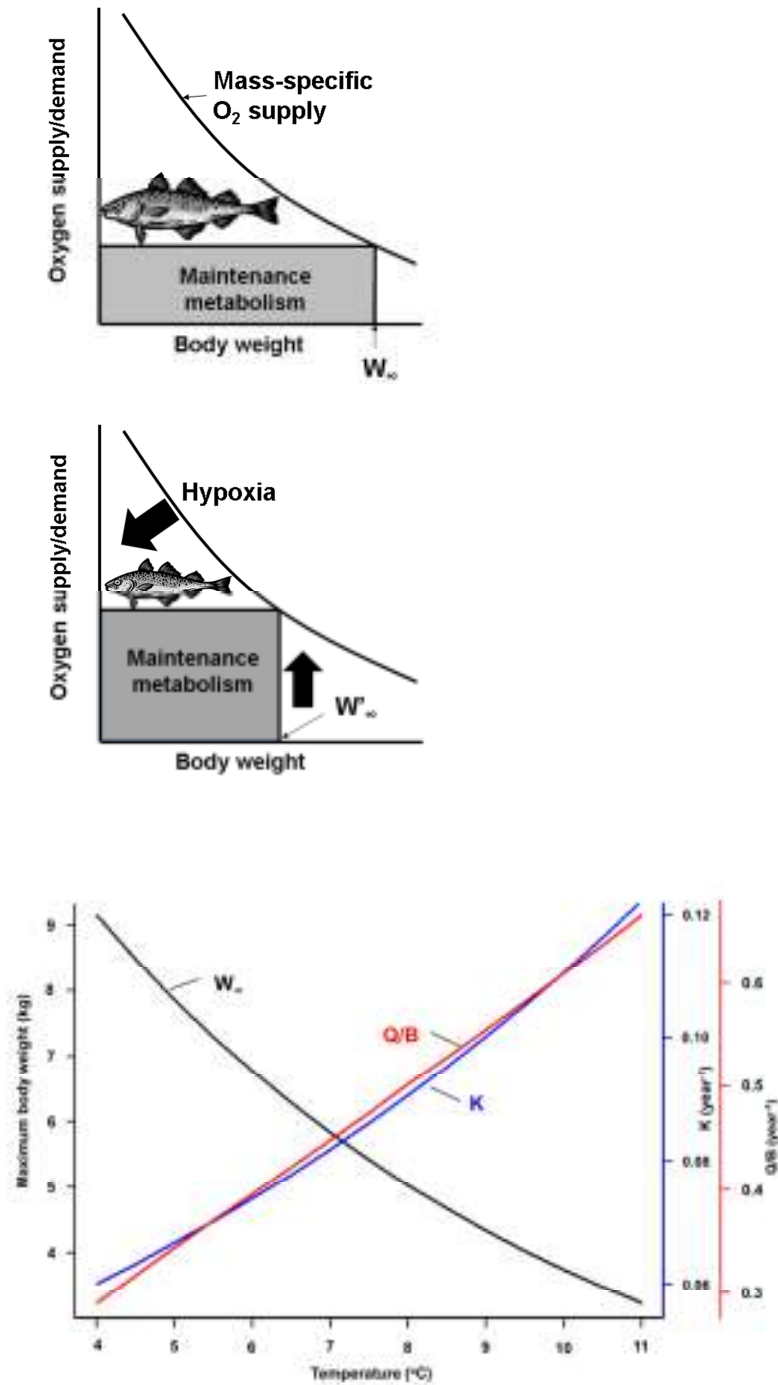
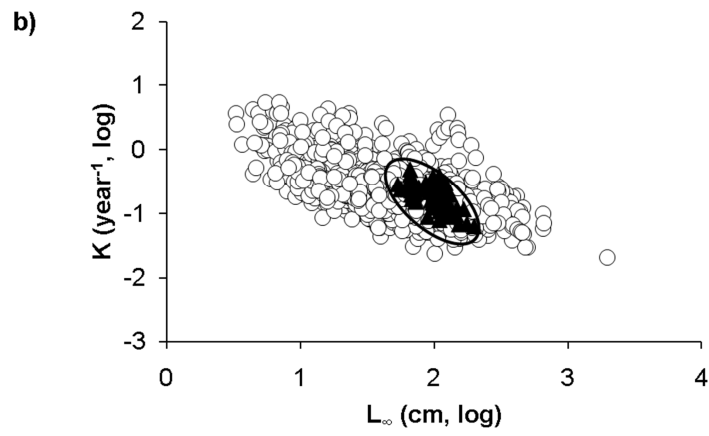
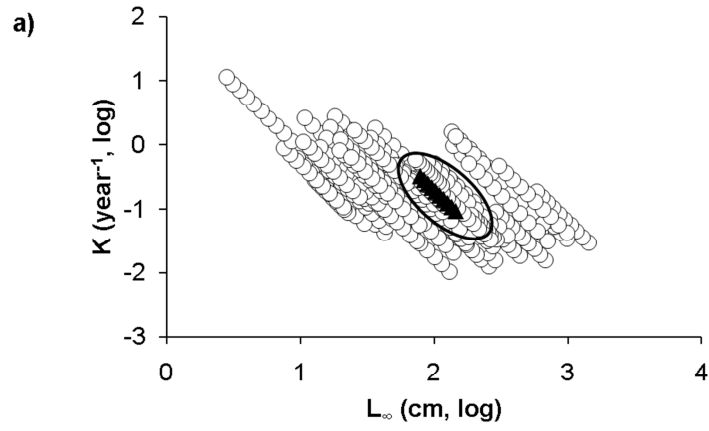


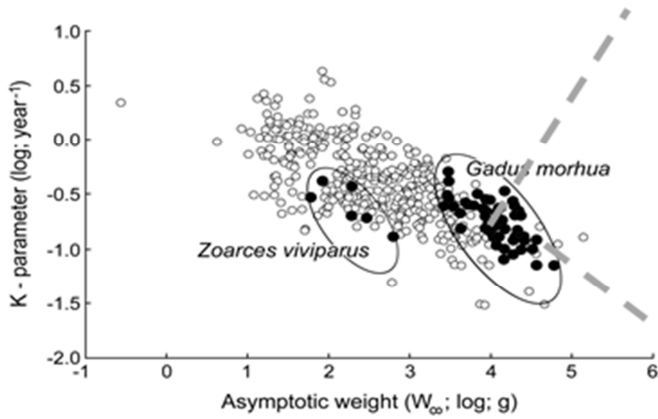
Figure S1. Schematic diagram illustrating how oxygen supply and demand determine maximum (i.e., asymptotic) body weight (W_{∞}) (upper panel), the effects of warming (black upward arrow) and hypoxia on growth and asymptotic weight (W'_{∞}) (middle panel) (Redrawn from [7]), and

example of the theoretical relationship between W_∞ , von Bertalanffy growth parameter K , consumption to biomass ratio (Q/B) of Atlantic cod and temperature of its habitat. The relationship of W_∞ and temperature is predicted from eq. S1, K and temperature is from eq. S2, and Q/B and temperature is from an empirical equation to estimate Q/B from temperature (T), asymptotic body size (W_∞) aspect ratio of the fish (A), and type of food item (F)¹⁸. i.e., $Q/B = -0.1775 - 0.2018 \ln W_\infty + 0.6121 \ln T + 0.5156 \ln A + 1.26F$.



c)

Observed log (K) vs log (W_{∞})



Simulated log (K) vs log (W_{∞})

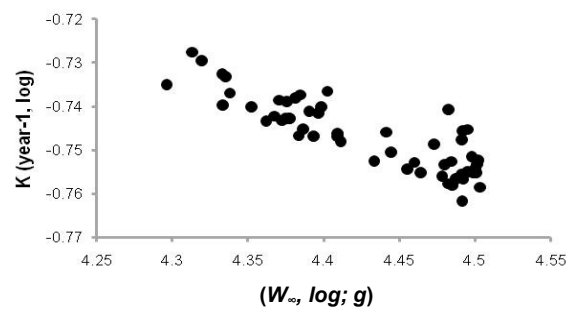


Figure S2. Plot of $\log K$ against $\log L_{\infty}$ of (a) 120 demersal fishes over the 5th and 95th percentile of their predicted habitat temperature (as predicted from the dynamic bioclimate envelope model); (b) published empirical estimates of VBGF of 2015 fishes (available from FishBase); and (c) Comparing observed changes in growth parameters (left) with simulated changes from the dynamic bioclimate envelope model under future scenarios of changes in ocean biogeochemistry and physical conditions (right) (redrawn from Cheung *et al.* 2011). The black triangles in (a) and (b) represent predictions and estimates for different Atlantic cod populations. Using Atlantic cod as an example, the predicted slope between $\log K$ and $\log L_{\infty}$ not significantly different ($p < 0.05$) from the slope calculated from observed $\log K$ and $\log L_{\infty}$ (Taylor 1958).

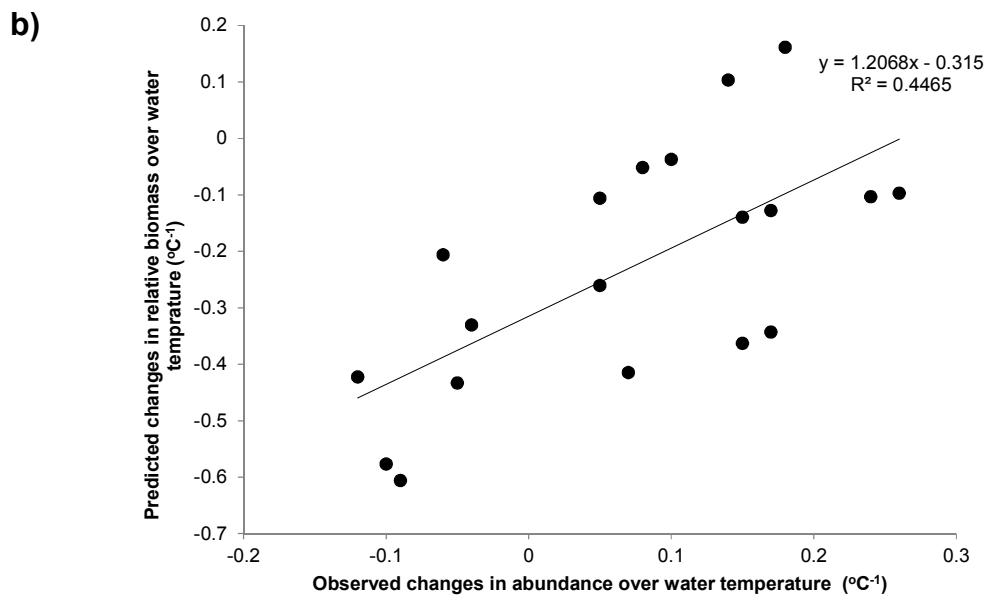
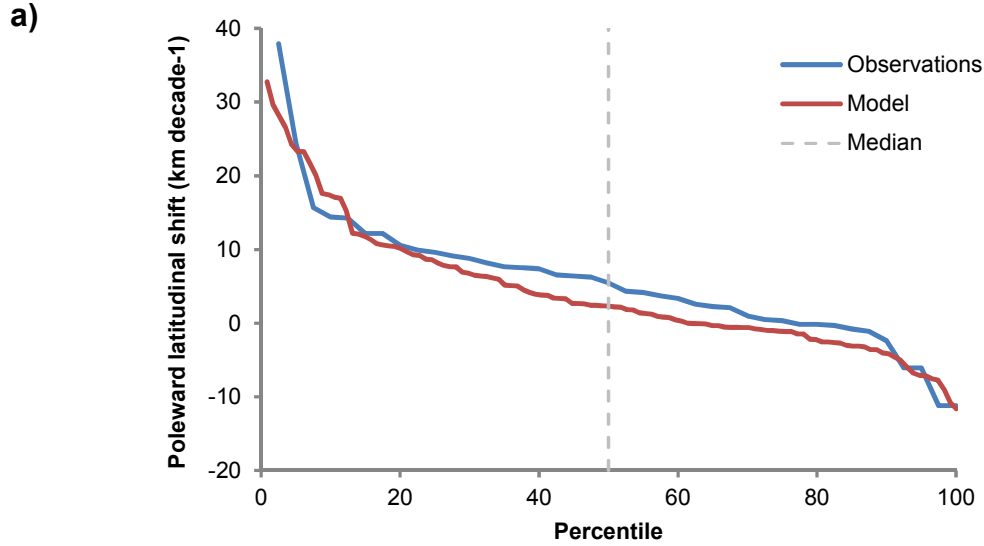


