Trait-based analyses reveal global patterns in diverse albacore tuna diets

Journal:	*Fish and Fisheries*
Manuscript ID	FaF-22-Dec-OA-372
Wiley - Manuscript type:	Original Article
Date Submitted by the Author:	05-Dec-2022
Complete List of Authors:	Hardy, Natasha; University of Alberta, Biological Sciences Matuch, Cindy; University of California Santa Cruz Roote, Zachary; University of Alberta, Biological Sciences George, Iris; University of Alberta, Biological Sciences Muhling, Barb; University of California Santa Cruz Institute of Marine Sciences; NOAA Fisheries Southwest Fisheries Science Center Jacox, Michael; NOAA Fisheries Southwest Fisheries Science Center Environmental Research Division; NOAA Physical Sciences Laboratory Hazen, Elliott; NOAA Fisheries Southwest Fisheries Science Center; NOAA Fisheries Southwest Fisheries Science Center Environmental Research Division Bograd, Steven; University of California Santa Cruz Institute of Marine Sciences; NOAA Fisheries Southwest Fisheries Science Center Environmental Research Division Crowder, Larry; Stanford University Hopkins Marine Station Green, Stephanie J.; University of Alberta, Biological Sciences
Key terms:	Highly migratory species, Macro-ecology, Functional biogeography, Pelagic predators, Predator-prey interactions, Tuna
Abstract:	Simplifying complex species interactions can facilitate prediction of changes in ecosystem function and structure under climate change. This is particularly important for highly migratory pelagic predators, which exploit diverse prey fields as they respond to dynamic environments. We reconstructed the historical resource use of albacore tuna (Thunnus alalunga) globally and confirmed highly biodiverse diets with 308 prey identified to species, and 279 at lower taxonomic resolution. We quantitatively synthesised prey diversity into 7 functional trait guilds using four traits that influence predator-prey encounter rates – prey habitat association, seasonal and diel vertical migration behaviour – using hierarchical divisive clustering algorithms. We further explore variability in historical composition of albacore diets across geographies based on species identity, individual trait information, and functional trait guilds using a multi-matrix modelling framework. Species-based diet composition was highly variable across geographies and years sampled. Trait-based models of albacore diets highlight the historical importance of near-surface epipelagic prey resources from coastal to oceanic habitats, and seasonally-migrating continental shelf prey, compared to less frequent pulses of deeper water and demersal taxa. Our results indicate that trait information and trait guilds serve as useful

	classification frameworks for identifying functionally redundant food web linkages involving biodiverse prey, and will prove useful in tracking predators' foraging responses to changing ecological states.

Title: Trait-based analyses reveal global patterns in diverse albacore tuna diets

Authors: Natasha A. Hardy*[1], Cindy Matuch[2], Zachary Roote[1], Iris George[1], Barbara A. Muhling[3,4], Michael G. Jacox[5,6], Elliott L. Hazen[4,5], Steven J. Bograd[3,5], Larry B. Crowder[7], Stephanie J. Green[1]

Corresponding authors: nahardy.wildlife@gmail.com & stephanie.green@ualberta.ca; Department of Biological Sciences, CW 422 Biological Sciences Building, University of Alberta, Edmonton, Alberta, Canada, T6G 2E9

Author affiliations

[1] Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada

[2] University of California Santa Cruz, Santa Cruz, CA, United States

[3] Institute of Marine Sciences, University of California Santa Cruz, Santa Cruz, CA, United States

[4] NOAA Southwest Fisheries Science Center, La Jolla, CA, United States

[5] NOAA Southwest Fisheries Science Center, Environmental Research Division, Pacific Grove, CA, United States

[6] NOAA Physical Sciences Laboratory, Boulder, CO, United States

[7] Hopkins Marine Station of Stanford University, Pacific Grove, CA, United States

Abstract

Simplifying complex species interactions can facilitate prediction of changes in ecosystem function and structure under climate change. This is particularly important for highly migratory pelagic predators, which exploit diverse prey fields as they respond to dynamic environments. We reconstructed the historical resource use of albacore tuna (*Thunnus alalunga*) globally and confirmed highly biodiverse diets with 308 prey identified to species, and 279 at lower taxonomic resolution. We quantitatively synthesised prey diversity into 7 functional trait guilds using four traits that influence predator-prey encounter rates – prey habitat association, seasonal and diel vertical migration behaviour – using hierarchical divisive clustering algorithms. We further explore variability in historical composition of albacore diets across geographies based on species identity, individual trait information, and functional trait guilds using a multi-matrix modelling framework. Species-based diet composition was highly variable across geographies and years sampled. Trait-based models of albacore diets highlight the historical importance of near-surface epipelagic prey resources from coastal to oceanic habitats, and seasonally-migrating continental shelf prey, compared to less frequent pulses of deeper water and demersal taxa. Our

results indicate that trait information and trait guilds serve as useful classification frameworks for identifying functionally redundant food web linkages involving biodiverse prey, and will prove useful in tracking predators' foraging responses to changing ecological states.

Table of Contents

1. Introduction

Pelagic ecosystems are among the last frontiers on Earth, politically and ecologically. Yet stressors such as climate change and intensive fishing efforts (Casini et al., 2009; Poloczanska et al., 2016) are altering the distributions and composition of pelagic communities (Hazen et al., 2013; Cheung et al., 2015; Morley et al., 2018), causing widespread species extirpations and undesirable ecosystem states (Polovina et al., 2011; Molinos et al., 2016). Altered pelagic ecosystem states can lead to changes in fisheries production and uncertain economic futures (Cheung et al., 2010; Blenckner et al., 2015; Free et al., 2019). Within pelagic systems, highly migratory predators such as tunas and billfishes contribute to valuable and extensive

77 international fisheries (Sala et al., 2018). These species evolved to migrate across ocean basin
78 scales in order to exploit seasonal food resources for growth and warmer waters for reproduction
79 (Mariani et al., 2016). However, anomalies and long-term changes in climate are producing
80 mismatches among predator migration and the productivity of forage resources, with
81 implications for fisheries productivity (Thackeray et al., 2010; Scheffers et al., 2016).
82 Accounting for trophic interactions is often the missing link to forecasting species
83 redistributions under climate change (Lan et al., 2021; Green et al., 2022), especially for highly
84 migratory marine species (Muhling et al., 2019). Marine species redistributions are typically
85 predicted on the basis of habitat use and changing physical oceanographic properties (Morley et
86 al., 2018). Despite empirical relationships between the biomass of prey species and their
87 prevalence in predator diets, efforts to model predator distributions in relation to the distribution
88 of key prey are often plagued by numerous issues including the accuracy of prey distribution
89 information (Muhling et al. 2019), the number and functional redundancy of interacting species
90 (Link, 2007; Carroll et al., 2019). These hurdles may be overcome by modelling functional
91 ecological relationships using synthetic parameters, or traits (Zakharova et al., 2019; Green et al.
92 2022).

Trait-based approaches to modelling predator-prey interactions aim to simplify taxonomically complex interactions among hundreds of species to synthetic and non-taxonomic predictors for those relationships, positioning scientists to predict ecological outcomes in new contexts (McGill et al., 2006; Kiørboe et al., 2018; Green et al., 2022). For example, the strength of predator-prey interactions can be modelled as a function of single or multiple individual prey trait variables influencing the predation process (Arrizabalaga-Escudero et al., 2019; Green et al., 2022). Additionally functional groupings of prey into 'guilds' are a common ecological practice of dimension or variable reduction (Pomerleau et al., 2015; Parravicini et al., 2020), based on shared traits describing similar roles for those species in ecosystem processes (Gitay & Noble, 1997) in order to model complex species distribution and interactions.

Trait-based approaches may be particularly useful for tunas – that have taxonomically broad diets (Duffy et al., 2017; Pethybridge et al., 2018) and there is little evidence for the influence of predator size on prey size selection (Romanov et al., 2020). While these foraging properties make them salient indicator species to track changing prey communities and predator-prey interactions under climate change, they also make them excellent candidates for trait-based modelling to synthesise complex interactions with numerous prey species and investigate

evidence for selection for certain types of forage (Glaser, 2010; Valls et al., 2022). Previous diet analyses related shifts and niche partitioning in the diets of yellowfin, bluefin, bigeye and albacore tunas across predator species, latitude, predator life stage, environmental drivers (Allain et al., 2012; Young et al., 2015; Duffy et al., 2017; Pethybridge et al., 2018; Portner et al., 2022; Valls et al., 2022; Nickels et al., 2023), and shifts in albacore distribution have been linked to prey availability (Pearcy, 1973). Many of these studies hypothesise about the role of traits in driving observed patterns and shifts. However, the extent to which trait information could explicitly be used to explain tuna foraging ecology across space and time and predict their resource use under changing environmental states remains poorly understood.

Using albacore (*Thunnus alalunga*) as a case study, we seek to move beyond descriptive diet analyses to identifying non-taxonomic predictors for trophic relationships in highly-migratory pelagic predators and commercially valuable species. Our synthesis aggregates historical data on albacore diets from published and grey literature dating from 1880–2020 globally. Our aims are threefold, to: (1) reconstruct historical resource use for albacore across geographies from published aggregate mean diet composition data, (2) use functional traits to distil diverse predator-prey interactions into key trait-based guilds, and (3) explore species-based and trait-based variability in the historical composition of albacore diets across the geographies sampled.

2. Methods

2.1 Historical diet data collation

Our synthesis required quantitative data on adult or juvenile albacore diet composition obtained from stomach content analyses that identified consumed prey to species-level. To obtain these data, we compiled published and grey literature, research theses, and historical reports for albacore diets by searching bibliographic databases (Table S1) queried from 1900 until 2020 using diet analysis search terms and synonymous scientific names for albacore (*Thunnus alalunga*; Supporting Information, Table S1). We also investigated diet reports cited within articles, which expanded our range to include several reports from the 1880s. Studies typically reported a mix of data types (i.e., frequency of occurrence and other metrics).

We obtained diet data from 26 studies that were suitable for meta-analysis (Supporting Information, Table S2); this included 69 independent, aggregate (i.e. by geographic region, year, or season sampled) observations of adult and juvenile albacore diet composition, from 1880–2015 (Supplementary Data, Table S3). We digitised and transcribed data reported typically for a specific geographic location (Figure 1a), year, and season sampled. However, several reports presented information that was further aggregated for multi-year sampling programs (Table S3) and for analyses in these cases, we use the last year of sampling completed. Albacore were typically collected either via scientific sampling programs (i.e., National Oceanic and Atmospheric Administration [NOAA], Centre National de la Recherche Scientifique [CNRS]),

149 or in collaboration with commercial fishing operations (Bello, 1999; Joubin & Rouie, 1918;
150 Glaser et al., 2015; Romanov et al., 2020), and using surface troll, pole-and-line, longlining at
151 specified depths, or purse seining gear (Table S3).
152
153 *2.2 Prey life stage estimation*
154
155 Albacore consume post-larval and juvenile prey as well as adult life stages. Given that traits
156 could vary between life stages for many species, we aimed to match traits to the life stage most
157 commonly consumed by albacore predators for each prey species. Of the 308 prey recorded to
158 species, 72 (or 23%) had associated life stage information reported within their corresponding
159 diet study, with 42 reported as post-larvae, young-of-year, or juveniles, and 37 species consumed
160 as adults (Supplementary Information, Figure S1). Albacore rarely consumed larvae (i.e., 11
161 species in total). Of these 72 species, 13 were reported at multiple life stages in albacore diets,
162 however, one life stage was typically dominant across diet studies (i.e., with an order of
163 magnitude greater frequency of occurrence than any other life stage). For example, of 11 species
164 with reported consumption of the larval life stage, 6 species were typically consumed as
165 juveniles (i.e. across multiple studies) and thus were assigned as juveniles for the purpose of this
166 meta-analysis (Supplementary Data, Table S4; Supplementary Information, Figure S1).
167 When life stage information was not provided, it was necessary to estimate prey life stage
168 from available information on the size and age class of either the predator or prey in a given
169 study (Figure S1; Table S4). For an additional 15 species (nearly 5% of species), prey length

information was reported but not life stage. Reported total lengths ranged from 1.5–24.5 cm, and these prey species' life stages were inferred relative to their known length at maturity (Figure S1; Table S4). The remaining 221 species (72% of the species) were identified in albacore diets without metainformation and assumed to be either juveniles or adults. Trait information was often similar between juvenile and adult life stages (Gleiber et al., 2022). Thus for 127 of these taxa (41% of the species), no further estimation of prey life stage was needed.

Trait information differed by life stage for 94 prey species (31% of the species) remaining; for example, these could include a benthic adult with a pelagic juvenile life stage (Figure S1). Here, the most plausible life stage consumed was then assessed on a case-by-case basis (Table S4). As albacore are epipelagic predators, the pelagic stage of these prey was most likely consumed, and albacore are more likely to consume smaller juvenile prey, for example epipelagic juvenile hake (less than 10 cm and up to 20 cm length) than benthopelagic adult hake (~40–90 cm) (Bailey et al., 1982). We corroborated these decisions based on calculated maxillary length (or 'gape limit') for albacore sampled to determine whether adult prey could feasibly have been consumed from a published relationship between length and gape for closely-related yellowfin tuna (Ménard et al., 2006). Depending on the data reported, we used either a measured maximum albacore fork length (FL) (51 species [16%]), or an estimated maximum FL for the population of albacore sampled for each study that did not measure or report albacore lengths sampled (43 species [14%]), as inputs to the equation (Figure S1) (Ménard et al., 2006). Where albacore lengths were not reported, we matched gear-specific length data (range and mean FL) from relevant regional fisheries management organisations (ICCAT, 2020; ISC, 2006) to albacore diet studies by year. There was no significant difference between the variances of

mean, minimum and maximum FL for studies where these parameters were measured or where these parameters were estimated in this study (Figure S2). This process of estimating albacore length information resulted in estimated gape limits of 6.4–11.5 cm across studies and locations sampled, and affected only 14% of decisions on prey life stage and selection of appropriate trait information (Figure S1). Further detail in estimating the mean and range in albacore lengths for a given study are further described in Supplementary Information (Supplementary Information, Appendix B). Overall, our synthesis uses the following prey life stages consumed by albacore: 5 larval life stages, 210 juveniles, and 93 adult prey (Supplementary Data, Table S5).

2.3 Prey trait information

For each prey species and life stage (i.e., larva, juvenile, adult), we collected information for four habitat use traits known to affect the likelihood of pelagic predators encountering and consuming prey (Green et al., 2019). These were: (i) vertical and (ii) horizontal habitat association, (iii) presence of diel vertical migration, and (iv) presence of seasonal migration and seasonal aggregation behaviour (Table 1; Table S5). These trait data were compiled for a broader database of traits that inform predator-prey interactions for albacore (Gleiber et al., 2022). We further describe how prey species' trait values were used in Supporting Information, Appendix C.

2.4 Trait-based analyses

All data manipulation, statistical analysis and graphical illustrations were performed in *R* (version 4.2.1) (R Core Team, 2022).

Taxonomic and trait diversity in albacore diets

Species accumulation was calculated and plotted using *BiodiversityR* (version 2-14.1; Kindt & Coe, 2005) in relation to ocean basins where sampling locations occurred and the final year sampled (n = 69 observations) by each study (n = 26). Prey species' phylogenetic information were extracted from the Open Tree of Life Data using the package *rotl* (version 3.0.12) (Michonneau et al., 2016) and parsed to a phylogenetic tree using *ape* (version 5.6-2) (Paradis & Schliep, 2019) and *stringr* (version 1.4.0) (Wickham, 2021) with integrated species-specific trait information displayed using *ggtree* (v3.3.1.900) (Yu et al., 2017) to visualise relationships between taxonomic and trait diversity in the data.

Albacore prey trait guilds

229 For the 292 prey species with complete trait information, key prey trait guilds were identified
230 using a divisive hierarchical clustering algorithm (Anderberg, 1973; Legendre & Legendre,
231 1998) on a Gower dissimilarity matrix (Gower, 1971) to identify relational structure among
232 albacore prey in relation to ecological trait data for the four habitat use variables: two binomial
233 variables (seasonal and diel vertical migration) and two multi-level categorical variables (vertical
234 and horizontal habitat use) (Table 1; Supplementary Data, Table S4) using the *diana* algorithm in
235 *vegan* (v2.5-7) (Oksanen et al., 2020) and *cluster* (v2.1.2) (Maechler et al., 2021) and visualised
236 with *ggplot2* (v3.3.5) (Wickham, 2016) and *dendextend* (v1.15.2) (Galili, 2015).
237 We used a consensus approach for validating cluster results – optimising cluster selection
238 and partition by assessing several stability and internal validation metrics (Supplementary Data,
239 Table S6) (Brock et al., 2008) and visualised using non-metric multidimensional scaling (nMDS)
240 plots (Field et al., 1982) using *vegan*. Specifically, we assessed: (1) inter-cluster variation –
241 maximum separation of species between clusters – indicated by higher average distance between
242 species clusters (Rousseeuw, 1987); (2) intra-cluster variance or minimum separation of species
243 within clusters indicated by lower average distance within species clusters (Handl et al., 2005);
244 (3) high silhouette width coefficient value and Dunny Smith residuals (Dunn†, 1974;

245 Rousseeuw, 1987) representing optimal cluster compactness and separation qualities; and lastly,
246 (4) optimal evenness or balance of cluster composition indicated by the number of species in
247 each cluster (Legendre & Legendre, 1998). Trait values that influence a species' occupancy
248 within a cluster were visualised using heat maps illustrating the importance of trait values to the
249 composition of each cluster.
250
251 *Trait-based vs taxonomic diet variation*
252
253 Historical albacore diet composition across geographies were visualised using frequency of
254 occurrence data from 26 studies that yielded 60 observations of diet composition, because the
255 other 3 studies in this dataset and their 9 observations included presence only data. To visualise
256 overall contributions of prey trait guilds to albacore diets, we calculated a normalised index of
257 contribution for each prey species relative to (i) the trait guild they were classified in and (ii) the
258 sum of frequency of occurrence data within each observation per study. Of note, several species
259 with incomplete trait information are therefore 'not classified' with trait guilds and are included
260 in illustrations of diet composition.
261 For further statistical analysis of trait-based variance in albacore diet composition across
262 geographies, all data from the 26 studies and 69 observations were transformed to
263 presence/absence to meet the model data distribution requirements. Poorly sampled locations
264 were excluded from analyses (samples from South Pacific, South Atlantic and Indian Oceans),

as well as rare species that only occurred once or twice in this reduced dataset. We therefore compare the diet composition for albacore from sampling locations in the North Pacific (samples mainly come from the California Current System), North Atlantic (largely representing North Atlantic Drift), and Mediterranean Sea, providing us with 57 observations of albacore diet composition and including 98 species.

We use a fourth-corner, model-based approach (Dray & Legendre, 2008; Brown et al., 2014), which builds on the generalised linear modelling (GLM) framework (Nelder & Wedderburn, 1972) to simultaneously test how the composition of albacore diets (L matrix of species presence/absence) differed as a function of two different types of explanatory variables: an environmental variable (R matrix, here containing geographic locations sampled) and prey trait information (Q matrices), producing the trait-environment interaction (QxR) or the fourth corner solution to a multi-matrix problem. We therefore built 3 models to test the role of species identity (no traits) or two types of trait information (individual trait values Q1 and seven trait guilds Q2), and geographic location (R) in explaining the presence of prey types (L) across the global data set (Table 2).

We used a binomial distribution for presence/absence data, analysed via logistic regression (with logit link function) using the *traitglm* function in the R package *mvabund* (version 4.1.12) (Wang et al., 2021). We include a species effect in models (i.e., a different intercept term for each species), akin to fitting a random effect variable to account for differences in absolute number of species occurrences (Brown et al., 2014; Wang et al., 2021). Additionally, models were fit with a LASSO penalty, specifying the fitting method as '*glm1path*', using penalised likelihood to impose a constraint on estimates of model parameters (Hastie et al., 2009;

287 Brown et al., 2014). This constraint shrinks coefficients to zero when not statistically significant,
288 providing a combined approach for variable selection, p-value adjustment for multiple models,
289 and parameter estimation to evaluate the magnitude and significance of an explanatory variable
290 (Hastie et al., 2009). Trait-environment relationships for individual trait variables and
291 constructed trait guilds were illustrated as heat maps indicating the interaction strength, and
292 positive or negative correlation between trait information and geographies sampled. Model fit
293 was assessed by plotting multivariate residuals against fitted values and plotting quantile-
294 quantile (Q-Q) plots. Multivariate data were previously screened for broad trends using
295 conditional boxplots (Zuur et al., 2010), for overdispersion and outliers by nMDS plots (Field et
296 al., 1982) using *vegan*. All model assumptions were met.
297
298 **3. Results**
299
300 *3.1 Taxonomic and trait diversity in albacore diets*
301

Our synthesis reveals the large biodiversity of prey consumed by albacore globally (Figure 1). Prey hailed from 7 classes representing 203 families; mainly of ray-finned fishes (n = 108 families of prey), cephalopods (n = 29), and crustaceans (Malacostraca n = 45, Hexanauplia n = 6), and also including pelagic gastropods (n = 6), salps (n = 2), one appendicularian, one branchiopod, one hydrozoan, and one elasmobranch (an unknown Squalidae species) (Supplementary Information, Figure S3). Of these, 308 taxa were reported to species level, with a further 279 taxa identified at variable resolutions from genus to order. Whilst the rate of species accumulation appears to level off in well-sampled locations such as the North Pacific, North Atlantic, and in the Mediterranean Sea (Figure 1b/c), an unknown and likely just as large diversity of prey remains to be studied in the South Pacific, South Atlantic, and Indian Oceans (Figure 1b/c). Additionally, out of 308 prey species, 201 were observed in < 10% of stomach samples within any study (Figure S3). Individual traits varied across phylogeny and recurred across unrelated prey taxa (Figure 2).

3.2 Albacore prey trait guilds

318 We obtained complete trait information for 292 prey species and these were optimally classified
319 into seven trait guilds reflecting different combinations of four traits affecting predator-prey
320 encounter processes (Table 1, Figure 3a). We selected 7 clusters by optimising cluster validation
321 outputs: (1) higher average distance between species clusters (Rousseeuw, 1987); (2) lower
322 average distance within species clusters (Handl et al., 2005); (3) high silhouette width coefficient
323 value and Dunny Smith residuals (Dunn†, 1974; Rousseeuw, 1987); and lastly, (4) optimal
324 evenness or balance of cluster composition indicated by the number of species in each cluster
325 (Legendre & Legendre, 1998) (Supplementary Data, Table S6).

326 The most taxonomically abundant trait guild consisted of diel migrating mesopelagics
327 (trait guild 2), distinct from the non-diel migrating mesopelagics (1) and least taxonomically
328 abundant (Figure 3). The second and third most abundant groups included the oceanic (or
329 'offshore') epipelagics (5) and coastal and shelf epipelagics (3), followed by seasonal,
330 continental shelf taxa (6) and resident continental shelf taxa (7). Finally, the rarest prey guild
331 globally was the coastal and shelf demersal taxa (4). The hierarchical divisive clustering
332 technique for 7 optimal clusters performed well in grouping taxa that are also clustered based on
333 their trait values in multivariate space (Figure 3b; Supplementary Information, Figure S4).

334

335 *3.3 Historical trait-based albacore diet composition*

336

337 Almost all trait guilds were observed in albacore diets in nearly all locations sampled (Figure 4) .
338 The Mediterranean was characterised by a relatively high contribution of samples containing
339 seasonal shelf taxa, with pulses of resident shelf taxa, diel migrating mesopelagics and oceanic
340 epipelagics at different points in time (Figure 4). North Atlantic samples were also characterised
341 by high prevalence of samples containing the seasonal shelf taxa and resident shelf taxa (Figures
342 4 & 5), the latter group mainly prevalent in earlier 1930's samples alongside consistent albeit
343 relatively low prevalence of non-diel migrating mesopelagics at that time. From 1968 however,
344 North Atlantic samples oscillate between higher contributions of the seasonal shelf taxa, coast
345 and shelf epipelagics and oceanic epipelagics. These guilds were also highly prevalent in North
346 Pacific diets, and samples from this basin were also characterised by oscillations between coast
347 and shelf epipelagics and oceanic epipelagics (Figures 4 & 5),. Oceanic epipelagics appeared to
348 dominate South Pacific sampling in most years, with intermittent higher prevalences of seasonal
349 shelf taxa and non-diel migrating mesopelagics. Notably in this region, a relatively high
350 contribution of unclassified species were observed in albacore diets lacking complete trait
351 information. Indian Ocean observations were few in number, and diets varied including two
352 important seasons for resident shelf taxa, one season dominated by coast and shelf epipelagics,
353 and consistent but low prevalences of non-diel migrating mesopelagics.

354 Overall, non-diel migrating mesopelagics were primarily observed in diets prior to 1950's
355 samples from the North Atlantic and with high prevalence in select years in the mid-2010s in the
356 Indian and South Pacific Oceans. The coast and shelf demersals were the rarest group across

357 geographies, and observed mainly in North Pacific samples in the 1940's and North Atlantic
358 samples from 1957. Due to low sample sizes, data from locations in the South Pacific, South
359 Atlantic, and Indian Oceans are illustrated (Figure 4) but were not used in further trait-based
360 models. Taxonomic variation in regional dietary signatures (Supplementary Information, Figure
361 S5) was significantly mediated by trait information and trait guilds, particularly for samples from
362 the North Pacific and the Mediterranean (Figure 5).
363

364 ## 4. Discussion

365

366 *4.1 Synthesis of albacore diet diversity and historical trait relationships*

367

368 We reconstructed historical resource use for albacore tuna (*Thunnus alalunga*) globally,
369 highlighting biodiverse diets in this predator (n = 308 prey identified to species, plus an
370 additional 279 prey taxa identified to genus or higher). We quantitatively synthesised this large
371 prey diversity into 7 functional trait guilds using four sets of traits influencing predator-prey
372 encounter rates: prey habitat association, seasonal and diel vertical migration behaviour.
373 Importantly, this study identifies both taxonomic and trait-based variability in diets of albacore
374 tuna globally, and identifies trait-based dietary signatures in albacore beyond taxonomic
375 variability.

376 Our results indicate that both trait information and constructed functional trait guilds
377 serve as useful and rapid classification tools for tracking large-scale shifts in albacore diets in
378 time and space. Importantly, trait-based frameworks enable functional simplification of diverse
379 prey and functionally redundant food web linkages (Link, 2007), especially involving highly
380 migratory pelagic predators. A traits approach may be of particular use for retaining data on diets
381 containing less common species in analysis such as species distribution models and network-
382 based food web models, as these typically risk being excluded from analyses seeking to
383 investigate predator-prey interactions due to insufficient data or insufficient weighting of these
384 species in models. Rare prey species likely contribute to diet characterization in sharing forms of
385 traits likely to be consumed with more common prey species. Thus, trait values or trait guilds are
386 more tractable analytical currencies for ecologists in the context of changing species distributions
387 and trophic interactions (Green et al., 2022). In applying traits to analysing ecological
388 interactions, it will be important to quantify the extent to which traits recur across unrelated taxa
389 (i.e. phylogenetically conserved or not) (Ives & Helmus, 2011). Trait and phylogenetic
390 information are likely not redundant and ideally should both be accounted for in modelling
391 frameworks (Ovaskainen et al., 2017), as both provide different and useful information in
392 characterising trophic interactions between albacore and their prey.

Traits have proven useful in describing albacore foraging dynamics in prior studies. In the South Pacific, previous studies describe albacore diets as largely consisting of mesopelagic and epipelagic prey, and to a lesser extent include surface migrating bathypelagic and coastal reef-associated taxa (Allain, 2005; Allain et al., 2012; Young et al., 2019). Albacore diets in the Indian Ocean have previously been characterised by a reliance on mixed epipelagic to mesopelagic resident prey stocks (Romanov et al., 2020). Our reanalysis of these data within the global synthesis corroborated and extended these previous descriptive observations.

Trait information was rarely used in an explanatory capacity in the North Pacific, North Atlantic and Mediterranean. Most studies from the North Atlantic and Mediterranean, home to some of the earliest and most detailed investigations of albacore diets (especially from the 1930's; Bouxin & Legendre, 1936; Legendre, 1934, 1940), categorised the diets of albacore as 'specialised' (Consoli et al., 2008), of narrow trophic niche width (Teffer et al., 2015), of short food chain length and low trophic adaptability (Pethybridge et al., 2018) compared to the longer food chain lengths and higher trophic complexity of Pacific tuna diets. Our reanalysis of the same data found that three habitat trait guilds accounted for a large proportion of diet composition observations from the North Atlantic and Mediterranean. Mediterranean samples

409 were especially dominated by two trait guilds overall: the seasonal and resident continental shelf
410 taxa. However, in the North Atlantic dominant prey trait guilds shifted over time, and the
411 detailed taxonomic identification by Bouxin and Legendre in the 1930's revealed particularly
412 trait-diverse diet composition. Trait guilds identified in sampling locations from the North
413 Atlantic and North Pacific were also more diverse than observed elsewhere, and included
414 prevalent consumption of continental shelf, offshore to coastal, mesopelagic and epipelagic trait
415 guilds.

416 We posit that investigating trait-based diet shifts in albacore will be a powerful
417 framework for tracking foraging responses to environmental variability. Our review shows clear
418 differences in trait-based diet composition across years and locations sampled. Investigating the
419 extent to which the consumption of trait guilds relates to environmental drivers and climate states
420 requires access to disaggregated diet data (i.e. prey from each individual predator) sampled
421 consistently over time and space. It may be that individual species productivity alternate and
422 shift across environmental gradients and inter-annual cycles, whilst that of trait guilds may be
423 more stable and offer predictive insights (e.g., the productivity of offshore mesopelagics and
424 coastal to offshore epipelagics in relation to environmental shifts). The extent to which species

taxonomic, phylogenetic and trait information explains variation in diet composition needs to be formally tested.

4.2 Synthesis limitations, knowledge accessibility and gaps to overcome

This review also highlights how variable the sampling of albacore tuna diets has been in space and time, with long gaps between studies ranging from a few years to over fifty years apart depending on ocean basin. Historically, the North Pacific and Atlantic basins were the most studied and taxonomically diverse regions for albacore diet composition, with over 100 species of prey identified in each region, particularly in the productive upwelling system of the Northeast Pacific where most samples were taken in this basin (from 1942 to 2010). In contrast, Pethybridge et al. (2018) found decreased dietary diversity in the productive upwelling regions of the Southeast Pacific (from 2000 to 2015) and for which aggregate diet data for albacore were not available for this meta-analysis. Additionally, sampled locations tended to be aggregated within biogeographic provinces of an ocean basin, such as the California Current System for the North Pacific and North Atlantic Drift for the North Atlantic. In most studies examined in this meta-analysis, samples were concentrated in either frontal, upwelling or offshore gyre zones,

thus likely more indicative of regional-scale rather than basin-scale processes. We note that published or open-access historical data were sparse for the South Pacific, South Atlantic and Indian Oceans, where we expect the taxonomic and trait biodiversity of prey consumed could be just as large as in the North Pacific.

Very large disaggregated datasets are needed to understand resource use in highly migratory pelagic predators at both broad and finer spatial scales. Indeed, several project-based, global-scale databases exist for the trophic ecology and resource use of albacore, yellowfin, bluefin and bigeye tunas (Young et al., 2015; Duffy et al., 2017; Bizzarro et al., 2022). The maintenance, expansion and collaborative accessibility of these datasets will enable the production of powerful and predictive models for tuna resource use under climate change. Critically, Young et al. (2015) note both a lack of long-term monitoring and inadequate sampling in some regions, and to that we add that the availability of such data after collection is also a significant hurdle. Tewksbury et al. (2014) and Young et al. (2015) also highlight the ongoing need for international cooperation and collaboration on data. While disaggregated historical data cannot be expected back to the late 1800's, we highlight the need for open science practices moving forward – publicly available raw diet data on commercially valuable pelagic predators.

458 Access to disaggregated diet data at high taxonomic resolution where information on
459 predator size information and prey size (e.g. lengths and widths) are recorded will enable more
460 accurate pairing of trait information with individual prey items (Zakharova et al., 2019). For each
461 trait in this meta-analysis, we needed to select a single trait value per species, and also estimate
462 the most likely life stage consumed for a large proportion of the data. We believe that traits for
463 prey consumed are representative of the life stage-appropriate habitat use and migratory
464 behaviour traits, but greater accuracy could be achieved and a very lengthy data curation process
465 used to ensure current accuracy in trait data could be significantly shortened with disaggregated
466 data.

467 Further, the need for sound design, maintenance and accessibility of large databases is
468 echoed for species' trait information. Many such efforts are publicly available for some
469 taxonomic groups and classes (Froese & Pauly, 2020; Palomares & Pauly, 2020). However,
470 researchers often expend significant effort and personnel towards further processing data from
471 these databases to fill knowledge gaps (Kim et al., 2018), as well as testing and creating
472 synthetic classifications from species-level data. Knowledge on the underlying distribution of
473 traits across environmental gradients is critical to their use as synthetic predictors in changing

474 ecosystems (McGill et al., 2006). This is a key knowledge gap in marine and freshwater
475 ecosystems (Green et al., 2022).
476
477 ## 5. Conclusions
478
479 Syntheses of historic trophic interactions are crucial for establishing baselines in understudied
480 systems and understanding how they may change. We reveal a comprehensive taxonomic and
481 trait-based portrait of the trophic plasticity of albacore. We generate 7 functional trait-based
482 guilds of prey consumed, applicable beyond this work to classifying prey in albacore and other
483 tunas. We highlight the utility of both functional trait guilds and prey trait information for
484 synthesising variation in predator diets. Trait-based models revealed broad biogeographic
485 signatures in albacore diets and corroborated known ecological differences between sampled
486 geographies, warranting further development of trait-based analyses and investigation to
487 understand how stable or flexible trait-based biogeographic resource use may be for highly
488 migratory pelagic predators, as pelagic ecosystems are altered by climate change and shift to
489 novel states. Ultimately, further modelling applications that use trait database products in
490 predator diet analyses frameworks will shed light on the extent to which future data collection

and modelling efforts in pelagic systems will benefit from a focus on traits (rather than taxonomic identity alone) when seeking to characterise the effect of trophic interactions on predator redistribution.

Acknowledgements

We are grateful to the Lenfest Ocean Program, and Pew Charitable Trust (GRANT 00032174), and MEOPAR (GRANT 0052372) for funding and regular support. Future Seas I and II (NOAA's Coastal and Ocean Climate Application COCA Program (NA17OAR4310268); NOAA's Climate and Fisheries Adaptation CAFA Program (NA20OAR4310507)). We sincerely thank Prof. David Warton in the School of Mathematics and Statistics at UNSW for support in multi-matrix modelling and use of *mvabund* R package. We thank Dr. Miram Gleiber, and all anonymous reviewers, for providing valuable feedback on manuscript drafts. We are especially grateful to innumerable scientists, fishermen, government-based ecosystem monitoring and data collection initiatives for over 100 years of historical data, collected, published or reported, archived, at least in aggregate form, and made available to us through many online requests to numerous libraries across the world. The authors declare no conflict of interest.