Figure S3. Comparison between observations and predictions from Dynamic Bioclimate Envelope Model for (A) Bering Sea (Large Marine Ecosystem) and (B) waters around the UK (North Sea and Irish Sea Large Marine Ecosystems). For (A), observations (blue line) are estimated rate of change of latitudinal centroid calculating using catch-per-unit-effort data from fishing survey in 1975 - 2001 in the Bering Sea (N = 40) (see ¹⁹) while predictions (red line) are calculated rate of change of latitudinal centroids (N = 114) in the Bering Sea Large

Marine Ecosystem from model outputs that are driven by historical simulation of global ocean biogeochemistry through the NOAA's GFDL ESM2.1 forced with historical reanalysis climate data. For (B), observations are the average estimated slope of abundance against water temperature from 1975 to 2007 (see ²⁰ for details) while predictions are the slope of change in modelled relative biomass in the North Sea and Irish Sea Large Marine Ecosystems of species that correspond to Simpson *et al.* (2011) (N = 19). Only species that show significant trends between abundance and temperature ($p < 0.05$) are included in the analysis.

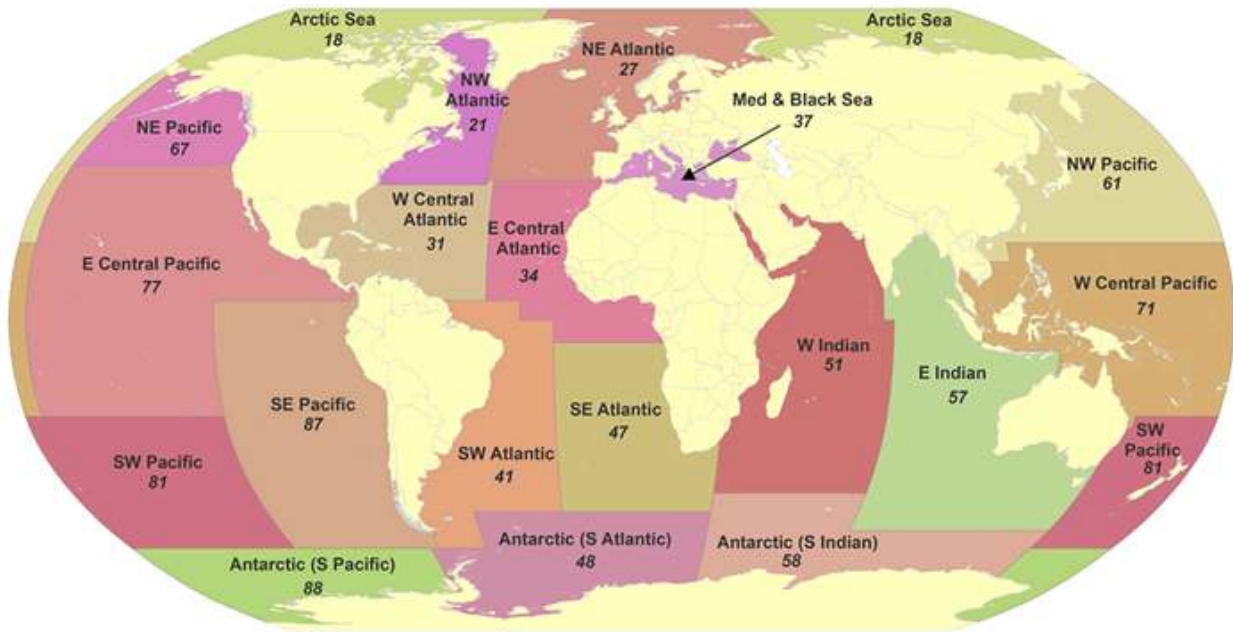


Figure S4. FAO Statistical Area (source: *Sea Around Us* Project: www.seaaroundus.org).

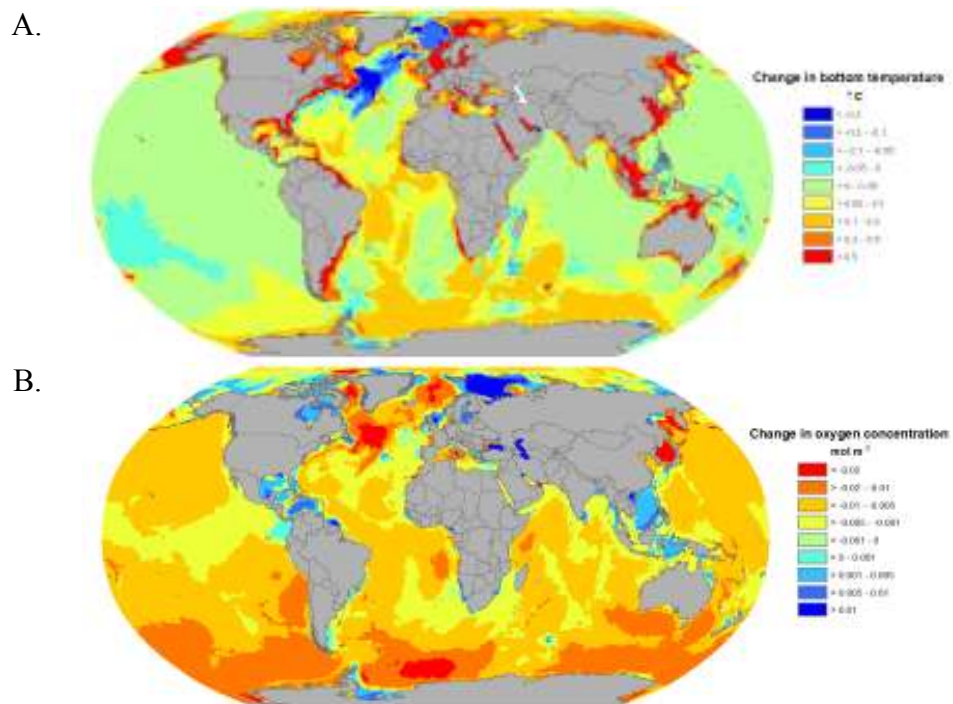
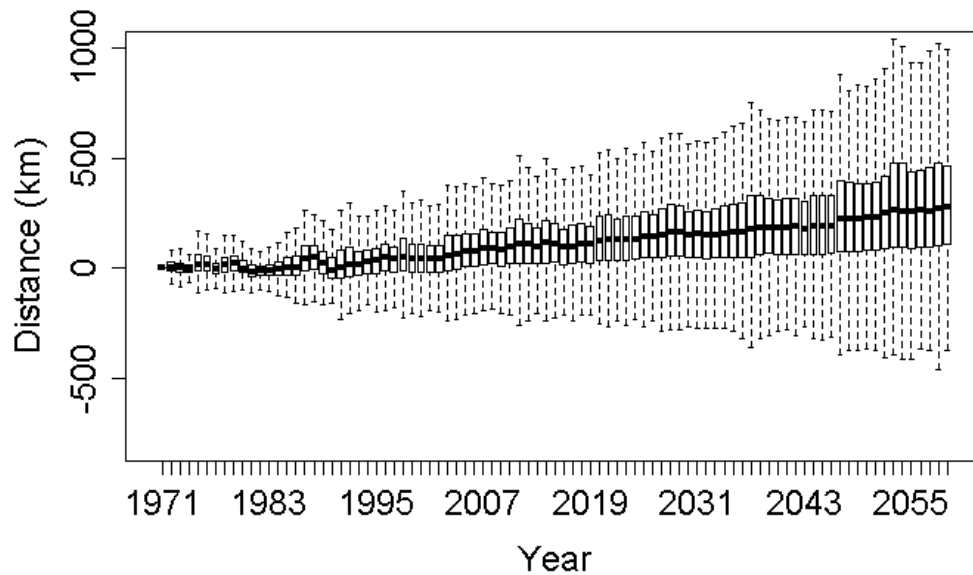


Figure S5. Projected changes in (A) sea bottom temperature and (B) sea bottom oxygen concentration from 1991 – 2000 to 2041 – 2060, averaged between outputs from GFDL ESM 2.1 and IPSL-CM4-LOOP.

a)



b)

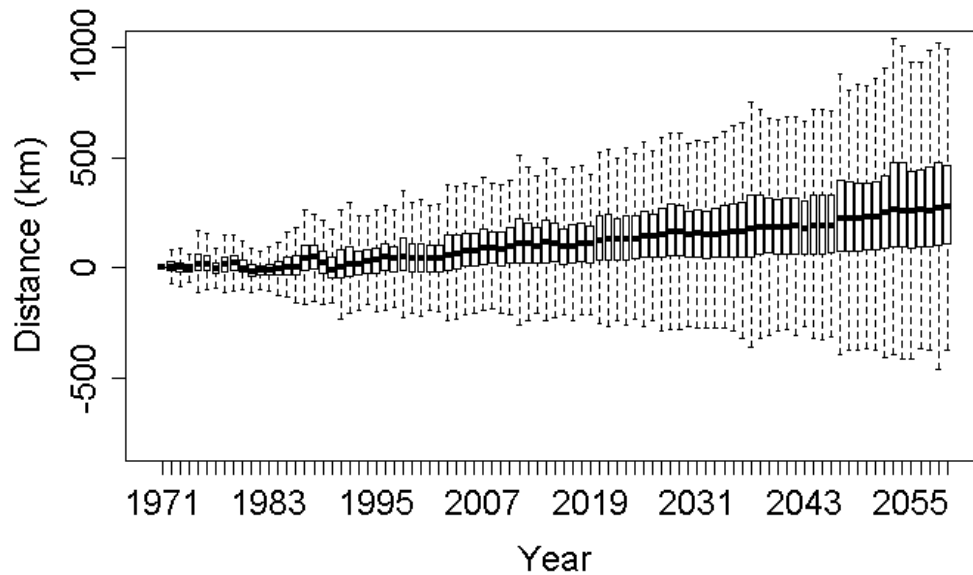


Figure S6. Predicted latitudinal shift of distribution centroids of 610 species of demersal fishes from 1971 to 2060 under the SRES A2 scenario based on outputs from (A) GFDL ESM2.1 and (B) IPSL-CM4-LOOP. The thick dark bar represents the median shift of all the species in a year, the lower and upper boundaries of the box represent the 25% and 75% quartiles, respectively. Positive value indicates poleward shift relative to average latitudinal centroids in 1971 - 2000.

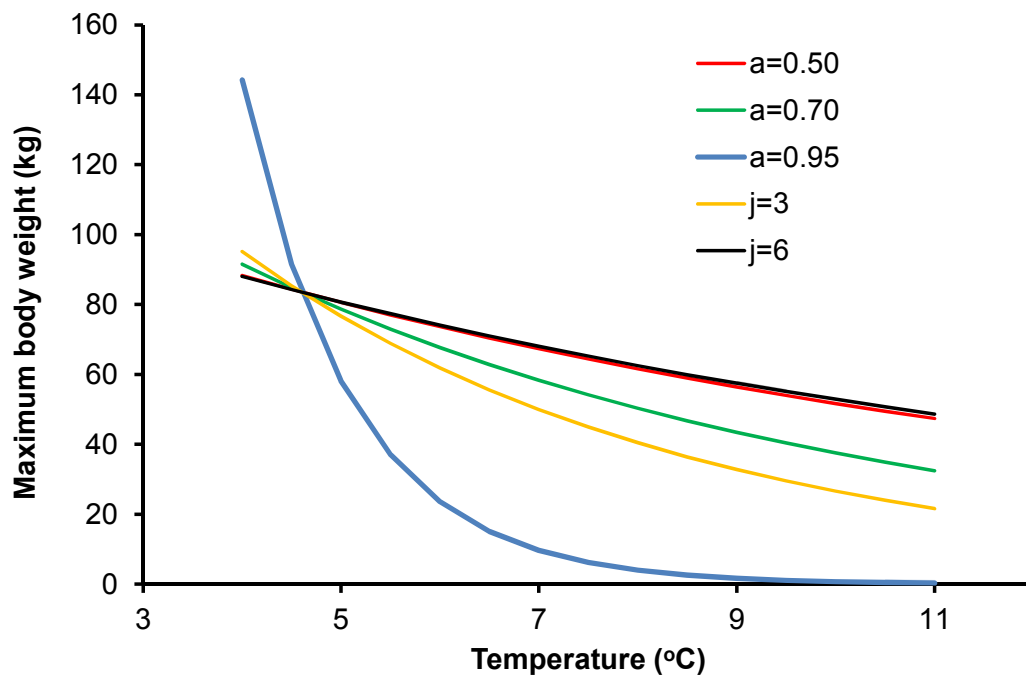


Figure S7. Predicted change in maximum body size for Atlantic cod under different environmental temperature from alternative parameter values for the growth and metabolic scaling models: (1) parameter $a = 0.50$, (2) parameter $a = 0.7$, (3) parameter $a = 0.95$, (4) parameter $j = 3$, (5) parameter $j = 6$.

Table S1. List of fish species included in the analysis, with their von Bertalanffy growth parameters (L_{∞} and K) and the corresponding parameters of their length-weight relationships (a , b).

Scientific name	Common name	Asymptotic length (cm)	Growth parameter K (year ⁻¹)	a	b
<i>Abudefduf luridus</i>	Canary damsel	15.9	0.47	0.01000	3.0
<i>Acanthistius brasilianus</i>	Sea bass	62.2	0.18	0.01000	3.0
<i>Acanthopagrus berda</i>	Picnic seabream	92.7	0.24	0.02380	3.0
<i>Acanthopagrus bifasciatus</i>	Twobar seabream	50.0	0.19	0.00176	3.0
<i>Acanthopagrus latus</i>	Yellowfin seabream	50.0	0.22	0.05430	2.9
<i>Acanthopagrus schlegeli</i>	Black porgy	52.0	0.14	0.01000	3.0
<i>Acanthurus monroviae</i>	Monrovia doctorfish	46.9	0.25	0.00181	3.1
<i>Acanthurus sohal</i>	Sohal surgeonfish	41.7	0.34	0.01000	3.0
<i>Acipenser gueldenstaedtii</i>	Russian sturgeon	253.0	0.05	0.00390	3.1
<i>Acipenser medirostris</i>	Green sturgeon	250.0	0.09	0.01000	3.0
<i>Acipenser ruthenus</i>	Sterlet	125.0	0.12	0.00020	3.9
<i>Acipenser stellatus</i>	Starry sturgeon	220.0	0.05	0.03400	2.6
<i>Acipenser sturio</i>	Sturgeon	500.0	0.03	0.00950	2.9
<i>Acipenser transmontanus</i>	White sturgeon	610.0	0.04	0.00290	3.2
<i>Aethaloperca roga</i>	Redmouth grouper	62.2	0.18	0.01000	3.0
<i>Albula vulpes</i>	Bonefish	104.0	0.24	0.02330	2.9
<i>Alepes djedaba</i>	Shrimp scad	40.0	0.61	0.00169	2.8
<i>Alepocephalus bairdii</i>	Bairds smooth-head	100	0.08	0.01000	3.0
<i>Alepocephalus rostratus</i>	Rissos smooth-head	50.0	0.08	0.00590	3.0
<i>Alepocephalus umbriceps</i>	Slickhead	65.3	0.09	0.01000	3.0
<i>Allocyttus niger</i>	Black oreo	47.0	0.06	0.00800	3.3
<i>Alopias superciliosus</i>	Bigeye thresher	488.0	0.09	0.00102	2.8
<i>Alopias vulpinus</i>	Thintail thresher	760.0	0.10	0.00188	2.5
<i>Amblyraja georgiana</i>	Antarctic starry skate	102.8	0.15	0.01000	3.0
<i>Amblyraja taaf</i>	Whiteleg skate	92.7	0.16	0.01000	3.0
<i>Ammodytes personatus</i>	Pacific sandeel	15.9	0.56	0.0404	3.0
<i>Anarhichas denticulatus</i>	Northern wolffish	180.0	0.10	0.07800	2.6
<i>Anarhichas lupus</i>	Wolf-fish	150.0	0.12	0.00400	3.2
<i>Anarhichas minor</i>	Spotted wolffish	180.0	0.09	0.00170	3.4
<i>Anoplopoma fimbria</i>	Sablefish	120.0	0.29	0.00580	3.1
<i>Anthias anthias</i>	Swallowtail seaperch	28.4	0.31	0.01000	3.0
<i>Aphanopus carbo</i>	Black scabbardfish	139.0	0.25	0.00020	3.4
<i>Aphanopus intermedius</i>	Intermediate scabbardfish	102.8	0.29	0.01000	3.0
<i>Aphareus rutilans</i>	Rusty jobfish	147.0	0.16	0.00154	3.0
<i>Archosargus probatocephalus</i>	Sheepshead seabream	91.0	0.36	0.04480	2.9
<i>Archosargus rhomboidalis</i>	Western Atlantic seabream	34.5	0.25	0.00180	3.1
<i>Arctoscopus japonicus</i>	Sailfin sandfish	31.5	0.37	0.01000	3.0

Scientific name	Common name	Asymptotic length (cm)	Growth parameter K (year ⁻¹)	a	b
<i>Argentina silus</i>	Greater argentine	70.0	0.12	0.00390	3.2
<i>Argyrops spinifer</i>	King soldierbream	96.4	0.08	0.00010	2.5
<i>Argyrosomus hololepidotus</i>	Southern meagre	203.4	0.10	0.01000	3.0
<i>Argyrosomus regius</i>	Meagre	230.0	0.09	0.00900	2.9
<i>Argyrozona argyrozona</i>	Carpenter seabream	90.0	0.07	0.00800	3.2
<i>Ariomma indica</i>	Indian ariomma	25.5	1.10	0.00160	3.0
<i>Arius thalassinus</i>	Giant seacatfish	185.0	0.06	0.09000	2.6
<i>Atheresthes stomias</i>	Arrowtooth flounder	86.6	0.11	0.00198	2.8
<i>Atherina boyeri</i>	Big-scale sand smelt	20.0	0.16	0.00750	3.0
<i>Atractoscion aequidens</i>	Geelbeck croaker	130.0	0.27	0.00840	3.0
<i>Atractoscion nobilis</i>	White weakfish	166.0	0.13	0.00123	2.9
<i>Atrobucca nibe</i>	Longfin kob	58.7	0.14	0.00300	3.2
<i>Atule mate</i>	Yellowtail scad	33.7	0.81	0.02000	3.0
<i>Austroglossus microlepis</i>	West coast sole	77.5	0.14	0.01000	3.0
<i>Austroglossus pectoralis</i>	Mud sole	60.0	0.38	0.00180	3.3
<i>Balistes capriscus</i>	Grey triggerfish	60.0	0.43	0.02140	3.0
<i>Bathylagus antarcticus</i>	Bathylagus antarcticus	14.9	0.17	0.01000	3.0
<i>Bathyraja eatonii</i>	Eatons skate	102.8	0.15	0.01000	3.0
<i>Bathyraja maccaini</i>	McCains skate	123.1	0.12	0.01000	3.0
<i>Bathyraja meridionalis</i>	Dark-belly skate	123.1	0.12	0.01000	3.0
<i>Bathyraja murrayi</i>	Murrays skate	62.2	0.24	0.01000	3.0
<i>Beryx decadactylus</i>	Alfonsino	100.0	0.16	0.01000	3.0
<i>Beryx splendens</i>	Splendid alfonsino	70.0	0.15	0.02260	3.0
<i>Bolbometopon muricatum</i>	Green humphead parrotfish	130.0	0.10	0.01000	3.0
<i>Boops boops</i>	Bogue	36.0	0.18	0.00970	3.0
<i>Boreogadus saida</i>	Polar cod	40.0	0.22	0.00500	3.2
<i>Borostomias antarcticus</i>	Borostomias antarcticus	31.5	0.30	0.01000	3.0
<i>Bothus pantherinus</i>	Leopard flounder	40.7	0.24	0.00200	3.8
<i>Brachydeuterus auritus</i>	Bigeye grunt	30.0	0.32	0.00132	3.1
<i>Brosme brosme</i>	Tusk	120.0	0.14	0.01000	3.0
<i>Brotula barbata</i>	Bearded brotula	94.0	0.19	0.01000	3.0
<i>Caelorinchus marinii</i>	Marinis grenadier	39.7	0.23	0.00104	2.7
<i>Callorhinchus capensis</i>	Cape elephantfish	122.0	0.17	0.01000	3.0
<i>Callorhinchus milii</i>	Ghost shark	125.0	0.22	0.00910	3.0
<i>Capros aper</i>	Boarfish	31.5	0.20	0.02820	2.8
<i>Carangoides ruber</i>	Bar jack	70.0	0.14	0.00180	3.0
<i>Caranx ignobilis</i>	Giant trevally	195.7	0.11	0.02960	3.0
<i>Caranx rhonchus</i>	False scad	60.0	0.30	0.00124	3.1
<i>Carcharhinus brachyurus</i>	Copper shark	385.0	0.04	0.00104	2.9
<i>Carcharhinus falciformis</i>	Silky shark	350.0	0.09	0.00101	3.1
<i>Carcharhinus limbatus</i>	Blacktip shark	275.0	0.28	0.00610	3.0
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	398.5	0.11	0.00170	3.0