Authorship Statement

NH led the design, data collection, analysis and writing. LC, SG and BM contributed to the framework and design of the meta-analysis. NH, SG, CM, IG and ZR co-developed data collection protocols. NH, CM, IG and ZR co-developed methods for data re-analysis and graphics. LC, SG, EH, SB and MJ acquired funding for and supervised this project, providing direct intellectual support and contributions from the conceptualization through to publication of the research. All authors contributed text and substantial revision to the final manuscript.

References

Allain, V. (2005). DIET OF FOUR TUNA SPECIES OF THE WESTERN AND CENTRAL PACIFIC OCEAN. *SPC Fisheries Newsletter*, *114*.

Allain, V., Fernandez, E., Hoyle, S. D., Caillot, S., Jurado-Molina, J., Andréfouët, S., & Nicol, S. J. (2012). Interaction between Coastal and Oceanic Ecosystems of the Western and Central Pacific Ocean through Predator-Prey Relationship Studies. *PLOS ONE*, *7*(5), e36701. https://doi.org/10.1371/journal.pone.0036701

Anderberg, M. R. (1973). CHAPTER 6—HIERARCHICAL CLUSTERING METHODS. In M. R. Anderberg (Ed.), *Cluster Analysis for Applications* (pp. 131–155). Academic Press.

https://doi.org/10.1016/B978-0-12-057650-0.50012-0

Arrizabalaga-Escudero, A., Merckx, T., García-Baquero, G., Wahlberg, N., Aizpurua, O., Garin, I., Goiti, U., & Aihartza, J. (2019). Trait-based functional dietary analysis provides a better insight into the foraging ecology of bats. *Journal of Animal Ecology*.

Bailey, K. M., Francis, R. C., & Stevens, P. R. (1982). *The life history and fishery of Pacific whiting, Merluccius productus*. CalCOFl Report, Vol. XXIII.

Bello, G. (1999). Cephalopods in the Diet of Albacore, Thunnus alalunga, from the Adriatic Sea. *Journal of Molluscan Studies*, *65*(2), 233–240. https://doi.org/10.1093/mollus/65.2.233

Bizzarro, J. J., Curtis, K. A., Field, J., Santora, J. A., & Wells, B. (2022, October 18). *California Current Trophic Database*. NOAA ERRDAP. https://oceanview.pfeg.noaa.gov/cctd/

Blenckner, T., Llope, M., Möllmann, C., Voss, R., Quaas, M. F., Casini, M., Lindegren, M., Folke, C., & Chr. Stenseth, N. (2015). Climate and fishing steer ecosystem regeneration to uncertain economic futures. *Proceedings of the Royal Society B: Biological Sciences*, *282*(1803), 20142809. https://doi.org/10.1098/rspb.2014.2809

Bouxin, J., & Legendre, R. (1936). La faune pélagique de l'Atlantique au large du Golfe de Gascogne, recueillie dans des estomacs de Germons—Deuxième Partie: Céphalopodes. *Annales de l'Institute Océanographique*, *16*(1), 1–102.

Brock, G., Pihur, V., Datta, S., & Datta, S. (2008). ClValid, an R package for cluster validation. *Journal of Statistical Software*, *25*(4), 1–22. https://doi.org/10.18637/jss.v025.i04

Brown, A. M., Warton, D. I., Andrew, N. R., Binns, M., Cassis, G., & Gibb, H. (2014). The fourth-corner solution – using predictive models to understand how species traits interact with the environment. *Methods in Ecology and Evolution*, *5*(4), 344–352. https://doi.org/10.1111/2041-210X.12163

551 Carroll, G., Holsman, K. K., Brodie, S., Thorson, J. T., Hazen, E. L., Bograd, S. J., Haltuch, M.
552 A., Kotwicki, S., Samhouri, J., Spencer, P., Willis-Norton, E., & Selden, R. L. (2019). A
553 review of methods for quantifying spatial predator–prey overlap. *Global Ecology and*
554 *Biogeography*, *28*(11), 1561–1577. https://doi.org/10.1111/geb.12984
555 Casini, M., Hjelm, J., Molinero, J.-C., Lövgren, J., Cardinale, M., Bartolino, V., Belgrano, A., &
556 Kornilovs, G. (2009). Trophic cascades promote threshold-like shifts in pelagic marine
557 ecosystems. *Proceedings of the National Academy of Sciences*, *106*(1), 197–202.
558 https://doi.org/10.1073/pnas.0806649105
559 Cheung, W. W. L., Brodeur, R. D., Okey, T. A., & Pauly, D. (2015). Projecting future changes in
560 distributions of pelagic fish species of Northeast Pacific shelf seas. *Progress in*
561 *Oceanography*, *130*, 19–31. https://doi.org/10.1016/j.pocean.2014.09.003
562 Cheung, W. W. L., Lam, V. W. Y., Sarmiento, J. L., Kearney, K., Watson, R., Zeller, D., &
563 Pauly, D. (2010). Large-scale redistribution of maximum fisheries catch potential in the
564 global ocean under climate change. *Global Change Biology*, *16*(1), 24–35.
565 https://doi.org/10.1111/j.1365-2486.2009.01995.x
566 Consoli, P., Romeo, T., Battaglia, P., Castriota, L., Esposito, V., & Andaloro, F. (2008). Feeding
567 habits of the albacore tuna Thunnus alalunga (Perciformes, Scombridae) from central
568 Mediterranean Sea. *Marine Biology*, *155*(1), 113–120. https://doi.org/10.1007/s00227-
569 008-1012-1
570 Dray, S., & Legendre, P. (2008). Testing the Species Traits–Environment Relationships: The
571 Fourth-Corner Problem Revisited. *Ecology*, *89*(12), 3400–3412.
572 https://doi.org/10.1890/08-0349.1
573 Duffy, L. M., Kuhnert, P. M., Pethybridge, H. R., Young, J. W., Olson, R. J., Logan, J. M., Goñi,

574 N., Romanov, E., Allain, V., Staudinger, M. D., Abecassis, M., Choy, C. A., Hobday, A.
575 J., Simier, M., Galván-Magaña, F., Potier, M., & Ménard, F. (2017). Global trophic
576 ecology of yellowfin, bigeye, and albacore tunas: Understanding predation on
577 micronekton communities at ocean-basin scales. *Deep Sea Research Part II: Topical*
578 *Studies in Oceanography*, *140*, 55–73. https://doi.org/10.1016/j.dsr2.2017.03.003
579 Dunn†, J. C. (1974). Well-Separated Clusters and Optimal Fuzzy Partitions. *Journal of*
580 *Cybernetics*, *4*(1), 95–104. https://doi.org/10.1080/01969727408546059
581 Field, J. G., Clarke, K. R., & Warwick, R. M. (1982). A Practical Strategy for Analysing
582 Multispecies Distribution Patterns. *Marine Ecology Progress Series*, *8*(1), 37–52.
583 Free, C. M., Thorson, J. T., Pinsky, M. L., Oken, K. L., Wiedenmann, J., & Jensen, O. P. (2019).
584 Impacts of historical warming on marine fisheries production. *Science*, *363*(6430), 979–
585 983. https://doi.org/10.1126/science.aau1758
586 Froese, R., & Pauly, D. (2020). *FishBase*. World Wide Web electronic publication, accessed
587 07/2020: www.fishbase.org.
588 Galili, T. (2015). dendextend: An R package for visualizing, adjusting and comparing trees of
589 hierarchical clustering. *Bioinformatics*, *31*(22), 3718–3720.
590 https://doi.org/10.1093/bioinformatics/btv428
591 Gitay, H., & Noble, I. (1997). What are functional types and how should we seek them? In *Plant*
592 *Functional Types*. In Smith, M. M., Shugart, H. H. and Woodward, F. I. (eds).
593 Glaser, S. (2010). Interdecadal variability in predator–prey interactions of juvenile North Pacific
594 albacore in the California Current System. *Marine Ecology Progress Series*, *414*, 209–
595 221. https://doi.org/10.3354/meps08723
596 Glaser, S. M., Waechter, K. E., & Bransome, N. C. (2015). Through the stomach of a predator:

Regional patterns of forage in the diet of albacore tuna in the California Current System and metrics needed for ecosystem-based management. *Journal of Marine Systems*, *146*, 38–49. https://doi.org/10.1016/j.jmarsys.2014.07.019

Gleiber, M. R., Hardy, N. A., Roote, Z., Morganson, C. J., Krug-Macleod, A., George, I., Matuch, C., Brookson, C. B., Crowder, L. B., & Green, S. J. (2022). *Pelagic Species Trait Database* [Data set]. Scholars Portal Dataverse. https://doi.org/10.5683/SP3/0YFJED

Gower, J. C. (1971). A General Coefficient of Similarity and Some of Its Properties. *Biometrics*, *27*(4), 857–871. https://doi.org/10.2307/2528823

Green, S. J., Brookson, C. B., Hardy, N. A., & Crowder, L. B. (2022). Trait-based approaches to global change ecology: Moving from description to prediction. *Proceedings of the Royal Society B: Biological Sciences*, *289*(1971), 20220071. https://doi.org/10.1098/rspb.2022.0071

Green, S. J., Dilley, E. R., Benkwitt, C. E., Davis, A. C. D., Ingeman, K. E., Kindinger, T. L., Tuttle, L. J., & Hixon, M. A. (2019). Trait-mediated foraging drives patterns of selective predation by native and invasive coral-reef fishes. *Ecosphere*, *10*(6), e02752. https://doi.org/10.1002/ecs2.2752

Handl, J., Knowles, J., & Kell, D. B. (2005). Computational cluster validation in post-genomic data analysis. *Bioinformatics*, *21*(15), 3201–3212. https://doi.org/10.1093/bioinformatics/bti517

Hastie, T., Tibshirani, R., & Friedman, J. (2009). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition*. Springer Science & Business Media.

Hazen, E. L., Jorgensen, S., Rykaczewski, R. R., Bograd, S. J., Foley, D. G., Jonsen, I. D.,

Shaffer, S. A., Dunne, J. P., Costa, D. P., Crowder, L. B., & Block, B. A. (2013). Predicted habitat shifts of Pacific top predators in a changing climate. *Nature Climate Change*, *3*(3), Article 3. https://doi.org/10.1038/nclimate1686

ICCAT. (2020). *Albacore (Thunnus alalunga) Task 2 size/weight frequencies from ICCAT (as of Jan/2021) for the period 1956-2019*. Public statistical databases, accessed 07/2020: https://www.iccat.int/en/accesingdb.html

ISC. (2006). *Report of the ISC – Albacore Working Group Stock Assessment Workshop*. National Research Institute of Far Seas Fisheries, Shimizu.

Ives, A. R., & Helmus, M. R. (2011). Generalized linear mixed models for phylogenetic analyses of community structure. *Ecological Monographs*, *81*(3), 511–525. https://doi.org/10.1890/10-1264.1

Joubin, L., & Rouie, L. (1918). Observations sur la nourriture des Thons de l'Atlantique (Germo alalonga Gmelin). *Bulletin de l'Institut Océanographique de Monaco*, *348*, 21–27.

Kim, S. W., Blomberg, S. P., & Pandolfi, J. M. (2018). Transcending data gaps: A framework to reduce inferential errors in ecological analyses. *Ecology Letters*, *21*(8), 1200–1210. https://doi.org/10.1111/ele.13089

Kindt, R., & Coe, R. (2005). *Tree diversity analysis. A manual and software for common statistical methods for ecological and biodiversity studies*. World Agroforestry Centre (ICRAF), Nairobi, Kenya. http://www.worldagroforestry.org/output/tree-diversity-analysis

Kiørboe, T., Visser, A., & Andersen, K. H. (2018). A trait-based approach to ocean ecology. *ICES Journal of Marine Science*, *75*(6), 1849–1863. https://doi.org/10.1093/icesjms/fsy090

643 Lan, K.-W., Wu, Y.-L., Chen, L.-C., Naimullah, M., & Lin, T.-H. (2021). Effects of Climate
644 Change in Marine Ecosystems Based on the Spatiotemporal Age Structure of Top
645 Predators: A Case Study of Bigeye Tuna in the Pacific Ocean. *Frontiers in Marine*
646 *Science*, *8*. https://doi.org/10.3389/fmars.2021.614594
647 Legendre, P., & Legendre, L. (1998). *Numerical ecology: Developments in environmental*
648 *modelling.*
649 Legendre, R. (1934). La faune pélagique de l'Atlantique au large du Golfe de Gascogne,
650 recueillie dans des estomacs de Germons—Première Partie: Poissons. *Annales de*
651 *l'Institute Océanographique*, *14*, 249–418.
652 Legendre, R. (1940). La faune pélagique de l'Atlantique au large du Golfe de Gascogne,
653 recueillie dans des estomacs de Germons—Troisième partie: Invertébrés (Céphalopodes
654 exclus). *Annales de l'Institute Océanographique*, *16*, 1–99.
655 Link, J. S. (2007). Underappreciated Species in Ecology: "Ugly Fish" in the Northwest Atlantic
656 Ocean. *Ecological Applications*, *17*(7), 2037–2060. https://doi.org/10.1890/06-1154.1
657 Maechler, M., Rousseeuw, P., Struyf, A., Hubert, M., & Hornik, K. (2021). cluster: Cluster
658 Analysis Basics and Extensions. *R Package Version 2.1.2*. https://CRAN.R-
659 project.org/package=cluster
660 Mariani, P., Křivan, V., MacKenzie, B. R., & Mullon, C. (2016). The migration game in habitat
661 network: The case of tuna. *Theoretical Ecology*, *9*(2), 219–232.
662 https://doi.org/10.1007/s12080-015-0290-8
663 McGill, B. J., Enquist, B. J., Weiher, E., & Westoby, M. (2006). Rebuilding community ecology
664 from functional traits. *Trends in Ecology & Evolution*, *21*(4), 178–185.
665 https://doi.org/10.1016/j.tree.2006.02.002

Ménard, F., Labrune, C., Shin, Y.-J., Asine, A. S., & Bard, F.-X. (2006). Opportunistic predation in tuna: A size-based approach. *Marine Ecology Progress Series*, *323*, 223–231. https://doi.org/10.3354/meps323223

Michonneau, F., Brown, J. W., & Winter, D. J. (2016). rotl: An R package to interact with the Open Tree of Life data. *Methods in Ecology and Evolution*, *7*(12), 1476–1481. https://doi.org/10.1111/2041-210X.12593

Molinos, J. G., Halpern, B. S., Schoeman, D. S., Brown, C. J., Kiessling, W., Moore, P. J., Pandolfi, J. M., Poloczanska, E. S., Richardson, A. J., & Burrows, M. T. (2016). Climate velocity and the future global redistribution of marine biodiversity. *Nature Climate Change*, *6*(1), Article 1. https://doi.org/10.1038/nclimate2769

Morley, J. W., Selden, R. L., Latour, R. J., Frölicher, T. L., Seagraves, R. J., & Pinsky, M. L. (2018). Projecting shifts in thermal habitat for 686 species on the North American continental shelf. *PLOS ONE*, *13*(5), e0196127. https://doi.org/10.1371/journal.pone.0196127

Muhling, B., Brodie, S., Snodgrass, O., Tommasi, D., & Jacox, M. (2019). *DYNAMIC HABITAT USE OF ALBACORE AND THEIR PRIMARY PREY SPECIES IN THE CALIFORNIA CURRENT SYSTEM*. *60*, 15.

Nelder, J. A., & Wedderburn, R. W. M. (1972). Generalized Linear Models. *Journal of the Royal Statistical Society: Series A (General)*, *135*(3), 370–384. https://doi.org/10.2307/2344614

Nickels, C., Portner, E. J., Snodgrass, O., Muhling, B. A., & Dewar, H. (2023). Juvenile Albacore Tuna (Thunnus alalunga) foraging ecology varies with environmental conditions in the California Current Large Marine Ecosystem. *Fisheries Oceanography*.

Oksanen, J., Blanchet, F. G., Friendly, M., Kindt, R., Legendre, P., McGlinn, D., Minchin, P. R.,

OHara, R. B., Simpson, G. L., Solymos, P., Stevens, M. H. H., Szoecs, E., & Wagner, H. (2020). *vegan: Community Ecology Package.* R package version 2.5-7. https://cran.ism.ac.jp/web/packages/vegan/vegan.pdf

Ovaskainen, O., Tikhonov, G., Norberg, A., Blanchet, F. G., Duan, L., Dunson, D., Roslin, T., & Abrego, N. (2017). How to make more out of community data? A conceptual framework and its implementation as models and software. *Ecology Letters*, *20*(5), 561–576. https://doi.org/10.1111/ele.12757

Palomares, M., & Pauly, D. (2020). *SeaLifeBase*. World Wide Web electronic publication, accessed 07/2020: www.sealifebase.org

Paradis, E., & Schliep, K. (2019). ape 5.0: An environment for modern phylogenetics and evolutionary analyses in R. *Bioinformatics*, *35*(3), 526–528. https://doi.org/10.1093/bioinformatics/bty633

Parravicini, V., Casey, J., Schiettekatte, N., Brandl, S., Pozas-Schacre, C., Carlot, J., Edgar, G., Graham, N., Harmelin-Vivien, M., Kulbicki, M., Strona, G., & Stuart-Smith, R. (2020). Delineating reef fish trophic guilds with global gut content data synthesis and phylogeny. *PLOS Biology*, *18*, e3000702. https://doi.org/10.1371/journal.pbio.3000702

Pearcy, W. G. (1973). Albacore oceanography off Oregon – 1970. *Fish Bulletin*, *71*, 489–177.

Pethybridge, H., Choy, C. A., Logan, J. M., Allain, V., Lorrain, A., Bodin, N., Somes, C. J., Young, J., Ménard, F., Langlais, C., Duffy, L., Hobday, A. J., Kuhnert, P., Fry, B., Menkes, C., & Olson, R. J. (2018). A global meta-analysis of marine predator nitrogen stable isotopes: Relationships between trophic structure and environmental conditions. *Global Ecology and Biogeography*, *27*(9), 1043–1055. https://doi.org/10.1111/geb.12763

Poloczanska, E. S., Burrows, M. T., Brown, C. J., García Molinos, J., Halpern, B. S., Hoegh-

712 Guldberg, O., Kappel, C. V., Moore, P. J., Richardson, A. J., Schoeman, D. S., &
713 Sydeman, W. J. (2016). Responses of Marine Organisms to Climate Change across
714 Oceans. *Frontiers in Marine Science*, *3*. https://doi.org/10.3389/fmars.2016.00062
715 Polovina, J. J., Dunne, J. P., Woodworth, P. A., & Howell, E. A. (2011). Projected expansion of
716 the subtropical biome and contraction of the temperate and equatorial upwelling biomes
717 in the North Pacific under global warming. *ICES Journal of Marine Science*, *68*(6), 986–
718 995. https://doi.org/10.1093/icesjms/fsq198
719 Pomerleau, C., Sastri, A. R., & Beisner, B. E. (2015). Evaluation of functional trait diversity for
720 marine zooplankton communities in the Northeast subarctic Pacific Ocean. *Journal of*
721 *Plankton Research*, *37*(4), 712–726. https://doi.org/10.1093/plankt/fbv045
722 Portner, E. J., Snodgrass, O., & Dewar, H. (2022). Pacific bluefin tuna, Thunnus orientalis,
723 exhibits a flexible feeding ecology in the Southern California Bight. *PLOS ONE*, *17*(8),
724 e0272048. https://doi.org/10.1371/journal.pone.0272048
725 R Core Team. (2022). R: A language and environment for statistical computing, version 4.2.1.
726 *Vienna, Austria, R Foundation for Statistical Computing*.
727 Romanov, E. V., Nikolic, N., Dhurmeea, Z., Bodin, N., Puech, A., Norman, S., Hollanda, S.,
728 Bourjea, J., West, W., & Potier, M. (2020). Trophic ecology of albacore tuna (Thunnus
729 alalunga) in the western tropical Indian Ocean and adjacent waters. *Marine and*
730 *Freshwater Research*. https://doi.org/10.1071/MF19332
731 Rousseeuw, P. J. (1987). Silhouettes: A graphical aid to the interpretation and validation of
732 cluster analysis. *Journal of Computational and Applied Mathematics*, *20*, 53–65.
733 https://doi.org/10.1016/0377-0427(87)90125-7
734 Sala, E., Mayorga, J., Costello, C., Kroodsma, D., Palomares, M. L. D., Pauly, D., Sumaila, U.

735 R., & Zeller, D. (2018). The economics of fishing the high seas. *Science Advances*, *4*(6),
736 eaat2504. https://doi.org/10.1126/sciadv.aat2504
737 Scheffers, B. R., Meester, L. D., Bridge, T. C. L., Hoffmann, A. A., Pandolfi, J. M., Corlett, R.
738 T., Butchart, S. H. M., Pearce-Kelly, P., Kovacs, K. M., Dudgeon, D., Pacifici, M.,
739 Rondinini, C., Foden, W. B., Martin, T. G., Mora, C., Bickford, D., & Watson, J. E. M.
740 (2016). The broad footprint of climate change from genes to biomes to people. *Science*,
741 *354*(6313). https://doi.org/10.1126/science.aaf7671
742 Teffer, A. K., Staudinger, M. D., & Juanes, F. (2015). Trophic niche overlap among dolphinfish
743 and co-occurring tunas near the northern edge of their range in the western North
744 Atlantic. *Marine Biology*, *162*(9), 1823–1840. https://doi.org/10.1007/s00227-015-2715-
745 8
746 Tewksbury, J. J., Anderson, J. G. T., Bakker, J. D., Billo, T. J., Dunwiddie, P. W., Groom, M. J.,
747 Hampton, S. E., Herman, S. G., Levey, D. J., Machnicki, N. J., del Rio, C. M., Power, M.
748 E., Rowell, K., Salomon, A. K., Stacey, L., Trombulak, S. C., & Wheeler, T. A. (2014).
749 Natural History's Place in Science and Society. *BioScience*, *64*(4), 300–310.
750 https://doi.org/10.1093/biosci/biu032
751 Thackeray, S. J., Sparks, T. H., Frederiksen, M., Burthe, S., Bacon, P. J., Bell, J. R., Botham, M.
752 S., Brereton, T. M., Bright, P. W., Carvalho, L., Clutton-Brock, T., Dawson, A.,
753 Edwards, M., Elliott, J. M., Harrington, R., Johns, D., Jones, I. D., Jones, J. T., Leech, D.
754 I., … Wanless, S. (2010). Trophic level asynchrony in rates of phenological change for
755 marine, freshwater and terrestrial environments. *Global Change Biology*, *16*(12), 3304–
756 3313. https://doi.org/10.1111/j.1365-2486.2010.02165.x
757 Valls, M., Saber, S., Gómez, M. J., Reglero, P., & Mele, S. (2022). Diet and feeding behaviour

of albacore Thunnus alalunga in the western Mediterranean Sea during the spawning period. *Journal of Fish Biology*, *100*(1), 203–217. https://doi.org/10.1111/jfb.14935

Wang, Y., Naumann, U., Eddelbuettel, D., Wilshire, J., & Warton, D. I. (2021). mvabund: Statistical Methods for Analysing Multivariate Abundance Data. *R Package Version 4.1.12*. https://CRAN.R-project.org/package=mvabund

Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis* (v. 3.3.5).

Wickham, H. (2021). *stringr: Simple, Consistent Wrappers for Common String Operations.* http://stringr.tidyverse.org, https://github.com/tidyverse/stringr

Young, J. W., Lansdell, M. J., Campbell, R. A., Cooper, S. P., Juanes, F., & Guest, M. A. (2010). Feeding ecology and niche segregation in oceanic top predators off eastern Australia. *Marine Biology*, *157*(11), 2347–2368. https://doi.org/10.1007/s00227-010-1500-y

Young, J. W., Olson, R. J., Ménard, F., Kuhnert, P. M., Duffy, L. M., Allain, V., Logan, J. M., Lorrain, A., Somes, C. J., Graham, B., Goñi, N., Pethybridge, H., Simier, M., Potier, M., Romanov, E., Pagendam, D., Hannides, C., & Choy, C. A. (2015). Setting the stage for a global-scale trophic analysis of marine top predators: A multi-workshop review. *Reviews in Fish Biology and Fisheries*, *25*(1), 261–272. https://doi.org/10.1007/s11160-014-9368-4

Yu, G., Smith, D. K., Zhu, H., Guan, Y., & Lam, T. T.-Y. (2017). ggtree: An r package for visualization and annotation of phylogenetic trees with their covariates and other associated data. *Methods in Ecology and Evolution*, *8*(1), 28–36. https://doi.org/10.1111/2041-210X.12628

Zakharova, L., Meyer, K. M., & Seifan, M. (2019). Trait-based modelling in ecology: A review of two decades of research. *Ecological Modelling*, *407*, 108703.

https://doi.org/10.1016/j.ecolmodel.2019.05.008

Zuur, A. F., Ieno, E. N., & Elphick, C. S. (2010). A protocol for data exploration to avoid common statistical problems. *Methods in Ecology and Evolution*, *1*(1), 3–14. https://doi.org/10.1111/j.2041-210X.2009.00001.x

Data Accessibility

The database for global and historical albacore diet composition from digitised published and grey literature will be made available on Dataverse's Borealis repository. All code for analyses will be made publicly available on Github (https://github.com/CHANGE-Lab/albacore-diet-global). Both the data and code will be made publicly available through a CC BY 4.0 public-use licence upon acceptance of this manuscript for publication. Given the nature of the data and commercial value of the study species we cannot make data publicly available prior to acceptance for publication of this product.

794 **Tables**

795

796 **Table 1.** Trait variables and values that influence the prey encounter phase of the predation process (Green et al., 2019).

Trait	Variable type	Definitions & relationships of traits for predator-prey interactions
Vertical habitat use	Categorical (demersal, epipelagic, mesopelagic)	Represents the water column position that prey resources primarily occupy (note that species can occur elsewhere, but this trait informs us of their main habitat use).
Horizontal habitat use	Categorical (coastal, continental shelf, oceanic)	Represents the typical position from the coastal to offshore waters that prey resources primarily occupy (note that species can occur elsewhere, but this trait informs us of their main habitat use). Coastal = coastal and reef associated; continental shelf = shelf and slope; oceanic = offshore taxa.
Diel migration	Binary (yes/no)	The relationship of this trait with predation is complicated due to an evolutionary arms race whereby prey species, particularly at larval, young-of-year and juvenile life stages, evolved to undertake these diel migrations to avoid predation, however, visual predators in turn evolved to mirror these migrations and intercept prey at crepuscular hours. We include this trait for exploratory analyses and generation of hypotheses on how this may affect predator-prey interactions for albacore tuna.
Seasonal migration	Binary (yes/no)	Represents whether prey species are seasonally abundant in the system, either in the form of seasonal spawning aggregations or seasonal migrations within the system, or local resident prey present at similar abundances year-round.

797

798 **Table 2.** Model design, variables and matrices used in multi-matrix fourth corner analysis.

Diet data (L)	Trait variables (Q)	Environmental variable (R)	Model
Diet composition (SPP)	None	Ocean basin	Diet composition ~ ocean basin
	Q1 – Trait variables (Table 1/S1)		Diet composition ~ traits variables + ocean basin
	Q2 – Trait guilds (Figure 3)		Diet composition ~ trait guilds + ocean basin

799

800

801 **Figure Legends**

802

803 **Figure 1.** a) Geographic distribution of published albacore diet papers, reports and grey literature from 1880–2020, including

804 Longhurst biogeographical province codes. A total of 26 studies reported diet data for 69 individual sampling locations and 36 distinct

805 sampling years. Of the 308 prey identified to species-level in albacore tuna diets, we illustrate the: b) mean species accumulation

806 curve in relation to the number of seasons sampled in each ocean basin; and c) step-wise species accumulation in relation to year and
807 ocean basin sampled from the 1880's to 2020.
808
809 **Figure 2.** Prey and trait diversity across phylogeny. Grey shading indicates no data available for a particular species and trait.
810
811 **Figure 3.** Seven optimal albacore prey trait guilds generated by divisive hierarchical clustering for 292 species with complete trait
812 information for vertical and horizontal habitat use, seasonal and diel vertical migration. Displayed: a) a radial cluster dendrogram and
813 overlaid description of the main trait values associated with each cluster (including the number of species within clusters), and b) non-
814 metric multidimensional scaling (nMDS) plot illustrating each species as an assemblage of four trait values and coloured in relation to
815 their classified trait guild.
816

817 **Figure 4.** Composition of prey trait guilds within historical albacore diets (y axis; relative % frequency of occurrence [FO]) across
818 locations and dates sampled from 1880–2015 (x axis; including first author and publication date information). Studies (x axis) are
819 ordered by year from oldest on the left to most recent on the right. Diet composition is illustrated using a normalised metric of relative
820 contribution to the total frequency of occurrence of all species' within each trait guild, normalised for each replicate diet observation.
821
822 **Figure 5.** Correlation coefficients for the trait-environment relationship modelled using the fourth corner solution for a) individual
823 trait information, and b) the trait guilds model and their interaction with the explanatory variable for ocean basin sampled. Coefficients
824 for all trait-environment interactions are presented using a (GLM)-LASSO model (Brown *et al.* 2014). Significant trait-based
825 relationships between albacore diet composition and geography sampled are coloured in relation to their correlation coefficient, and
826 the strength and direction of the relationship.
827
828 **Supplementary Materials**
829

Supplementary Information includes literature search terms, treatment of albacore diet data, metainformation and prey trait information, as well as supplementary results illustrations. Supplementary Data contain tables that further support data treatment and decisions described in the manuscript and Supplementary Information

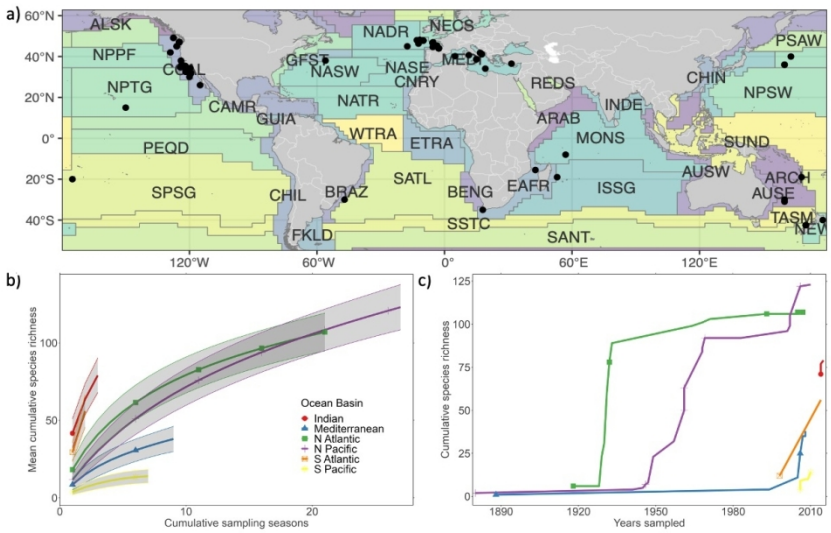


Figure 1. a) Geographic distribution of published albacore diet papers, reports and grey literature from 1880–2020, including Longhurst biogeographical province codes. A total of 26 studies reported diet data for 69 individual sampling locations and 36 distinct sampling years. Of the 308 prey identified to species-level in albacore tuna diets, we illustrate the: b) mean species accumulation curve in relation to the number of seasons sampled in each ocean basin; and c) step-wise species accumulation in relation to year and ocean basin sampled from the 1880's to 2020.

338x190mm (111 x 111 DPI)

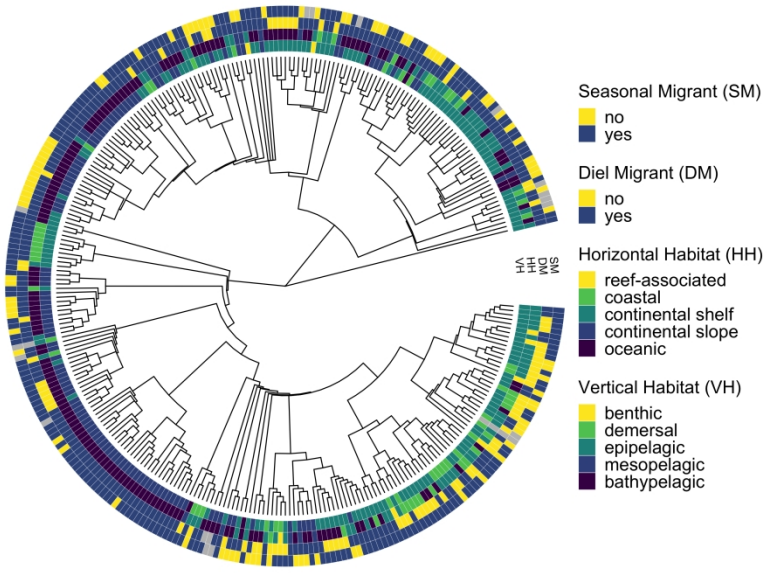


Figure 2. Prey and trait diversity across phylogeny. Grey shading indicates no data available for a particular species and trait.

1481x1058mm (72 x 72 DPI)

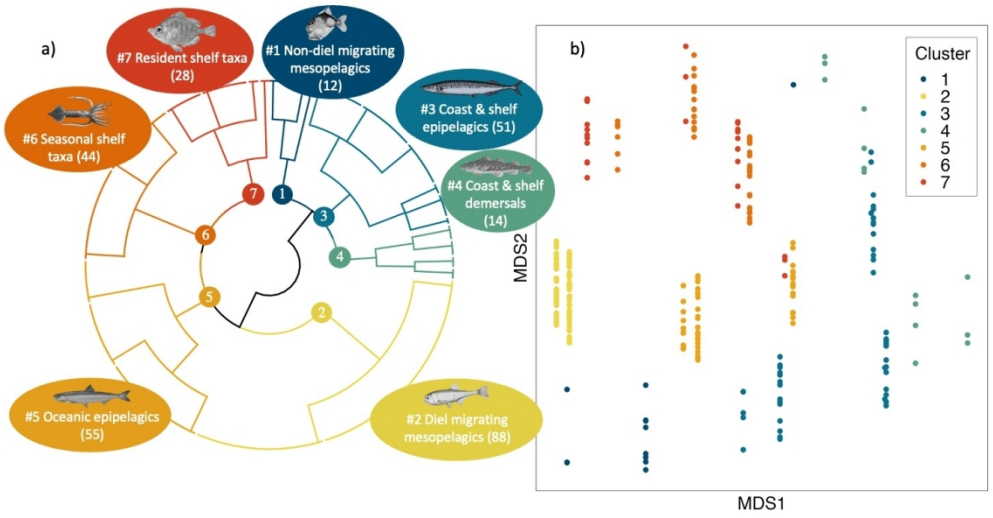


Figure 3. Seven optimal albacore prey trait guilds generated by divisive hierarchical clustering for 292 species with complete trait information for vertical and horizontal habitat use, seasonal and diel vertical migration. Displayed: a) a radial cluster dendrogram and overlaid description of the main trait values associated with each cluster (including the number of species within clusters), and b) non-metric multidimensional scaling (nMDS) plot illustrating each species as an assemblage of four trait values and coloured in relation to their classified trait guild.