Scientific name	Common name	Asymptotic length (cm)	Growth parameter K (year ⁻¹)	a	b
<i>Carcharhinus obscurus</i>	Dusky shark	449.0	0.04	0.00940	2.9
<i>Carcharhinus plumbeus</i>	Sandbar shark	266.0	0.06	0.00580	3.3
<i>Carcharhinus sorrah</i>	Spottail shark	160.0	1.17	0.00070	3.7
<i>Carcharias taurus</i>	Sand tiger shark	323.0	0.14	0.00106	2.9
<i>Carcharodon carcharias</i>	Great white shark	792.0	0.06	0.00720	3.0
<i>Caulolatilus chrysops</i>	Atlantic goldeye tilefish	62.2	0.18	0.00102	3.0
<i>Caulolatilus princeps</i>	Ocean whitefish	104.9	0.11	0.01000	3.0
<i>Centriscopus humerosus</i>	Banded yellowfish	31.5	0.24	0.01000	3.0
<i>Centroberyx affinis</i>	Redfish	53.0	0.17	0.01000	3.0
<i>Centrophorus granulosus</i>	Gulper shark	163.3	0.05	0.01000	3.0
<i>Centrophorus lusitanicus</i>	Lowfin gulper shark	163.3	0.05	0.01000	3.0
<i>Centrophorus squamosus</i>	Leafscale gulper shark	164.0	0.04	0.01000	3.0
<i>Centropomus undecimalis</i>	Common snook	140.0	0.30	0.00580	3.0
<i>Centropristis striata</i>	Black seabass	66.0	0.46	0.06490	2.5
<i>Centroscyllium fabricii</i>	Black dogfish	109.9	0.05	0.00090	3.4
<i>Centroscymnus coelolepis</i>	Portuguese dogfish	123.1	0.05	0.00430	3.1
<i>Centroscymnus crepidater</i>	Longnose velvet dogfish	133.1	0.05	0.00240	3.2
<i>Cephalopholis argus</i>	Peacock hind	62.2	0.18	0.00166	3.0
<i>Cephalopholis fulva</i>	Coney	41.0	0.63	0.02230	2.9
<i>Cephalopholis hemistiktos</i>	Yellowfin hind	35.0	0.11	0.01000	3.0
<i>Cephalopholis miniata</i>	Coral hind	46.9	0.11	0.00107	3.1
<i>Cepola macrophthalma</i>	Red bandfish	80.0	0.21	0.00162	2.0
<i>Cetorhinus maximus</i>	Basking shark	1000.0	0.06	0.00490	3.0
<i>Chaenocephalus aceratus</i>	Blackfin icefish	76.5	0.17	0.00050	3.7
<i>Chaenodraco wilsoni</i>	Spiny icefish	44.8	0.29	0.01000	3.0
<i>Channichthys rhinoceratus</i>	Unicorn icefish	62.2	0.22	0.01000	3.0
<i>Chanos chanos</i>	Milkfish	183.4	0.10	0.00193	3.0
<i>Cheilodactylus variegatus</i>	Peruvian morwong	1.1	0.23	0.01000	3.0
<i>Cheimerius nufar</i>	Santer seabream	75.0	0.18	0.07800	2.7
<i>Chelidonichthys capensis</i>	Cape gurnard	80.3	0.10	0.01000	3.0
<i>Chelidonichthys gurnardus</i>	Grey gurnard	60.0	0.77	0.00540	3.1
<i>Chelidonichthys kumu</i>	Bluefin gurnard	60.0	0.49	0.00111	3.0
<i>Chelidonichthys lastoviza</i>	Streaked gurnard	40.0	0.37	0.00152	3.0
<i>Chelidonichthys lucerna</i>	Tub gurnard	75.0	0.17	0.00770	3.1
<i>Chelidonichthys spinosus</i>	Red gurnard	41.7	0.26	0.01000	3.0
<i>Chelon haematocheilus</i>	So-iny (redlip) mullet	4.5	2.15	0.01000	3.0
<i>Chelon labrosus</i>	Thicklip grey mullet	75.0	0.12	0.00630	3.0
<i>Chimaera monstrosa</i>	Rabbit fish	150.0	0.07	0.00280	2.8
<i>Chionobathyscus dewitti</i>	Chionobathyscus dewitti	62.2	0.22	0.01000	3.0
<i>Chionodraco hamatus</i>	Hooked icefish	51.0	0.26	0.01000	3.0
<i>Chionodraco myersi</i>	Chionodraco myersi	39.7	0.33	0.01000	3.0
<i>Chionodraco rastrispinosus</i>	Ocellated icefish	54.0	0.25	0.00390	3.9
<i>Chirocentrus dorab</i>	Dorab wolf-herring	102.8	0.17	0.00510	3.0

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<i>Chloroscombrus orqueta</i>	Pacific bumper	31.5	0.58	0.01000	3.0
<i>Chromis chromis</i>	Damselfish	25.0	0.25	0.02990	2.8
<i>Chrysophrys auratus</i>	Squirefish	130.0	0.07	0.04470	2.8
<i>Ciliata mustela</i>	Fivebeard rockling	26.3	0.77	0.00640	3.0
<i>Citharichthys sordidus</i>	Pacific sanddab	41.0	0.30	0.01000	3.0
<i>Citharus linguatula</i>	Atlantic spotted flounder	30.0	0.26	0.00500	3.1
<i>Conger conger</i>	European conger	300.0	0.06	0.00050	3.2
<i>Conger myriaster</i>	Whitespotted conger	102.8	0.15	0.01000	3.0
<i>Conger oceanicus</i>	American conger	233.4	0.07	0.00010	3.8
<i>Conger orbignyanus</i>	Argentine conger	115.0	0.13	0.00020	3.4
<i>Conodon nobilis</i>	Barred grunt	35.2	0.31	0.02430	3.1
<i>Coregonus lavaretus</i>	Common whitefish	73.0	0.27	0.00116	2.9
<i>Coregonus oxyrinchus</i>	Houting	50.0	0.38	0.01000	3.0
<i>Coris julis</i>	Mediterranean rainbow wrasse	30.0	0.11	0.00690	3.0
<i>Crenidens crenidens</i>	Karenteen seabream	31.5	0.27	0.01000	3.0
<i>Cryodraco antarcticus</i>	Cryodraco antarcticus	41.0	0.27	0.00060	3.5
<i>Ctenolabrus rupestris</i>	Goldsinny-wrasse	18.0	0.31	0.00123	3.0
<i>Cyclopterus lumpus</i>	Lumpsucker	61.0	0.12	0.05870	2.9
<i>Cynomacrus piriei</i>	Dogtooth grenadier	52.0	0.18	0.01000	3.0
<i>Cynoscion analis</i>	Peruvian weakfish	47.5	0.23	0.01000	3.0
<i>Cynoscion nebulosus</i>	Spotted weakfish	100.0	0.13	0.01000	3.0
<i>Cynoscion regalis</i>	Gray weakfish	98.0	0.26	0.00880	3.0
<i>Cynoscion striatus</i>	S. Amer. striped weakfish	62.2	0.23	0.01000	3.0
<i>Dalatias licha</i>	Kitefin shark	185.4	0.05	0.01000	3.0
<i>Dasyatis akajei</i>	Red stingray	203.4	0.10	0.01000	3.0
<i>Dasyatis centroura</i>	Roughtail stingray	223.4	0.10	0.01000	3.0
<i>Dasyatis pastinaca</i>	Common stingray	59.2	0.09	0.00850	2.9
<i>Deania calcea</i>	Birdbeak dogfish	122	0.14	0.00120	3.3
<i>Dentex angolensis</i>	Angola dentex	58.8	0.11	0.02760	2.9
<i>Dentex congoensis</i>	Congo dentex	50.0	0.35	0.03190	2.8
<i>Dentex dentex</i>	Common dentex	100.0	0.08	0.00171	3.0
<i>Dentex macrophthalmus</i>	Large-eye dentex	65.0	0.18	0.00192	3.0
<i>Dentex maroccanus</i>	Morocco dentex	45.0	0.18	0.00157	3.1
<i>Diagramma pictum</i>	Painted sweetlips	100.0	0.24	0.00144	3.0
<i>Diastobranchus capensis</i>	Basketwork eel	183.4	0.39	0.01000	3.0
<i>Dicentrarchus labrax</i>	European seabass	103.0	0.16	0.00790	3.1
<i>Dicologlossa cuneata</i>	Wedge sole	30.0	0.47	0.00850	3.0
<i>Diplectrum formosum</i>	Sand seabass	30.0	1.50	0.00114	3.1
<i>Diplodus annularis</i>	Annular seabream	24.0	0.25	0.02310	3.0
<i>Diplodus argenteus</i>	South American silver porgy	39.5	0.22	0.01000	3.0
<i>Diplodus cervinus</i>	Zebra seabream	57.1	0.08	0.00116	3.1

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<i>Diplodus puntazzo</i>	Sharpsnout seabream	62.2	0.36	0.07170	3.0
<i>Diplodus sargus</i>	White seabream	57.6	0.10	0.00138	3.1
<i>Diplodus vulgaris</i>	Comm. two-banded seabream	45.0	0.36	0.02400	3.0
<i>Dipturus batis</i>	Blue skate	285.0	0.06	0.00108	3.1
<i>Dipturus laevis</i>	Barndoor skate	155.3	0.10	0.01000	3.0
<i>Dipturus linteus</i>	Sailray	126.1	0.12	0.01000	3.0
<i>Dipturus nasutus</i>	New Zealand rough skate	118.0	0.16	0.02180	3.0
<i>Dipturus oxyrinchus</i>	Longnosed skate	153.3	0.10	0.00070	3.4
<i>Dissostichus eleginoides</i>	Patagonian toothfish	218.5	0.08	0.01000	3.0
<i>Dissostichus mawsoni</i>	Antarctic toothfish	185.0	0.06	0.00185	2.9
<i>Drepane africana</i>	African sicklefish	54.3	0.13	0.00128	3.3
<i>Drepane punctata</i>	Spotted sicklefish	50.0	0.19	0.00167	3.2
<i>Echinorhinus brucus</i>	Bramble shark	313.1	0.001	0.01000	3.0
<i>Eleginus gracilis</i>	Saffron cod	55.0	0.18	0.00980	2.9
<i>Eleginus navaga</i>	Navaga	43.8	0.18	0.01000	3.0
<i>Eleutheronema tetradactylum</i>	Fourfinger threadfin	203.4	0.12	0.01000	3.0
<i>Emmelichthys nitidus</i>	Redbait	52.0	0.31	0.01000	3.0
<i>Enchelyopus cimbrius</i>	Fourbeard rockling	41.0	0.20	0.00350	3.1
<i>Eopsetta jordani</i>	Petrale sole	58.6	0.17	0.00610	3.2
<i>Epigonus telescopus</i>	Bulls-eye	77.5	0.03	0.01000	3.0
<i>Epinephelus aeneus</i>	White grouper	120.0	0.23	0.00530	3.2
<i>Epinephelus analogus</i>	Spotted grouper	106.9	0.11	0.01000	3.0
<i>Epinephelus areolatus</i>	Areolate grouper	47.0	0.29	0.00142	3.0
<i>Epinephelus chlorostigma</i>	Brownspotted grouper	75.0	0.29	0.00110	3.0
<i>Epinephelus coioides</i>	Orange-spotted grouper	120.0	0.17	0.00105	3.1
<i>Epinephelus fasciatus</i>	Blacktip grouper	40.0	0.16	0.00161	2.9
<i>Epinephelus flavolimbatus</i>	Yellowedge grouper	115.0	0.10	0.05000	2.8
<i>Epinephelus fuscoguttatus</i>	Brown-marbled grouper	120.0	0.20	0.00133	3.1
<i>Epinephelus goreensis</i>	Dungat grouper	143.2	0.08	0.00164	3.0
<i>Epinephelus guttatus</i>	Red hind	76.0	0.12	0.00840	3.1
<i>Epinephelus marginatus</i>	Dusky grouper	150.0	0.09	0.00127	3.1
<i>Epinephelus morio</i>	Red grouper	125.0	0.12	0.00162	3.0
<i>Epinephelus morrhua</i>	Comet grouper	92.7	0.12	0.00910	3.1
<i>Epinephelus multinotatus</i>	White-blotched grouper	100.0	0.27	0.00167	3.0
<i>Epinephelus nigritus</i>	Warsaw grouper	230.0	0.14	0.02100	3.0
<i>Epinephelus niveatus</i>	Snowy grouper	132.0	0.09	0.02140	2.9
<i>Epinephelus polyphekadion</i>	Camouflage grouper	92.7	0.10	0.00124	3.1
<i>Epinephelus striatus</i>	Nassau grouper	122.0	0.12	0.00650	3.2
<i>Epinephelus summana</i>	Summan grouper	54.0	0.20	0.01000	3.0
<i>Epinephelus tauvina</i>	Greasy grouper	102.0	0.13	0.00156	3.0
<i>Etmopterus spinax</i>	Velvet belly lantern shark	62.2	0.20	0.00180	3.2

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<i>Gadus macrocephalus</i>	Pacific cod	119.0	0.27	0.00790	3.1
<i>Gadus morhua</i>	Atlantic cod	200.0	0.18	0.00104	3.0
<i>Gadus ogac</i>	Greenland cod	79.5	0.16	0.00117	3.0
<i>Galeichthys feliceps</i>	White baggar	57.1	0.19	0.00198	3.0
<i>Galeocerdo cuvier</i>	Tiger shark	750.0	0.18	0.00140	3.2
<i>Galeoides decadactylus</i>	Lesser African threadfin	50.0	0.44	0.00119	3.1
<i>Galeorhinus galeus</i>	Tope shark	193.0	0.17	0.00680	2.9
<i>Galeus melastomus</i>	Blackmouth catshark	77.5	0.19	0.00250	3.0
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	11.0	2.40	0.01000	3.0
<i>Genyonemus lineatus</i>	White croaker	42.8	0.72	0.02720	2.9
<i>Genypterus blacodes</i>	Pink cusk-eel	200.0	0.09	0.00110	3.3
<i>Genypterus capensis</i>	Kingklip	180.0	0.19	0.00120	3.3
<i>Genypterus chilensis</i>	Red cusk-eel	153.3	0.08	0.01000	3.0
<i>Genypterus maculatus</i>	Black cusk-eel	102.8	0.19	0.01000	3.0
<i>Gerres nigri</i>	Guinean striped mojarra	21.1	0.61	0.01000	3.0
<i>Gerres oblongus</i>	Slender silverbiddy	31.5	0.35	0.01000	3.0
<i>Gerres oyena</i>	Common silver-biddy	31.5	0.42	0.00940	3.3
<i>Ginglymostoma cirratum</i>	Nurse shark	432.1	0.14	0.00105	2.9
<i>Girella nigricans</i>	Opaleye	68.3	0.33	0.01000	3.0
<i>Girella tricuspidata</i>	Luderick	71.0	0.18	0.00163	3.0
<i>Glossanodon semifasciatus</i>	Deepsea smelt	25.5	1.20	0.01000	3.0
<i>Glyptocephalus cynoglossus</i>	Witch	60.0	0.20	0.00170	3.4
<i>Glyptocephalus zachirus</i>	Rex sole	62.2	0.11	0.00280	3.5
<i>Gnathanodon speciosus</i>	Golden trevally	120.0	0.53	0.03900	2.8
<i>Gobionotothen acuta</i>	Triangular notothen	36.6	0.20	0.01000	3.0
<i>Gobionotothen gibberifrons</i>	Humped rockcod	57.1	0.07	0.00180	3.5
<i>Gobius niger</i>	Black goby	18.0	0.19	0.00160	2.9
<i>Grammoplites suppositus</i>	Spotfin flathead	26.3	0.38	0.01000	3.0
<i>Gymnosarda unicolor</i>	Dogtooth tuna	251.4	0.12	0.00105	3.1
<i>Gymnothorax unicolor</i>	Brown moray	102.8	0.20	0.01000	3.0
<i>Gymnura altavela</i>	Spiny butterfly ray	402.4	0.05	0.02680	3.0
<i>Halaehurus canescens</i>	Dusky catshark	72.4	0.24	0.01000	3.0
<i>Halargyreus johnsonii</i>	Slender codling	58.1	0.28	0.01000	3.0
<i>Halobatrachus didactylus</i>	Lusitanian toadfish	52.0	0.13	0.01000	3.0
<i>Harpadon nehereus</i>	Bombay duck	40.0	0.53	0.00240	3.1
<i>Helicolenus dactylopterus</i>	Blackbelly rosefish	47.0	0.10	0.00104	3.1
<i>Himantura gerrardi</i>	Sharpnose stingray	203.4	0.10	0.01000	3.0
<i>Hippoglossoides elassodon</i>	Flathead sole	54.0	0.35	0.00102	3.0
<i>Hippoglossoides platessoides</i>	American plaice	82.6	0.11	0.00110	3.3
<i>Hippoglossus hippoglossus</i>	Atlantic halibut	470.0	0.03	0.00130	3.2
<i>Hippoglossus stenolepis</i>	Pacific halibut	258.0	0.06	0.00310	3.2
<i>Hoplostethus mediterraneus</i>	Mediterranean slimehead	42.0	0.11	0.00830	3.2

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<i>Huso huso</i>	Beluga	500.0	0.02	0.00400	3.2
<i>Hydrolagus colliei</i>	Spotted ratfish	97.0	0.22	0.01000	3.0
<i>Hydrolagus mirabilis</i>	Large-eyed rabbitfish	39.7	0.34	0.01000	3.0
<i>Hydrolagus novaezealandiae</i>	Dark ghost shark	98.8	0.18	0.00190	3.3
<i>Hyperoglyphe antarctica</i>	Antarctic butterfish	140.0	0.31	0.00960	3.2
<i>Hypoptychus dybowskii</i>	Korean sandeel	10.0	3.65	0.01000	3.0
<i>Hyporhamphus ihi</i>	Garfish	27.3	0.79	0.01000	3.0
<i>Isacia conceptionis</i>	Cabinza grunt	62.2	0.18	0.01000	3.0
<i>Isurus oxyrinchus</i>	Shortfin mako	400.0	0.20	0.00167	2.8
<i>Isurus paucus</i>	Longfin mako	419.3	0.10	0.01000	3.0
<i>Kathetostoma giganteum</i>	Giant stargazer	90.0	0.20	0.00198	3.0
<i>Kyphosus cinerascens</i>	Blue seachub	52.2	0.25	0.01000	3.0
<i>Kyphosus sectatrix</i>	Bermuda sea chub	78.5	0.13	0.00174	3.1
<i>Labrus bergylta</i>	Ballan wrasse	65.9	0.10	0.00119	3.1
<i>Labrus merula</i>	Brown wrasse	45.0	0.22	0.00109	3.1
<i>Laemonema longipes</i>	Longfin codling	72.0	0.15	0.00590	2.9
<i>Lamna nasus</i>	Porbeagle	350.0	0.06	0.04700	2.7
<i>Larimichthys croceus</i>	Large yellow croaker	82.6	0.23	0.01000	3.0
<i>Larimichthys polyactis</i>	Yellow croaker	40.0	0.44	0.02650	2.9
<i>Lateolabrax japonicus</i>	Japanese seaperch	102.0	0.19	0.05080	2.8
<i>Lates calcarifer</i>	Barramundi	200.0	0.12	0.00107	3.0
<i>Leiostomus xanthurus</i>	Spot croaker	36.0	0.43	0.00920	3.1
<i>Lepidonotothen larseni</i>	Lepidonotothen larseni	25.3	0.27	0.00420	3.2
<i>Lepidonotothen mizops</i>	Toad notothen	15.9	0.51	0.01000	3.0
<i>Lepidonotothen nudifrons</i>	Gaudy notothen	20.6	0.34	0.01000	3.0
<i>Lepidonotothen squamifrons</i>	Grey rockcod	55.0	0.12	0.00230	3.4
<i>Lepidoperca pulchella</i>	Orange perch	29.4	0.35	0.01000	3.0
<i>Lepidopsetta bilineata</i>	Rock sole	58.0	0.15	0.02060	2.9
<i>Lepidopus caudatus</i>	Silver scabbardfish	210.0	0.30	0.00040	3.1
<i>Lepidorhombus boscii</i>	Fourspotted megrim	40.0	0.26	0.00340	3.2
<i>Lepidorhombus whiffiagonis</i>	Megrim	60.0	0.13	0.00290	3.3
<i>Lepidotrigla cavillone</i>	Large-scaled gurnard	20.0	0.53	0.00780	3.2
<i>Lethrinus atlanticus</i>	Atlantic emperor	52.0	0.25	0.02420	2.9
<i>Lethrinus borbonicus</i>	Snubnose emperor	41.7	0.31	0.01000	3.0
<i>Lethrinus harak</i>	Thumbprint emperor	50.0	0.46	0.00170	3.0
<i>Lethrinus lentjan</i>	Pink ear emperor	52.0	0.33	0.00189	2.9
<i>Lethrinus mahsena</i>	Sky emperor	65.0	0.10	0.00120	3.2
<i>Lethrinus microdon</i>	Smalltooth emperor	82.0	0.20	0.00188	3.0
<i>Lethrinus nebulosus</i>	Spangled emperor	87.0	0.21	0.00161	3.0
<i>Lethrinus obsoletus</i>	Orange-striped emperor	60.0	0.38	0.00173	3.0
<i>Lethrinus xanthochilus</i>	Yellowlip emperor	72.3	0.14	0.02010	3.0
<i>Leucoraja circularis</i>	Sandy ray	123.1	0.12	0.01000	3.0