338x190mm (111 x 111 DPI)

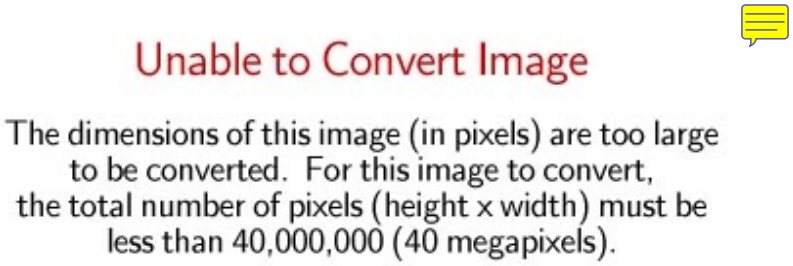


Figure 4. Composition of prey trait guilds within historical albacore diets (y axis; relative % frequency of occurrence [FO]) across locations and dates sampled from 1880–2015 (x axis; including first author and publication date information). Studies (x axis) are ordered by year from oldest on the left to most recent on the right. Diet composition is illustrated using a normalised metric of relative contribution to the total frequency of occurrence of all species' within each trait guild, normalised for each replicate diet observation.

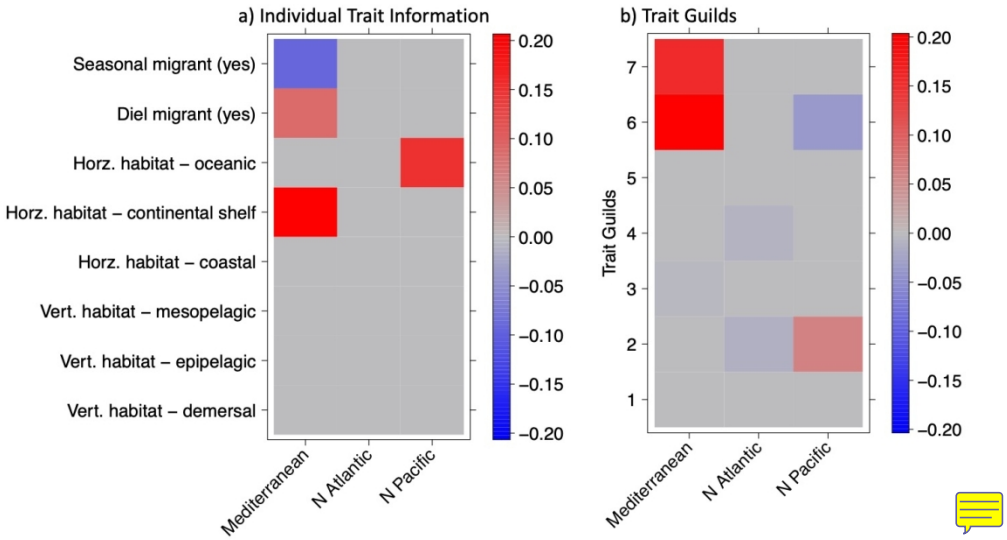


Figure 5. Correlation coefficients for the trait-environment relationship modelled using the fourth corner solution for a) individual trait information, and b) the trait guilds model and their interaction with the explanatory variable for ocean basin sampled. Coefficients for all trait-environment interactions are presented using a (GLM)-LASSO model (Brown et al. 2014). Significant trait-based relationships between albacore diet composition and geography sampled are coloured in relation to their correlation coefficient, and the strength and direction of the relationship.

338x190mm (111 x 111 DPI)

Supplemental Information

Appendix A – Literature Search

Table S1. Literature search terms used to identify published papers and historical reports of albacore tuna diets queried from 1900 until 2020 using the Web of Science (Clarivate Analytics, 2020), Aquatic Sciences and Fisheries Abstracts (ASFA, 2020) and Federal Science Library Canada (FSLN, 2020) bibliographic databases. Both the diet research terms and synonymous scientific names for albacore tuna were combined by a Boolean 'AND' clause.

Diet research terms	**Albacore tuna synonymous scientific names**
(diet* OR forag* OR prey) AND	("Thunnus alalunga" OR "Scomber alalunga" OR "Albacora alalonga" OR "Germo alalonga" OR "Germo alalunga" OR "Germo germo" OR "Germo germon" OR "Germo germon steadi" OR "Orcynus alalonga" OR "Orcynus alatunga" OR "Orcynus germo" OR "Orcynus germon" OR "Orcynus pacificus" OR "Scomber alalunga" OR "Scomber alalunga" OR "Scomber alatunga" OR "Scomber albicans" OR "Scomber germo" OR "Scomber germo" OR "Scomber germon" OR "Thunnus alalonga" OR "Thunnus alalunga" OR "Thunnus germo" OR "Thunnus pacificus" OR "Thynnus alalonga" OR "Thynnus alalunga" OR "Thynnus pacificus")

Table S2. Published and historical reports of albacore tuna diet that provided detailed stomach content data. Several older papers, typically prior to the 1980's, needed to be scanned and digitised to PDF format. These are available upon request and all data digitised from published papers and reports are available in our diet database. For every diet report, we recorded the date range, months and seasons of sampling, the median geographic location of albacore tuna collections, the number of albacore tuna collected, fishing gear and time of day for collections.

CiteAuth	CiteYear	CiteSource	CiteTitle
Aloncle, H.	1973	Thesis	Rythmes alimentaires et circadiens chez le germon *Thunnus alalunga* dans le Nord-Est atlantique
Bello, G.	1999	Journal of Molluscan Studies	Cephalopods in the diet of albacore, *Thunnus alalunga*, from the Adriatic Sea
Bernard et al.	1985	CalCOFI Reports	Stomach contents of albacore, skipjack, and bonito
Clemens & Iselin	1963	FAO World Sci. Meet. Biol. Tunas and Related Species, Sec. 5, Exper. Pap., (30) : 1–13	Food of Pacific albacore in the California fishery
Consoli et al.	2008	Marine Biology	Feeding habits of the albacore tuna *Thunnus alalunga* (Perciformes, Scombridae) from central Mediterranean Sea
Dos Santos & Haimovici	2002	Bulletin of Marine Science	Cephalopods in the Trophic Relations off Southern Brazil
Glaser et al.	2015	Journal of Marine Systems	Through the stomach of a predator: Regional patterns of forage in the diet of albacore tuna in the California Current System and metrics needed for ecosystem-based management
Goni et al.	2011	Marine Biology	Variability of albacore (*Thunnus alalunga*) diet in the Northeast Atlantic and Mediterranean Sea
Hart, JL	1948	Pacific Biological Station	Accumulated Data on Albacore
Iversen, RTB	1962	Fishery Bulletin	Food of albacore tuna, *Thunnus germo* (Lacepède), in the central and northeastern Pacific
Jordan & Gilbert	1880	Proceedings of the National Academy of Sciences	Description of two species of scopeloid fishes, *Sudis ringens* and *Myctophum crenulare* from Santa Barbara Channel, California.

Joubin & Rouie	1918	Bulletin de l'Institut Océanographique de Monaco	Observations sur la nourriture des thons de l'Atlantique (*Germo alalonga* Gmelin)
Legendre & Bouxin†	1934; 1936; 1940	Blondel la Rougery	La Faune pélagique de l'Atlantique au large du Golfe de Gascogne recueillie dans des estomacs de Germons: première partie: poissons; deuxième partie: céphalopodes; troisième partie: invertébrés (céphalopodes exclus), parasites du germon.
Logan et al.‡	2013	Deep Sea Research Part II: Topical Studies in Oceanography	Contribution of Cephalopod prey to the Diet of Large Pelagic Fish Predators in Central North Atlantic Ocean
Madigan et al.	2015	Proceedings of the National Academy of Sciences	Assessing niche width of endothermic fish from genes to ecosystem
Matthews et al.	1977	NOAA Technical Report	Food of Western North Atlantic Tunas (*Thunnus*) and Lancetfishes (*Alepisaurus*)
McHugh, JL	1952	Bulletin of the Scripps Institution of Oceanography	The food of albacore (*Germo alalunga*) off California
Ortiz de Zarate, V	1987	Instituto Español de Oceanografía	Datos sobre la alimentacion del atun blanco (*Thunnus alalunga*) juvenil capturado en el golfo de vizcaya
Pinkas et al.	1971	Fish Bulletin	Food habits of albacore, bluefin tuna, and bonito
Prince Albert de Monaco	1888	Comptes Rendus de l'Académie des Sciences	Sur l'alimentation des naufragés en pleine mer (On the nutrition of castaways in the open ocean)
Pusineri et al.	2005	Journal of Marine Science	Food and feeding ecology of juvenile albacore, *Thunnus alalunga*, off the Bay of Biscay: a case study
Romanov et al.	2020	Marine and Freshwater Research	Trophic ecology of albacore tuna (*Thunnus alalunga*) in the western tropical Indian Ocean and adjacent waters
Romero et al.	2012	Helgoland Marine	Pelagic cephalopods of the central

		Research	Mediterranean Sea determined by the analysis of the stomach content of large fish predators
Salman & Karakulak	2009	Journal of Marine Biological Association of the United Kingdom	Cephalopods in the diet of albacore, *Thunnus alalunga*, from the eastern Mediterranean
Teffer et al.‡	2015	Marine Biology	Trophic niche overlap among dolphinfish and co-occurring tunas near the northern edge of their range in the western North Atlantic
Watanabe et al.	2004	Fisheries Science	Feeding habits of albacore *Thunnus alalunga* in the transition region of the central North Pacific
Williams et al.	2015	Deep Sea Research Part II: Topical Studies in Oceanography	Vertical behavior and diet of albacore tuna (*Thunnus alaguna*) vary with latitude in the South Pacific Ocean
Young et al.	2010	Marine Biology	Feeding ecology and niche segregation in oceanic top predators off eastern Australia

†These publications were combined as they consisted of three part publication on the taxonomic composition of albacore diets

‡These publications met nearly all criteria for review, but are not included in further analyses as prey were reported at Family, Order and Class levels.

Appendix B – Estimation of albacore prey size/age consumed

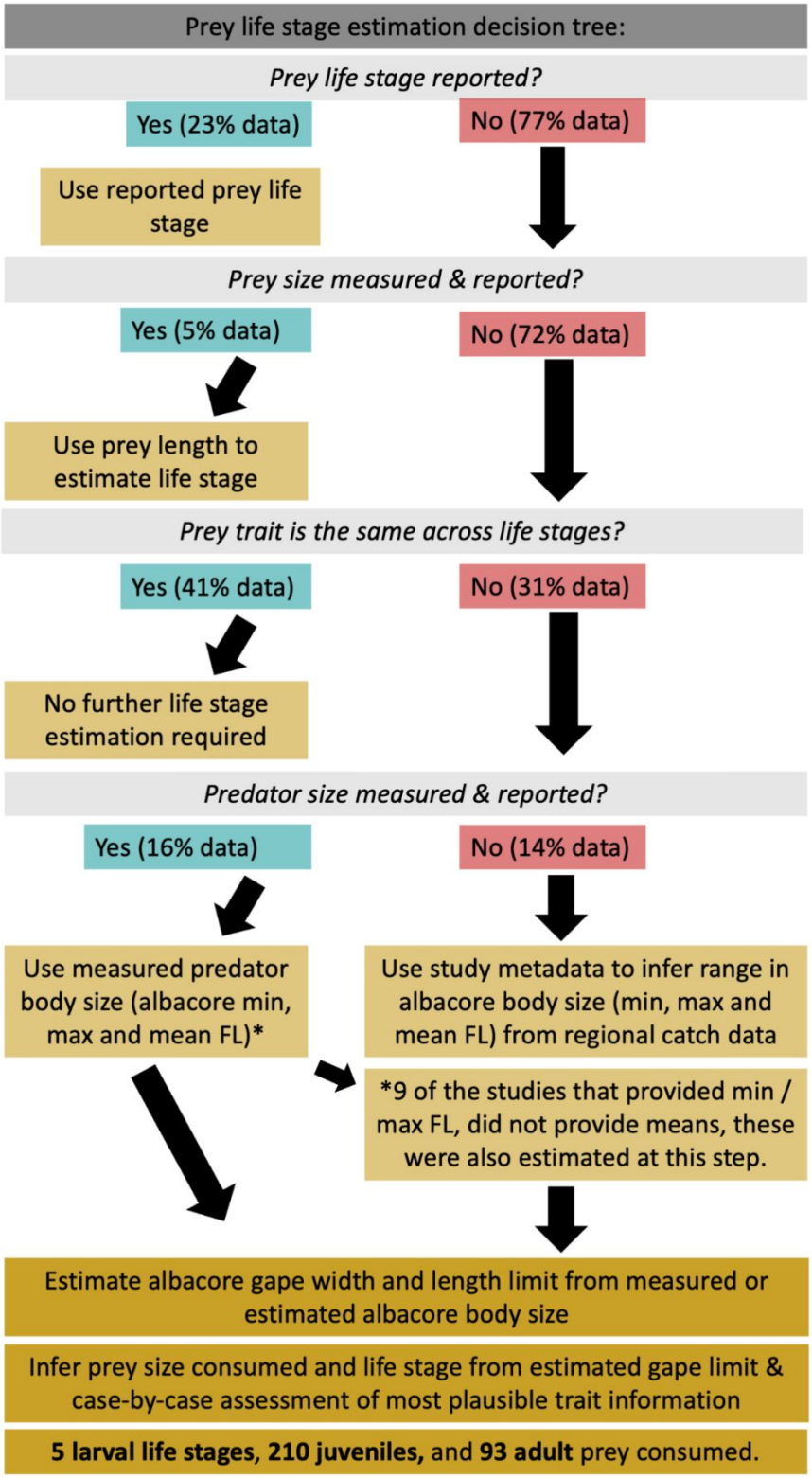
For 94 prey species, we lacked metainformation to assist in their direct life stage estimation and selection of appropriate trait information among different traits for juvenile and adult life stages. We corroborated decisions on selection of appropriate trait information among these species using albacore gape length limits calculated from maximum measured or estimated albacore fork lengths and using the equation developed by (Ménard et al., 2006) for yellowfin tuna to estimate gape limits ranging here from 6.4–11.5 cm across studies and locations sampled. Here we described how data on measured albacore length information were handled and how we estimated fork length information if this was also not measured or reported (Figure S1).

Out of 26 research papers, 16 measured albacore fork length (FL) range, minima and maxima (Figure S2). Of these, seven also reported the mean FL and five an estimated age range or life stage for albacore sampled (e.g., adult, juvenile) (Supplementary Data, Table S3). We also estimated mean FL for the 9 studies that reported FL range but not means (Figure S2), and all FL data for the remaining 10 studies that lacked size or life history information using metadata collected on fishing gear used and matched to gear-specific length data from relevant regional fisheries management organisations.

Of the 10 studies that lacked size or life history information for albacore, four reported the method of sampling (i.e. troll, trawl, longline). For these four studies and to complete the missing mean fork length (FL) for 7 studies noted above, we matched gear-specific length data (range and mean FL) from relevant regional fisheries management organisations (ICCAT, 2020; ISC, 2006) to albacore diet studies by year. We then estimated the likely life stage(s) sampled

using region-specific age and growth curves, and reported sizes at maturity (described in Supplementary Data, Table S3).

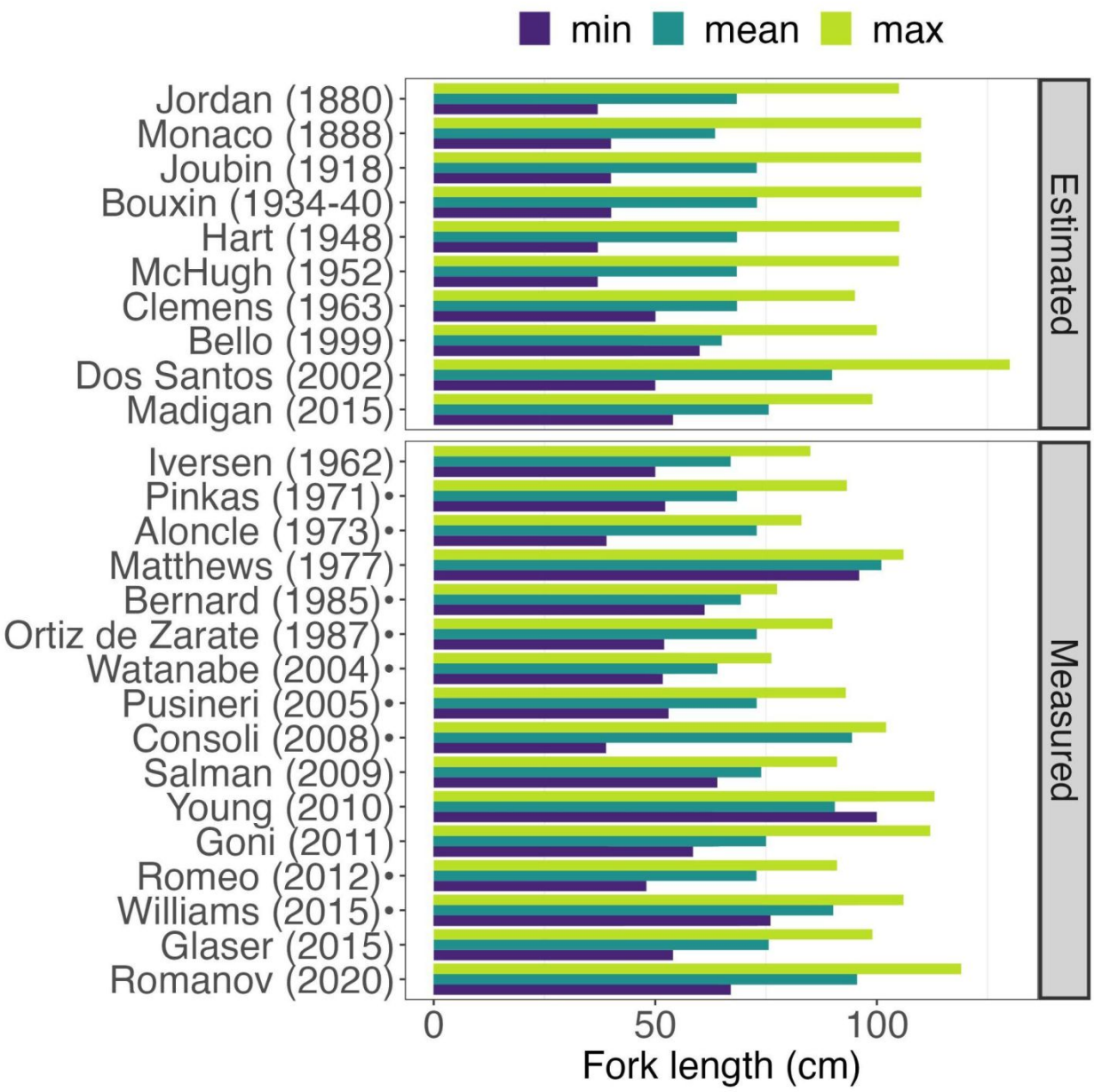
Finally, six historical studies lacked any information about sampled albacore length or age, did not provide catch method and/or were outside any record-keeping time-frames for fisheries catch data. Here, we estimated likely life stage(s) for albacore based on studies that sampled the same geographic area (Supplementary Data, Table S3). We confirmed our life-stage estimations using known albacore ontogenetic and migratory behaviours in the large marine ecosystems sampled (Nikolic et al., 2017). There was no significant difference between the variances of mean, minimum and maximum FL for studies where these parameters were measured or where these parameters were estimated in this study (Figure S2). Overall, we estimate that sampled albacore ranged from 37–119 cm with mean fork lengths of 47–101 cm (Supplementary Information, Figure S2).



52

53 **Figure S1.** Prey species life stage estimation decision tree.

54



55

56 **Figure S2.** Albacore tuna fork length minima (min), mean and maxima (max) obtained from
57 measured and reported data from 16 publications and estimated for a further 10 publications. Of
58 the 16 reporting length information, 9 publications (annotated with •) did not include a mean and
59 this value was estimated in the protocol described in the methods of this manuscript.

Appendix C – Trait-data collection & Analyses

Four trait variables (Table 1) were extracted from a global database of albacore prey traits (Gleiber et al., 2022) for taxa identified to species and for the estimated life stage consumed (Supplementary Data, Table S5). We used online repositories for species-level information, primarily FishBase (Froese & Pauly, 2020), SeaLifeBase (Palomares & Pauly, 2020), and the IUCN Red List of Threatened Species (IUCN, 2020), and by searching descriptive published literature for each species using Web of Science and Google Scholar. Of the 308 species identified in albacore diets, we obtained complete trait information for 292 species for the life stage consumed, for the four habitat use traits used in this meta-analysis: (i) vertical and (ii) horizontal habitat association, (iii) presence of diel vertical migration, and (iv) presence of seasonal migration (Supplementary Data, Table S5).

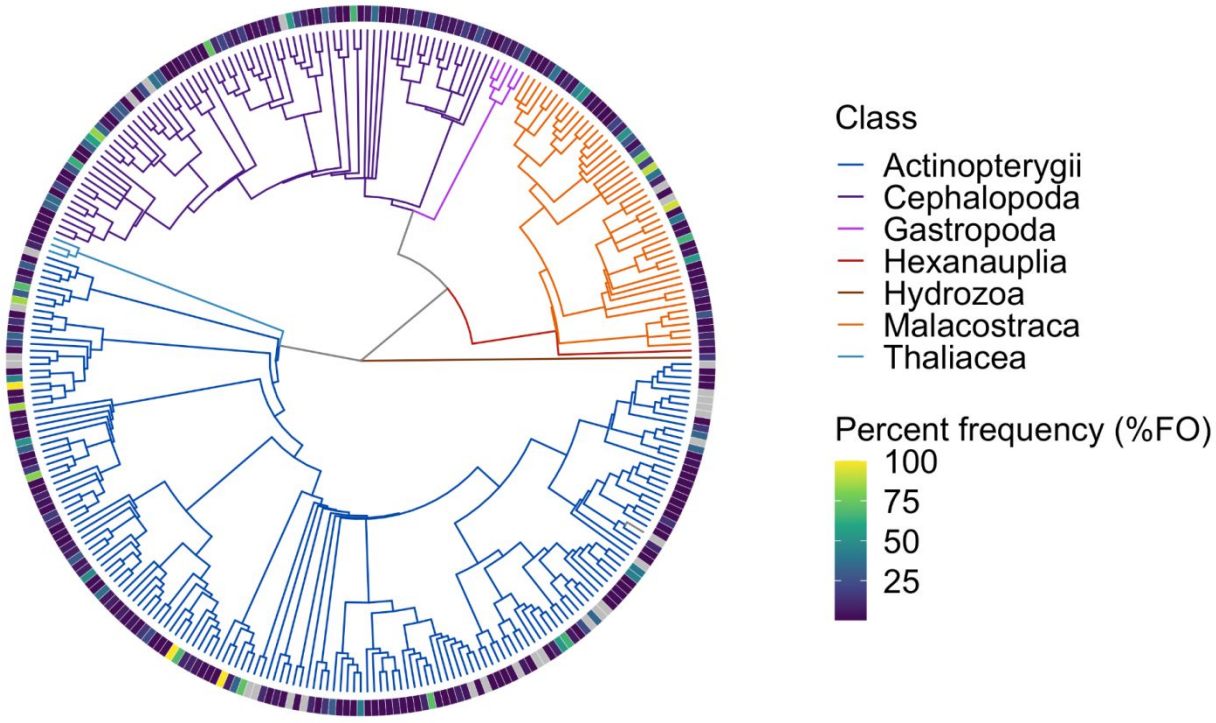
Vertical and horizontal habitat use traits were directly extracted from online repositories and corroborated alongside species distribution maps, reported depth range and typical depth strata inhabited (Gleiber et al., 2022). Where published literature expanded on or differed from a general value reported by species information repositories, we used the published literature and data. For example, if a species is listed as 'bathypelagic' in FishBase, but we do not have access to the original data and published papers report their distribution as typically 'mesopelagic', we selected their vertical habitat use trait to be 'mesopelagic' for the purposes of this analysis. Trait values for the presence and nature of diel vertical migration or seasonal migration behaviour were collected by keyword searching for each of these terms and for the prey species scientific name on Google Scholar (2020), Web of Science (Clarivate Analytics, 2020), Aquatic Sciences and Fisheries Abstracts (ASFA, 2020) and Federal Science Library Canada (FSLN, 2020)

bibliographic databases. This task was performed and repeated by up to 6 individual data collectors and values were cross-checked between data collectors, multiple published papers and data.

Of note, we further edited vertical habitat use information for two species, *Janicella spinicauda* (Oplophoroidae) and *Lampanyctus crocodilus* (Myctophidae), which were classified primarily as 'bathypelagic' (> 1300 m depth) and appear as such in the database but are also known to occur in the mesopelagic zone listed as secondary habitat in our database. The mesopelagic zone is where these prey were most likely encountered by albacore tuna that are not known to occur in or be able to dive to the bathypelagic at all. Thus for analyses, we relabelled those two species as 'mesopelagic' in order to retain them rather than exclude them from analyses.

94 **Appendix D – Supplemental Results**

95

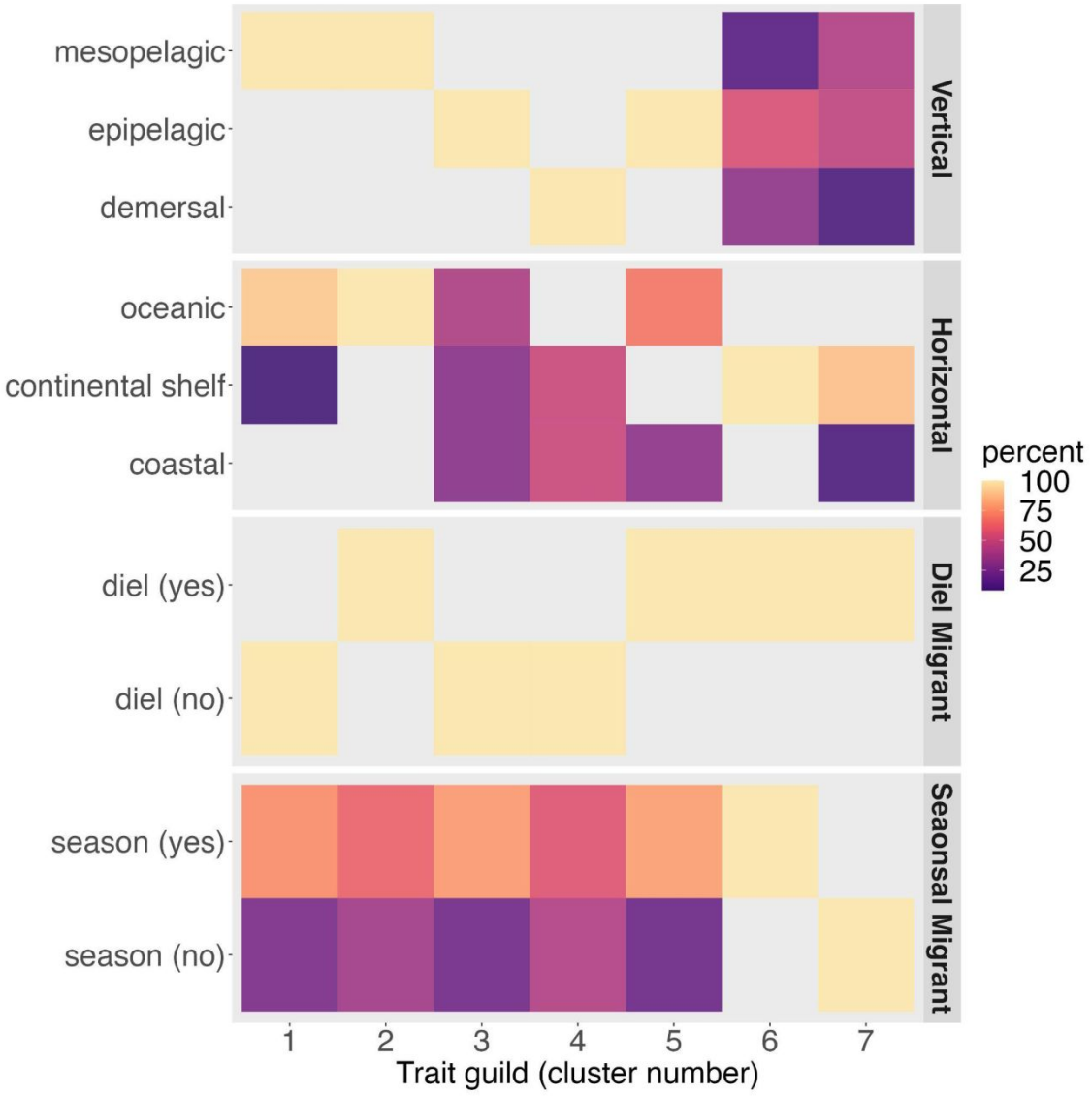


96

97 **Figure S3.** The maximum percent frequency of occurrence observed across phylogeny. Grey

98 shading indicates no quantitative diet data were available for a particular species and trait.

99



100

101 **Figure S4.** Trait heatmap illustrating the distribution of trait values within each trait guild

102 (cluster), as a proportion of species within each trait guild associated with each trait value, using

103 hierarchical divisive clustering algorithms (k = 7), for vertical habitat ('Vertical'), horizontal

104 habitat use ('Horizontal'), diel vertical migration ('Diel Migrant') and seasonal habitat use

105 ('Seasonal Migrant').

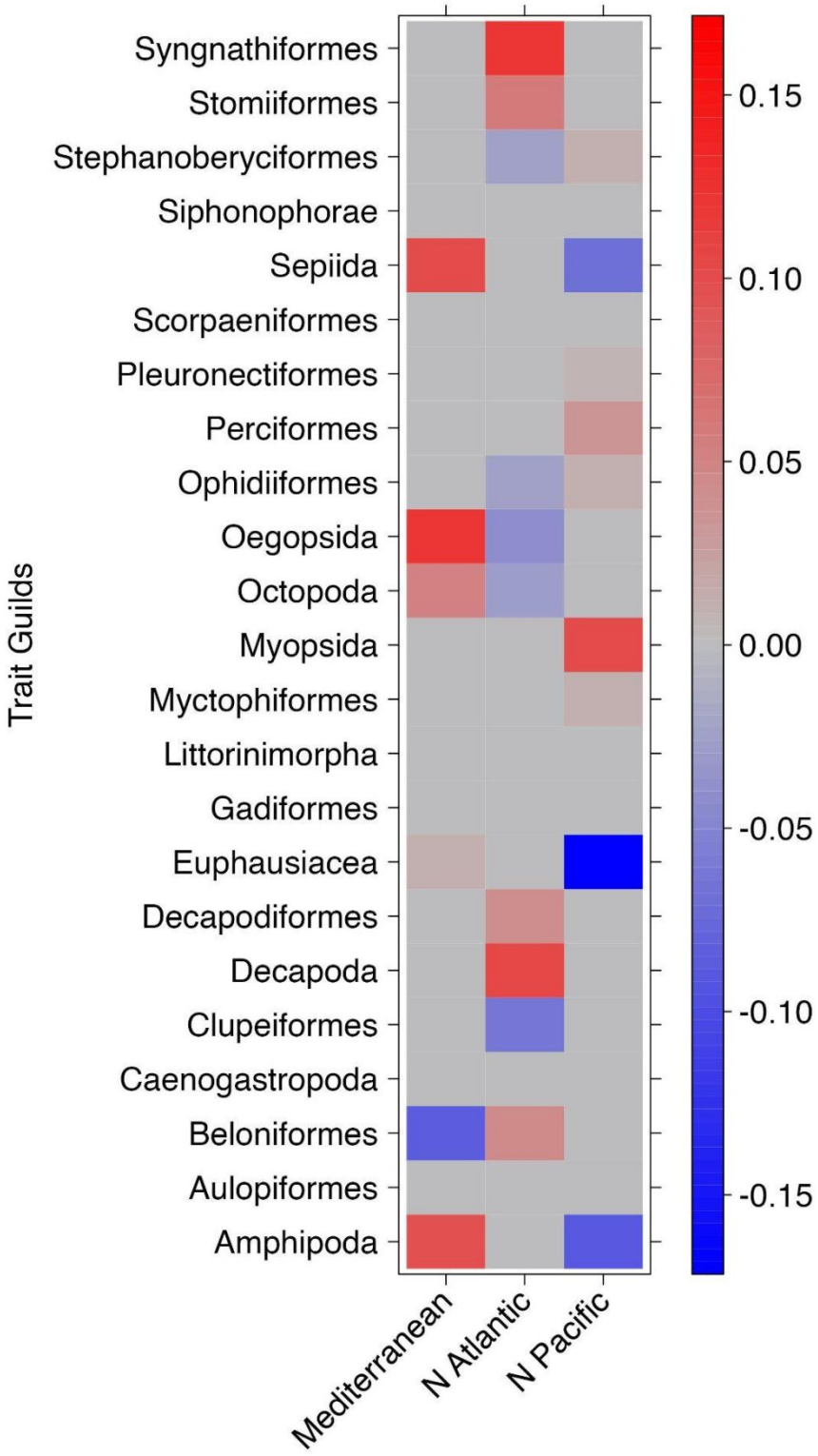

Trait Guilds
Syngnathiformes
Stomiiformes
Stephanoberyciformes
Siphonophorae
Sepiida
Scorpaeniformes
Pleuronectiformes
Perciformes
Ophidiiformes
Oegopsida
Octopoda
Myopsida
Myctophiformes
Littorinimorpha
Gadiformes
Euphausiacea
Decapodiformes
Decapoda
Clupeiformes
Caenogastropoda
Beloniformes
Aulopiformes
Amphipoda
Mediterranean
N Atlantic
N Pacific
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15

Figure S5. Correlation coefficients for the fourth corner solution and significant relationships between taxonomic variability and ocean basins sampled. Here we aggregate 98 species by their phylogenetic order to illustrate the results of taxonomic variability. Coefficients for all trait-environment interactions are presented using a (GLM)-LASSO model (Brown *et al.* 2014). Significant trait-based relationships between albacore diet composition and geography sampled are coloured in relation to their correlation coefficient, and the strength and direction of the relationship.

References

ASFA. (2020). *Aquatic Sciences and Fisheries Abstracts*. World Wide Web electronic publication, accessed 07/2020: http://www.ala.org.au http://www.fao.org/fishery/asfa/en. Accessed July 2020.