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<i>Leucoraja erinacea</i>	Little skate	54.0	0.35	0.00270	3.2
<i>Leucoraja fullonica</i>	Shagreen ray	123.1	0.12	0.01000	3.0
<i>Leucoraja naevus</i>	Cuckoo ray	91.6	0.11	0.00240	3.2
<i>Limanda aspera</i>	Yellowfin sole	49.0	0.14	0.00760	3.2
<i>Limanda ferruginea</i>	Yellowtail flounder	64.0	0.34	0.01000	3.0
<i>Limanda limanda</i>	Dab	43.0	0.39	0.00490	3.1
<i>Lithognathus lithognathus</i>	White steenbras	200.0	0.10	0.02280	2.9
<i>Lithognathus mormyrus</i>	Striped seabream	55.0	0.24	0.00154	3.0
<i>Liza klunzingeri</i>	Klunzingers mullet	21.1	0.45	0.01000	3.0
<i>Liza saliens</i>	Leaping mullet	40.0	0.20	0.00102	3.0
<i>Lophius americanus</i>	American angler	158.0	0.09	0.00170	3.0
<i>Lophius budegassa</i>	Black-bellied angler	102.0	0.08	0.00130	3.0
<i>Lophius piscatorius</i>	Angler	200.0	0.11	0.02550	2.8
<i>Lophius vaillanti</i>	Shortspine African angler	52.0	0.20	0.01000	3.0
<i>Lophius vomerinus</i>	Cape monk	100.0	0.14	0.00120	3.0
<i>Lopholatilus chamaeleonticeps</i>	Great northern tilefish	125.0	0.13	0.00490	3.3
<i>Lutjanus argentimaculatus</i>	Mangrove red snapper	150.0	0.19	0.02800	2.8
<i>Lutjanus argentiventris</i>	Yellow snapper	71.0	0.16	0.01000	3.0
<i>Lutjanus bohar</i>	Two-spot red snapper	90.0	0.27	0.00156	3.1
<i>Lutjanus campechanus</i>	Northern red snapper	100.0	0.17	0.00169	3.0
<i>Lutjanus gibbus</i>	Humpback red snapper	50.0	0.40	0.00131	3.1
<i>Lutjanus johnii</i>	Johns snapper	99.4	0.12	0.00182	3.0
<i>Lutjanus kasmira</i>	Common bluestripe snapper	42.4	0.21	0.00117	3.1.0
<i>Lutjanus malabaricus</i>	Malabar blood snapper	100.0	0.19	0.02070	2.9
<i>Lutjanus purpureus</i>	Southern red snapper	100.0	0.13	0.00141	3.0
<i>Lutjanus quinquelineatus</i>	Five-lined snapper	38.0	0.31	0.00123	3.1
<i>Lutjanus synagris</i>	Lane snapper	60.0	0.20	0.02950	2.8
<i>Lycodichthys antarcticus</i>	Lycodichthys antarcticus	25.3	0.45	0.01000	3.0
<i>Macrodon ancylodon</i>	King weakfish	45.0	0.42	0.00330	3.3
<i>Macroramphosus scolopax</i>	Longspine snipefish	20.0	0.46	0.00790	2.9
<i>Macrourus berglax</i>	Onion-eye grenadier	110.0	0.04	0.00980	3.0
<i>Macrourus carinatus</i>	Ridge scaled rattail	102.8	0.10	0.01000	3.0
<i>Macrourus holotrachys</i>	Bigeye grenadier	82.6	0.12	0.01000	3.0
<i>Macruronus magellanicus</i>	Patagonian grenadier	115.0	0.09	0.00310	3.0
<i>Macruronus novaezelandiae</i>	Blue grenadier	120.0	0.26	0.00600	2.8
<i>Melanogrammus aeglefinus</i>	Haddock	112.0	0.12	0.00520	3.2
<i>Mene maculata</i>	Moonfish	30.0	0.19	0.02190	3.1
<i>Menticirrhus littoralis</i>	Gulf kingcroaker	50.3	0.37	0.00400	3.2
<i>Menticirrhus saxatilis</i>	Northern kingcroaker	46.0	0.56	0.01000	3.0
<i>Merlangius merlangus</i>	Whiting	70.0	0.34	0.00620	3.1
<i>Merluccius albidus</i>	Offshore hake	48.6	0.57	0.01000	3.0

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<i>Merluccius angustimanus</i>	Panama hake	40.0	0.34	0.01000	3.0
<i>Merluccius australis</i>	Southern hake	126.0	0.31	0.00190	3.3
<i>Merluccius bilinearis</i>	Silver hake	76.0	0.18	0.00390	3.2
<i>Merluccius capensis</i>	Shallow-water Cape hake	140.0	0.11	0.00520	3.1
<i>Merluccius gayi gayi</i>	South Pacific hake	102.0	0.12	0.00700	3.0
<i>Merluccius hubbsi</i>	Argentine hake	95.0	0.13	0.00102	2.9
<i>Merluccius merluccius</i>	European hake	140.0	0.09	0.00430	3.2
<i>Merluccius paradoxus</i>	Deep-water Cape hake	120.0	0.12	0.00610	3.0
<i>Merluccius polli</i>	Benguela hake	80.0	0.39	0.01000	3.0
<i>Merluccius productus</i>	North Pacific hake	91.0	0.13	0.02040	2.7
<i>Merluccius senegalensis</i>	Senegalese hake	85.2	0.17	0.00790	3.0
<i>Meuschenia scaber</i>	Velvet leatherjacket	32.5	0.26	0.05560	2.9
<i>Microchirus variegatus</i>	Thickback sole	35.	0.37	0.00890	3.1
<i>Microgadus proximus</i>	Pacific tomcod	32.0	0.38	0.01000	3.0
<i>Microgadus tomcod</i>	Atlantic tomcod	39.8	0.29	0.01000	3.0
<i>Micromesistius australis</i>	Southern blue whiting	90.0	0.20	0.00410	3.2
<i>Micromesistius poutassou</i>	Blue whiting	50.0	0.37	0.00740	3.0
<i>Micropogonias furnieri</i>	Whitemouth croaker	60.1	0.22	0.00121	3.0
<i>Micropogonias undulatus</i>	Atlantic croaker	55.0	0.35	0.00310	3.2
<i>Microstomus kitt</i>	Lemon sole	65.0	0.15	0.01000	3.0
<i>Microstomus pacificus</i>	Dover sole	76.0	0.26	0.00122	2.9
<i>Miichthys miuy</i>	Mi-iuy croaker	80.6	0.32	0.01000	3.0
<i>Molva dypterygia</i>	Blue ling	160.0	0.11	0.00190	3.1
<i>Molva molva</i>	Ling	200.0	0.17	0.01000	3.4
<i>Monotaxis grandoculis</i>	Humpnose big-eye bream	62.2	0.21	0.02390	3.0
<i>Morone americana</i>	White perch	52.0	0.07	0.00820	3.2
<i>Morone saxatilis</i>	Striped sea-bass	200.0	0.20	0.00610	3.2
<i>Mugil cephalus</i>	Flathead mullet	100.0	0.27	0.00850	3.0
<i>Mugil liza</i>	Liza	80.0	0.24	0.00130	3.0
<i>Mugil soiuy</i>	So-iuy mullet	97.3	0.14	0.00700	3.1
<i>Mulloidichthys flavolineatus</i>	Yellowstripe goatfish	43.0	0.21	0.00890	3.1
<i>Mullus argentinae</i>	Argentine goatfish	31.5	0.45	0.00300	3.5
<i>Mullus barbatus</i>	Red mullet	30.0	0.21	0.00129	3.1
<i>Mullus surmuletus</i>	Striped red mullet	40.0	0.30	0.00820	3.1
<i>Mustelus asterias</i>	Starry smooth-hound	143.2	0.30	0.00200	3.1
<i>Mustelus canis</i>	Dusky smooth-hound	150.0	0.04	0.00230	3.1
<i>Mustelus henlei</i>	Brown smooth-hound	100.0	0.23	0.01000	3.0
<i>Mustelus lenticulatus</i>	Spotted estuary smooth-hound	161.0	0.11	0.00150	3.2
<i>Mustelus mustelus</i>	Smooth-hound	200.0	0.12	0.00080	3.3
<i>Mustelus schmitti</i>	Narrownose smooth-hound	94.7	0.19	0.01000	3.0
<i>Mycteroperca bonaci</i>	Black grouper	150.0	0.17	0.00173	3.1

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<i>Mycteroperca microlepis</i>	Gag	145.0	0.12	0.00130	3.0
<i>Mycteroperca phenax</i>	Scamp	108.0	0.09	0.01000	3.0
<i>Mycteroperca venenosa</i>	Yellowfin grouper	100.0	0.17	0.00122	3.0
<i>Mycteroperca xenarcha</i>	Broomtail grouper	153.3	0.08	0.01000	3.0
<i>Myliobatis aquila</i>	Common eagle ray	186.4	0.17	0.00080	3.3
<i>Naso unicornis</i>	Bluespine unicornfish	70.0	0.14	0.02280	2.9
<i>Negaprion brevirostris</i>	Lemon shark	342.9	0.04	0.00530	3.2
<i>Nemadactylus bergi</i>	White morwong	41.2	0.15	0.01000	3.0
<i>Nemadactylus macropterus</i>	Tarakihi	70.0	0.21	0.02200	3.0
<i>Nemadactylus monodactylus</i>	St. Pauls fingerfin	62.2	0.12	0.01000	3.0
<i>Nemipterus japonicus</i>	Japanese threadfin bream	32.6	0.51	0.00470	2.9
<i>Nemipterus randalli</i>	Randalls threadfin bream	21.9	0.83	0.02230	2.9
<i>Nemipterus virgatus</i>	Golden threadfin bream	49.8	0.30	0.00175	3.0
<i>Neocyttus rhomboidalis</i>	Spiky oreo	41.7	0.03	0.02290	3.0
<i>Neopagetopsis ionah</i>	Bible icefish	58.1	0.23	0.01000	3.0
<i>Nezumia aequalis</i>	Common Atlantic grenadier	37.6	0.16	0.01000	3.0
<i>Nibe mitsukurii</i>	Nibe croaker	77.5	0.21	0.01000	3.0
<i>Notorynchus cepedianus</i>	Broadnose sevengill shark	300.0	0.25	0.01000	3.0
<i>Notothenia coriiceps</i>	Yellowbelly rockcod	62.0	0.13	0.02790	3.0
<i>Notothenia rossii</i>	Marbled rockcod	97.0	0.11	0.00160	3.0
<i>Oblada melanura</i>	Saddled seabream	34.2	0.30	0.00113	3.0
<i>Ocyurus chrysurus</i>	Yellowtail snapper	86.3	0.13	0.03140	2.8
<i>Oncorhynchus gorbuscha</i>	Pink salmon	78.5	0.33	0.00340	3.3
<i>Oncorhynchus keta</i>	Chum salmon	120.0	0.27	0.02300	3.2
<i>Oncorhynchus kisutch</i>	Coho salmon	110.9	0.21	0.01000	3.0
<i>Oncorhynchus masou</i>	Cherry salmon	81.6	0.16	0.00135	3.0
<i>Oncorhynchus mykiss</i>	Rainbow trout	120.0	0.46	0.00118	3.0
<i>Oncorhynchus tshawytscha</i>	Chinook salmon	153.3	0.15	0.01000	3.0
<i>Ophiodon elongatus</i>	Lingcod	152.0	0.18	0.01000	3.0
<i>Orthopristis chrysoptera</i>	Pigfish	47.9	0.20	0.00950	3.0
<i>Otolithes ruber</i>	Tiger-toothed croaker	90.0	0.39	0.02030	2.9
<i>Pagellus acarne</i>	Axillary seabream	36.0	0.21	0.00860	3.1
<i>Pagellus bellottii</i>	Red Pandora	42.0	0.18	0.00131	3.0
<i>Pagellus bogaraveo</i>	Blackspot seabream	70.0	0.09	0.00124	3.1
<i>Pagellus erythrinus</i>	Common pandora	60.0	0.16	0.02060	3.0
<i>Pagrus auriga</i>	Redbanded seabream	82.6	0.09	0.01000	3.0
<i>Pagrus caeruleostictus</i>	Bluespotted seabream	90.0	0.21	0.02220	2.9
<i>Pagrus pagrus</i>	Common seabream	91.0	0.17	0.00152	3.0
<i>Pampus argenteus</i>	Silver pomfret	60.0	0.24	0.04230	2.9
<i>Paradiplospinus gracilis</i>	Slender escolar	54.0	0.26	0.01000	3.0
<i>Paralabrax humeralis</i>	Peruvian rock seabass	56.6	0.34	0.01000	3.0
<i>Paralichthys californicus</i>	California flounder	152.0	0.10	0.01000	3.0