Clarivate Analytics. (2020). *Web of Science*. World Wide Web electronic publication, accessed 07/2020: www.webofknowledge.com.

Froese, R., & Pauly, D. (2020). *FishBase*. World Wide Web electronic publication, accessed 07/2020: www.fishbase.org.

FSLN. (2020). *Federal Science Libraries Network*. World Wide Web electronic publication, accessed 07/2020: https://science-libraries.canada.ca/eng/home/

Gleiber, M. R., Hardy, N. A., Roote, Z., Morganson, C. J., Krug-Macleod, A., George, I.,

Matuch, C., Brookson, C. B., Crowder, L. B., & Green, S. J. (2022). *Pelagic Species Trait Database* [Data set]. Scholars Portal Dataverse. https://doi.org/10.5683/SP3/0YFJED

Google Scholar. (2020). *Google Scholar*. https://scholar.google.com/

ICCAT. (2020). *Albacore (Thunnus alalunga) Task 2 size/weight frequencies from ICCAT (as of Jan/2021) for the period 1956-2019.* Public statistical databases, accessed 07/2020: https://www.iccat.int/en/accesingdb.html

ISC. (2006). *Report of the ISC – Albacore Working Group Stock Assessment Workshop*. National Research Institute of Far Seas Fisheries, Shimizu.

IUCN. (2020). *The IUCN Red List of Threatened Species*. World Wide Web publication, accessed 07/2020: https://www.iucnredlist.org.

Ménard, F., Labrune, C., Shin, Y.-J., Asine, A. S., & Bard, F.-X. (2006). Opportunistic predation in tuna: A size-based approach. *Marine Ecology Progress Series*, *323*, 223–231. https://doi.org/10.3354/meps323223

Nikolic, N., Morandeau, G., Hoarau, L., West, W., Arrizabalaga, H., Hoyle, S., Nicol, S. J., Bourjea, J., Puech, A., Farley, J. H., Williams, A. J., & Fonteneau, A. (2017). Review of albacore tuna, Thunnus alalunga, biology, fisheries and management. *Reviews in Fish Biology and Fisheries*, *27*(4), 775–810. https://doi.org/10.1007/s11160-016-9453-y

Palomares, M., & Pauly, D. (2020). *SeaLifeBase*. World Wide Web electronic publication, accessed 07/2020: www.sealifebase.org

List of supplementary information tables

sonal migration) phase of the predation process (Green et al., 2019). We used these traits for building p

una diets queried from 1900 until 2020 using the Web of Science (Clarivate Analytics, 2020), Aquatic
t data. Several older papers, typically prior to the 1980's, needed to be scanned and digitised to PDF fo
npling, fishing gear used, depth sampled and time of day, the number of non-empty stomachs, measure
ciated notes, and trait variables and values that influence the prey encounter (habitat use, diel vertical ar
d type of length measurement taken (maxl_type), as well as the associated maximum gape limit (maxG
cluster validation outputs: (1) higher average distance between species clusters (Rousseeuw,
and grey literature form the 1880's to 2020.

prey functional groups and for investigating differences in albacore diets across the world.

Sciences and Fisheries Abstracts (ASFA, 2020) and Federal Science Library Canada (FSLN, 2020) bi
rmat. These are available upon request and all data digitised from published papers and reports are ava
d albacore length and life history data, and description of our estimation for albacore life history stage,
nd seasonal migration) phase of the predation process (Green et al., 2019). We used these traits for buil
ape) for the albacore sampled from the same study as the prey taxa. Appended are the estimated life st
1987); (2) lower average distance within species clusters (Handl et al., 2005); (3) high silhou

bliographic databases. Both the diet research terms and synonymous scientific names for albacore tuna
ailable in our diet database. For every diet report, we recorded the date range, months and seasons of sa
age and lengths based on basin-scale fisheries catch data and age and growth work. Several reports pr
lding prey functional groups and for investigating differences in albacore diets across the world.
age (life_stage) and associated notes used to select the final life stage assigned to each species for selec
ette width coefficient value and Dunny Smith residuals (Dunn†, 1974; Rousseeuw, 1987); an

ı were combined by a Boolean ‘AND’ clause.
ımpling, the median geographic location of albacore tuna collections, the number of albacore tuna colle
esented aggregate information for an entire multi-year program.

ction of appropriate trait information. ***See notes below table.
d lastly, (4) optimal evenness or balance of cluster composition indicated by the number of sp

ɛcted, fishing gear and time of day for collections.

ɔecies in each cluster (Legendre & Legendre, 1998).

Table 1. Trait variables and values that influence the prey encounter (

Trait	Variable type
Vertical habitat use	Categorical
Horizontal habitat use	Categorical
Diel vertical	Binary (yes/no)
Seasonal migration	Binary (yes/no)

(habitat use, diel vertical and seasonal migration) phase of the predation process (Green et al., 2019). V

Definitions & relationships of traits for predator-prey
Represents the water column position that prey resources
Represents the typical position from the coastal to
The relationship of this trait with predation is
Represents whether prey species are seasonally abundant

We used these traits for building prey functional groups and for investigating differences in albacore die

ets across the world.

Table 2. Model design, variables and matrices used in multi-matrix fourth corner anal

Diet data (L)	Trait variables (Q)	Environmental variable (R)
Diet composition (SPP)	None	Ocean basin
	Phylogeny	
	Trait variables (Table 1/S1)	
	Trait guilds (Figure 3)	

lysis.

Model
iet composition ~ ocean basi
nposition ~ phylogeny + ocea
osition ~ traits variables + oc
nposition ~ trait guilds + ocea

Table S1. Literature search terms used to identify published papers and historical reports of albacore t

Diet	**Albacore tuna synonymous scientific names**
(diet* OR forag* OR prey) AND	("Thunnus alalunga" OR "Scomber alalunga" OR "Albacora alalonga" OR "Germo alalonga" OR "Germo alalunga" OR "Germo germo" OR "Germo germon" OR "Germo germon steadi" OR "Orcynus alalonga" OR "Orcynus alatunga" OR "Orcynus germo" OR "Orcynus germon" OR "Orcynus pacificus" OR "Scomber alalunga" OR "Scomber alalunga" OR "Scomber alatunga" OR "Scomber albicans" OR "Scomber germo" OR "Scomber germo" OR "Scomber germon" OR "Thunnus alalonga" OR "Thunnus alalunga" OR "Thunnus germo" OR "Thunnus pacificus" OR "Thynnus alalonga" OR "Thynnus alalunga" OR "Thynnus pacificus")

tuna diets queried from 1900 until 2020 using the Web of Science (Clarivate Analytics, 2020), Aquatic

: Sciences and Fisheries Abstracts (ASFA, 2020) and Federal Science Library Canada (FSLN, 2020) bi

ibliographic databases. Both the diet research terms and synonymous scientific names for albacore tuna

a were combined by a Boolean ‘AND’ clause.

Table S2. Published and historical reports of albacore tuna diet that provided detailed stomach co

CiteAuth	CiteYear	CiteSource	CiteTitle
Aloncle, H.	1973	Thesis	Rythmes alimentaires et circa
Bello, G.	1999	Journal of Molluscan Studies	Cephalopods in the diet of all
Bernard et al.	1985	CalCOFI Reports	Stomach contents of albacore
Clemens & Iselin	1963	FAO World Sci. Meet. Biol.	Food of Pacific albacore in th
Consoli et al.	2008	Marine Biology	Feeding habits of the albacor
Dos Santos & Haimovi	2002	Bulletin of Marine Science	Cephalopods in the Trophic I
Glaser et al.	2015	Journal of Marine Systems	Through the stomach of a pre
Goni et al.	2011	Marine Biology	Variability of albacore (*Thun*
Hart, JL	1948	Pacific Biological Station	Accumulated Data on Albacc
Iversen, RTB	1962	Fishery Bulletin	Food of albacore tuna, *Thunn*
Jordan & Gilbert	1880	Proceedings of the National A	Description of two species of
Joubin & Rouie	1918	Bulletin de l'Institut Océanog	Observations sur la nourritur
Legendre & Bouxin†	1934; 1936; 19	Blondel la Rougery	La Faune pélagique de l'Atla
Logan et al.‡	2013	Deep Sea Research Part II: T	Contribution of Cephalopod p
Madigan et al.	2015	Proceedings of the National A	Assessing niche width of end
Matthews et al.	1977	NOAA Technical Report	Food of Western North Atlan
McHugh, JL	1952	Bulletin of the Scripps Institu	The food of albacore (*Germo*
Ortiz de Zarate, V	1987	Instituto Español de Oceanog	Datos sobre la alimentacion c
Pinkas et al.	1971	Fish Bulletin	Food habits of albacore, blue
Prince Albert de Monac	1888	Comptes Rendus de l'Acadén	Sur l'alimentation des naufrag
Pusineri et al.	2005	Jounal of Marine Science	Food and feeding ecology of
Romanov et al.	2020	Marine and Freshwater Resea	Trophic ecology of albacore t
Romero et al.	2012	Helgoland Marine Research	Pelagic cephalopods of the ce
Salman & Karakulak	2009	Journal of Marine Biological	Cephalopods in the diet of all
Teffer et al.‡	2015	Marine Biology	Trophic niche overlap among
Watanabe et al.	2004	Fisheries Science	Feeding habits of albacore *Th*
Williams et al.	2015	Deep Sea Research Part II: T	Vertical behavior and diet of
Young et al.	2010	Marine Biology	Feeding ecology and niche se
†These publications were combined as they consisted of three part			

ɔntent data. Several older papers, typically prior to the 1980's, needed to be scanned and digitised to PI

adiens chez le germon *Thunnus alalunga* dans le Nord-Est atlantique
bacore, *Thunnus alalunga*, from the Adriatic Sea
e, skipjack, and bonito
he California fishery
·e tuna *Thunnus alalunga* (Perciformes, Scombridae) from central Mediterranean Sea
Relations off Southern Brazil
edator: Regional patterns of forage in the diet of albacore tuna in the California Current System and me
nus alalunga) diet in the Northeast Atlantic and Mediterranean Sea
ɔre
nus germo (Lacepède), in the central and northeastern Pacific
f scopeloid fishes, *Sudis ringens* and *Myctophum crenulare* from Santa Barbara Channel, California.
e des thons de l'Atlantique (*Germo alalonga* Gmelin)
ntique au large du Golfe de Gascogne recueillie dans des estomacs de Germons: première partie: poiss
prey to the Diet of Large Pelagic Fish Predators in Central North Atlantic Ocean
lothermic fish from genes to ecosystem
ıtic Tunas (*Thunnus*) and Lancetfishes (*Alepisaurus*)
› *alalunga*) off California
del atun blanco (*Thunnus alalunga*) juvenil capturado en el golfo de vizcaya
:fin tuna, and bonito
gés en pleine mer (On the nutrition of castaways in the open ocean)
`juvenile albacore, *Thunnus alalunga*, off the Bay of Biscay: a case study
tuna (*Thunnus alalunga*) in the western tropical Indian Ocean and adjacent waters
entral Mediterranean Sea determined by the anaylsis of the stomach content of large fish predators
bacore, *Thunnus alalunga*, from the eastern Mediterranean
g dolphinfish and co-occuring tunas near the northern edge of their range in the western North Atlantic
hunnus alalunga in the transiton region of the central North Pacific
`albacore tuna (*Thunnus alaguna*) vary with latitude in the South Pacific Ocean
egregation in oceanic top predators off eastern Australia

DF format. These are available upon request and all data digitised from published papers and reports ar

ɛtrics needed for ecosystem-based management

ons; deuxième partie: céphalopodes; troisième partie: invertébrés (céphalopodes exclus), parasites du g

re available in

germon.

Table S3. Metainformation for published papers and reports on location, year, months, seasor

StudyID	OceanBasin	LocatName	LocatLatitud	LocatLon	MonthRa	YearRange
Aloncle1973	N Atlantic	NE Atlantic, S	44.632016	-5.5	May–Sep	1968–71
Bello1999	Mediterranean	SW Adriatic	41.096462	17.5122	Sep–Oct	1992
Bello1999	Mediterranean	SW Adriatic	41.2	17.5122	Sep–Oct	1994
Bernard1985	N Pacific	Southern CA	35.358333	-121.91	Aug–Sep	1983
Bouxin&Lege	N Atlantic	Golfe de Gasc	48	-11.681	Jul–Aug	1929
Bouxin&Lege	N Atlantic	Golfe de Gasc	48	-11.681	Jul–Nov	1933
Bouxin&Lege	N Atlantic	Golfe de Gasc	48	-11.681	Jul–Oct	1930
Bouxin&Lege	N Atlantic	Golfe de Gasc	48	-11.681	Jul–Oct	1931
Bouxin&Lege	N Atlantic	Golfe de Gasc	48	-11.681	Jul–Oct	1932
Bouxin&Lege	N Atlantic	Golfe de Gasc	48	-11.681	Oct	1928
Clemens&Isel	N Pacific	A	38	-124	Jul–Sep	1955–61
Clemens&Isel	N Pacific	A-B	36.046601	-123.62	Jul–Sep	1955–61
Clemens&Isel	N Pacific	A-B-C	32.5	-121.84	Jul–Sep	1955–61
Clemens&Isel	N Pacific	B	33.5	-121.84	Jul–Sep	1955–61
Clemens&Isel	N Pacific	B-C	31.5	-119.5	Jul–Sep	1955–61
Clemens&Isel	N Pacific	C	30	-120	Jul–Sep	1955–61
Clemens&Isel	N Pacific	D	26	-115	Jul–Sep	1955–61
Consoli2008	Mediterranean	Central Medite	38.744181	15.0595	Year-roun	2005–06
DosSantos&H	S Atlantic	Southern Braz	-30	-47.036	Multi-mo	1980–98
Glaser2015	N Pacific	Mexico to Car	42	-128.99	Jun–Sep	2005–06
Goni2011	Mediterranean	Balearic	40.158082	5	Oct	2005
Goni2011	Mediterranean	S Adriatic	41.824403	16.7668	Nov	2006
Goni2011	Mediterranean	Tyrrhenian	40.658373	11.4454	Jan	2008
Goni2011	N Atlantic	Bay of Biscay	48	-13	Jul–Aug	2005
Goni2011	N Atlantic	Bay of Biscay	47.8	-10	Aug–Oct	2004
Goni2011	N Atlantic	Bay of Biscay	47.8	-10	Jul	2005
Goni2011	N Atlantic	Bay of Biscay	47.8	-10	Jul	2006
Goni2011	N Atlantic	Bay of Biscay	46.7	-5.6	Aug	2005
Goni2011	N Atlantic	Bay of Biscay	46.7	-5.6	Sep–Oct	2006
Goni2011	N Atlantic	Bay of Biscay	45.4	-3.5	Jul–Sep	2006
Goni2011	N Atlantic	Bay of Biscay	44	-2.7	Aug–Oct	2007
Goni2011	N Atlantic	Bay of Biscay	44	-2.7	Jun–Oct	2005
Goni2011	N Atlantic	Bay of Biscay	44	-2.7	Jun–Oct	2006
Hart1948	N Pacific	Vancouver Isl	49.117928	-127.55	NA	1941
Hart1948	N Pacific	Vancouver Isl	49.117928	-127.55	NA	1946
Hart1948	N Pacific	Washington C	47.046499	-124.79	NA	1941
Hart1948	N Pacific	Washington C	47.046499	-124.79	NA	1945
Hart1948	N Pacific	Washington C	47.046499	-124.79	NA	1946
Hart1948	N Pacific	Washington C	47.046499	-124.79	NA	1947
Iversen1962	N Pacific	Central NE Pa	15	-150	Year-roun	1950–57
Jordan1880	N Pacific	Central CA, S	34.345859	-119.72	NA	1880
Joubin1918	N Atlantic	Golfe de Gasc	46.307336	-12.25	NA	1918
Madigan2015	N Pacific	Mexico to Cal	34.633208	-124.29	Jul–Oct	2008–10
Matthews1977	N Atlantic	NW Atlantic	38	-56	NA	1957–64
McHugh1952	N Pacific	Baja to northe	32.5	-121	Jun & Oct	1949
Monaco1888	Mediterranean	Mediterranean	34.061761	19.2096	Sep	1888

OrtizZarate19	N Atlantic	Bay of Biscay	46.986108	-5.4076	NA		1968
Pinkas1971	N Pacific	Central Califo	35.28333333	-122	Jul–Nov		1968
Pinkas1971	N Pacific	Oregon-Washi	45	-126	Jul–Nov		1968
Pinkas1971	N Pacific	Oregon-Washi	45	-126	Jul–Sep		1969
Pinkas1971	N Pacific	Southern Calif	32	-119.5	Jul–Nov		1968
Pinkas1971	N Pacific	Southern Calif	32	-119.5	Jul–Sep		1969
Pusineri2005	N Atlantic	Bay of Biscay	45	-17.5	Jun–Sep		1993
Romanov2020	Indian	Indian Monsoo	-8	57	Multi-mo	2001–15	
Romanov2020	Indian	Indian South S	-19	53	Multi-mo	2003-14	
Romanov2020	Indian	Mozambique (	-15.5	42.76	Multi-mo	2003-14	
Romanov2020	S Atlantic	Atlantic Ocear	-35	18	Multi-mo	2013–14	
Romeo2012	Mediterranean	S. Tyrrhenian	38.6	15	NA	2002–08	
Salman&Kara	Mediterranean	Antalya Bay (I	36.5	31.5	May-July		2007
Watanabe200	N Pacific	central North I	36	160	July		2002
Watanabe200	N Pacific	central North I	36	160	May-June		2002
Watanabe200	N Pacific	central North I	40	163	Septembe		2001
Williams2015	S Pacific	NE New Zeala	-40	178	Apr–May		2010
Williams2015	S Pacific	New Caledoni	-19	168	Feb–Oct		2010
Williams2015	S Pacific	SW New Zeal	-42.5	170	Jan–Apr		2008
Williams2015	S Pacific	SW New Zeal	-42.5	170	Jan–Mar		2009
Williams2015	S Pacific	Tonga (TO_L_	-20	-175.09	Jun–Jul		2010
Young2010	S Pacific	Eastern Austra	-31	160	Year-roun	2004–06	
Young2010	S Pacific	Eastern Austra	-30	160	Year-roun	2004–06	

ns of sampling, fishing gear used, depth sampled and time of day, the number of non-empty st

YearEnd	stomachs_i	SampleMe	SampleDepth	TimeDay	pred_life	pred_life_est
1971	1754	troll	surface	day	juvenile	Estimated: by
1992	35	troll, trawl,	100–700 m	day, night	juvenile	Estimated: by
1994	21	troll, trawl,	750–1150 m	day, night	juvenile	Estimated: by
1983	94	troll, pole-li	surface	day	juvenile	Estimated: by
1929	6	troll	NA	day	juvenile, adult	Estimated: by
1933	54	troll	NA	day	juvenile, adult	Estimated: by
1930	9	troll	NA	day	juvenile, adult	Estimated: by
1931	25	troll	NA	day	juvenile, adult	Estimated: by
1932	35	troll	NA	day	juvenile, adult	Estimated: by
1928	1	troll	NA	day	juvenile, adult	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
1961	NA	troll, live-ba	surface		juvenile	Estimated: by
2006	116	longline, dr	surface, >500r	night	juvenile, adult	Estimated: by
1998	NA	longline	surface	day	juvenile, adult	Estimated: by
2006	371	troll, pole-li	surface	day	juvenile	Estimated: stu
2005	24	longline	0-50m	night	juvenile	Estimated: by
2006	24	longline	0-50m	night	juvenile	Estimated: by
2008	29	longline	0-50m	night	juvenile	Estimated: by
2005	46	troll, pole-li	surface	day	juvenile, adult	Estimated: by
2004	19	trawl	0-100m	night	juvenile, adult	Estimated: by
2005	14	troll/ pole-li	surface	day	juvenile, adult	Estimated: by
2006	39	troll/ pole-li	surface	day	juvenile, adult	Estimated: by
2005	29	trawl	0-100m	night	juvenile, adult	Estimated: by
2006	32	trawl	0-100m	night	juvenile, adult	Estimated: by
2006	22	trawl	0-100m	night	juvenile, adult	Estimated: by
2007	31	pole-line	surface	day	juvenile, adult	Estimated: by
2005	186	pole-line	surface	day	juvenile, adult	Estimated: by
2006	58	pole-line	surface	day	juvenile, adult	Estimated: by
1941	214	NA	NA	NA	juvenile	Estimated: by
1946	3	NA	NA	NA	juvenile	Estimated: by
1941	196	NA	NA	NA	juvenile	Estimated: by
1945	45	NA	NA	NA	juvenile	Estimated: by
1946	222	NA	NA	NA	juvenile	Estimated: by
1947	88	NA	NA	NA	juvenile	Estimated: by
1957	348	longline, tro	surface, subsu	day	juvenile	Estimated: by
1880	1	NA	NA	NA	juvenile	Estimated: by
1918	NA	troll	surface	day	juvenile, adult	Estimated: by
2010	86	troll, pole-li	surface	day	juvenile	Estimated: stu
1964	38	longline	10-60 m	day	adult	Estimated: by
1949	301	troll	surface	day	juvenile	Estimated: by
1888	NA	troll	surface	day	juvenile, adult	Estimated: by

1968		97	troll	surface	day	juvenile	Estimated: by
1968		286	most caugh	surface	day	juvenile	Estimated: by
1968		177	most caugh	surface	day	juvenile	Estimated: by
1969		20	most caugh	surface	day	juvenile	Estimated: by
1968		222	most caugh	surface	day	juvenile	Estimated: by
1969		200	most caugh	surface	day	juvenile	Estimated: by
1993		27	driftnets	surface	night	juvenile	Estimated: stu
2015		150	mixed scier	NA	multiple	juvenile, adult	Estimated: by
2014		184	mixed scier	NA	multiple	juvenile, adult	Estimated: by
2014		63	mixed scier	NA	multiple	juvenile, adult	Estimated: by
2014		290	mixed scier	NA	multiple	juvenile, adult	Estimated: by
2008	NA		drifting lon	surface	day	juvenile	Estimated: by
2007		61	long-line	surface	day	juvenile	Estimated: by
2002		46	pole-line, g	surface	day, night	juvenile	Estimated: by
2002		64	pole-line, g	surface	day, night	juvenile	Estimated: by
2001		14	pole-line, g	surface	day, night	juvenile	Estimated: by
2010		11	trolling	< 100m	day	juvenile, adult	Estimated: by
2010		342	longline	50-150m	day, night	juvenile, adult	Estimated: by
2008		152	trolling	< 100m	day	juvenile	Estimated: by
2009		61	trolling	< 100m	day	juvenile	Estimated: by
2010		42	longline	50-150m	day, night	juvenile, adult	Estimated: stu
2006		10	longline	25–385 m	day, night	adult	Estimated: by
2006		36	longline	25–385 m	day, night	juvenile, adult	Estimated: by

omachs, measured albacore length and life history data, and description of our estimation for albac

pred_age	pred_age_est	pred_flm	pred_flmean_	pred_flm	pred_flmin	pred_fl	pred_fle
1–5 yo	Estimated: by	72.9		Estimated:	39	83	Measure
1+ yo	Estimated: stu	47.23		Estimated:	45	60	Estimate
2+ yo	Estimated: stu	65		Estimated:	60	100	Estimate
2–3 yo	Estimated: by	69.3		Estimated:	61.13	77.47	Measure
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–3 yo	Estimated: stu	68.4	6.5	Estimated:	50	95	Estimate
1–7 yo	Estimated: by	94.4		Estimated:	38.9	102.1	Measure
4+ yo	Estimated: by	89.9		Estimated:	50	130	Estimate
2–4 yo	Estimated: stu	75.6	8.9	Measured:	54	99	Measure
2–3 yo	Estimated: stu	64.4		Measured:	58.5	83.2	Measure
2–3 yo	Estimated: stu	64.4		Measured:	58.5	83.2	Measure
3–5+ yo	Estimated: stu	75		Measured:	58.5	83.2	Measure
1–4 yo	Estimated: stu	63.2		Measured:	39.6	112	Measure
2–5+ yo	Estimated: stu	63.2		Measured:	39.6	112	Measure
1–3 yo	Estimated: stu	63.2		Measured:	39.6	112	Measure
1–3 yo	Estimated: stu	61.1		Measured:	39.6	112	Measure
1–3 yo	Estimated: stu	63.2		Measured:	39.6	112	Measure
2–4 yo	Estimated: stu	61.1		Measured:	39.6	112	Measure
1–4 yo	Estimated: stu	61.1		Measured:	39.6	112	Measure
1–5+ yo	Estimated: stu	61.1		Measured:	39.6	112	Measure
1–5+ yo	Estimated: stu	63.2		Measured:	39.6	112	Measure
1–5+ yo	Estimated: stu	61.1		Measured:	39.6	112	Measure
2–5+ yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
2–5+ yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
2–5+ yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
2–5+ yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
2–5+ yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
2–5+ yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
2–4 yo	Estimated: by	67		Measured:	50	85	Measure
2–5 yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
1–8 yo	Estimated: by	72.9		Estimated:	40	110	Estimate
2–4 yo	Estimated: by	75.6	8.9	Estimated:	54	99	Estimate
6–8 yo	Estimated: by	101		Measured:	96	106	Measure
2–5 yo	Estimated: by	68.4	6.5	Estimated:	37	105	Estimate
1–8 yo	Estimated: by	63.4875		Estimated:	40	110	Estimate

1–5 yo	Estimated: by	72.9		Estimated:	52	90	Measured
2–5 yo	Estimated: by	68.4	6.5	Estimated:	52.2	93.2	Measured
2–5 yo	Estimated: by	68.4	6.5	Estimated:	52.2	93.2	Measured
2–5 yo	Estimated: by	68.4	6.5	Estimated:	52.2	93.2	Measured
2–5 yo	Estimated: by	68.4	6.5	Estimated:	52.2	93.2	Measured
2–5 yo	Estimated: by	68.4	6.5	Estimated:	52.2	93.2	Measured
2–3 yo	Estimated: pap	72.9		Estimated:	53	93	Measured
2+ yo	Estimated: by	95.5		Measured:	67	119	Measured
2+ yo	Estimated: by	95.5		Measured:	67	119	Measured
2+ yo	Estimated: by	95.5		Measured:	67	119	Measured
2+ yo	Estimated: by	95.5		Measured:	67	119	Measured
1–5 yo	Estimated: by	72.84		Estimated:	48	91	Measured
2–5 yo	Estimated: by	73.9	4.9	Measured:	64	91	Measured
1–3 yo	Estimated: by	64.006	3.219	Estimated:	48.9	76.2	Measured
1–3 yo	Estimated: by	64.006	3.219	Estimated:	50.5	75.8	Measured
1 yo	Estimated: by	54.763	5.849	Estimated:	51.7	56.4	Measured
2–6 yo	Estimated: by	84.409	4.064	Estimated:	69	95	Measured
3–9 yo	Estimated: by	90.13	4.291	Estimated:	73	106	Measured
1–4 yo	Estimated: by	64.006	3.219	Estimated:	43	86	Measured
1–5 yo	Estimated: by	74.248	4.543	Estimated:	43	90	Measured
3–9 yo	Estimated: by	90.13	4.291	Estimated:	76	105	Measured
8–12 yo	Estimated: by	90.5		Measured:	100	113	Measured
2–8 yo	Estimated: by	90.5		Measured:	63	100	Measured

ore life history stage, age and lengths based on basin-scale fisheries catch data and age and growth wo

est_note	est_ref
Synthesis effo	Aloncle & Delaporte (1974); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Synthesis effo	Santiago & Arrizabalaga (2005)
Synthesis effo	Santiago & Arrizabalaga (2005)
Bernard (1985	Bernard (1985); ISC (2006); Xu et al. (2014)
Used albacore	ICCAT (2020); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Used albacore	ICCAT (2020); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Used albacore	ICCAT (2020); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Used albacore	ICCAT (2020); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Used albacore	ICCAT (2020); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Used albacore	ICCAT (2020); Goni et al. (2011); Santiago & Arrizabalaga (2005)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Synthesis effo	Clemens et al. (1963, 1965) catch data; ISC (2006); Xu et al. (2014)
Consoli et al. (	Consoli et al. (2008); ICCAT (2020); Santiago & Arrizabalaga (2005)
Synthesis effo	Chang et al. (1999); ICCAT (2020); Santiago & Arrizabalaga (2005)
Glaser et al. (2	Glaser (2010); Xu et al. (2014)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Goni et al. (20	Goni et al. (2011); Santiago & Arrizabalaga (2005)
Synthesis effo	ISC (2006); Xu et al. (2014)
Synthesis effo	ISC (2006); Xu et al. (2014)
Synthesis effo	ISC (2006); Xu et al. (2014)
Synthesis effo	ISC (2006); Xu et al. (2014)
Synthesis effo	ISC (2006); Xu et al. (2014)
Synthesis effo	ISC (2006); Xu et al. (2014)
Study reportec	Iversen (1962); Xu et al. (2014)
Synthesis estir	ISC (2006); Xu et al. (2014)
Synthesis effo	Goni et al. (2011) length values for the Mediterranean; Santiago & Arrizabalaga (2005)
Madigan et al.	Glaser (2010); Xu et al. (2014)
Matthews et al	Matthews et al. (1977); Santiago & Arrizabalaga (2005)
Synthesis effo	ISC (2006); Xu et al. (2014)
Synthesis effo	Goni et al. (2011) length values for the Mediterranean; Santiago & Arrizabalaga (2005)

Ortiz de Zarat Ortiz de Zarate (1987); ICCAT (2020); Santiago & Arrizabalaga (2005)
Pinkas et al. (1 Pinkas et al. (1971); ISC (2006); Xu et al. (2014)
Pinkas et al. (1 Pinkas et al. (1971); ISC (2006); Xu et al. (2014)
Pinkas et al. (1 Pinkas et al. (1971); ISC (2006); Xu et al. (2014)
Pinkas et al. (1 Pinkas et al. (1971); ISC (2006); Xu et al. (2014)
Pinkas et al. (1 Pinkas et al. (1971); ISC (2006); Xu et al. (2014)
Pusineri et al. Pusineri et al. (2005); Santiago & Arrizabalaga (2005)
Romanov et al Romanov et al. (2020); Santiago & Arrizabalaga (2005); Xu et al. (2014)
Romanov et al Romanov et al. (2020); Santiago & Arrizabalaga (2005); Xu et al. (2014)
Romanov et al Romanov et al. (2020); Santiago & Arrizabalaga (2005); Xu et al. (2014)
Romanov et al Romanov et al. (2020); Santiago & Arrizabalaga (2005); Xu et al. (2014)
Romeo et al. (Romeo et al. (2012); Santiago & Arrizabalaga (2005);
Salman & Kar Salman & Karakulak (2009); Santiago & Arrizabalaga (2005)
Watanabe et a Watanabe et al. (2004); ISC (2006); Xu et al. (2014)
Watanabe et a Watanabe et al. (2004); ISC (2006); Xu et al. (2014)
Watanabe et a Watanabe et al. (2004); ISC (2006); Xu et al. (2014)
Williams et al. Williams et al. (2015); ISC (2006); Xu et al. (2014)
Williams et al. Williams et al. (2015); ISC (2006); Xu et al. (2014)
Williams et al. Williams et al. (2015); ISC (2006); Xu et al. (2014)
Williams et al. Williams et al. (2015); ISC (2006); Xu et al. (2014)
Williams et al. Williams et al. (2015); ISC (2006); Xu et al. (2014)
Young et al. (2 Young et al. (2010); Xu et al. (2014)
Young et al. (2 Young et al. (2010); Xu et al. (2014)

Table S4. Reported information for prey species life stage (pre_age_reported_1_), lengths (maxL)

prey_sp	prey_age_reported_1	maxl_type	maxL (cm)	maxGape (cm)
Abralia redfieldi	none	NO	0	9.15677
Abraliopsis affinis	none	NO	0	7.97988
Abraliopsis felis	none	NO	0	7.97988
Abraliopsis gilchristi	none	NO	0	9.61765
Abraliopsis morisii	none	NO	0	9.61765
Acanthephyra pelagica	adult	NO	0	7.75767
Alepisaurus ferox	none	NO	0	9.61765
Alloteuthis subulata	none	NO	0	9.52712
Alpheus glaber	none	NO	0	7.75767
Anarrhichthys ocellatus	none	NO	0	7.38732
Anchylomera blossevillei	none	NO	0	9.52712
Ancistrocheirus lesueurii	none	NO	0	9.61765
Ancistroteuthis lichtenstein	none	ML	12.8	7.75767
Ancistroteuthis lichtenstein	none	NO	0	9.52712
Anoplopoma fimbria	none	NO	0	7.38732
Anotopterus nikparini	none	NO	0	7.97988
Anotopterus pharao	none	NO	0	7.75767
Antigonia capros	none	NO	0	10.0703
Antimora rostrata	none	NO	0	9.61765
Arctozenus risso	none	NO	0	7.75767
Arctozenus risso	none	SL	20.4	7.75767
Argonauta argo	none	NO	0	9.61765
Argonauta nodosus	none	NO	0	9.20615
Argonauta nouryi	none	NO	0	7.38732
Argyropelecus aculeatus	none	NO	0	9.61765
Argyropelecus olfersii	none	NO	0	7.75767
Argyropelecus olfersii	none	SL	6.8	7.75767
Arnoglossus imperialis	none	NO	0	7.75767
Ateleopus natalensis	none	NO	0	9.61765
Atherinopsis californiensis	none	PB	9.46	7.97988
Atlanta peronii	none	NO	0	7.75767
Axius stirhynchus	none	NO	0	7.75767
Balistes punctatus	none	NO	0	9.61765
Barathronus parfaiti	none	NO	0	7.75767
Bathophilus flemingi	none	NO	0	7.38732
Bathyagonus pentacanthus	none	NO	0	7.97988
Bathylagoides wesethi	none	NO	0	7.38732
Belone belone	none	NO	0	7.75767
Benthosema glaciale	none	NO	0	6.95936
Benthosema glaciale	none	SL	2.5	7.75767
Berryteuthis anonychus	none	NO	0	7.38732
Beryx splendens	none	NO	0	9.61765
Blennius ocellaris	none	NO	0	7.75767
Boops boops	none	NO	0	7.75767
Brachioteuthis riisei	none	NO	0	7.75767
Brachyscelus crusculum	adult	NO	0	7.75767

Brachyscelus crusculum	none	NO	0	9.61765
Brachyscelus macrocephalu	none	NO	0	7.38732
Brama brama	none	NO	0	7.38732
Brama orcini	none	NO	0	10.0703
Bregmaceros mcclellandi	none	NO	0	9.61765
Calanus finmarchicus	none	NO	0	7.75767
Canthidermis maculata	none	NO	0	9.61765
Capros aper	none	NO	0	9.52712
Carinaria lamarckii	none	NO	0	7.75767
Cavolinia tridentata	none	NO	0	9.20615
Centrolophus niger	none	NO	0	7.75767
Ceratias tentaculatus	none	NO	0	9.61765
Ceratoscopelus maderensis	adult	NO	0	7.75767
Ceratoscopelus townsendi	larva	NO	0	7.38732
Ceratoscopelus townsendi	none	NO	0	7.38732
Ceratoscopelus warmingii	none	NO	0	7.0256938
Chelophyes appendiculata	none	NO	0	7.75767
Chiasmodon niger	none	NO	0	9.61765
Chilara taylori	none	NO	0	7.38732
Chiroteuthis veranii	none	NO	0	9.15677
Chlorophthalmus agassizi	none	NO	0	7.75767
Chromis punctipinnis	none	NO	0	7.38732
Chtenopteryx sicula	none	NO	0	7.75767
Citharichthys sordidus	none	NO	0	7.38732
Clio pyramidata	none	NO	0	7.75767
Clupea pallasii	none	NO	0	7.38732
Cololabis saira	adult	NO	0	7.38732
Cololabis saira	juvenile	NO	0	7.2721
Cololabis saira	juvenile	PB	11.91	7.97988
Cololabis saira	none	NO	0	7.97988
Cookeolus japonicus	none	NO	0	9.61765
Coryphaena hippurus	none	NO	0	7.2721
Cranchia scabra	none	NO	0	9.61765
Cubiceps capensis	none	NO	0	9.61765
Cubiceps gracilis	none	NO	0	7.38732
Cubiceps gracilis	none	TL	12	7.75767
Cubiceps pauciradiatus	none	NO	0	9.61765
Cymatogaster aggregata	none	NO	0	7.38732
Cyphocaris faurei	none	NO	0	9.61765
Dactyloptena orientalis	none	NO	0	9.61765
Decapterus macarellus	none	NO	0	9.61765
Decapterus macrosoma	none	NO	0	9.61765
Desmodema polystictum	none	NO	0	7.38732
Diacria trispinosa	none	NO	0	9.61765
Diaphus effulgens	none	NO	0	9.61765
Diaphus lucidus	none	NO	0	9.61765
Diaphus luetkeni	adult	NO	0	7.75767
Diaphus ostenfeldi	none	NO	0	9.61765

Diaphus perspicillatus	none	NO	0	9.61765
Diaphus theta	adult	PB	6.6	7.97988
Diaphus theta	none	NO	0	7.38732
Diplodus sargus	none	NO	0	7.75767
Diplospinus multistriatus	none	SL	15.1	10.0703
Diretmus argenteus	none	NO	0	9.61765
Doryteuthis opalescens	juvenile	PB	0.06	7.97988
Doryteuthis opalescens	none	NO	0	7.97988
Dosidicus gigas	none	ML	0	7.97988
Dosidicus gigas	none	NO	0	7.38732
Echinosquilla guerinii	none	NO	0	7.2721
Electrona risso	adult	NO	0	7.75767
Electrona risso	none	NO	0	9.61765
Eledone cirrhosa	none	NO	0	7.83997
Engraulis capensis	none	NO	0	9.61765
Engraulis encrasicolus	juvenile	NO	0	7.9305
Engraulis encrasicolus	none	NO	13	7.75767
Engraulis japonicus	juvenile	NO	0	7.0256938
Engraulis mordax	juvenile	NO	0	7.38732
Engraulis mordax	juvenile	PB	3.47	7.97988
Engraulis mordax	juvenile	SL	4.7	7.46139
Engraulis mordax	juvenile	TL	4	7.38732
Engraulis mordax	none	NO	0	7.97988
Entelurus aequoreus	none	NO	0	7.75767
Eucleoteuthis luminosa	none	NO	0	9.61765
Euphausia pacifica	adult	NO	0	7.38732
Eusergestes arcticus	adult	NO	0	7.75767
Eusergestes arcticus	juvenile	NO	0	7.75767
Eusergestes similis	adult	NO	0	7.38732
Eusergestes similis	none	PB	3.6	7.97988
Eutrigla gurnardus	none	NO	0	7.75767
Funchalia taaningi	none	NO	0	9.61765
Funchalia woodwardi	none	NO	0	9.61765
Gaidropsarus vulgaris	none	NO	0	7.75767
Galiteuthis armata	none	NO	0	7.75767
Galiteuthis phyllura	none	NO	0	7.38732
Gempylus serpens	none	NO	0	9.61765
Gennadas elegans	juvenile	NO	0	7.75767
Glyptocephalus zachirus	none	NO	0	7.38732
Gonatopsis borealis	juvenile	NO	0	7.97988
Gonatopsis borealis	none	NO	0	7.0256938
Gonatus berryi	none	NO	0	7.0256938
Gonatus californiensis	juvenile	PB	0.12	7.97988
Gonatus onyx	juvenile	PB	0.15	7.97988
Gonatus pyros	juvenile	NO	0	7.97988
Gonatus steenstrupi	none	ML	10.8	7.75767
Gonatus steenstrupi	none	NO	0	7.75767
Grimalditeuthis bonplandi	none	NO	0	9.61765

Halichoeres nicholsi	none	NO	0	7.38732
Haliphron atlanticus	none	NO	0	9.15677
Helicocranchia pfefferi	none	NO	0	7.75767
Helicolenus dactylopterus	none	NO	0	7.75767
Heterocarpus laevigatus	none	NO	0	9.61765
Heteroteuthis dispar	adult	ML	2.58	7.1075
Heteroteuthis dispar	adult	NO	0	9.52712
Heteroteuthis dispar	none	NO	0	7.83997
Histioteuthis bonnellii	juvenile	NO	0	7.1075
Histioteuthis bonnellii	none	NO	0	7.75767
Histioteuthis heteropsis	none	NO	0	7.38732
Histioteuthis meleagroteuth	none	NO	0	9.61765
Histioteuthis reversa	none	NO	0	9.52712
Hyaloteuthis pelagica	none	NO	0	9.175699
Hygophum hygomii	none	NO	0	9.61765
Hyperia galba	adult	NO	0	7.75767
Hyperia galba	none	NO	0	7.75767
Icichthys lockingtoni	none	NO	0	7.97988
Idotea metallica	none	NO	0	7.75767
Illex argentinus	juvenile	NO	0	9.15677
Illex coindetii	none	NO	0	9.52712
Janicella spinicauda	none	NO	0	9.61765
Janthina exigua	none	NO	0	7.75767
Japetella diaphana	none	NO	0	9.61765
Japetella heathi	none	NO	0	9.175699
Katsuwonus pelamis	none	NO	0	7.2721
Lactoria diaphana	none	NO	0	7.2721
Lagocephalus lagocephalus	none	NO	0	9.61765
Lampadena luminosa	none	NO	0	9.61765
Lampanyctodes hectoris	none	NO	0	9.61765
Lampanyctus alatus	adult	NO	0	7.75767
Lampanyctus crocodilus	adult	NO	0	7.75767
Lampanyctus intricarius	adult	NO	0	7.75767
Lampanyctus mexicanus	larva	NO	0	7.38732
Lanceola sayana	adult	NO	0	7.75767
Lepidocybium flavobrunnei	none	NO	0	9.61765
Leptocotis tenuirostris	none	NO	0	7.0256938
Lestidiops ringens	none	NO	0	7.97988
Lestidiops similis	none	NO	0	9.61765
Lestidiops sphyrenoides	none	NO	0	7.75767
Lestrolepis intermedia	none	NO	0	9.61765
Leuroglossus stilbius	none	NO	0	7.38732
Liocranchia reinhardtii	none	NO	0	7.75767
Lobianchia gemellarii	adult	NO	0	7.75767
Lobianchia gemellarii	none	NO	0	9.61765
Lycoteuthis lorigera	none	NO	0	9.61765
Lysiosquilla tredecimdentat	none	NO	0	9.61765
Macroparalepis affinis	none	SL	16.9	7.75767

Macroramphosus scolopax	none	NO	0	9.20615
Magnisudis atlantica	none	NO	0	9.61765
Makaira mazara	none	NO	0	9.61765
Mastigoteuthis dentata	none	NO	0	7.97988
Masturus lanceolatus	none	NO	0	9.61765
Maurolicus imperatorius	none	NO	0	7.0256938
Maurolicus muelleri	none	NO	4	9.61765
Maurolicus muelleri	none	SL	6.2	7.75767
Medialuna californiensis	none	NO	0	7.97988
Meganyctiphanes norvegica	adult	NO	0	7.75767
Meganyctiphanes norvegica	none	NO	0	9.52712
Meganyctiphanes norvegica	none	TL	4	7.75767
Melamphaes lugubris	none	NO	0	7.38732
Melanostomias valdiviae	none	NO	0	7.38732
Merluccius productus	juvenile	PB	6.09	7.97988
Merluccius productus	larva	NO	0	7.38732
Merluccius productus	none	NO	0	7.38732
Microgadus proximus	none	NO	0	7.38732
Micromesistius poutassou	none	NO	16	7.75767
Microstomus pacificus	none	NO	0	7.38732
Monacoa grimaldii	none	NO	0	9.61765
Mugil cephalus	none	NO	0	7.38732
Mullus barbatus barbatus	none	NO	0	7.75767
Myctophum asperum	none	NO	0	9.61765
Myctophum punctatum	adult	NO	0	7.75767
Nannobrachium regale	larva	NO	0	7.38732
Nannobrachium ritteri	larva	NO	0	7.38732
Nannobrachium ritteri	none	NO	0	7.38732
Nansenia macrolepis	none	NO	0	9.61765
Natosquilla investigatoris	none	NO	0	9.61765
Nealotus tripes	none	NO	0	10.0703
Nematoscelis megalops	adult	NO	0	7.75767
Nematoscelis megalops	adult	TL	4	7.75767
Nematoscelis megalops	none	NO	0	9.52712
Neoanchisquilla tuberculata	none	NO	0	9.61765
Neognathophausia gigas	adult	NO	0	7.38732
Neognathophausia ingens	none	NO	0	7.75767
Nesiarchus nasutus	none	NO	0	10.0703
Notoscopelus kroyeri	adult	NO	0	7.75767
Notoscopelus kroyeri	none	NO	0	6.95936
Nyctiphanes australis	none	NO	0	7.8686104
Octopoteuthis nielseni	juvenile	NO	0	7.38732
Octopoteuthis rugosa	none	NO	0	9.61765
Octopoteuthis sicula	none	NO	0	7.97988
Octopus bimaculatus	juvenile	NO	0	7.38732
Octopus bimaculatus	none	ML	0	7.97988
Octopus vulgaris	none	NO	0	9.15677
Ocythoe tuberculata	none	NO	0	9.61765

Odontodactylus hansenii	none	NO	0	7.2721
Odontodactylus scyllarus	none	NO	0	9.61765
Ommastrephes bartramii	none	NO	0	9.61765
Omosudis lowii	none	NO	0	10.0703
Onychoteuthis banksii	juvenile	NO	0	7.38732
Onychoteuthis banksii	none	NO	0	9.61765
Onychoteuthis borealijapon	none	NO	0	7.97988
Onychoteuthis borealijapon	none	PB	0.8	7.97988
Onykia loennbergii	none	NO	0	9.61765
Onykia robusta	none	NO	0	7.38732
Onykia robusta	none	PB	0.1	7.97988
Opisthoteuthis californiana	none	NO	0	7.38732
Oplophorus typus	none	NO	0	9.61765
Ornithoteuthis antillarum	juvenile	NO	0	9.15677
Ornithoteuthis volatilis	none	NO	0	9.61765
Ostracion cubicus	none	NO	0	9.61765
Palinurus mauritanicus	juvenile	NO	0	7.75767
Palinurus mauritanicus	larva	NO	0	7.75767
Paralepis coregonoides	adult	NO	0	9.52712
Paralepis coregonoides	none	NO	0	7.75767
Paralepis speciosa	adult	NO	0	9.52712
Parapasiphae sulcatifrons	none	NO	0	7.75767
Parapronoe crustulum	none	NO	0	7.0256938
Parribacus antarcticus	none	NO	0	9.61765
Peprilus simillimus	none	NO	0	7.38732
Peristedion gracile	none	NO	0	10.0703
Photonectes margarita	none	NO	0	7.38732
Phrosina semilunata	adult	NO	0	7.75767
Phrosina semilunata	none	NO	0	10.0703
Platyscelus armatus	none	NO	0	7.38732
Platyscelus ovoides	none	NO	0	9.61765
Platyscelus serratulus	none	NO	0	9.52712
Pleuroncodes planipes	adult	NO	0	7.38732
Pleuroncodes planipes	adult	PB	3.38	7.97988
Pleuroncodes planipes	none	NO	0	7.97988
Pleuronichthys decurrens	none	NO	0	7.38732
Pleuronichthys decurrens	none	PB	1.8	7.97988
Polybius henslowii	adult	NO	0	7.75767
Polybius henslowii	larva	NO	0	7.75767
Polybius henslowii	none	NO	0	6.95936
Primno macropa	none	NO	0	9.52712
Protomyctophum crockeri	none	NO	0	7.38732
Psenes pellucidus	none	NO	0	10.0703
Pteroctopus tetracirrhus	juvenile	NO	0	7.752732
Pterycombus petersii	none	NO	0	9.61765
Pterygioteuthis giardi	none	NO	0	7.83997
Pterygioteuthis microlampa	juvenile	NO	0	7.38732
Pyrosoma atlanticum	none	NO	0	7.75767

Pyroteuthis margaritifera	none	NO	0	9.61765
Ranzania laevis	none	NO	0	9.61765
Rexea prometheoides	none	NO	0	9.61765
Rhinogobiops nicholsii	none	NO	0	7.38732
Robustosergia robusta	none	NO	0	7.75767
Salpa maxima	none	NO	0	9.61765
Sardina pilchardus	none	NO	0	9.52712
Sardinella aurita	none	NO	0	9.52712
Sardinops sagax	juvenile	PB	4.92	7.97988
Sardinops sagax	juvenile	TL	0	7.97988
Sardinops sagax	larva	NO	0	7.38732
Scaeurgus unicirrhus	juvenile	NO	0	7.752732
Scaeurgus unicirrhus	none	NO	0	7.83997
Scomber japonicus	larva	NO	0	7.38732
Scomber japonicus	none	NO	0	10.0703
Scomber japonicus	none	TL	0	7.97988
Scomber scombrus	none	NO	0	7.75767
Scomberesox saurus	none	NO	1.5	9.61765
Scomberesox saurus	none	SL	22.1	7.75767
Scombrolabrax heterolepis	none	NO	0	9.61765
Scopelarchus analis	none	NO	0	9.61765
Scopelogadus bispinosus	none	NO	0	7.38732
Scopelosaurus hoedti	none	NO	0	9.61765
Scyllarus arctus	adult	NO	0	7.75767
Scyllarus arctus	juvenile	NO	0	7.75767
Scyllarus arctus	larva	NO	0	7.75767
Scyllarus arctus	none	NO	0	6.78653
Sebastes aleutianus	juvenile	PB	1.18	7.97988
Sebastes brevispinis	juvenile	PB	1.25	7.97988
Sebastes diploproa	juvenile	PB	1.68	7.97988
Sebastes helvomaculatus	juvenile	NO	0	7.97988
Sebastes maliger	juvenile	NO	0	7.97988
Sebastes miniatus	juvenile	PB	0.99	7.97988
Sebastes proriger	juvenile	PB	1.44	7.97988
Sebastes wilsoni	juvenile	PB	1.3	7.97988
Sebastes zacentrus	juvenile	PB	1.93	7.97988
Selene setapinnis	none	NO	0	10.0703
Sepietta oweniana	none	NO	0	7.75767
Soestia zonaria	none	NO	0	7.75767
Spirula spirula	none	NO	0	9.61765
Spondyliosoma cantharus	none	NO	0	7.75767
Stenobrachius leucopsarus	adult	PB	5.98	7.97988
Stenobrachius leucopsarus	none	NO	0	7.38732
Sternoptyx diaphana	none	NO	0	10.0703
Sternoptyx obscura	adult	NO	0	7.38732
Sthenoteuthis oualaniensis	none	NO	0	9.61765
Stigmatoteuthis dofleini	none	NO	0	9.61765
Stigmatoteuthis hoylei	none	NO	0	9.61765

Streetsia challengeri	none	NO	0	9.52712
Strongylura exilis	adult	NO	0	7.38732
Stylocheiron abbreviatum	none	NO	0	7.75767
Sudis hyalina	adult	NO	0	9.52712
Symbolophorus barnardi	none	NO	0	9.61765
Symbolophorus evermanni	none	NO	0	9.61765
Syngnathus californiensis	none	NO	0	7.97988
Systellaspis debilis	none	NO	0	7.75767
Taningia danae	none	NO	0	9.61765
Taractes asper	none	NO	0	7.38732
Tarletonbeania crenularis	adult	NO	7.48	7.97988
Tarletonbeania crenularis	larva	NO	0	7.38732
Tarletonbeania crenularis	none	NO	0	7.38732
Tetragonurus atlanticus	none	NO	0	7.75767
Tetragonurus cuvieri	none	NO	0	7.38732
Teuthowenia megalops	none	ML	12.9	7.75767
Teuthowenia megalops	none	NO	0	7.75767
Thaleichthys pacificus	none	NO	0	7.38732
Themisto gaudichaudii	adult	NO	0	7.75767
Themisto gaudichaudii	none	NO	0	7.75767
Themisto gaudichaudii	none	TL	1.8	7.75767
Thyrsitoides marleyi	none	NO	0	9.61765
Thysanoteuthis rhombus	none	NO	0	9.61765
Todarodes pacificus	none	NO	0	7.0256938
Todarodes sagittatus	juvenile	NO	0	7.1075
Todarodes sagittatus	none	NO	0	7.83997
Todaropsis eblanae	none	NO	0	9.20615
Trachinotus ovatus	none	NO	0	7.75767
Trachipterus trachypterus	none	NO	0	7.38732
Trachurus japonicus	none	NO	0	6.2649949
Trachurus symmetricus	juvenile	NO	0	7.38732
Trachurus symmetricus	juvenile	TL	0	7.97988
Trachurus symmetricus	none	NO	0	7.38732
Trachurus symmetricus	none	PB	6.47	7.97988
Trachurus trachurus	none	NO	12	7.75767
Tremoctopus gracilis	none	NO	0	9.61765
Tremoctopus violaceus	none	NO	0	9.15677
Triphoturus mexicanus	none	NO	0	7.97988
Vampyroteuthis infernalis	none	NO	0	7.38732
Vampyroteuthis infernalis	none	PB	0.28	7.97988
Vibilia gibbosa	none	NO	0	9.52712
Vinciguerria lucetia	juvenile	NO	0	7.38732
Vinciguerria lucetia	none	NO	0	7.38732
Walvisteuthis rancureli	none	NO	0	9.61765

* Note that TL = total length, SL = standard length, ML = mantle length, PB = a problematic meas
** Note that we converted SL and ML to TL for taxa with known conversion ratios (Gleiber et al.
*** Note that multiple observations per species occurred whereby multiple life stages and reported

and type of length measurement taken (maxl_type), as well as the associated maximum ga

life_stage	life_note
adult	NA
adult	NA
adult	NA
adult	NA
adult	NA
adult	NA
juvenile	NA
juvenile	NA
larva	rvae; Bouxin & Legendre reported mostly larvae
juvenile	NA
adult	NA
juvenile	y juvenile / young-of-year
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	based on size and trait information
adult	NA
adult	NA
juvenile	papers typically reporting unique larvae like these
juvenile	papers typically reporting unique larvae like these
juvenile	papers typically reporting unique larvae like these
adult	NA
adult	NA
adult	NA
juvenile	ential even larva
juvenile	NA
juvenile	NA
adult	NA
juvenile	y juvenile / young-of-year
juvenile	ı based on vertical habitat trait
adult	NA
juvenile	NA
juvenile	Based on traits
juvenile	NA
juvenile	ıt larvae based on size
juvenile	oth adult & juvenile life stage possible based on Lmax
juvenile	oth adult & juvenile life stage possible based on Lmax
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
adult	NA

adult	NA
adult	NA
juvenile	NA
juvenile	NA
adult	NA
adult	NA
juvenile	NA
juvenile	NA
adult	NA
adult	NA
juvenile	NA
juvenile	ife stage and we know almost nothing of the larval stage
adult	& Legendre reported age
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	", most likely were post-larvae -- juvenile / young-of-year
adult	NA
adult	NA
juvenile	NA
juvenile	NA
juvenile	likely to be larva consumed
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	ential ly even larva
adult	NA
juvenile	NA
juvenile	at larvae based on size
juvenile	at larvae based on size
juvenile	at larvae based on size
juvenile	at larvae based on size
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	o be larvae, based on size ratios
juvenile	NA
juvenile	NA
juvenile	NA
adult	NA
adult	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
adult	NA
juvenile	NA
juvenile	NA
adult	& Legendre reported age
adult	NA

adult	migration, could be juvenile.
adult	ased on diel migration, could be juvenile.
adult	ased on diel migration, could be juvenile.
juvenile	NA
juvenile	there are pelagic eggs and larvae
juvenile	NA
juvenile	Glaser (2010)
juvenile	Glaser (2010)
juvenile	y juvenile / young-of-year
juvenile	y juvenile / young-of-year
juvenile	y juvenile / young-of-year
adult	& Legendre reported age
adult	& Legendre reported age
juvenile	NA
juvenile	NA
juvenile	11) reported juvenile life stage
juvenile	11) reported juvenile life stage
juvenile	primarily consumed, secondary was the adult life stage.
juvenile	) and Bernard et al. (1985) all reported juvenile life stage consumed
juvenile	) and Bernard et al. (1985) all reported juvenile life stage consumed
juvenile	) and Bernard et al. (1985) all reported juvenile life stage consumed
juvenile	) and Bernard et al. (1985) all reported juvenile life stage consumed
juvenile	) and Bernard et al. (1985) all reported juvenile life stage consumed
juvenile	y juvenile / young-of-year
juvenile	NA
adult	NA
adult	ɔuxin & Legendre
adult	ɔuxin & Legendre
adult	nkas et al. (1971)
adult	nkas et al. (1971)
juvenile	y juvenile / young-of-year
adult	NA
adult	NA
juvenile	va based on trait information
juvenile	NA
juvenile	y juvenile / young-of-year
juvenile	NA
juvenile	egendre reported juveniles
juvenile	y juvenile / young-of-year
juvenile	tanabe et al. (2004) reported juveniles
juvenile	tanabe et al. (2004) reported juveniles
juvenile	NA
juvenile	2010) reported juveniles
juvenile	2010) reported juveniles
juvenile	2010) reported juveniles
juvenile	NA
juvenile	NA
juvenile	NA

juvenile	Based on traits
juvenile	y juvenile / young-of-year
adult	Very little info
juvenile	NA
juvenile	NA
adult	NA
adult	NA
adult	NA
juvenile	ello et al. (1999)
juvenile	ello et al. (1999)
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	y juvenile / young-of-year
adult	NA
adult	NA
adult	NA
juvenile	NA
adult	ly to have eaten larva
juvenile	NA
juvenile	NA
adult	NA
adult	NA
juvenile	sed on habitat traits
juvenile	sed on habitat traits
juvenile	y juvenile / young-of-year
juvenile	NA
juvenile	arval but lacking size info
juvenile	NA
adult	NA
adult	& Legendre reported age
juvenile	& Legendre reported age
juvenile	& Legendre reported age
juvenile	", most likely were post-larvae -- juvenile / young-of-year
adult	NA
juvenile	NA
adult	NA
adult	NA
adult	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
adult	& Legendre reported age
adult	& Legendre reported age
juvenile	NA
juvenile	Based on trait
juvenile	NA

adult	NA
juvenile	NA
juvenile	on size and other traits
juvenile	NA
juvenile	y juvenile / young-of-year
adult	NA
adult	; in the review reported lengths ~6 cm (SL)
adult	; in the review reported lengths ~6 cm (SL)
juvenile	NA
adult	) and Pusineri et al. (2005) reported 33-40 mm individuals in guts
adult	) and Pusineri et al. (2005) reported 33-40 mm individuals in guts
adult	) and Pusineri et al. (2005) reported 33-40 mm individuals in guts
adult	NA
juvenile	NA
juvenile	stage, McHugh (1952) reported larvae / postlarvae
juvenile	stage, McHugh (1952) reported larvae / postlarvae
juvenile	stage, McHugh (1952) reported larvae / postlarvae
juvenile	NA
juvenile	NA
juvenile	y juvenile / young-of-year
adult	NA
juvenile	NA
juvenile	NA
adult	NA
adult	& Legendre reported age
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	NA
adult	Based on trait
juvenile	Based on traits
adult	Legendre reported adults
adult	Legendre reported adults
adult	Legendre reported adults
juvenile	y juvenile / young-of-year
adult	NA
juvenile	giant red mysid shrimp
juvenile	Based on traits
adult	, but based on gape length more likely juveniles
adult	, but based on gape length more likely juveniles
adult	NA
juvenile	(1952) reported juveniles
juvenile	NA
juvenile	NA
juvenile	ted pelagic juvenile Octopus bimaculatus
juvenile	ted pelagic juvenile Octopus bimaculatus
juvenile	d on O. bimaculatus
juvenile	y juvenile / young-of-year

juvenile	y juvenile / young-of-year
juvenile	y juvenile / young-of-year
juvenile	NA
juvenile	NA
juvenile	(1952) reported juveniles
juvenile	(1952) reported juveniles
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	y juvenile / young-of-year
juvenile	y juvenile / young-of-year
juvenile	ot-yet settled juvenile phase
adult	NA
juvenile	ntos reported juveniles
juvenile	NA
juvenile	arval but lacking size info
larva	n occurence of juveniles, extremely unlilely to eat adults.
larva	n occurence of juveniles, extremely unlilely to eat adults.
juvenile	i et al. (2008) reported
juvenile	i et al. (2008) reported
juvenile	i et al. (2008) reported
adult	NA
adult	NA
larva	ted by similar species consumed in Bouxin & Legendre study
juvenile	NA
juvenile	Probably larva
juvenile	y juvenile / young-of-year
adult	NA
adult	NA
adult	NA
adult	NA
adult	NA
juvenile	t juveniles (see season note)
juvenile	t juveniles (see season note)
juvenile	t juveniles (see season note)
juvenile	y juvenile / young-of-year
juvenile	y juvenile / young-of-year
larva	orted larvae and an occurence of adults
larva	orted larvae and an occurence of adults
larva	orted larvae and an occurence of adults
adult	NA
adult	NA
juvenile	NA
juvenile	l. (2012) reported juveniles
juvenile	NA
adult	NA
juvenile	(1952) reported juveniles
adult	NA

adult	NA
juvenile	y juvenile / young-of-year
juvenile	Based on traits
juvenile	Based on traits
adult	NA
adult	NA
juvenile	NA
juvenile	ed multiple life stages
juvenile	5) reported juvenile and y-o-y life stages consumed
juvenile	5) reported juvenile and y-o-y life stages consumed
juvenile	5) reported juvenile and y-o-y life stages consumed
juvenile	l. (2012) reported juveniles
juvenile	l. (2012) reported juveniles
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	", most likely were post-larvae -- juvenile / young-of-year
juvenile	y juvenile / young-of-year
juvenile	ile life stage based on reported length
juvenile	ile life stage based on reported length
juvenile	y juvenile / young-of-year
adult	NA
adult	NA
adult	NA
larva	arvae and an occurence of juveniles and adults
larva	arvae and an occurence of juveniles and adults
larva	arvae and an occurence of juveniles and adults
larva	arvae and an occurence of juveniles and adults
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	l by Glaser (2010), but could also be larvae
juvenile	NA
adult	NA
adult	NA
adult	NA
juvenile	NA
adult	0) reported age, length info
adult	0) reported age, length info
adult	NA
adult	NA
juvenile	NA
juvenile	NA
juvenile	NA

adult	NA
juvenile	ıt larvae based on size
adult	NA
juvenile	i et al. (2008) reported
juvenile	NA
adult	NA
juvenile	y juvenile / young-of-year
adult	NA
juvenile	y juvenile / young-of-year
juvenile	NA
adult	l adults, McHugh (1952) - post-larvae
adult	l adults, McHugh (1952) - post-larvae
adult	l adults, McHugh (1952) - post-larvae
juvenile	n tunicates in albacore diets?
juvenile	n tunicates in albacore diets?
juvenile	·ted 20 cm total lengths, and juvenile sizes
juvenile	·ted 20 cm total lengths, and juvenile sizes
juvenile	NA
adult	NA
adult	NA
adult	NA
juvenile	on size and other traits
juvenile	y juvenile / young-of-year
juvenile	NA
juvenile	. (1999) reported juveniles
juvenile	. (1999) reported juveniles
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	NA
juvenile	y juvenile / young-of-year
juvenile	y juvenile / young-of-year
adult	NA
juvenile	NA
juvenile	NA
adult	NA
juvenile	(1952) reported juveniles
juvenile	(1952) reported juveniles
juvenile	NA

ɜurement lacking enough information to use it, NO = no measurement information
2022)
l sizes were reported.

ape limit (maxGape) for the albacore sampled from the same study as the prey taxa. Appended are the

estimated life stage (life_stage) and associated notes used to select the final life stage assigned to each

species for selection of appropriate trait information. ***See notes below table.

Table S5. Prey species information (class, order, family, species), estimated prey life stages and assoc

prey_class	prey_order	prey_family	prey_sp	life_stage	life_note	vert_habitat
Actinopterygii	Aulopiformes	Notosudidae	Scopelosaurus	adult	NA	mesopelagic
Actinopterygii	Aulopiformes	Paralepididae	Arctozenus ris	adult	NA	mesopelagic
Actinopterygii	Aulopiformes	Paralepididae	Lestidiops ring	adult	NA	mesopelagic
Actinopterygii	Aulopiformes	Paralepididae	Lestidiops sim	adult	NA	mesopelagic
Actinopterygii	Aulopiformes	Scopelarchida	Scopelarchus a	adult	NA	mesopelagic
Actinopterygii	Gadiformes	Bregmacerotic	Bregmaceros r	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Ceratoscopelu	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Ceratoscopelu	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Diaphus luetk	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Diaphus osten	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Diaphus persp	adult	Based on diel	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Diaphus theta	adult	Glaser (2010)	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Electrona riss	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Hygophum hy	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Lampanyctode	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Lampanyctus	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Lobianchia ge	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Myctophum as	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Myctophum p	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Notoscopelus	adult	Bouxin & Leg	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Protomyctoph	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Stenobrachius	adult	Glaser (2010)	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Symbolophoru	adult	NA	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Tarletonbeania	adult	Glaser (2010)	mesopelagic
Actinopterygii	Myctophiform	Myctophidae	Triphoturus m	adult	NA	mesopelagic
Actinopterygii	Ophidiiformes	Aphyonidae	Barathronus p	adult	NA	bathypelagic
Actinopterygii	Osmeriformes	Opisthoproctic	Monacoa grim	adult	NA	mesopelagic
Actinopterygii	Perciformes	Embiotocidae	Cymatogaster	adult	NA	demersal
Actinopterygii	Stephanoberyc	Melamphaidae	Melamphaes l	adult	NA	mesopelagic
Actinopterygii	Stephanoberyc	Melamphaidae	Scopelogadus	adult	NA	mesopelagic
Actinopterygii	Stomiiformes	Sternoptychid	Argyropelecus	adult	NA	mesopelagic
Actinopterygii	Stomiiformes	Sternoptychid	Argyropelecus	adult	NA	mesopelagic
Actinopterygii	Stomiiformes	Sternoptychid	Maurolicus im	adult	NA	mesopelagic
Actinopterygii	Stomiiformes	Sternoptychid	Maurolicus m	adult	Several of the	mesopelagic
Actinopterygii	Stomiiformes	Sternoptychid	Sternoptyx dia	adult	NA	mesopelagic
Actinopterygii	Stomiiformes	Sternoptychid	Sternoptyx ob	adult	NA	mesopelagic
Actinopterygii	Sygnathiforme	Centriscidae	Macrorampho	adult	NA	demersal
Cephalopoda	Oegopsida	Cranchiidae	Helicocranchi	adult	Very little infc	mesopelagic
Cephalopoda	Oegopsida	Enoploteuthid	Abralia redfiel	adult	NA	epipelagic
Cephalopoda	Oegopsida	Enoploteuthid	Abraliopsis af	adult	NA	epipelagic
Cephalopoda	Oegopsida	Enoploteuthid	Abraliopsis fe	adult	NA	epipelagic
Cephalopoda	Oegopsida	Enoploteuthid	Abraliopsis gi	adult	NA	mesopelagic
Cephalopoda	Oegopsida	Enoploteuthid	Abraliopsis m	adult	NA	mesopelagic
Cephalopoda	Oegopsida	Pyroteuthidae	Pterygioteuthi	adult	NA	mesopelagic
Cephalopoda	Oegopsida	Pyroteuthidae	Pyroteuthis ma	adult	NA	mesopelagic
Cephalopoda	Sepiida	Sepiolidae	Heteroteuthis	adult	NA	mesopelagic