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<i>Paralichthys dentatus</i>	Summer flounder	94.0	0.22	0.00540	3.1
<i>Paralichthys olivaceus</i>	Bastard halibut	117.0	0.15	0.00118	3.0
<i>Paralonchurus peruanus</i>	Peruvian banded croaker	53.0	0.40	0.01000	3.0
<i>Parapercis colias</i>	Blue cod	45.0	0.66	0.01000	3.1
<i>Parapristipoma octolineatum</i>	African striped grunt	52.0	0.18	0.01000	3.0
<i>Parastromateus niger</i>	Black pomfret	75.0	0.59	0.02110	3.0
<i>Parona signata</i>	Parona leatherjacket	62.2	0.30	0.01000	3.0
<i>Parophrys vetula</i>	English sole	49.0	0.24	0.00380	3.1
<i>Patagonotothen brevicauda</i>	Patagonian rockcod	24.2	0.35	0.01000	3.0
<i>Patagonotothen ramsayi</i>	Ramsay's icefish	45.8	0.28	0.01000	3.0
<i>Pegusa lascaris</i>	Sand sole	40.0	0.45	0.00690	3.1
<i>Pelates quadrilineatus</i>	Fourlined terapon	31.5	0.33	0.00134	3.0
<i>Pennahia anea</i>	Greyfin croaker	30.0	0.80	0.01000	3.1
<i>Pennahia argentata</i>	White croaker	35.3	0.76	0.01000	3.0
<i>Pentanemus quinquarius</i>	Royal threadfin	35.0	1.08	0.00060	3.4
<i>Peprilus alepidotus</i>	Harvestfish	29.4	0.59	0.01000	3.0
<i>Peprilus simillimus</i>	Pacific pompano	29.4	0.49	0.01000	3.0
<i>Peprilus triacanthus</i>	American butterfish	30.0	0.80	0.00650	3.3
<i>Percophis brasiliensis</i>	Brazilian flathead	55.4	0.14	0.00410	3.0
<i>Petromyzon marinus</i>	Sea lamprey	123.1	0.09	0.00080	3.2
<i>Petrus rupestris</i>	Red steenbras	200.0	0.08	0.02700	3.0
<i>Phycis blennoides</i>	Greater forkbeard	110.0	0.17	0.00120	3.3
<i>Phycis phycis</i>	Forkbeard	65.3	0.19	0.00700	3.2
<i>Platichthys flesus</i>	Flounder	60.0	0.23	0.00930	3.1
<i>Platichthys stellatus</i>	Starry flounder	91.0	0.19	0.00360	3.3
<i>Platycephalus indicus</i>	Bartail flathead	102.8	0.41	0.00660	3.0
<i>Plectorhinchus gaterinus</i>	Blackspotted rubberlips	52.0	0.22	0.01000	3.0
<i>Plectorhinchus macrolepis</i>	Biglip grunt	46.9	0.24	0.01000	3.0
<i>Plectorhinchus mediterraneus</i>	Rubberlip grunt	80.0	0.18	0.02020	2.9
<i>Plectorhinchus pictus</i>	Trout sweetlips	85.0	0.17	0.04400	2.8
<i>Plectorhinchus schotaf</i>	Minstrel sweetlip	82.6	0.14	0.01000	3.0
<i>Plectropomus areolatus</i>	Squaretail coralgroupier	75.5	0.15	0.01000	3.0
<i>Plectropomus pessuliferus</i>	Roving coralgroupier	123.1	0.09	0.01000	3.0
<i>Pleurogrammus azonus</i>	Okhostk atka mackerel	64.3	0.34	0.01000	3.0
<i>Pleuronectes platessus</i>	European plaice	100.0	0.12	0.00103	3.0
<i>Pleuronectes quadrituberculatus</i>	Alaska plaice	62.0	0.10	0.00114	3.0
<i>Pleuronichthys decurrens</i>	Curlfin sole	38.7	0.23	0.01000	3.0
<i>Pogonias cromis</i>	Black drum	170.0	0.17	0.00186	2.9
<i>Pollachius pollachius</i>	Pollack	130.0	0.19	0.00610	3.1
<i>Pollachius virens</i>	Saithe	130.0	0.17	0.00770	3.0
<i>Polydactylus quadrifilis</i>	Giant African threadfin	203.4	0.12	0.00124	3.1

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<i>Polyprion americanus</i>	Wreckfish	210.0	0.08	0.02340	2.9
<i>Polyprion oxygeneios</i>	Hapuka	150.0	0.08	0.00142	3.0
<i>Pomacanthus maculosus</i>	Yellowbar angelfish	52.0	0.16	0.01000	3.0
<i>Pomadasys argenteus</i>	Silver grunt	74.1	0.27	0.02670	2.9
<i>Pomadasys incisus</i>	Bastard grunt	50.0	0.22	0.08800	2.5
<i>Pomadasys jubelini</i>	Sompat grunt	60.0	0.30	0.00182	2.9
<i>Pomadasys kaakan</i>	Javelin grunter	80.0	0.57	0.06570	2.7
<i>Pomadasys stridens</i>	Striped piggy	21.1	0.51	0.01000	3.0
<i>Pontinus kuhlii</i>	Offshore rockfish	52.2	0.09	0.00820	3.2
<i>Priacanthus macracanthus</i>	Red bigeye	30.0	1.30	0.02100	2.8
<i>Prionace glauca</i>	Blue shark	400.0	0.16	0.00300	3.3
<i>Prolatilus jugularis</i>	Tilefish	41.7	0.26	0.01000	3.0
<i>Promethichthys prometheus</i>	Roudi escolar	100.0	0.18	0.00500	3.0
<i>Psenopsis anomala</i>	Melon seed	30.0	0.54	0.01000	3.0
<i>Psettichthys melanostictus</i>	West American sand sole	65.3	0.34	0.01000	3.0
<i>Psettodes belcheri</i>	Spottail spiny turbot	82.6	0.29	0.01000	3.0
<i>Psettodes bennettii</i>	Spiny turbot	57.1	0.42	0.01000	3.0
<i>Psettodes erumei</i>	Indian spiny turbot	64.0	0.56	0.00390	3.2
<i>Pseudocaranx dentex</i>	White trevally	125.1	0.06	0.00170	3.0
<i>Pseudochaenichthys georgianus</i>	South Georgia icefish	60.0	0.32	0.00080	3.7
<i>Pseudocyttus maculatus</i>	Smooth oreo	68.0	0.07	0.02900	2.9
<i>Pseudopercis semifasciata</i>	Pigletfish	102.8	0.11	0.00730	3.1
<i>Pseudophycis bachus</i>	Red codling	90.0	0.42	0.00970	3.0
<i>Pseudopleuronectes americanus</i>	Winter flounder	64.0	0.38	0.01000	3.0
<i>Pseudopleuronectes herzensteini</i>	Littlemouth flounder	50.0	0.20	0.00180	3.4
<i>Pseudotolithus elongatus</i>	Bobo croaker	47.0	0.42	0.00320	3.3
<i>Pseudotolithus senegalensis</i>	Cassava croaker	114.0	0.33	0.01000	3.0
<i>Pseudotolithus senegallus</i>	Law croaker	233.4	0.09	0.01000	3.0
<i>Pseudupeneus prayensis</i>	West African goatfish	55.0	0.53	0.00181	3.0
<i>Pterogymnus laniarius</i>	Panga seabream	45.0	0.18	0.02000	3.0
<i>Pteroscion peli</i>	Boe drum	33.5	0.54	0.00112	3.0
<i>Pterothrissus belloci</i>	Longfin bonefish	41.7	0.70	0.01000	3.0
<i>Pterygotrigla picta</i>	Spotted gurnard	36.0	0.24	0.01000	3.0
<i>Pterygotrigla polyommata</i>	Latchet	64.3	0.17	0.01000	3.0
<i>Raja asterias</i>	Starry ray	72.4	0.21	0.00180	3.3
<i>Raja clavata</i>	Thornback ray	105.0	0.21	0.00180	3.3
<i>Raja microocellata</i>	Small-eyed ray	82.6	0.12	0.00890	3.3
<i>Raja montagui</i>	Spotted ray	80.0	0.18	0.00180	3.2
<i>Raja stellulata</i>	Starry skate	78.5	0.19	0.01000	3.0
<i>Raja undulata</i>	Undulate ray	109.0	0.11	0.00210	3.3
<i>Reinhardtius evermanni</i>	Kamchatka flounder	100.0	0.13	0.00370	3.3