Cephalopoda	Sepiida	Sepiolidae	Sepietta owen	adult	NA	benthic
Cephalopoda	Spirulida	Spirulidae	Spirula spirula	adult	NA	mesopelagic
Gastropoda	Caenogastropo	Epitoniodea	Janthina exigu	adult	NA	epipelagic
Gastropoda	Littorinimorph	Atlantidae	Atlanta peroni	adult	NA	epipelagic
Gastropoda	Littorinimorph	Carinariidae	Carinaria lama	adult	NA	epipelagic
Gastropoda	Pteropoda	Cavoliniidae	Cavolinia trid	adult	NA	epipelagic
Gastropoda	Pteropoda	Cavoliniidae	Diacria trispin	adult	NA	epipelagic
Gastropoda	Pteropoda	Cliidae	Clio pyramida	adult	NA	epipelagic
Hexanauplia	Calanoida	Calanidae	Calanus finma	adult	NA	epipelagic
Hydrozoa	Siphonophora	Diphyidae	Chelophyes ap	adult	NA	epipelagic
Malacostraca	Amphipoda	Brachyscelida	Brachyscelus c	adult	NA	epipelagic
Malacostraca	Amphipoda	Brachyscelida	Brachyscelus r	adult	NA	epipelagic
Malacostraca	Amphipoda	Cyphocaridida	Cyphocaris fa	adult	NA	mesopelagic
Malacostraca	Amphipoda	Eupronoidae	Parapronoe cr	adult	NA	epipelagic
Malacostraca	Amphipoda	Hyperiidae	Hyperia galba	adult	NA	epipelagic
Malacostraca	Amphipoda	Hyperiidae	Themisto gauc	adult	NA	epipelagic
Malacostraca	Amphipoda	Lanceolidae	Lanceola saya	adult	NA	bathypelagic
Malacostraca	Amphipoda	Oxyccephalid	Leptocotis ten	adult	NA	epipelagic
Malacostraca	Amphipoda	Oxyccephalid	Streetsia chall	adult	NA	epipelagic
Malacostraca	Amphipoda	Phrosinidae	Anchylomera	adult	NA	epipelagic
Malacostraca	Amphipoda	Phrosinidae	Phrosina semi	adult	NA	epipelagic
Malacostraca	Amphipoda	Phrosinidae	Primno macro	adult	NA	epipelagic
Malacostraca	Amphipoda	Platyscelidae	Platyscelus ari	adult	NA	epipelagic
Malacostraca	Amphipoda	Platyscelidae	Platyscelus ov	adult	NA	epipelagic
Malacostraca	Amphipoda	Platyscelidae	Platyscelus se	adult	NA	epipelagic
Malacostraca	Amphipoda	Vibiliidae	Vibilia gibbos	adult	NA	epipelagic
Malacostraca	Decapoda	Acanthephyric	Acanthephyra	adult	NA	mesopelagic
Malacostraca	Decapoda	Oplophoroida	Janicella spini	adult	NA	bathypelagic
Malacostraca	Decapoda	Oplophoroida	Oplophorus ty	adult	NA	mesopelagic
Malacostraca	Decapoda	Oplophpridae	Systellaspis de	adult	NA	mesopelagic
Malacostraca	Decapoda	Pasiphaeidae	Parapasiphae s	adult	NA	mesopelagic
Malacostraca	Decapoda	Penaeidae	Funchalia taan	adult	NA	mesopelagic
Malacostraca	Decapoda	Penaeidae	Funchalia woc	adult	NA	mesopelagic
Malacostraca	Decapoda	Sergestidae	Eusergestes ar	adult	Bouxin & Leg	demersal
Malacostraca	Decapoda	Sergestidae	Eusergestes si	adult	Pinkas et al. (1	epipelagic
Malacostraca	Decapoda	Sergestidae	Robustosergia	adult	NA	bathypelagic
Malacostraca	Euphausiacea	Euphausiidae	Euphausia pac	adult	NA	epipelagic
Malacostraca	Euphausiacea	Euphausiidae	Meganyctipha	adult	Bouxin & Leg	epipelagic
Malacostraca	Euphausiacea	Euphausiidae	Nematoscelis	adult	Bouxin & Leg	epipelagic
Malacostraca	Euphausiacea	Euphausiidae	Nyctiphanes a	adult	NA	epipelagic
Malacostraca	Euphausiacea	Euphausiidae	Stylocheiron a	adult	NA	epipelagic
Malacostraca	Isopoda	Idoteidae	Idotea metallic	adult	unlikely to ha	epipelagic
Malacostraca	Lophogastrida	Gnathophausii	Neognathopha	adult	NA	bathypelagic
Malacostraca	Stomatopoda	Squillidae	Natosquilla in	adult	Based on trait	epipelagic
Thaliacea	Pyrosomatida	Pyrosomatidae	Pyrosoma atla	adult	NA	epipelagic
Thaliacea	Salpida	Salpidae	Salpa maxima	adult	NA	epipelagic
Thaliacea	Salpida	Salpidae	Soestia zonari	adult	NA	epipelagic

ciated notes, and trait variables and values that influence the prey encounter (habitat use, diel vertical ar

horz_habitat	diel_migrant	diel_migrant	season_migra	season_cat	maxFO	maxN
oceanic	1	diel_yes	NA	season_NA	0.5	0
oceanic	1	diel_yes	1	season_yes	52	4
oceanic	1	diel_yes	1	season_yes	4	0
oceanic	1	diel_yes	1	season_yes	1.6	0.2
oceanic	1	diel_yes	0	season_no	6	1
oceanic	1	diel_yes	1	season_yes	2.1	0.3
oceanic	1	diel_yes	1	season_yes	29.62962963	0
oceanic	1	diel_yes	1	season_yes	5.6	0.8
oceanic	1	diel_yes	1	season_yes	2.857142857	0
oceanic	1	diel_yes	1	season_yes	0.7	0
oceanic	1	diel_yes	1	season_yes	7.9	5.8
oceanic	1	diel_yes	1	season_yes	5.6	9.8
oceanic	1	diel_yes	1	season_yes	5.714285714	0.1
oceanic	1	diel_yes	1	season_yes	0.7	0
oceanic	1	diel_yes	1	season_yes	23.4	11.7
oceanic	1	diel_yes	1	season_yes	5.555555556	0
oceanic	1	diel_yes	1	season_yes	4	0.1
oceanic	1	diel_yes	1	season_yes	2.2	0.9
oceanic	1	diel_yes	1	season_yes	68.51851852	0
oceanic	1	diel_yes	1	season_yes	15.8	0
oceanic	1	diel_yes	1	season_yes	2.7	0.2
oceanic	1	diel_yes	1	season_yes	7.6	0.2
oceanic	1	diel_yes	1	season_yes	0.3	0
oceanic	1	diel_yes	1	season_yes	100	5.4
oceanic	1	diel_yes	1	season_yes	6.976744186	0.459066565
oceanic	1	diel_yes	0	season_no	1.851851852	0
oceanic	1	diel_yes	0	season_no	0.5	0
coastal	0	diel_no	1	season_yes	0.5	0.1
oceanic	0	diel_no	0	season_no	5.9	1.1
oceanic	1	diel_yes	0	season_no	2.7	0.4
oceanic	1	diel_yes	0	season_no	0.5	0
oceanic	1	diel_yes	1	season_yes	100	0
oceanic	1	diel_yes	1	season_yes	4.2	0.2
continental she	1	diel_yes	1	season_yes	85.71428571	78.5
oceanic	0	diel_no	1	season_yes	44.44444444	0.1
oceanic	1	diel_yes	0	season_no	0.996677741	0
continental she	1	diel_yes	1	season_yes	30	0
oceanic	0	diel_no	0	season_no	7.407407407	0
oceanic	1	diel_yes	1	season_yes	5	0
oceanic	1	diel_yes	0	season_no	1.162790698	0.076511094
oceanic	1	diel_yes	1	season_yes	36.4	11.3
continental slo	1	diel_yes	1	season_yes	0.7	0.2
oceanic	1	diel_yes	1	season_yes	4.9	3.4
oceanic	1	diel_yes	1	season_yes	1.63	0.16
oceanic	1	diel_yes	0	season_no	1.63	0.16
continental slo	1	diel_yes	0	season_no	66	88.2

continental she	1	diel_yes	1	season_yes	2.857142857	0
continental slo	1	diel_yes	0	season_no	0.7	0.1
oceanic	0	diel_no	0	season_no	5.714285714	0
oceanic	1	diel_yes	0	season_no	1.851851852	0
oceanic	1	diel_yes	1	season_yes	34.28571429	0
oceanic	1	diel_yes	1	season_yes	10	0
oceanic	1	diel_yes	NA	season_NA	5.714285714	0.3
oceanic	1	diel_yes	1	season_yes	11.11111111	0
oceanic	1	diel_yes	1	season_yes	3.703703704	0
continental she	1	diel_yes	1	season_yes	16	0
continental she	1	diel_yes	0	season_no	92.59259259	6.2
continental she	1	diel_yes	NA	season_NA	0	0
continental slo	1	diel_yes	0	season_no	1.6	0.1
continental she	1	diel_yes	0	season_no	1.5	0.2
oceanic	1	diel_yes	1	season_yes	5.714285714	0
oceanic	1	diel_yes	1	season_yes	54.3	5.1
oceanic	1	diel_yes	0	season_no	1.851851852	0
oceanic	1	diel_yes	1	season_yes	2.1	0.1
continental she	1	diel_yes	1	season_yes	40	0.19
continental she	1	diel_yes	1	season_yes	4.2	1.65
continental she	1	diel_yes	1	season_yes	65	4.2
oceanic	1	diel_yes	0	season_no	2.857142857	0.49
continental she	1	diel_yes	0	season_no	0	0
continental she	1	diel_yes	0	season_no	9.259259259	1.1
continental she	1	diel_yes	1	season_yes	1.851851852	0.06
continental she	1	diel_yes	1	season_yes	0.862068966	0.24
oceanic	1	diel_yes	1	season_yes	38.88888889	0
continental slo	1	diel_yes	0	season_no	2.2	0.5
continental slo	1	diel_yes	0	season_no	3.2	0.5
oceanic	1	diel_yes	1	season_yes	8	0
oceanic	1	diel_yes	0	season_no	4	0
continental she	1	diel_yes	0	season_no	1.6	0.2
continental slo	1	diel_yes	0	season_no	0.7	0.1
continental she	1	diel_yes	1	season_yes	52	0
oceanic	1	diel_yes	1	season_yes	45	76.5
oceanic	1	diel_yes	1	season_yes	2.857142857	0
oceanic	1	diel_yes	1	season_yes	38.9	43.1
continental she	1	diel_yes	1	season_yes	89.7	7.3
continental she	1	diel_yes	1	season_yes	80	0.61
coastal	1	diel_yes	1	season_yes	27.9	0
coastal	0	diel_no	1	season_yes	16.66666667	0
continental she	0	diel_no	1	season_yes	3.703703704	0
oceanic	1	diel_yes	0	season_no	0.7	0.1
oceanic	0	diel_no	NA	season_NA	2	1.8
oceanic	1	diel_yes	NA	season_NA	2.857142857	0
oceanic	1	diel_yes	1	season_yes	4.8	1.9
coastal	1	diel_yes	1	season_yes	8.571428571	0

nd seasonal migration) phase of the predation process (Green et al., 2019). We used these traits for buil

maxM
0.2
0.5
0
0.1
0.9
0.2
0
0.2
0
0
5
0.2
0.1
0
10.8
0
0
0.6
0
6.3
0
0.2
0
0
0.000609243
0
0
0
0
0
0
0
0.1
24.6
0
0
0.07
0
0
0.006092434
2.132352045
0.1
3.4
0
0
3.68

0
0
0
0
0
0.1
0.1
0
0
0
2.2
0
0
0.1
0
27.3
0
0.1
0.05
3.3
6.5
0.24
0
1.3
0.08
0.05
0
0.1
0.3
0
0
0.3
0.1
0
0
0
0
84.3
4.2
20.4
0
0
0
1.5
0
1.3
0

lding prey functional groups and for investigating differences in albacore diets across the world.

Table S6. Clustering algorithm statistical output table. We selected 7 clusters by optimising cluster va

Output statist	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
cluster.numbe	2	3	4	5	6	7
n (species)	292	292	292	292	292	292
within.cluster.	29.53	27.62	25.09	15.84	10.62	7.85
average.within	0.39	0.37	0.35	0.26	0.21	0.18
average.betwe	0.67	0.66	0.66	0.6	0.58	0.58
dunn2	1.71	1.31	1.25	1.04	1.28	1.43
avg.silwidth	0.41	0.24	0.23	0.4	0.49	0.54
Cluster- 1 size	77	12	12	12	12	12
Cluster- 2 size	215	215	215	88	88	88
Cluster- 3 size	0	65	51	51	51	51
Cluster- 4 size	0	0	14	14	14	14
Cluster- 5 size	0	0	0	127	55	55
Cluster- 6 size	0	0	0	0	72	44
Cluster- 7 size	0	0	0	0	0	28
Cluster- 8 size	0	0	0	0	0	0
Cluster- 9 size	0	0	0	0	0	0
Cluster- 10 si	0	0	0	0	0	0
Cluster- 11 si	0	0	0	0	0	0
Cluster- 12 si	0	0	0	0	0	0
Cluster- 13 si	0	0	0	0	0	0
Cluster- 14 si	0	0	0	0	0	0
Cluster- 15 si	0	0	0	0	0	0

ılidation outputs: (1) higher average distance between species clusters (Rousseeuw, 1987); (2) lower av

Test 7	Test 8	Test 9	Test 10	Test 11	Test 12	Test 13
8	9	10	11	12	13	14
292	292	292	292	292	292	292
7.76	6.5	6.07	5.02	4.6	4.46	4.05
0.18	0.16	0.15	0.14	0.13	0.13	0.12
0.58	0.58	0.58	0.57	0.57	0.57	0.57
1.19	1.19	1.57	1.57	1.47	1.47	1.53
0.51	0.54	0.54	0.54	0.54	0.53	0.57
11	11	11	11	11	8	8
88	88	88	88	88	88	88
51	40	40	40	40	40	13
14	14	8	8	8	8	8
55	55	55	44	44	44	44
44	44	44	44	44	44	27
1	1	6	6	6	6	44
28	28	1	1	1	1	6
0	11	28	28	25	25	1
0	0	11	11	11	11	25
0	0	0	11	11	11	11
0	0	0	0	3	3	11
0	0	0	0	0	3	3
0	0	0	0	0	0	3
0	0	0	0	0	0	0

verage distance within species clusters (Handl et al., 2005); (3) high silhouette width coefficient value a

Test 14
15
292
3.63
0.1
0.57
1.53
0.61
8
88
13
8
44
15
44
12
6
1
25
11
11
3
3

and Dunny Smith residuals (Dunn†, 1974; Rousseeuw, 1987); and lastly, (4) optimal evenness or balan

ıce of cluster composition indicated by the number of species in each cluster (Legendre & Legendre, 19

998).

Table S7. Extended list of taxonomic identifications from albacore stomach contents from published a

prey_class	prey_order	prey_family	prey_genus	prey_species	prey_tax	tax_level
Actinopterygii	Anguilliformes	Nemichthyidae	NA	NA	Nemichthyidae	family
Actinopterygii	Anguilliformes	Nettastomatidae	Leptocephalus	NA	Leptocephalus	genus
Actinopterygii	Argentiniformes	Argentinidae	NA	NA	Argentinidae	family
Actinopterygii	Argentiniformes	Bathylagidae	Bathylagoides	wesethi	Bathylagoides w	species
Actinopterygii	Argentiniformes	Bathylagidae	Bathylagus	NA	Bathylagus	genus
Actinopterygii	Argentiniformes	Bathylagidae	Leuroglossus	stilbius	Leuroglossus st	species
Actinopterygii	Argentiniformes	Microstomatidae	Nansenia	NA	Nansenia	genus
Actinopterygii	Argentiniformes	Opisthoproctida	Dolichopteryx	NA	Dolichopteryx	genus
Actinopterygii	Ateleopodiforme	Ateleopodidae	Ateleopus	natalensis	Ateleopus natal	species
Actinopterygii	Atheriniformes	Atherinidae	Atherinopsis	californiensis	Atherinopsis cal	species
Actinopterygii	Aulopiformes	Alepisauridae	Alepisaurus	ferox	Alepisaurus ferc	species
Actinopterygii	Aulopiformes	Alepisauridae	Alepisaurus	NA	Alepisaurus	genus
Actinopterygii	Aulopiformes	Alepisauridae	NA	NA	Alepisauridae	family
Actinopterygii	Aulopiformes	Anotopteridae	Anotopterus	NA	Anotopterus	genus
Actinopterygii	Aulopiformes	Anotopteridae	Anotopterus	nikparini	Anotopterus nik	species
Actinopterygii	Aulopiformes	Anotopteridae	Anotopterus	pharao	Anotopterus pha	species
Actinopterygii	Aulopiformes	Chlorothalmidae	Chlorophthalmu	agassizi	Chlorophthalmu	species
Actinopterygii	Aulopiformes	Notosudidae	Scopelosaurus	hoedti	Scopelosaurus	species
Actinopterygii	Aulopiformes	Notosudidae	Scopelosaurus	NA	Scopelosaurus	genus
Actinopterygii	Aulopiformes	Omosudidae	Omosudis	lowii	Omosudis lowii	species
Actinopterygii	Aulopiformes	Paralepididae	Arctozenus	risso	Arctozenus riss	species
Actinopterygii	Aulopiformes	Paralepididae	Lestidiops	ringens	Lestidiops ringe	species
Actinopterygii	Aulopiformes	Paralepididae	Lestidiops	similis	Lestidiops simili	species
Actinopterygii	Aulopiformes	Paralepididae	Lestidium	NA	Lestidium	genus
Actinopterygii	Aulopiformes	Paralepididae	Lestrolepis	intermedia	Lestrolepis inter	species
Actinopterygii	Aulopiformes	Paralepididae	Macroparalepis	affinis	Macroparalepis	species
Actinopterygii	Aulopiformes	Paralepididae	Magnisudis	atlantica	Magnisudis atla	species
Actinopterygii	Aulopiformes	Paralepididae	NA	NA	Paralepididae	family
Actinopterygii	Aulopiformes	Paralepididae	Paralepis	coregonoides	Paralepis coreg	species
Actinopterygii	Aulopiformes	Paralepididae	Paralepis	NA	Paralepis	genus
Actinopterygii	Aulopiformes	Paralepididae	Paralepis	speciosa	Paralepis speci	species
Actinopterygii	Aulopiformes	Paralepididae	Paralepis	sphyraenoides	Lestidiops sphy	species
Actinopterygii	Aulopiformes	Paralepididae	Sudis	hyalina	Sudis hyalina	species
Actinopterygii	Aulopiformes	Scopelarchidae	Benthalbella	NA	Benthalbella	genus
Actinopterygii	Aulopiformes	Scopelarchidae	Scopelarchus	analis	Scopelarchus a	species
Actinopterygii	Aulopiformes	Scoperlarchidae	NA	NA	Scoperlarchidae	family
Actinopterygii	Aulopiformes	Scoperlarchidae	Scopelarchus	NA	Scopelarchus	genus
Actinopterygii	Aulopiformes	Synodontidae	NA	NA	Synodontidae	family
Actinopterygii	Beloniformes	Belonidae	Belone	belone	Belone belone	species
Actinopterygii	Beloniformes	Belonidae	Strongylura	exilis	Strongylura exil	species
Actinopterygii	Beloniformes	Exocoetidae	Cypselurus	NA	Cypselurus	genus
Actinopterygii	Beloniformes	Scomberesocid	Cololabis	saira	Cololabis saira	species
Actinopterygii	Beloniformes	Scomberesocid	NA	NA	Scomberesocid	family
Actinopterygii	Beloniformes	Scomberesocid	Scomberesox	saurus	Scomberesox s	species
Actinopterygii	Beryciformes	Anoplogastridae	NA	NA	Anoplogastridae	family
Actinopterygii	Beryciformes	Berycidae	Beryx	splendens	Beryx splenden	species
Actinopterygii	Beryciformes	Berycidae	NA	NA	Berycidae spp.	family
Actinopterygii	Beryciformes	Diretmidae	Diretmus	argenteus	Diretmus argent	species

Actinopterygii	Beryciformes	Holocentridae	Holocentrus	NA	Holocentrus	genus
Actinopterygii	Beryciformes	Holocentridae	NA	NA	Holocentridae	family
Actinopterygii	Beryciformes	Trachichthyidae	NA	NA	Trachichthyidae	family
Actinopterygii	Clupeiformes	Clupeidae	Clupea	NA	Clupea	genus
Actinopterygii	Clupeiformes	Clupeidae	Clupea	pallasii	Clupea pallasii	species
Actinopterygii	Clupeiformes	Clupeidae	Sardina	pilchardus	Sardina pilchard	species
Actinopterygii	Clupeiformes	Clupeidae	Sardinella	aurita	Sardinella aurita	species
Actinopterygii	Clupeiformes	Clupeidae	Sardinops	NA	Sardinops	genus
Actinopterygii	Clupeiformes	Clupeidae	Sardinops	sagax	Sardinops saga	species
Actinopterygii	Clupeiformes	Engraulidae	Engraulis	encrasicolus	Engraulis encra	species
Actinopterygii	Clupeiformes	Engraulidae	Engraulis	japonicus	Engraulis japon	species
Actinopterygii	Clupeiformes	Engraulidae	Engraulis	mordax	Engraulis morda	species
Actinopterygii	Clupeiformes	Engraulidae	Engraulis	capensis	Engraulis caper	species
Actinopterygii	Clupeiformes	Engraulidae	NA	NA	Engraulidae	family
Actinopterygii	Gadiformes	Bregmacerotida	Bregmaceros	mcclellandi	Bregmaceros m	species
Actinopterygii	Gadiformes	Gadidae	Microgadus	proximus	Microgadus pro	species
Actinopterygii	Gadiformes	Gadidae	Micromesistius	poutassou	Micromesistius	species
Actinopterygii	Gadiformes	Gadidae	NA	NA	Gadidae	family
Actinopterygii	Gadiformes	Lotidae	Gaidropsarus	vulgaris	Gaidropsarus vu	species
Actinopterygii	Gadiformes	Merlucciidae	Merluccius	NA	Merluccius	genus
Actinopterygii	Gadiformes	Merlucciidae	Merluccius	productus	Merluccius prod	species
Actinopterygii	Gadiformes	Merlucciidae	Merluccius	NA	Merluccius	genus
Actinopterygii	Gadiformes	Moridae	Antimora	rostrata	Antimora rostrat	species
Actinopterygii	Lampriformes	Trachipteridae	Desmodema	polystictum	Desmodema po	species
Actinopterygii	Lampriformes	Trachipteridae	Trachipterus	NA	Trachipterus	genus
Actinopterygii	Lampriformes	Trachipteridae	Trachipterus	trachypterus	Trachipterus tra	species
Actinopterygii	Lophiiformes	Ceratiidae	Ceratias	tentaculatus	Ceratias tentacu	species
Actinopterygii	Lophiiformes	Ogcocephalidae	NA	NA	Ogcocephalidae	family
Actinopterygii	Myctophiformes	Myctophidae	Benthosema	glaciale	Benthosema gla	species
Actinopterygii	Myctophiformes	Myctophidae	Ceratoscopelus	maderensis	Ceratoscopelus	species
Actinopterygii	Myctophiformes	Myctophidae	Ceratoscopelus	townsendi	Ceratoscopelus	species
Actinopterygii	Myctophiformes	Myctophidae	Ceratoscopelus	warmingi	Ceratoscopelus	species
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	lucidus	Diaphus lucidus	species
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	luetkeni	Diaphus luetker	species
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	ostenfeldi	Diaphus ostenfe	species
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	effulgens	Diaphus effulge	species
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	NA	Diaphus	genus
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	perspicillatus	Diaphus perspic	species
Actinopterygii	Myctophiformes	Myctophidae	Diaphus	theta	Diaphus theta	species
Actinopterygii	Myctophiformes	Myctophidae	Electrona	rissoi	Electrona rissoi	species
Actinopterygii	Myctophiformes	Myctophidae	Gymnoscopelus	NA	Gymnoscopelus	genus
Actinopterygii	Myctophiformes	Myctophidae	Hygophum	hygomii	Hygophum hygo	species
Actinopterygii	Myctophiformes	Myctophidae	Hygophum	NA	Hygophum	genus
Actinopterygii	Myctophiformes	Myctophidae	Lampadena	luminosa	Lampadena lum	species
Actinopterygii	Myctophiformes	Myctophidae	Lampanyctodes	hectoris	Lampanyctodes	species
Actinopterygii	Myctophiformes	Myctophidae	Lampanyctus	alatus	Lampanyctus al	species
Actinopterygii	Myctophiformes	Myctophidae	Lampanyctus	crocodilus	Lampanyctus cr	species
Actinopterygii	Myctophiformes	Myctophidae	Lampanyctus	intricarius	Lampanyctus in	species
Actinopterygii	Myctophiformes	Myctophidae	Lampanyctus	mexicanus	Lampanyctus m	species
Actinopterygii	Myctophiformes	Myctophidae	Lampanyctus	NA	Lampanyctus	genus
Actinopterygii	Myctophiformes	Myctophidae	Lobianchia	gemellarii	Lobianchia gem	species
Actinopterygii	Myctophiformes	Myctophidae	Myctophum	punctatum	Myctophum pun	species
Actinopterygii	Myctophiformes	Myctophidae	Myctophum	asperum	Myctophum asp	species
Actinopterygii	Myctophiformes	Myctophidae	Myctophum	NA	Myctophum	genus
Actinopterygii	Myctophiformes	Myctophidae	NA	NA	Myctophidae	family
Actinopterygii	Myctophiformes	Myctophidae	Nannobrachium	regale	Nannobrachium	species
Actinopterygii	Myctophiformes	Myctophidae	Nannobrachium	ritteri	Nannobrachium	species
Actinopterygii	Myctophiformes	Myctophidae	Notoscopelus	kroyeri	Notoscopelus kr	species

Actinopterygii	Myctophiformes	Myctophidae	Protomyctophur	crockeri	Protomyctophur	species
Actinopterygii	Myctophiformes	Myctophidae	Stenobrachius	leucopsarus	Stenobrachius l	species
Actinopterygii	Myctophiformes	Myctophidae	Symbolophorus	barnardi	Symbolophorus	species
Actinopterygii	Myctophiformes	Myctophidae	Symbolophorus	evermanni	Symbolophorus	species
Actinopterygii	Myctophiformes	Myctophidae	Tarletonbeania	crenularis	Tarletonbeania	species
Actinopterygii	Myctophiformes	Myctophidae	Tarletonbeania	NA	NA	genus
Actinopterygii	Myctophiformes	Myctophidae	Triphoturus	mexicanus	Triphoturus me	species
Actinopterygii	NA	NA	NA	NA	Actinopterygii	class
Actinopterygii	NA	NA	NA	NA	Teleostei	subclass
Actinopterygii	Ophidiiformes	Aphyonidae	Barathronus	parfaiti	Barathronus pa	species
Actinopterygii	Ophidiiformes	Ophdiidae	Chilara	taylori	Chilara taylori	species
Actinopterygii	Osmeriformes	Microstomatida	Nansenia	macrolepis	Nansenia macr	species
Actinopterygii	Osmeriformes	Opisthoproctida	Monacoa	grimaldii	Monacoa grima	species
Actinopterygii	Osmeriformes	Osmeridae	Thaleichthys	pacificus	Thaleichthys pa	species
Actinopterygii	Perciformes	Acanthuridae	NA	NA	Acanthuridae	family
Actinopterygii	Perciformes	Acropomatidae	Synagrops	NA	Synagrops	genus
Actinopterygii	Perciformes	Ammodytidae	Ammodytes	tobianus	Ammodytes tob	species
Actinopterygii	Perciformes	Ammodytidae	NA	NA	Ammodytidae	family
Actinopterygii	Perciformes	Anarhichadidae	Anarrhichthys	ocellatus	Anarrhichthys o	species
Actinopterygii	Perciformes	Apogonidae	NA	NA	Apogonidae	family
Actinopterygii	Perciformes	Benniidae	NA	NA	Benniidae	family
Actinopterygii	Perciformes	Blenniidae	Blennius	ocellaris	Blennius ocella	species
Actinopterygii	Perciformes	Bramidae	Brama	brama	Brama brama	species
Actinopterygii	Perciformes	Bramidae	Brama	orcini	Brama orcini	species
Actinopterygii	Perciformes	Bramidae	NA	NA	Bramidae	family
Actinopterygii	Perciformes	Bramidae	Pteraclis	NA	Pteraclis	genus
Actinopterygii	Perciformes	Bramidae	Pterycombus	NA	Pterycombus	genus
Actinopterygii	Perciformes	Bramidae	Pterycombus	petersii	Pterycombus pe	species
Actinopterygii	Perciformes	Bramidae	Taractes	asper	Taractes asper	species
Actinopterygii	Perciformes	Callionymidae	Callionymus	NA	Callionymus sp	genus
Actinopterygii	Perciformes	Caproidae	Antigonia	capros	Antigonia capro	species
Actinopterygii	Perciformes	Caproidae	Capros	aper	Capros aper	species
Actinopterygii	Perciformes	Caproidae	NA	NA	Caproidae	family
Actinopterygii	Perciformes	Carangidae	Decapterus	NA	Decapterus	genus
Actinopterygii	Perciformes	Carangidae	Decapterus	macarellus	Decapterus ma	species
Actinopterygii	Perciformes	Carangidae	Decapterus	macrosoma	Decapterus ma	species
Actinopterygii	Perciformes	Carangidae	NA	NA	Carangidae	family
Actinopterygii	Perciformes	Carangidae	Selene	setapinnis	Selene setapinr	species
Actinopterygii	Perciformes	Carangidae	Trachinotus	ovatus	Trachinotus ova	species
Actinopterygii	Perciformes	Carangidae	Trachurus	japonicus	Trachurus japor	species
Actinopterygii	Perciformes	Carangidae	Trachurus	symmetricus	Trachurus symr	species
Actinopterygii	Perciformes	Carangidae	Trachurus	trachurus	Trachurus trach	species
Actinopterygii	Perciformes	Centrolophidae	Centrolophus	niger	Centrolophus ni	species
Actinopterygii	Perciformes	Centrolophidae	Icichthys	lockingtoni	Icichthys lockin	species
Actinopterygii	Perciformes	Chaetodontidae	NA	NA	Chaetodontidae	family
Actinopterygii	Perciformes	Champsodontid	NA	NA	Champsodontid	family
Actinopterygii	Perciformes	Chiasmodontida	Chiasmodon	niger	Chiasmodon nig	species
Actinopterygii	Perciformes	Chiasmodontida	NA	NA	Chiasmodontida	family
Actinopterygii	Perciformes	Chiasmodontida	Pseudoscopelu	NA	Pseudoscopelu	genus
Actinopterygii	Perciformes	Coryphaenidae	Coryphaena	hippurus	Coryphaena hip	species
Actinopterygii	Perciformes	Embiotocidae	Cymatogaster	aggregata	Cymatogaster a	species
Actinopterygii	Perciformes	Gempylidae	Diplospinus	multistriatus	Diplospinus mul	species
Actinopterygii	Perciformes	Gempylidae	Gempylus	NA	Gempylus	genus
Actinopterygii	Perciformes	Gempylidae	Gempylus	serpens	Gempylus serpe	species
Actinopterygii	Perciformes	Gempylidae	Lepidocybium	flavobrunneum	Lepidocybium fl	species
Actinopterygii	Perciformes	Gempylidae	NA	NA	Gempylidae	family
Actinopterygii	Perciformes	Gempylidae	Nealotus	tripes	Nealotus tripes	species
Actinopterygii	Perciformes	Gempylidae	Nesiarchus	nasutus	Nesiarchus nas	species

Actinopterygii	Perciformes	Gempylidae	Rexea	NA	Rexea	genus
Actinopterygii	Perciformes	Gempylidae	Rexea	prometheoides	Rexea prometh	species
Actinopterygii	Perciformes	Gempylidae	Thyrsitoides	marleyi	Thyrsitoides ma	species
Actinopterygii	Perciformes	Gobiidae	Gobius	NA	Gobius	genus
Actinopterygii	Perciformes	Gobiidae	Rhinogobiops	nicholsii	Rhinogobiops n	species
Actinopterygii	Perciformes	Haemulidae	NA	NA	Haemulidae	family
Actinopterygii	Perciformes	Holocentridae	Sargocentron	NA	Sargocentron	genus
Actinopterygii	Perciformes	Istiophoridae	Makaira	mazara	Makaira mazara	species
Actinopterygii	Perciformes	Kyphosidae	Medialuna	californiensis	Medialuna calif	species
Actinopterygii	Perciformes	Labridae	Halichoeres	nicholsi	Halichoeres nic	species
Actinopterygii	Perciformes	Malacanthidae	NA	NA	Malacanthidae	family
Actinopterygii	Perciformes	Mugilidae	Liza	NA	Liza	genus
Actinopterygii	Perciformes	Mugilidae	Mugil	cephalus	Mugil cephalus	species
Actinopterygii	Perciformes	Mullidae	Mullus	barbatus	Mullus barbatus	species
Actinopterygii	Perciformes	NA	NA	NA	Perciformes	order
Actinopterygii	Perciformes	Nomeidae	Cubiceps	gracilis	Cubiceps gracili	species
Actinopterygii	Perciformes	Nomeidae	Cubiceps	capensis	Cubiceps caper	species
Actinopterygii	Perciformes	Nomeidae	Cubiceps	pauciradiatus	Cubiceps pauci	species
Actinopterygii	Perciformes	Nomeidae	NA	NA	Nomeidae	family
Actinopterygii	Perciformes	Nomeidae	Psenes	pellucidus	Psenes pellucid	species
Actinopterygii	Perciformes	Pomacanthidae	NA	NA	Pomacanthidae	family
Actinopterygii	Perciformes	Pomacentridae	Chromis	punctipinnis	Chromis punctip	species
Actinopterygii	Perciformes	Pomacentridae	NA	NA	Pomacentridae	family
Actinopterygii	Perciformes	Pomacentridae	Plectroglyphido	NA	Plectroglyphido	genus
Actinopterygii	Perciformes	Priacanthidae	Cookeolus	japonicus	Cookeolus japo	species
Actinopterygii	Perciformes	Scombridae	Auxis	NA	Auxis	genus
Actinopterygii	Perciformes	Scombridae	Katsuwonus	pelamis	Katsuwonus pel	species
Actinopterygii	Perciformes	Scombridae	NA	NA	Scombridae	family
Actinopterygii	Perciformes	Scombridae	Scomber	japonicus	Scomber japoni	species
Actinopterygii	Perciformes	Scombridae	Scomber	NA	Scomber	genus
Actinopterygii	Perciformes	Scombridae	Scomber	scombrus	Scomber scomb	species
Actinopterygii	Perciformes	Scombridae	Thunnus	NA	Thunnus	genus
Actinopterygii	Perciformes	Scombrolabraci	Scombrolabrax	heterolepis	Scombrolabrax	species
Actinopterygii	Perciformes	Serranidae	NA	NA	Serranidae	family
Actinopterygii	Perciformes	Sparidae	Boops	boops	Boops boops	species
Actinopterygii	Perciformes	Sparidae	Diplodus	sargus	Diplodus sargus	species
Actinopterygii	Perciformes	Sparidae	Spondyliosoma	cantharus	Spondyliosoma	species
Actinopterygii	Perciformes	Sphyraenidae	NA	NA	Sphyraenidae s	family
Actinopterygii	Perciformes	Stromateidae	Peprilus	simillimus	Peprilus simillim	species
Actinopterygii	Perciformes	Stromateidae	NA	NA	Stromateidae	family
Actinopterygii	Perciformes	Tetragonuridae	Tetragonurus	atlanticus	Tetragonurus at	species
Actinopterygii	Perciformes	Tetragonuridae	Tetragonurus	cuvieri	Tetragonurus cu	species
Actinopterygii	Perciformes	Trichiuridae	NA	NA	Trichiuridae	family
Actinopterygii	Perciformes	Zanclidae	NA	NA	Zanclidae spp.	family
Actinopterygii	Pleuronectiform	Bothidae	Arnoglossus	imperialis	Arnoglossus imp	species
Actinopterygii	Pleuronectiform	Bothidae	NA	NA	Bothidae	family
Actinopterygii	Pleuronectiform	NA	NA	NA	Pleuronectiform	order
Actinopterygii	Pleuronectiform	Paralichthyidae	Citharichthys	NA	Citharichthys	genus
Actinopterygii	Pleuronectiform	Paralichthyidae	Citharichthys	sordidus	Citharichthys so	species
Actinopterygii	Pleuronectiform	Pleuronectidae	Microstomus	NA	Microstomus	genus
Actinopterygii	Pleuronectiform	Pleuronectidae	Pleuronichthys	decurrens	Pleuronichthys	species
Actinopterygii	Pleuronectiform	Pleuronectidae	Pleuronichthys	NA	Pleuronichthys	genus
Actinopterygii	Pleuronectiform	Pleutonectidae	Microstomus	pacificus	Microstomus pa	species
Actinopterygii	Pleutonectiform	Pleuronectidae	Glyptocephalus	zachirus	Glyptocephalus	species
Actinopterygii	Polymixiiformes	Polymixiidae	Polymixia	NA	Polymixia	genus
Actinopterygii	Scorpaeniforme	Agonidae	Bathyagonus	pentacanthus	Bathyagonus pe	species
Actinopterygii	Scorpaeniforme	Agonidae	NA	NA	Agonidae	family
Actinopterygii	Scorpaeniforme	Anoplopomatida	Anoplopoma	fimbria	Anoplopoma fim	species

Actinopterygii	Scorpaeniforme	Dactylopteridae	Dactyloptena	orientalis	Dactyloptena or	species
Actinopterygii	Scorpaeniforme	Dactylopteridae	NA	NA	Dactylopteridae	family
Actinopterygii	Scorpaeniforme	Gonatidae	Heliocolenus	dactylopterus	Helicolenus dac	species
Actinopterygii	Scorpaeniforme	Peristediidae	NA	NA	Peristediidae sp	genus
Actinopterygii	Scorpaeniforme	Peristediidae	Peristedion	gracile	Peristedion gra	species
Actinopterygii	Scorpaeniforme	Psychrolutidae	NA	NA	Psychrolutidae	family
Actinopterygii	Scorpaeniforme	Scorpaenidae	NA	NA	Scorpaenidae	family
Actinopterygii	Scorpaeniforme	Scorpaenidae	Scorpaena	NA	Scorpaena	genus
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	aleutianus	Sebastes aleuti	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	brevispinis	Sebastes brevis	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	diploproa	Sebastes diplo	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	helvomaculatus	Sebastes helvo	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	maliger	Sebastes malig	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	miniatus	Sebastes miniat	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	NA	Sebastes	genus
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	proriger	Sebastes prorig	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	wilsoni	Sebastes wilsor	species
Actinopterygii	Scorpaeniforme	Sebastidae	Sebastes	zacentrus	Sebastes zacer	species
Actinopterygii	Scorpaeniforme	Triglidae	Eutrigla	gurnardus	Eutrigla gurnard	species
Actinopterygii	Stephanoberyci	Melamphaidae	Melamphaes	lugubris	Melamphaes lu	species
Actinopterygii	Stephanoberyci	Melamphaidae	Scopelogadus	mizolepis	Scopelogadus b	species
Actinopterygii	Stomiiformes	Gonostomatida	Gonostoma	NA	Gonostoma	genus
Actinopterygii	Stomiiformes	Gonostomatida	NA	NA	Gonostomatida	family
Actinopterygii	Stomiiformes	Phosichthyidae	Vinciguerria	lucetia	Vinciguerria luc	species
Actinopterygii	Stomiiformes	Sternoptychidae	Argyropelecus	aculeatus	Argyropelecus a	species
Actinopterygii	Stomiiformes	Sternoptychidae	Argyropelecus	olfersii	Argyropelecus o	species
Actinopterygii	Stomiiformes	Sternoptychidae	Maurolicus	imperatorius	Maurolicus impe	species
Actinopterygii	Stomiiformes	Sternoptychidae	Maurolicus	muelleri	Maurolicus mue	species
Actinopterygii	Stomiiformes	Sternoptychidae	NA	NA	Sternoptychidae	family
Actinopterygii	Stomiiformes	Sternoptychidae	Sternoptyx	diaphana	Sternoptyx diap	species
Actinopterygii	Stomiiformes	Sternoptychidae	Sternoptyx	NA	Sternoptyx	genus
Actinopterygii	Stomiiformes	Sternoptychidae	Sternoptyx	obscura	Sternoptyx obsc	species
Actinopterygii	Stomiiformes	Stomiidae	Bathophilus	flemingi	Bathophilus flen	species
Actinopterygii	Stomiiformes	Stomiidae	Idiacanthus	NA	Idiacanthus	genus
Actinopterygii	Stomiiformes	Stomiidae	Melanostomias	valdiviae	Melanostomias	species
Actinopterygii	Stomiiformes	Stomiidae	Melanostomias.	NA	Melanostomias	genus
Actinopterygii	Stomiiformes	Stomiidae	Photonectes	margarita	Photonectes ma	species
Actinopterygii	Stomiiformes	Stomiiformes	Cyclothone	NA	Cyclothone	genus
Actinopterygii	Sygnathiformes	Centriscidae	Macroramphosu	scolopax	Macroramphosu	species
Actinopterygii	Syngnathiforme	Syngnathidae	Entelurus	aequoreus	Entelurus aequ	species
Actinopterygii	Syngnathiforme	Syngnathidae	NA	NA	Syngnathidae	family
Actinopterygii	Syngnathiforme	Syngnathidae	Syngnathus	californiensis	Syngnathus cali	species
Actinopterygii	Syngnathiforme	Syngnathidae	Syngnathus	NA	Syngnathus	genus
Actinopterygii	Tetraodontiform	Balistidae	Balistes	punctatus	Balistes punctat	species
Actinopterygii	Tetraodontiform	Balistidae	Canthidermis	maculata	Canthidermis m	species
Actinopterygii	Tetraodontiform	Balistidae	NA	NA	Balistidae	family
Actinopterygii	Tetraodontiform	Diodontidae	Chilomycterus	NA	Chilomycterus	genus
Actinopterygii	Tetraodontiform	Molidae	Masturus	lanceolatus	Masturus lance	species
Actinopterygii	Tetraodontiform	Molidae	NA	NA	Molidae	family
Actinopterygii	Tetraodontiform	Molidae	Ranzania	laevis	Ranzania laevis	species
Actinopterygii	Tetraodontiform	Monacanthidae	Cantherhines	NA	Cantherhines	genus
Actinopterygii	Tetraodontiform	Monacanthidae	NA	NA	Monacanthidae	family
Actinopterygii	Tetraodontiform	Monacanthidae	Stephanolepis	NA	Stephanolepis	genus
Actinopterygii	Tetraodontiform	Ostraciidae	Lactoria	diaphana	Lactoria diapha	species
Actinopterygii	Tetraodontiform	Ostraciidae	Lactoria	NA	Lactoria	genus
Actinopterygii	Tetraodontiform	Ostraciidae	NA	NA	Ostraciidae	family
Actinopterygii	Tetraodontiform	Ostraciidae	Ostracion	cubicus	Ostracion cubic	species
Actinopterygii	Tetraodontiform	Tetraodontidae	Lagocephalus	lagocephalus	Lagocephalus la	species

Actinopterygii	Tetraodontiform	Tetraodontidae	NA	NA	Tetraodontidae	family
Actinopterygii	Tetraodontiform	Tricanthodidae	Halimochirurgus	NA	Halimochirurgus	genus
Appendicularia	NA	NA	NA	NA	Appendicularia	class
Branchiopoda	Cladocera	NA	NA	NA	Cladocera	order
Branchiopoda	Onychopoda	Podonidae	Evadne	NA	Evadne	genus
Branchiopoda	Onychopoda	Podonidae	Pseudevadne	tergestina	Pseudevadne te	species
Cephalopoda	Decapodiformes	Chtenopterygid	Chtenopteryx	sicula	Chtenopteryx si	species
Cephalopoda	Myopsida	Loliginidae	Alloteuthis	subulata	Alloteuthis subu	species
Cephalopoda	Myopsida	Loliginidae	Doryteuthis	opalescens	Doryteuthis opa	species
Cephalopoda	Myopsida	Loliginidae	Loligo	NA	Loligo	genus
Cephalopoda	Myopsida	Loliginidae	NA	NA	Loliginidae	family
Cephalopoda	Myopsida	Loliginidae	Sepioteuthis	NA	Sepioteuthis sp	genus
Cephalopoda	Myopsida	NA	NA	NA	Myopsida	order
Cephalopoda	NA	NA	NA	NA	Cephalopoda	class
Cephalopoda	NA	NA	NA	NA	Decapodiformes	superorder
Cephalopoda	Octopoda	Alloposidae	Haliphron	Haliphron atlant	Haliphron atlant	species
Cephalopoda	Octopoda	Amphitretidae	Japetella	diaphana	Japetella diapha	species
Cephalopoda	Octopoda	Amphitretidae	Japetella	heathi	Japetella heathi	species
Cephalopoda	Octopoda	Amphitretidae	Vitreledonella	NA	Vitreledonella	genus
Cephalopoda	Octopoda	Argonautidae	Argonauta	argo	Argonauta argo	species
Cephalopoda	Octopoda	Argonautidae	Argonauta	nodosus	Argonauta nodo	species
Cephalopoda	Octopoda	Argonautidae	Argonauta	nouryi	Argonauta nour	species
Cephalopoda	Octopoda	Argonautidae	NA	NA	Argonautidae	family
Cephalopoda	Octopoda	Eledonidae	Eledone	cirrhosa	Eledone cirrhos	species
Cephalopoda	Octopoda	NA	NA	NA	Octopoda	order
Cephalopoda	Octopoda	Octopodidae	NA	NA	Octopodidae	family
Cephalopoda	Octopoda	Octopodidae	Octopus	bimaculatus	Octopus bimacu	species
Cephalopoda	Octopoda	Octopodidae	Octopus	vulgaris	Octopus vulgari	species
Cephalopoda	Octopoda	Octopodidae	Octopus	NA	Octopus	genus
Cephalopoda	Octopoda	Octopodidae	Pteroctopus	tetracirrhus	Pteroctopus tetr	species
Cephalopoda	Octopoda	Octopodidae	Scaeurgus	unicirrhus	Scaeurgus unic	species
Cephalopoda	Octopoda	Opisthoteuthida	Opisthoteuthis	californiana	Opisthoteuthis c	species
Cephalopoda	Octopoda	Tremoctopodida	Tremoctopus	violaceus	Tremoctopus vi	species
Cephalopoda	Octopoda	Tremoctopodida	Tremoctopus	gracilis	Tremoctopus gr	species
Cephalopoda	Oegopsida	Ancistrocheirida	Ancistrocheirus	lesueurii	Ancistrocheirus	species
Cephalopoda	Oegopsida	Architeuthidae	NA	NA	Architeuthidae	family
Cephalopoda	Oegopsida	Brachioteuthida	Brachioteuthis	NA	Brachioteuthis	genus
Cephalopoda	Oegopsida	Brachioteuthida	Brachioteuthis	riisei	Brachioteuthis r	species
Cephalopoda	Oegopsida	Chiroteuthidae	Chiroteuthis	NA	Chiroteuthis spp	genus
Cephalopoda	Oegopsida	Chiroteuthidae	Chiroteuthis	veranii	Chiroteuthis ver	species
Cephalopoda	Oegopsida	Chiroteuthidae	Grimalditeuthis	bonplandi	Grimalditeuthis	species
Cephalopoda	Oegopsida	Chiroteuthidae	NA	NA	Chiroteuthidae	family
Cephalopoda	Oegopsida	Cranchiidae	Cranchia	scabra	Cranchia scabra	species
Cephalopoda	Oegopsida	Cranchiidae	Teuthowenia	hyperborea	Teuthowenia m	species
Cephalopoda	Oegopsida	Cranchiidae	Galiteuthis	armata	Galiteuthis arma	species
Cephalopoda	Oegopsida	Cranchiidae	Galiteuthis	phyllura	Galiteuthis phyl	species
Cephalopoda	Oegopsida	Cranchiidae	Heliococranchia	pfefferi	Helicocranchia	species
Cephalopoda	Oegopsida	Cranchiidae	Leachia	NA	Leachia	genus
Cephalopoda	Oegopsida	Cranchiidae	Liocranchia	reinhardtii	Liocranchia rein	species
Cephalopoda	Oegopsida	Cranchiidae	Liocranchia	NA	Liocranchia	genus
Cephalopoda	Oegopsida	Cranchiidae	NA	NA	Cranchiidae	family
Cephalopoda	Oegopsida	Cranchiidae	NA	NA	Taoniinae	subfamily
Cephalopoda	Oegopsida	Cranchiidae	NA	NA	Cranchiidae sp	family
Cephalopoda	Oegopsida	Cranchiidae	Taonius	NA	Taonius	genus
Cephalopoda	Oegopsida	Cranchiidae	Teuthowenia	megalops	Teuthowenia m	species
Cephalopoda	Oegopsida	Enoploteuthidae	Abralia	Abralia redfieldi	Abralia redfieldi	species
Cephalopoda	Oegopsida	Enoploteuthidae	Abralia	NA	Abralia	genus
Cephalopoda	Oegopsida	Enoploteuthidae	Abraliopsis	affinis	Abraliopsis affin	species

Cephalopoda	Oegopsida	Enoploteuthidae	Abraliopsis	felis	Abraliopsis felis	species
Cephalopoda	Oegopsida	Enoploteuthidae	Abraliopsis	gilchristi	Abraliopsis gilch	species
Cephalopoda	Oegopsida	Enoploteuthidae	Abraliopsis	morisii	Abraliopsis mor	species
Cephalopoda	Oegopsida	Enoploteuthidae	Abraliopsis	NA	Abraliopsis	genus
Cephalopoda	Oegopsida	Enoploteuthidae	NA	NA	Enoploteuthidae	family
Cephalopoda	Oegopsida	Enoploteuthidae	NA	NA	Enoploteuthidae	family
Cephalopoda	Oegopsida	Gonatidae	Berryteuthis	anonychus	Berryteuthis ano	species
Cephalopoda	Oegopsida	Gonatidae	Gonatopsis	borealis	Gonatopsis bore	species
Cephalopoda	Oegopsida	Gonatidae	Gonatopsis	NA	Gonatopsis	genus
Cephalopoda	Oegopsida	Gonatidae	Gonatus	berryi	Gonatus berryi	species
Cephalopoda	Oegopsida	Gonatidae	Gonatus	californiensis	Gonatus californ	species
Cephalopoda	Oegopsida	Gonatidae	Gonatus	NA	Gonatus	genus
Cephalopoda	Oegopsida	Gonatidae	Gonatus	onyx	Gonatus onyx	species
Cephalopoda	Oegopsida	Gonatidae	Gonatus	pyros	Gonatus pyros	species
Cephalopoda	Oegopsida	Gonatidae	Gonatus	steenstrupi	Gonatus steens	species
Cephalopoda	Oegopsida	Gonatidae	NA	NA	Gonatidae	family
Cephalopoda	Oegopsida	Histioteuthidae	Histioteuthis	bonnellii	Histioteuthis bo	species
Cephalopoda	Oegopsida	Histioteuthidae	Histioteuthis	heteropsis	Histioteuthis het	species
Cephalopoda	Oegopsida	Histioteuthidae	Histioteuthis	NA	Histioteuthis	genus
Cephalopoda	Oegopsida	Histioteuthidae	Histioteuthis	reversa	Histioteuthis rev	species
Cephalopoda	Oegopsida	Histioteuthidae	Histioteuthis	meleagroteuthis	Histioteuthis me	species
Cephalopoda	Oegopsida	Histioteuthidae	NA	NA	Histioteuthidae	family
Cephalopoda	Oegopsida	Histioteuthidae	Stigmatoteuthis	hoylei	Stigmatoteuthis	species
Cephalopoda	Oegopsida	Histioteuthidae	Stigmatoteuthis	dofleini	Stigmatoteuthis	species
Cephalopoda	Oegopsida	Lycoteuthidae	Lycoteuthis	lorigera	Lycoteuthis lorig	species
Cephalopoda	Oegopsida	Mastigoteuthida	Mastigoteuthis	dentata	Mastigoteuthis d	species
Cephalopoda	Oegopsida	Mastigoteuthida	Mastigoteuthis	NA	Mastigoteuthis	genus
Cephalopoda	Oegopsida	NA	NA	NA	Oegopsida	order
Cephalopoda	Oegopsida	Octopoteuthida	Octopoteuthis	NA	Octopoteuthis	genus
Cephalopoda	Oegopsida	Octopoteuthida	Octopoteuthis	nielseni	Octopoteuthis n	species
Cephalopoda	Oegopsida	Octopoteuthida	Octopoteuthis	rugosa	Octopoteuthis ru	species
Cephalopoda	Oegopsida	Octopoteuthida	Octopoteuthis	sicula	Octopoteuthis s	species
Cephalopoda	Oegopsida	Octopoteuthida	Taningia	danae	Taningia danae	species
Cephalopoda	Oegopsida	Ocythoidae	Ocythoe	tuberculata	Ocythoe tubercu	species
Cephalopoda	Oegopsida	Ommastrephida	Dosidicus	gigas	Dosidicus gigas	species
Cephalopoda	Oegopsida	Ommastrephida	Eucleoteuthis	luminosa	Eucleoteuthis lu	species
Cephalopoda	Oegopsida	Ommastrephida	Hyaloteuthis	pelagica	Hyaloteuthis pe	species
Cephalopoda	Oegopsida	Ommastrephida	Illex	argentinus	Illex argentinus	species
Cephalopoda	Oegopsida	Ommastrephida	Illex	coindetii	Illex coindetii	species
Cephalopoda	Oegopsida	Ommastrephida	NA	NA	Ommastrephida	family
Cephalopoda	Oegopsida	Ommastrephida	Ommastrephes	NA	Ommastrephes	genus
Cephalopoda	Oegopsida	Ommastrephida	Ommastrephes	bartramii	Ommastrephes	species
Cephalopoda	Oegopsida	Ommastrephida	Ornithoteuthis	antillarum	Ornithoteuthis a	species
Cephalopoda	Oegopsida	Ommastrephida	Ornithoteuthis	volatilis	Ornithoteuthis v	species
Cephalopoda	Oegopsida	Ommastrephida	Sthenoteuthis	NA	Sthenoteuthis	genus
Cephalopoda	Oegopsida	Ommastrephida	Sthenoteuthis	oualaniensis	Sthenoteuthis o	species
Cephalopoda	Oegopsida	Ommastrephida	Todarodes	pacificus	Todarodes paci	species
Cephalopoda	Oegopsida	Ommastrephida	Todarodes	sagittatus	Todarodes sagi	species
Cephalopoda	Oegopsida	Ommastrephida	Todarodes	NA	Todarodes	genus
Cephalopoda	Oegopsida	Ommastrephida	Todaropsis	eblanae	Todaropsis ebla	species
Cephalopoda	Oegopsida	Onychoteuthida	Ancistrocheirus	lichtensteinii	Ancistroteuthis l	species
Cephalopoda	Oegopsida	Onychoteuthida	NA	NA	Onychoteuthida	family
Cephalopoda	Oegopsida	Onychoteuthida	Onychoteuthis	banksii	Onychoteuthis s	species
Cephalopoda	Oegopsida	Onychoteuthida	Onychoteuthis	banksii	Onychoteuthis b	species
Cephalopoda	Oegopsida	Onychoteuthida	Onychoteuthis	borealijaponica	Onychoteuthis b	species
Cephalopoda	Oegopsida	Onychoteuthida	Onychoteuthis	NA	Onychoteuthis	genus
Cephalopoda	Oegopsida	Onychoteuthida	Onykia	loennbergii	Onykia loennbe	species
Cephalopoda	Oegopsida	Onychoteuthida	Onykia	robusta	Onykia robusta	species

Cephalopoda	Oegopsida	Onychoteuthida	Walvisteuthis	rancureli	Walvisteuthis ra	species
Cephalopoda	Oegopsida	Pyroteuthidae	NA	NA	Pyroteuthidae	family
Cephalopoda	Oegopsida	Pyroteuthidae	Pterygioteuthis	giardi	Pterygioteuthis	species
Cephalopoda	Oegopsida	Pyroteuthidae	Pterygioteuthis	microlampas	Pterygioteuthis	species
Cephalopoda	Oegopsida	Pyroteuthidae	Pterygioteuthis	NA	Pterygioteuthis	genus
Cephalopoda	Oegopsida	Pyroteuthidae	Pyroteuthis	margaritifera	Pyroteuthis mar	species
Cephalopoda	Oegopsida	Thysanoteuthid	Thysanoteuthis	rhombus	Thysanoteuthis	species
Cephalopoda	Sepiida	Sepiolidae	Heteroteuthis	dispar	Heteroteuthis di	species
Cephalopoda	Sepiida	Sepiolidae	Heteroteuthis	NA	Heteroteuthis	genus
Cephalopoda	Sepiida	Sepiolidae	NA	NA	Sepiolidae	family
Cephalopoda	Sepiida	Sepiolidae	Sepietta	NA	Sepietta	genus
Cephalopoda	Sepiida	Sepiolidae	Sepietta	oweniana	Sepietta owenia	species
Cephalopoda	Spirulida	Spirulidae	Spirula	spirula	Spirula spirula	species
Cephalopoda	Teuthida	NA	NA	NA	Teuthida	order
Cephalopoda	Vampyromorph	Vampyroteuthid	Vampyroteuthis	infernalis	Vampyroteuthis	species
Elasmobranchii	Squaliformes	Squalidae	NA	NA	Squalidae	family
Gastropoda	Caenogastropo	Epitoniodea	Janthina	Janthina exigua	Janthina exigua	species
Gastropoda	Caenogastropo	Epitoniodea	Janthina	NA	Janthina	genus
Gastropoda	NA	NA	NA	NA	Unidentified Mo	class
Gastropoda	Littorinimorpha	Atlantidae	Atlanta	Atlanta peronii	Atlanta peronii	species
Gastropoda	Littorinimorpha	Atlantidae	NA	NA	Atlantidae	family
Gastropoda	Littorinimorpha	Carinariidae	Carinaria	lamarckii	Carinaria lamar	species
Gastropoda	Littorinimorpha	NA	Littorinimorpha	NA	Littorinimorpha	genus
Gastropoda	NA	NA	NA	NA	Gastropoda	class
Gastropoda	Pteropoda	Cavoliniidae	Cavolinia	NA	Cavolinia	genus
Hexanauplia	Calanoida	Calanidae	Calanus	Calanus finmarc	Calanus finmarc	species
Hexanauplia	Calanoida	Calanidae	Cosmocalanus	darwinii	Cosmocalanus	species
Hexanauplia	Calanoida	Clausocalanida	Clausocalanus	furcatus	Clausocalanus f	species
Hexanauplia	Calanoida	Clausocalanida	Clausocalanus	NA	Clausocalanus	genus
Hexanauplia	Calanoida	NA	NA	NA	Calanoida	order
Hexanauplia	Calanoida	Paracalanidae	Paracalanus	NA	Paracalanus	genus
Hexanauplia	Copepoda(subc	NA	NA	NA	Copepoda	subclass
Hexanauplia	Copepoda(subc	Oithonidae	Oithona	NA	Oithona	family
Hexanauplia	Cyclopoida	Corycaeidae	Corycaeus	NA	Corycaeus	genus
Hexanauplia	Cyclopoida	Corycaeidae	Farranula	gibbula	Farranula gibbu	species
Hexanauplia	Cyclopoida	NA	NA	NA	Cyclopoida	order
Hydrozoa	Siphonophorae	Diphyidae	Chelophyes	Chelophyes app	Chelophyes app	species
Hydrozoa	Siphonophorae	Diphyidae	Diphyes	NA	Diphyes	genus
Hydrozoa	Siphonophorae	Diphyidae	Sulculeolaria	NA	Sulculeolaria	genus
Malacostraca	Amphipoda	Brachyscelidae	Brachyscelus	crusculum	Brachyscelus cr	species
Malacostraca	Amphipoda	Brachyscelidae	Brachyscelus	macrocephalus	Brachyscelus m	species
Malacostraca	Amphipoda	Brachyscelidae	Brachyscelus	NA	Brachyscelus	genus
Malacostraca	Amphipoda	Cyphocarididae	Cyphocaris	faurei	Cyphocaris faur	species
Malacostraca	Amphipoda	Cyproideidae	Cyproidea	NA	Cyproidea	genus
Malacostraca	Amphipoda	Eupronoidae	Parapronoe	crustulum	Parapronoe cru	species
Malacostraca	Amphipoda	Eupronoidae	Parapronoe	NA	Parapronoe	genus
Malacostraca	Amphipoda	Gammaridae	NA	NA	Gammaridae	family
Malacostraca	Amphipoda	Hyperiidae	Hyperia	galba	Hyperia galba	species
Malacostraca	Amphipoda	Hyperiidae	NA	NA	Hyperiidae	family
Malacostraca	Amphipoda	Hyperiidae	Themisto	gaudichaudii	Themisto gaudi	species
Malacostraca	Amphipoda	Lanceolidae	Lanceola	Lanceola sayan	Lanceola sayan	species
Malacostraca	Amphipoda	Lycaediae	NA	NA	Lycaediae	family
Malacostraca	Amphipoda	NA	NA	NA	Amphipoda	order
Malacostraca	Amphipoda	Oxyccephalidae	Leptocotis	tenuirostris	Leptocotis tenui	species
Malacostraca	Amphipoda	Oxyccephalidae	Streetsia	challengeri	Streetsia challe	species
Malacostraca	Amphipoda	Oxyccephalidae	Streetsia	NA	Streetsia	genus
Malacostraca	Amphipoda	Phrosinidae	Anchylomera	blossevillei	Anchylomera bl	species
Malacostraca	Amphipoda	Phrosinidae	NA	NA	Phrosinidae	family

Malacostraca	Amphipoda	Phrosinidae	Phrosina	NA	Phrosina	genus
Malacostraca	Amphipoda	Phrosinidae	Phrosina	semilunata	Phrosina semilu	species
Malacostraca	Amphipoda	Phrosinidae	Primno	macropa	Primno macropa	species
Malacostraca	Amphipoda	Phrosinidae	Primno	NA	Primno	genus
Malacostraca	Amphipoda	Platyscelidae	Platyscelus	armatus	Platyscelus arm	species
Malacostraca	Amphipoda	Platyscelidae	Platyscelus	NA	Platyscelus	genus
Malacostraca	Amphipoda	Platyscelidae	Platyscelus	ovoides	Platyscelus ovo	species
Malacostraca	Amphipoda	Platyscelidae	Platyscelus	serratulus	Platyscelus ser	species
Malacostraca	Amphipoda	Vibiliidae	Vibilia	gibbosa	Vibilia gibbosa	species
Malacostraca	Decapoda	Acanthephyrida	Acanthephyra	pelagica	Acanthephyra p	species
Malacostraca	Decapoda	Acanthephyrida	NA	NA	Acanthephyrida	family
Malacostraca	Decapoda	Alpheidae	Alpheus	glaber	Alpheus glaber	species
Malacostraca	Decapoda	Axiidae	Axius	Axius stirhynchu	Axius stirhynchu	species
Malacostraca	Decapoda	Benthesicymida	Gennadas	Gennadas elega	Gennadas elega	species
Malacostraca	Decapoda	Benthesicymida	Gennadas	NA	Gennadas	genus
Malacostraca	Decapoda	Enoplometopida	Enoplometopus	NA	Enoplometopus	genus
Malacostraca	Decapoda	Enoplometopida	NA	NA	Enoplometopida	family
Malacostraca	Decapoda	Homolidae	NA	NA	Homolidae	family
Malacostraca	Decapoda	Munididae	Pleuroncodes	NA	Pleuroncodes	genus
Malacostraca	Decapoda	Munididae	Pleuroncodes	planipes	Pleuroncodes p	species
Malacostraca	Decapoda	NA	NA	NA	Decapoda	order
Malacostraca	Decapoda	NA	NA	NA	Anomura	infraorder
Malacostraca	Decapoda	NA	NA	NA	Brachyura	infraorder
Malacostraca	Decapoda	NA	NA	NA	Caridea	infraorder
Malacostraca	Decapoda	NA	NA	NA	Decapoda	order
Malacostraca	Decapoda	NA	NA	NA	Majoidea	superfamily
Malacostraca	Decapoda	NA	NA	NA	Paguroidea	superfamily
Malacostraca	Decapoda	Nephropidae	NA	NA	Nephropidae	family
Malacostraca	Decapoda	Oplophoroidae	Janicella	spinicauda	Janicella spinica	species
Malacostraca	Decapoda	Oplophoroidae	NA	NA	Oplophoridae sp	family
Malacostraca	Decapoda	Oplophoroidae	Oplophorus	typus	Oplophorus typu	species
Malacostraca	Decapoda	Oplophoroidae	Oplophorus	NA	Oplophorus	genus
Malacostraca	Decapoda	Oplophpridae	Systellaspis	Systellaspis deb	Systellaspis deb	species
Malacostraca	Decapoda	Paguridae	NA	NA	Paguridae spp.	family
Malacostraca	Decapoda	Palinuridae	Jasus	NA	Jasus	genus
Malacostraca	Decapoda	Palinuridae	NA	NA	Palinuridae	family
Malacostraca	Decapoda	Palinuridae	Palinurus	mauritanicus	Palinurus mauri	species
Malacostraca	Decapoda	Pandalidae	Heterocarpus	NA	Heterocarpus	genus
Malacostraca	Decapoda	Pandalidae	Heterocarpus	laevigatus	Heterocarpus la	species
Malacostraca	Decapoda	Pandalidae	Thalassocaris	NA	Thalassocaris	genus
Malacostraca	Decapoda	Pasiphaeidae	NA	NA	Pasiphaeidae	family
Malacostraca	Decapoda	Pasiphaeidae	Parapasiphae	sulcatifrons	Parapasiphae s	species
Malacostraca	Decapoda	Pasiphaeidae	Pasiphaea	NA	Pasiphaea	genus
Malacostraca	Decapoda	Penaeidae	Funchalia	taaningi	Funchalia taani	species
Malacostraca	Decapoda	Penaeidae	Funchalia	woodwardi	Funchalia wood	species
Malacostraca	Decapoda	Penaeidae	NA	NA	Penaeidae	family
Malacostraca	Decapoda	Polybiidae	Polybius	henslowii	Polybius henslo	species
Malacostraca	Decapoda	Portunidae	NA	NA	Portunidae	family
Malacostraca	Decapoda	Scyllaridae	NA	NA	Scyllaridae	family
Malacostraca	Decapoda	Scyllaridae	Parribacus	antarcticus	Parribacus anta	species
Malacostraca	Decapoda	Scyllaridae	Scyllarus	arctus	Scyllarus arctus	species
Malacostraca	Decapoda	Sergestidae	Eusergestes	arcticus	Eusergestes arc	species
Malacostraca	Decapoda	Sergestidae	Eusergestes	similis	Eusergestes sir	species
Malacostraca	Decapoda	Sergestidae	NA	NA	Sergestidae	family
Malacostraca	Decapoda	Sergestidae	Robustosergia	robusta	Robustosergia r	species
Malacostraca	Euphausiacea	Euphausiidae	Euphausia	NA	Euphausia	genus
Malacostraca	Euphausiacea	Euphausiidae	Euphausia	pacifica	Euphausia paci	species
Malacostraca	Euphausiacea	Euphausiidae	Meganycitphan	norvegica	Meganyctiphan	species

Malacostraca	Euphausiacea	Euphausiidae	NA	NA	Euphausiidae	family
Malacostraca	Euphausiacea	Euphausiidae	Nematoscelis	megalops	Nematoscelis m	species
Malacostraca	Euphausiacea	Euphausiidae	Nematoscelis	NA	Nematoscelis	genus
Malacostraca	Euphausiacea	Euphausiidae	Nyctiphanes	australis	Nyctiphanes au	species
Malacostraca	Euphausiacea	Euphausiidae	Stylocheiron	Stylocheiron	Stylocheiron ab	species
Malacostraca	Euphausiacea	NA	NA	NA	Euphausiacea	order
Malacostraca	Isopoda	Idoteidae	Idotea	Idotea metallica	Idotea metallica	species
Malacostraca	Isopoda	Idoteidae	NA	NA	Idoteidae	family
Malacostraca	Isopoda	NA	NA	NA	Isopoda	order
Malacostraca	Lophogastrida	Gnathophausiid	Negnathophaus	gigas	Neognathophau	species
Malacostraca	Lophogastrida	Gnathophausiid	Neognathophau	Neognathophau	Neognathophau	species
Malacostraca	Mysida	Mysidae	NA	NA	Mysidae	family
Malacostraca	Mysida	NA	NA	NA	Mysida	order
Malacostraca	NA	NA	NA	NA	Malacostraca	class
Malacostraca	Stomatopoda	Coronididae	Coronida	NA	Coronida	genus
Malacostraca	Stomatopoda	Lysiosquillidae	Lysiosquilla	tredecimdentata	Lysiosquilla trec	species
Malacostraca	Stomatopoda	Lysiosquillidae	Lysiosquilla	NA	Lysiosquilla	genus
Malacostraca	Stomatopoda	NA	NA	NA	Stomatopoda	order
Malacostraca	Stomatopoda	Odontodactylid	Odontodactylus	hansenii	Odontodactylus	species
Malacostraca	Stomatopoda	Odontodactylid	Odontodactylus	NA	Odontodactylus	genus
Malacostraca	Stomatopoda	Odontodacylida	Odontodactylus	scyllarus	Odontodactylus	species
Malacostraca	Stomatopoda	Psuedosquillida	Pseudosquilla	NA	Pseudosquilla	genus
Malacostraca	Stomatopoda	Squillidae	NA	NA	Squillidae	family
Malacostraca	Stomatopoda	Squillidae	Natosquilla	investigatoris	Natosquilla inve	species
Malacostraca	Stomatopoda	Squillidae	Squilla	NA	Squilla	genus
Malacostraca	Stomatopoda	Squilllidae	Neoanchisquilla	tuberculata	Neoanchisquilla	species
Malacostraca	Stromatopoda	Gonodactylidae	Gonodactylus	NA	Gonodactylus	genus
Malacostraca	Stromatopoda	Protosquillidae	Echinosquilla	guerinii	Echinosquilla gu	species
NA	NA	NA	NA	NA	Gelatinous zoop	NA
NA	NA	NA	NA	NA	Mollusca	class
Other	NA	NA	NA	NA	Unidentified ren	NA
Other	Other	NA	NA	NA	Invertebrates ur	NA
Thaliacea	Salpida	Salpidae	Salpa	maxima	Salpa maxima	species
Actinopterygii	NA	NA	NA	NA	Coastal and ree	class
Actinopterygii	NA	NA	NA	NA	Open-ocean fisl	class
Cestoda	Trypanorhyncha	Sphyriocephalic	Hepatoxylon	NA	Hepatoxylon	genus
Hexanauplia	Copepoda(subc	NA	NA	NA	Cirripedia	subclass
Hexanauplia	Lepadiformes	Lepadidae	Dosima	fascicularis	Dosima fascicul	species
Hexanauplia	Lepadiformes	Lepadidae	Lepas	Lepas anatifera	Lepas anatifera	species
Hexanauplia	Lepadiformes	Lepadidae	NA	NA	Lepadidae	family
Hexanauplia	Sessilia	Pyrgomatidae	Pyrgopsella	NA	Pyrgopsella	genus
Hexanauplia	Siphonostomati	Pennellidae	Pennella	filosa	Pennella filosa	species
Hexanauplia	Siphonostomati	Pseudocycnida	Psuedocycnus	appendiculatus	Pseudocycnus a	species
Hydrozoa	Anthoathecata	Porpitidae	Velella	velella	Velella velella	species
Hydrozoa	Siphonophorae	NA	NA	NA	Calycophorae	suborder
Hydrozoa	Siphonophorae	NA	NA	NA	Siphonophorae	order
Malacostraca	Amphipoda	Oxycephalidae	Oxycephalus	NA	Oxycephalus	genus
Malacostraca	Amphipoda	Phronimidae	NA	NA	Phronimidae	family
Malacostraca	Amphipoda	Phronimidae	Phronima	atlantica	Phronima atlant	species
Malacostraca	Amphipoda	Phronimidae	Phronima	NA	Phronima	genus
Malacostraca	Amphipoda	Phronimidae	Phronima	sedentaria	Phronima seder	species
Ostracoda	Halocyprida	Halocyprididae	Conchoecia	NA	Conchoecia	genus
Other	NA	NA	NA	NA	Parasite	NA
Other	NA	NA	NA	NA	Plastics	NA
Other	NA	NA	NA	NA	Seaweed	NA
Other	NA	NA	NA	NA	Trash	NA
Other	NA	NA	NA	NA	Unidentified Pla	kingdom
Other	NA	NA	NA	NA	Unidentified Bir	class