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<i>Reinhardtius hippoglossoides</i>	Greenland halibut	116.3	0.07	0.00300	3.3
<i>Rexea solandri</i>	Silver gemfish	121.7	0.15	0.00340	3.2
<i>Rhabdosargus globiceps</i>	White stumpnose	65.0	0.16	0.01000	3.0
<i>Rhabdosargus haffara</i>	Haffara seabream	36.6	0.23	0.01000	3.0
<i>Rhinobatos percellens</i>	Chola guitarfish	102.8	0.31	0.00810	2.8
<i>Rhinobatos planiceps</i>	Pacific guitarfish	78.8	0.41	0.01000	3.0
<i>Rhomboplites aurorubens</i>	Vermilion snapper	63.0	0.20	0.02340	2.9
<i>Rhynchobatus djiddensis</i>	Giant guitarfish	313.1	0.11	0.00380	3.1
<i>Ruvettus pretiosus</i>	Oilfish	303.2	0.09	0.01000	3.0
<i>Salilota australis</i>	Tadpole codling	52.0	0.31	0.00172	2.8
<i>Salmo salar</i>	Atlantic salmon	156.0	0.29	0.00920	3.0
<i>Salvelinus alpinus</i>	Charr	107.0	0.05	0.00157	3.1
<i>Sargocentron spiniferum</i>	Sabre squirrelfish	53.0	0.34	0.00154	3.1
<i>Sarpa salpa</i>	Salema	51.0	0.23	0.00134	3.0
<i>Saurida tumbil</i>	Greater lizardfish	60.0	0.70	0.00260	3.3
<i>Saurida undosquamis</i>	Brushtooth lizardfish	50.0	0.60	0.00600	3.0
<i>Scarus ghobban</i>	Blue-barred parrotfish	92.7	0.32	0.00165	3.0
<i>Scarus persicus</i>	Gulf parrotfish	52.0	0.27	0.01000	3.0
<i>Schedophilus ovalis</i>	Imperial blackfish	102.8	0.12	0.01000	3.0
<i>Schedophilus pamarco</i>	Pamarco blackfish	52.0	0.23	0.01000	3.0
<i>Sciaena umbra</i>	Brown meagre	70.0	0.11	0.03520	3.0
<i>Sciaenops ocellatus</i>	Red drum	155.0	0.46	0.00770	3.1
<i>Scolopsis taeniatus</i>	Black-streaked monocle bream	37.6	0.43	0.01000	3.0
<i>Scomberoides commersonianus</i>	Talang queenfish	123.1	0.16	0.00150	2.9
<i>Scomberomorus cavalla</i>	King mackerel	184.0	0.28	0.00830	3.0
<i>Scomberomorus regalis</i>	Cero	186.4	0.17	0.02020	2.8
<i>Scophthalmus aquosus</i>	Windowpane	45.7	0.24	0.01000	3.0
<i>Scophthalmus maximus</i>	Turbot	100.0	0.26	0.00168	2.9
<i>Scophthalmus rhombus</i>	Brill	75.0	0.50	0.00143	2.9
<i>Scorpaena porcus</i>	Black scorpionfish	37.0	0.16	0.00176	3.0
<i>Scorpaena scrofa</i>	Largescaled scorpionfish	57.2	0.08	0.03130	2.8
<i>Scorpaenichthys marmoratus</i>	Cabezon	99.0	0.34	0.01000	3.0
<i>Scyliorhinus canicula</i>	Smallspotted catshark	100.0	0.53	0.00160	3.2
<i>Scyliorhinus stellaris</i>	Nursehound	173.4	0.11	0.01000	3.0
<i>Sebastes alutus</i>	Pacific ocean perch	53.0	0.12	0.00500	3.2
<i>Sebastes flavidus</i>	Yellowtail rockfish	66.0	0.16	0.01000	3.0
<i>Sebastes goodei</i>	Chilipepper	56.6	0.18	0.01000	3.0
<i>Sebastes marinus</i>	Ocean perch	100.0	0.06	0.01000	3.0
<i>Sebastes melanops</i>	Black rockfish	65.3	0.10	0.01000	3.0
<i>Sebastes paucispinis</i>	Bocaccio	92.4	0.11	0.01000	3.0

Scientific name	Common name	Asymptotic length (cm)	Growth parameter K (year ⁻¹)	a	b
<i>Sebastes pinniger</i>	Canary rockfish	76.0	0.14	0.01000	3.0
<i>Sebastes viviparus</i>	Norway redfish	36.0	0.07	0.00115	3.1
<i>Sebastolobus alascanus</i>	Shortspine thornyhead	82.6	0.02	0.01000	3.0
<i>Selene dorsalis</i>	African moonfish	38.6	0.60	0.04280	2.7
<i>Selene setapinnis</i>	Atlantic moonfish	62.2	0.63	0.00156	2.9
<i>Semicossyphus pulcher</i>	California sheephead	93.7	0.16	0.01000	3.0
<i>Seriola dumerili</i>	Greater amberjack	190.0	0.25	0.02400	2.9
<i>Seriola lalandi</i>	Yellowtail amberjack	250.0	0.14	0.05620	2.8
<i>Seriolella brama</i>	Common warehou	78.5	0.16	0.01000	3.0
<i>Seriolella porosa</i>	Choicy ruff	38.3	0.36	0.00470	3.3
<i>Seriolella punctata</i>	Silver warehou	66.0	0.41	0.00850	3.2
<i>Seriolina nigrofasciata</i>	Blackbanded trevally	72.4	0.26	0.01000	3.0
<i>Serranus cabrilla</i>	Comber	40.0	0.11	0.02520	2.8
<i>Sillago sihama</i>	Silver sillago	31.0	0.75	0.00510	3.2
<i>Solea senegalensis</i>	Senegalese sole	62.2	0.15	0.00670	3.1
<i>Solea solea</i>	Common sole	70.0	0.26	0.00620	3.0
<i>Spaniblennius rioudourensis</i>	Rio de Oreo blenny	5.5	1.13	0.01000	3.0
<i>Sparisoma cretense</i>	Parrotfish	50.0	0.30	0.00570	3.3
<i>Sparus auratus</i>	Gilthead seabream	70.0	0.37	0.00140	3.0
<i>Sparus hasta</i>	Sobaity seabream	52.0	0.35	0.00116	3.0
<i>Sphoeroides maculatus</i>	Northern puffer	36.0	0.61	0.01000	3.0
<i>Sphyraena barracuda</i>	Great barracuda	200.0	0.09	0.02670	2.9
<i>Sphyraena jello</i>	Pickhandle barracuda	164.5	0.10	0.00140	2.8
<i>Sphyraena obtusata</i>	Obtuse barracuda	55.0	0.50	0.00700	2.9
<i>Sphyrna lewini</i>	Scalloped hammerhead	430.0	0.07	0.00280	3.1
<i>Sphyrna zygaena</i>	Smooth hammerhead	501.3	0.08	0.00140	3.3
<i>Spicara maena</i>	Blotched picarel	25.0	0.31	0.00125	3.0
<i>Spondyliosoma cantharus</i>	Black seabream	60.0	0.18	0.00151	3.0
<i>Squalus acanthias</i>	Piked dogfish	160.0	0.04	0.00310	3.1
<i>Squatina argentina</i>	Argentine angelshark	173.4	0.12	0.01000	3.0
<i>Squatina squatina</i>	Angelshark	186.4	0.08	0.03460	2.7
<i>Stenotomus chrysops</i>	Scup	46.0	0.27	0.01000	3.0
<i>Stephanolepis cirrhifer</i>	Thread-sail filefish	31.5	0.26	0.01000	3.0
<i>Stereolepis gigas</i>	Giant sea-bass	253.4	0.05	0.01000	3.0
<i>Stromateus fiatola</i>	Blue butterflyfish	52.0	0.29	0.01000	3.0
<i>Symphodus melops</i>	Corkwing wrasse	28.0	0.31	0.00650	3.2
<i>Synagrops japonicus</i>	Japanese splitfin	36.6	0.25	0.01000	3.0
<i>Takifugu vermicularis</i>	Pear puffer	31.5	0.33	0.01000	3.0
<i>Tautoga onitis</i>	Tautog	91.0	0.09	0.02630	3.0
<i>Tautogolabrus adspersus</i>	Cunner	38.0	0.20	0.00270	3.4
<i>Thalassoma pavo</i>	Ornate wrasse	26.3	0.24	0.01000	3.0
<i>Theragra chalcogramma</i>	Alaska pollack	91.0	0.41	0.00104	2.9
<i>Thyrsites atun</i>	Snoek	203.4	0.19	0.00940	2.9

Scientific name	Common name	Asymptotic length (cm)	Growth parameter K (year ⁻¹)	a	b
<i>Thyrsitops lepidopoides</i>	White snake mackerel	41.7	0.34	0.00220	3.3
<i>Totoaba macdonaldi</i>	Totoaba	203.4	0.08	0.01000	3.0
<i>Trachinotus blochii</i>	Snubnose pompano	113.0	0.16	0.08800	2.6
<i>Trachinotus carolinus</i>	Florida pompano	66.3	0.29	0.04530	2.3
<i>Trachinotus mookalee</i>	Indian pompano	92.7	0.21	0.01000	3.0
<i>Trachurus declivis</i>	Greenback horse mackerel	64.0	0.20	0.00960	3.0
<i>Trachurus japonicus</i>	Japanese jack mackerel	50.0	0.38	0.01000	3.0
<i>Trachurus lathami</i>	Rough scad	40.0	0.17	0.00105	2.9
<i>Trachurus picturatus</i>	Blue jack mackerel	62.2	0.30	0.00820	3.1
<i>Trachurus trecae</i>	Cunene horse mackerel	46.3	0.26	0.00139	3.0
<i>Trachyrincus scabrus</i>	Roughsnout grenadier	60.0	0.35	0.01000	3.0
<i>Trachyscorpia cristulata</i>	Atlantic thornyhead	52.0	0.10	0.01000	3.0
<i>Trematomus eulepidotus</i>	Blunt scalyhead	35.6	0.24	0.00210	3.6
<i>Trematomus hansonii</i>	Striped rockcod	42.8	0.22	0.00140	3.6
<i>Trichiurus lepturus</i>	Largehead hairtail	234.0	0.25	0.00020	3.3
<i>Trigla lyra</i>	Piper gurnard	74.9	0.11	0.00106	2.9
<i>Tripterygius gilchristi</i>	Grenadier cod	34.5	0.45	0.01000	3.0
<i>Trisopterus esmarkii</i>	Norway pout	35.0	0.52	0.00660	3.0
<i>Trisopterus luscus</i>	Pouting	46.7	0.21	0.00120	3
<i>Umbrina canosai</i>	Argentine croaker	41.7	0.26	0.00148	3.0
<i>Umbrina cirrosa</i>	Shi drum	86.5	0.28	0.00119	3.0
<i>Urophycis brasiliensis</i>	Brazilian codling	41.7	0.28	0.00400	3.2
<i>Urophycis chuss</i>	Red hake	66.0	0.19	0.01000	3.0
<i>Urophycis tenuis</i>	White hake	136	0.11	0.00400	3.2
<i>Valamugil seheli</i>	Bluespot mullet	60.2	0.23	0.03720	2.6
<i>Variola louti</i>	Yellow-edged lyretail	83.0	0.18	0.00122	3.1
<i>Zenopsis conchifer</i>	Silvery John dory	82.6	0.23	0.00142	3.0
<i>Zenopsis nebulosus</i>	Mirror dory	72.4	0.11	0.00164	3.0
<i>Zeus faber</i>	John dory	90.0	0.29	0.02300	2.9
<i>Zoarces americanus</i>	Ocean pout	122.0	0.11	0.01000	3.0
<i>Zoarces viviparus</i>	Viviparous blenny	52.0	0.19	0.00190	3.2

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