Other	Other	NA	NA	NA	Amphipods, sea	NA
Polychaeta	NA	NA	NA	NA	Polychaeta	class
Polychaeta	Phyllodocida	Alciopidae	Naiades	cantrainii	Naiades cantrai	species
Polychaeta	Phyllodocida	Alciopidae	Torrea	Torrea candida	Torrea candida	species
Scyphozoa	Semaeostomea	Pelagiidae	Pelagia	noctiluca	Pelagia noctiluc	species
Thaliacea	NA	NA	NA	NA	Thaliacea	class
Thaliacea	Salpida	Salpidae	NA	NA	Salpidae	family
Trematoda	Plagiorchiida	Didymozoidae	Didymocystis	NA	Didymocystis sp	genus
Trematoda	Plagiorchiida	Hirudinellidae	Hirudinella	Hirudinella vent	Hirudinella vent	species
Cephalopoda	Oegopsida	Chiroteuthidae	Chiroteuthis	NA	Chiroteuthis sp3	genus
Cephalopoda	Oegopsida	Chiroteuthidae	Chiroteuthis	NA	Chiroteuthis sp4	genus
Gastropoda	Pteropoda	Cavoliniidae	Cavolinia	tridentata	Cavolinia triden	species
Gastropoda	Pteropoda	Cavoliniidae	Diacria	Diacria trispinos	Diacria trispinos	species
Gastropoda	Pteropoda	Cavoliniidae	Diacria	NA	Diacria	genus
Gastropoda	Pteropoda	Cliidae	Cilo	Clio pyramidata	Clio pyramidata	species
Thaliacea	Pyrosomatida	Pyrosomatidae	Pyrosoma	atlanticum	Pyrosoma atlan	species
Thaliacea	Salpida	Salpidae	Soestia	zonaria	Soestia zonaria	species

and grey literature form the 1880's to 2020.

prey_sp	PreyLife	PreyLifeNote	PreyCommonN	PreyOtherCNa	CommonName	ClassificationI
Nemichthyidae	NA	Not assessed ir	snipe eel	NA	Wikipedia	WoRMS
Leptocephalus s	adult		conger eels	NA	NA	WoRMS
Argentinidae sp	adult		argentines	Herring smelts	NOAA AFSC, F	WoRMS
Bathylagoides v	adult		snubnose black	NA	FishBase	WoRMS
Bathylagus spp.	larvae; post-larvae		smelt	NA	NOAA AFSC	WoRMS
Leuroglossus st	adult		California smoo	NA	FishBase	WoRMS
Nansenia spp.	adult		pencil smelt	NA	Wikipedia	WoRMS
Dolichopteryx s	adult		barreleyes fish	NA	Wikipedia	WoRMS
Ateleopus natal	NA	Not assessed ir	jelly-head fish	NA	FishBase	WoRMS
Atherinopsis cal	adult		jacksmelt	jack sivlerside	FishBase, web	WoRMS
Alepisaurus ferc	NA	Not assessed ir	long snouted la	longnose lancet	FishBase	WoRMS
Alepisaurus spp	adult		lancetfish	NA	Wikipedia	WoRMS
Alepisauridae s	adult		lancetfishes	NA	NOAA AFSC	WoRMS
Anotopterus spp	adult		daggertooth	NA	Wikipedia	WoRMS
Anotopterus nik	adult		North Pacific da	NA	FishBase	WoRMS
Anotopterus pha	adult		daggertooth	NA	FishBase	WoRMS
Chlorophthalmu	adult		shortnose greer	NA	FishBase	WoRMS
Scopelosaurus	NA	Not assessed ir	Hoedt's waryfisl	NA	FishBase	WoRMS
Scopelosaurus	NA	Not assessed ir	NA	NA	NA	WoRMS
Omosudis lowii	adult		hammerjaw	omosudid	Wikipedia/FishE	WoRMS
Arctozenus riss	adult		spotted barracu	NA	FishBase	WoRMS
Lestidiops ringe	adult; juvenile		slender barracu	NA	FishBase	WoRMS
Lestidiops simili	NA	Not assessed ir	NA	NA	FishBase	WoRMS
Lestidium spp.	adult		barracudina	NA	Wikipedia	WoRMS
Lestrolepis inter	NA	Not assessed ir	NA	NA	NA	WoRMS
Macroparalepis	adult		NA	NA	NA	WoRMS
Magnisudis atla	adult		duckbill barracu	NA	FishBase	WoRMS
Paralepididae s	adult; juvenile		barracudinas	NA	NOAA AFSC	WoRMS
Paralepis coreg	adult		sharpchin barra	NA	FishBase	WoRMS
Paralepis spp.	adult		barracudinas	NA	Fishbase	WoRMS
Paralepis specie	adult		NA	NA	NA	WoRMS
Lestidiops sphy	adult		NA	NA	NA	WoRMS
Sudis hyalina	adult		NA	NA	NA	WoRMS
Benthalbella sp	NA	Not assessed ir	NA	NA	NA	WoRMS
Scopelarchus a	NA	Not assessed ir	short fin pearley	pearl eye	FishBase	WoRMS
Scopelarchidae	adult		pearleyes	NA	FishBase	WoRMS
Scopelarchus s	adult		pearleyes fish	NA	Wikipedia	WoRMS
Synodontidae s	adult		lizardfish	NA	FishBase	WoRMS
Belone belone	adult		garfish	NA	FishBase	WoRMS
Strongylura exil	adult		Californian nee	NA	FishBase	WoRMS
Cypselurus spp	adult		flying fish	NA	FishBase	WoRMS
Cololabis saira	adult; juvenile		Pacific saury	saury	FishBase	WoRMS
Scomberesocid	adult		sauries	NA	FishBase	WoRMS
Scomberesox s	adult		Atlantic saury	NA	Wikipedia	WoRMS
Anoplogastridae	adult		fangtooth fish	NA	Wikipedia	WoRMS
Beryx splenden	NA	Not assessed ir	splendid alfonsi	slender alfonso	FishBase	WoRMS
Berycidae spp.	NA	Not assessed ir	alfonsinos	shorefishes	Smithsonian Tr	WoRMS
Diretmus argen	NA	Not assessed ir	silver spinyfin	discfish	FishBase	WoRMS

Holocentrus spp	adult		squirrelfishes	NA	Fishbase	WoRMS
Holocentridae s	adult		squirrelfishes	soldierfishes	Fishbase	WoRMS
Trachichthyidae	adult		slimeheads	NA	FishBase	WoRMS
Clupea spp.	adult		herrings	NA	Wikipedia	WoRMS
Clupea pallasii	adult		Pacific herring	NA	FishBase	WoRMS
Sardina pilchar	adult		European sardi	NA	Fishbase	WoRMS
Sardinella aurit	adult		round sardinella	NA	FishBase	WoRMS
Sardinops spp.	adult		NA	NA	NA	WoRMS
Sardinops saga	larvae; post-larvae; young-of-ye		Pacific sardine	blue pilchard	FishBase, Wiki	WoRMS
Engraulis encra	adult		European anch	NA	FishBase	WoRMS
Engraulis japon	adult; juvenile		Japanese anch	NA	FishBase	WoRMS
Engraulis mord	adult; postlarvae; juvenile; larva		California ancho	NA	FishBase	WoRMS
Engraulis caper	NA	Not assessed ir	Southern African	anchovy	FishBase	WoRMS
Engraulidae spp	adult		anchovy	NA	FishBase	WoRMS
Bregmaceros m	NA	Not assessed ir	unicorn cod	spotted codlet, I	FishBase	WoRMS
Microgadus pro	adult		Pacific tomcod	NA	FishBase	WoRMS
Micromesistius	adult		blue whiting	NA	FishBase	WoRMS
Gadidae spp.	adult		cods and haddc	true cods	FishBase/Wikip	WoRMS
Gaidropsarus v	adult		three-bearded r	NA	FishBase	WoRMS
Merluccius merl	adult		European lake	NA	FishBase	WoRMS
Merluccius prod	adult; juvenile; postlarvae		North Pacific ha	Pacific Hake, P	FishBase, IUCN	WoRMS
Merluccius spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Antimora rostra	NA	Not assessed ir	blue antimora	NA	FishBase	WoRMS
Desmodema po	adult		polka-dot ribonf	NA	FishBase	WoRMS
Trachipterus sp	larvae; post-larvae		ribbonfish	NA	Fishbase	WoRMS
Trachipterus tra	adult		Mediterranean	ribbonfish	FishBase/Wikip	WoRMS
Ceratias tentac	NA	Not assessed ir	southern seade	NA	FishBase	WoRMS
Ogcocephalidae	adult		batfishes	NA	FishBase	WoRMS
Benthosema gl	adult		glacier lantern f	NA	FishBase	WoRMS
Ceratoscopelus	adult		madiera lantern	NA	FishBase	WoRMS
Ceratoscopelus	adult		dogtooth lampfi	NA	FishBase	WoRMS
Ceratoscopelus	adult		warming's lante	NA	FishBase	WoRMS
Diaphus lucidus	NA	Not assessed ir	spotlight lantern	NA	FishBase	WoRMS
Diaphus luetker	adult		Luetken's lanter	NA	FishBase	WoRMS
Diaphus ostenf	NA	Not assessed ir	Ostenfeld's lant	NA	FishBase	WoRMS
Diaphus effulge	NA	Not assessed ir	headlight fish	NA	FishBase	WoRMS
Diaphus spp.	adult; larvae; post-larvae		headlight fish	NA	NOAA AFSC	WoRMS
Diaphus perspic	NA	Not assessed ir	transparent lant	flatface lanternfi	FishBase	WoRMS
Diaphus theta	adult		California headl	NA	FishBase	WoRMS
Electrona rissoi	adult		electric lantern	NA	FishBase	WoRMS
Gymnoscopelus	NA	Not assessed ir	NA	NA	NA	WoRMS
Hygophum hyg	NA	Not assessed ir	Bermuda lanter	Hygom's lanterr	FishBase	WoRMS
Hygophum spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Lampadena lum	NA	Not assessed ir	luminous lanter	NA	FishBase	WoRMS
Lampanyctodes	NA	Not assessed ir	Hector's lantern	NA	FishBase	WoRMS
Lampanyctus al	adult		winged lanternfi	NA	FishBase	WoRMS
Lampanyctus cr	adult		jewel lanternfish	NA	FishBase	WoRMS
Lampanyctus in	adult		diamindcheek la	NA	FishBase	WoRMS
Lampanyctus m	adult		lanterfish	NA	NA	Not found in Wo
Lampanyctus sp	adult		lanternfish	NA	Wikipedia	WoRMS
Lobianchia gem	adult		Cocco's lantern	NA	FishBase	WoRMS
Myctophum pun	adult		spotted lanternf	NA	FishBase	WoRMS
Myctophum asp	NA	Not assessed ir	prickly lanternfis	rough lanternfis	FishBase	WoRMS
Myctophum spp	adult; larvae; postlarvae		lanternfish	NA	NOAA AFSC	WoRMS
Myctophidae sp	adult		lanternfishes	NA	Fishbase	WoRMS
Nannobrachium	larvae; postlarvae		pinpoint lampfis	NA	Fishbase	WoRMS
Nannobrachium	adult		broadfin lampfis	NA	FishBase	WoRMS
Notoscopelus k	adult		lancet fish	NA	Fishbase	WoRMS

Protomyctophur	adult		California flashl	NA	FishBase	WoRMS
Stenobrachius l	adult		northern lampfis	NA	FishBase	WoRMS
Symbolophorus	NA	Not assessed ir	Barnards lanter	NA	FishBase	WoRMS
Symbolophorus	NA	Not assessed ir	Evermann's lan	NA	FishBase	WoRMS
Tarletonbeania	adult; larvae		blue lanternfish	NA	FishBase	WoRMS
Tarletonbeania	adult		blue lanternfish	NA	FishBase	WoRMS
Triphoturus mey	adult		Mexican lampfis	NA	FishBase	WoRMS
Actinopterygii s	adult; larvae		fishes unknown	NA	NA	WoRMS
Teleostei spp.	adult		NA	NA	NA	WoRMS
Barathronus pa	adult		NA	NA	NA	WoRMS
Chilara taylori	adult		spotted cusk-ee	NA	FishBase	WoRMS
Nansenia macr	NA	Not assessed ir	NA	NA	NA	WoRMS
Monacoa grima	NA	Not assessed ir	mirrorbelly	NA	FishBase	WoRMS
Thaleichthys pa	adult		eulachon	NA	FishBase	WoRMS
Acanthuridae s	adult		surgeonfishes, tangs, and unico		Fishbase	WoRMS
Synagrops spp.	adult		ocean bass	NA	Fishbase	WoRMS
Ammodytes tob	adult		small sand eel	launce	FishBase	WoRMS
Ammodytidae s	adult		sand lances	NA	FishBase	WoRMS
Anarrhichthys o	adult		wolf eel	NA	FishBase	WoRMS
Apogonidae spp	adult		cardinalfishes	NA	Fishbase	WoRMS
Blenniidae spp.	adult		combtooth blen	NA	Wikipedia	WoRMS
Blennius ocellar	adult		butterfly blenny	NA	FishBase	WoRMS
Brama brama	adult		Atlantic pomfret	NA	FishBase	WoRMS
Brama orcini	adult		bigtooth pomfre	NA	Fishbase	WoRMS
Bramidae spp.	adult		promfets	NA	Fishbase	WoRMS
Pteraclis spp.	adult		fanfishes	NA	Fishbase	WoRMS
Pterycombus sp	adult		NA	NA	NA	WoRMS
Pterycombus pe	adult		prickly fanfish	NA	FishBase	WoRMS
Taractes asper	adult		rough pomfret	NA	FishBase	WoRMS
Callionymus sp	adult		dragonets	NA	Wikipedia	WoRMS
Antigonia capro	adult		deepbody boarf	NA	FishBase	WoRMS
Capros aper	adult		boarfish	NA	FishBase	WoRMS
Caproidae spp.	NA		boarfishes	NA	FishBase	WoRMS
Decapterus spp	NA	Not assessed ir	mackerel scads	round scads, ho	Wikipedia	WoRMS
Decapterus ma	NA	Not assessed ir	mackerel scad	NA	FishBase	WoRMS
Decapterus ma	NA	Not assessed ir	shortfin scad	slender scad	FishBase	WoRMS
Carangidae spp	adult		carangid unkno	NA	NA	WoRMS
Selene setapinr	adult		Atlantic moonfis	NA	FishBase	WoRMS
Trachinotus ova	adult		pompano	NA	FishBase	WoRMS
Trachurus japor	adult		Japanese jack r	NA	FishBase	WoRMS
Trachurus symr	adult; juvenile		Pacific jack ma	NA	FishBase	WoRMS
Trachurus trach	adult		Atlantic horse m	NA	FishBase	WoRMS
Centrolophus ni	adult		rudderfish	NA	FishBase	WoRMS
Icichthys lockin	adult; juvenile		medusafish	NA	FishBase	WoRMS
Chaetodontidae	adult		chaetodontid ur	NA	NA	WoRMS
Champsodontid	adult		crocodile toothfi	NA	Fishbase	WoRMS
Chiasmodon nig	adult		black swallower	NA	Fishbase	WoRMS
Chiasmodontid	adult		snaketooth fish	Swallowers	Fishbase, Wikip	WoRMS
Pseudoscopelu	NA	Not assessed ir	swallowers	NA	Australian Muse	WoRMS
Coryphaena hip	adult		mahi mahi	common dolphi	Wikipedia	WoRMS
Cymatogaster a	adult		shiner perch	NA	FishBase	WoRMS
Diplospinus mul	adult		striped escolar	NA	FishBase	WoRMS
Gempylus spp.	adult		snake mackerel	NA	NA	WoRMS
Gempylus serpe	adult		snake mackerel	escolars	Fishbase, Wikip	WoRMS
Lepidocybium fl	NA	Not assessed ir	escolar	black oilfish	FishBase	WoRMS
Gempylidae spp	adult		perciform fishes	snake mackerel	Wikipedia	WoRMS
Nealotus tripes	adult		black snake ma	NA	FishBase	WoRMS
Nesiarchus nas	adult		black gemfish	NA	FishBase	WoRMS

Rexea spp.	adult		escolars	gemfish	FishBase	WoRMS
Rexea prometh	NA	Not assessed ir	royal escolar	NA	FishBase	WoRMS
Thyrsitoides ma	NA	Not assessed ir	black snoek	blacksail snake	FishBase	WoRMS
Gobius spp.	adult		NA	NA	NA	WoRMS
Rhinogobiops n	adult		blaceye giby	NA	FishBase	WoRMS
Haemulidae spp	adult		grunts	NA	FishBase	WoRMS
Sargocentron sp	NA	Not assessed ir	NA	NA	NA	WoRMS
Makaira mazara	NA	Not assessed ir	Indo-Pacific blu	Cuban blue mar	FishBase	WoRMS
Medialuna califc	adult		halfmoon	NA	FishBase	WoRMS
Halichoeres nicl	adult		spinster wrasse	NA	FishBase	WoRMS
Malacanthidae s	adult		tilefish	NA	FishBase	WoRMS
Liza spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Mugil cephalus	adult		flathead grey m	NA	FishBase	WoRMS
Mullus barbatus	adult		red mullet	NA	FishBase	WoRMS
Perciformes spp	adult		ray-finned fish	NA	Wikipedia	WoRMS
Cubiceps gracili	adult		driftfish	NA	FishBase	WoRMS
Cubiceps caper	NA	Not assessed ir	cape flathead	cape cigarfish	FishBase	WoRMS
Cubiceps pauci	NA	Not assessed ir	bigeye cigarfish	longfin cubehea	FishBase	WoRMS
Nomeidae spp.	adult		driftfishes	NA	Fishbase	WoRMS
Psenes pellucid	adult		bluefin driftfish	NA	FishBase	WoRMS
Pomacanthidae	NA		angelfishes	NA	FishBase	WoRMS
Chromis punctip	adult		blackfish	NA	FishBase	WoRMS
Pomacentridae	adult		damselfish	NA	FishBase	WoRMS
Plectroglyphido	NA	Not assessed ir	NA	NA	NA	WoRMS
Cookeolus japo	NA	Not assessed ir	longfinned bulls	longfin bigeye	FishBase	WoRMS
Auxis spp.	adult		frigate tuna	NA	Wikipedia	WoRMS
Katsuwonus pel	adult		skipjack tuna	balaya	Fishbase, Wikip	WoRMS
Scombridae spp	adult		Scombrid unkno	NA	NA	WoRMS
Scomber japoni	adult; larvae; post-larvae		Pacific chub ma	chub mackerel	FishBase, IUCN	WoRMS
Scomber spp.	adult		mackerel	NA	Wikipedia	WoRMS
Scomber scomb	adult		Atlantic macker	NA	Fishbase	WoRMS
Thunnus spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Scombrolabrax	NA	Not assessed ir	longfin escolar	NA	FishBase	WoRMS
Serranidae spp.	adult		groupers and fa	NA	FishBase	WoRMS
Boops boops	adult		bogue	NA	FishBase	WoRMS
Diplodus sargus	adult		white seabream	NA	FishBase	WoRMS
Spondyliosoma	adult		black seabream	NA	FishBase	WoRMS
Sphyraenidae s	NA	Not assessed ir	barracuda	sea pikes	Fishes of Austra	WoRMS
Peprilus simillin	adult		Pacific pompan	NA	FishBase	WoRMS
Stromateidae sp	adult		butterfish	NA	FishBase	WoRMS
Tetragonurus at	adult		bigeye squareta	NA	FishBase	WoRMS
Tetragonurus cu	adult		smalleye squar	NA	FishBase	WoRMS
Trichiuridae spp	adult		cutlassfish	NA	FishBase	WoRMS
Zanclidae spp.	NA	Not assessed ir	moorish idol fish	NA	Wikipedia	WoRMS
Arnoglossus imp	adult		imperial saldfish	NA	FishBase	WoRMS
Bothidae spp.	adult		lefteye flounder	NA	FishBase	WoRMS
Pleuronectiform	adult		flatfishes	NA	FishBase	WoRMS
Citharichthys sp	adult		whiffs	NA	FishBase	WoRMS
Citharichthys sc	adult		Pacific sanddab	NA	FishBase	WoRMS
Microstomus sp	larvae; postlarvae		righteye flounde	NA	Wikipedia	WoRMS
Pleuronichthys	adult; juvenile		curlfin sole	NA	FishBase	WoRMS
Pleuronichthys	adult		right-eye flound	NA	FishBase	WoRMS
Microstomus pa	adult		dove sole	NA	FishBase	WoRMS
Glyptocephalus	adult		rex sole	NA	FishBase	WoRMS
Polymixia spp.	adult		beardfishes	NA	FishBase	WoRMS
Bathyagonus pe	adult		bigeye poacher	NA	FishBase	WoRMS
Agonidae spp.	adult		poacher	NA	FishBase	WoRMS
Anoplopoma fim	adult		sablefish	black cod	FishBase/ Wikip	WoRMS

Dactyloptena or	NA	Not assessed ir	oriental flying gu	purple flying gur	FishBase	WoRMS
Dactylopteridae	adult		flying gurnards	NA	FishBase	WoRMS
Helicolenus dac	adult		blackbelly rosef	NA	FishBase	WoRMS
Peristediidae sp	adult		armored searob	NA	FishBase	WoRMS
Peristedion gra	adult		slender searobi	NA	Wikipedia	WoRMS
Psychrolutidae :	juvenile		flatheads	NA	FishBase	WoRMS
Scorpaenidae s	adult		scorpionfish	NA	FishBase	WoRMS
Scorpaena spp.	adult		scorpionfish	NA	Fishbase	WoRMS
Sebastes aleuti	juvenile		rougheye rockfi	NA	FishBase, NOA	WoRMS
Sebastes brevis	juvenile		silvergray rockfi	NA	FishBase, NOA	WoRMS
Sebastes diplop	juvenile		splitnose rockfis	NA	FishBase, NOA	WoRMS
Sebastes helvo	juvenile		rosethorn rockfi	NA	FishBase, NOA	WoRMS
Sebastes malig	juvenile		quillback rockfis	NA	FishBase, NOA	WoRMS
Sebastes miniat	juvenile		vermilion rockfis	NA	FishBase, NOA	WoRMS
Sebastes spp.	juvenile		rockfish	NA	FishBase	WoRMS
Sebastes prorig	juvenile		redstripe rockfis	NA	FishBase, NOA	WoRMS
Sebastes wilsor	juvenile		pygmy rockfish	NA	FishBase, NOA	WoRMS
Sebastes zacer	juvenile		sharpchin rockfi	NA	FishBase, NOA	WoRMS
Eutrigla gurnard	adult		grey gurnard	NA	FishBase	WoRMS
Melamphaes lu	adult		highsnout melai	NA	FishBase	WoRMS
Scopelogadus b	adult		twospine bigsca	NA	Wikipedia	WoRMS
Gonostoma spp	adult		bristlemouths	NA	NA	WoRMS
Gonostomatida	adult		bristlemouths	NA	Wikipedia	WoRMS
Vinciguerria luc	juvenile; adult		Panama lightfis	NA	FishBase	WoRMS
Argyropelecus a	NA	Not assessed ir	lovely hatchetfis	Atlantic silver ha	FishBase	WoRMS
Argyropelecus c	adult		NA	NA	FishBase	WoRMS
Maurolicus impe	adult		emperor seamo	NA	FishBase	WoRMS
Maurolicus mue	adult		silvery lightfish	NA	FishBase	WoRMS
Sternoptychidae	adult		marine hatchetf	NA	FishBase	WoRMS
Sternoptyx diap	adult		diaphanous hat	NA	FishBase	WoRMS
Sternoptyx spp.	adult		hatchetfish	NA	FishBase	WoRMS
Sternoptyx obsc	adult		diaphanous hat	NA	wikipedia	WoRMS
Bathophilus flen	adult		highfin dragonfi	NA	FishBase	WoRMS
Idiacanthus spp	adult; larvae		barbeled dragor	NA	Wikipedia	WoRMS
Melanostomias	adult		Valdivia black d	NA	FishBase	WoRMS
Melanostomias	adult		barbeled dragor	NA	Wikipedia	WoRMS
Photonectes ma	adult		NA	NA	NA	WoRMS
Cyclothone spp	larvae; post-larvae		bristlemouth	NA	NOAA AFSC	WoRMS
Macroramphosu	adult		longspine snipe	NA	FishBase	WoRMS
Entelurus aequ	adult		snake pipefish	NA	FishBase	WoRMS
Syngnathidae s	adult		pipefishes	NA	FishBase	WoRMS
Syngnathus cali	adult; juvenile		kelp pipefish	NA	FishBase	WoRMS
Syngnathus spp	adult		pipefish	NA	FishBase	WoRMS
Balistes punctat	NA	Not assessed ir	bluespotted trig	golden heart trig	FishBase	WoRMS
Canthidermis m	NA	Not assessed ir	rough triggerfish	spotted ocean t	FishBase	WoRMS
Balistidae spp.	adult		triggerfishes	NA	Fishbase	WoRMS
Chilomycterus s	adult		burrfishes	NA	Wikipedia	WoRMS
Masturus lance	NA	Not assessed ir	sharptail mola	sharptail sunfish	FishBase	WoRMS
Molidae spp.	larvae?		molas	sunfish	Fishbase, Wikip	WoRMS
Ranzania laevis	NA	Not assessed ir	slender sunfish	slender mola	FishBase	WoRMS
Cantherhines sp	NA	Not assessed ir	NA	NA	NA	WoRMS
Monacanthidae	NA		filefishes	NA	FishBase	WoRMS
Stephanolepis s	NA	Not assessed ir	NA	NA	NA	WoRMS
Lactoria diapha	adult		roundbelly cowf	NA	Fishbase	WoRMS
Lactoria spp.	adult		boxfish	NA	Fishbase	WoRMS
Ostraciidae spp	adult		boxfish	NA	FishBase	WoRMS
Ostracion cubic	NA	Not assessed ir	yellow boxfish	NA	FishBase	WoRMS
Lagocephalus la	NA	Not assessed ir	oceanic puffer	NA	FishBase	WoRMS

Tetraodontidae	NA		puffers		FishBase	WoRMS
Halimochirurgus	adult		spikefish	NA	Fishbase	WoRMS
Appendicularia	adult	NA	larvacea	NA	Wikipedia	WoRMS
Cladocera spp.	adult		water flea	NA	Wikipedia	WoRMS
Evadne spp.	adult		NA	NA	NA	WoRMS
Pseudevadne te	adult		NA	NA	NA	WoRMS
Chtenopteryx si	adult		Sicilian comb-fi	NA	SeaLifeBase	WoRMS
Alloteuthis subu	adult		European comn	NA	SeaLifeBase	WoRMS
Doryteuthis opa	adult; juvenile		opalescent insh	NA	SeaLifeBase	WoRMS
Loligo spp.	juvenile		myopsid squid	NA	Wikipedia	WoRMS
Loliginidae spp.	adult		pencil squid	NA	Wikipedia	WoRMS
Sepioteuthis sp	adult		Reef squids	oval squids	Wikipedia	WoRMS
Myopsida spp.	adult		Myopsida unkn	NA	NA	WoRMS
Cephalopoda sp	adult; juvenile		cephalopods un	NA	NA	WoRMS
Decapodiformes	adult		squid unknown	NA	Wikipedia	WoRMS
Haliphron atlant	adult		seven-arm octo	NA	Wikipedia	WoRMS
Japetella diaphа	larvae	larvae	pelagic octopus	NA	Wikipedia	WoRMS
Japetella heathi	adult; larvae		pelagic octopod	NA	Wikipedia	WoRMS
Vitreledonella s	adult		glass octopus	NA	Wikipedia	WoRMS
Argonauta argo	adult; juvenile		greater argonau	NA	Wikipedia	WoRMS
Argonauta nodc	adult		knobbed argona	NA	SeaLifeBase	WoRMS
Argonauta nour	adult		rough-keeled ar	Noury's argonau	sealifebase, wik	WoRMS
Argonautidae sp	adult		paper nautiluse	NA	Wikipedia	WoRMS
Eledone cirrhos	adult		curled octopus	NA	Wikipedia	WoRMS
Octopoda spp.	adult; juvenile		octopod unknov	NA	NA	WoRMS
Octopodidae sp	adult; juvenile		octopuses unkn	NA	NA	WoRMS
Octopus bimacu	adult		California two-s	Verill's two-spot	FishBase, Wikip	WoRMS
Octopus vulgari	adult		common octopu	NA	SeaLifeBase	WoRMS
Octopus spp.	adult; juvenile		common octopu	NA	NA	WoRMS
Pteroctopus tetr	adult		fourhorn octopu	NA	SeaLifeBase	WoRMS
Scaeurgus unic	adult		unihorn octopus	NA	SeaLifeBase	WoRMS
Opisthoteuthis c	adult		flapjack octopus	NA	SeaLifeBase	WoRMS
Tremoctopus vi	adult		violet blacket oc	NA	SeaLifeBase	WoRMS
Tremoctopus gr	NA	Not assessed ir	NA	NA	NA	WoRMS
Ancistrocheirus	adult		sharpear enope	NA	SeaLifeBase	WoRMS
Architeuthidae s	adult		giant squid	NA	Wikipedia	WoRMS
Brachioteuthis s	adult		bioluminescent	NA	Wikipedia	WoRMS
Brachioteuthis r	adult		common arm sc	NA	Wikipedia	WoRMS
Chiroteuthis spp	NA	Not assessed ir	chiroteuthid squid			
Chiroteuthis ver	adult		long-armed squ	NA	Wikipedia	WoRMS
Grimalditeuthis	NA	Not assessed ir	NA	NA	NA	WoRMS
Chiroteuthidae s	adult; juvenile		deep-sea squid	NA	Wikipedia	WoRMS
Cranchia scabra	adult		rough cranch sc	NA	SeaLifeBase	WoRMS
Teuthowenia m	adult		NA	NA	NA	WoRMS
Galiteuthis arma	adult		armed cranch s	NA	FishBase	WoRMS
Galiteuthis phyll	adult		cockatoo squid	NA	Wikipedia	WoRMS
Helicocranchia	adult		Pfeffer's cranch	NA	SeaLifeBase	WoRMS
Leachia spp.	adult		glass squids	NA	Wikipedia	WoRMS
Liocranchia rein	adult		Reinhardt's crar	NA	SeaLifeBase	WoRMS
Liocranchia spp	adult		glass squid	NA	Wikipedia	WoRMS
Cranchiidae spp	adult; juvenile		glass squid	cockatoo squid	Wikipedia	WoRMS
Taoniinae spp.	adult		glass squid	NA	Wikipedia	WoRMS
Cranchiidae spp	adult; juvenile	Not assessed in paper				
Taonius spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Teuthowenia m	adult		Atlantic cranch	NA	Wikipedia	WoRMS
Abralia redfieldi	adult		NA	NA	NA	WoRMS
Abralia spp.	adult		NA	NA	NA	WoRMS
Abraliopsis affin	adult		enoploteuthid s	NA	SeaLifeBase	WoRMS

Abraliopsis felis	adult		enoploteuthid s	NA	SeaLifeBase	WoRMS
Abraliopsis gilch	NA	Not assessed ir	NA	NA	NA	WoRMS
Abraliopsis mor	NA	Not assessed ir	Pfeffer's firefly s	NA	SeaLifeBase	WoRMS
Abraliopsis spp.	adult; juvenile		enoploteuthid s	NA	NA	WoRMS
Enoploteuthidae	adult; juvenile		Enoploteuthid u	NA	NA	WoRMS
Enoploteuthidae	NA	Not assessed in paper				
Berryteuthis an	adult		smallfin gonate	minimal armhoc	SeaLifeBase, W	WoRMS
Gonatopsis bor	adult		boreopacific go	boreopacific arm	SeaLifeBase, W	WoRMS
Gonatopsis spp	adult		gonatid squid	NA	NA	WoRMS
Gonatus berryi	adult		berry armhook s	NA	SeaLifeBase	WoRMS
Gonatus californ	adult		California armh	NA	SeaLifeBase	WoRMS
Gonatus spp.	adult; juvenile		armhook squid	NA	SeaLifeBase	WoRMS
Gonatus onyx	adult		clawed armhool	black-eyed squi	SeaLifeBase, W	WoRMS
Gonatus pyros	adult		fiery armhook s	NA	SeaLifeBase	WoRMS
Gonatus steens	adult		Atlantic gonate	NA	Sealife Base	WoRMS
Gonatidae spp.	adult		armhook squid	NA	Wikipedia	WoRMS
Histioteuthis bo	adult; juvenile		umbrella squid	NA	SeaLifeBase	WoRMS
Histioteuthis he	adult		strawberry squi	cockeyed squid	mbari/ Wikipedi	WoRMS
Histioteuthis sp	adult; juvenile		cock-eyed squi	NA	NIWA	WoRMS
Histioteuthis rev	adult		elongate jewell	NA	SeaLifeBase	WoRMS
Histioteuthis me	NA	Not assessed ir	pearly jewel squ	NA	SeaLifeBase	WoRMS
Histioteuthidae	adult		cock-eyed squi	NA	Wikipedia	WoRMS
Stigmatoteuthis	NA	Not assessed ir	flowervase jewe	NA	SeaLifeBase	WoRMS
Stigmatoteuthis	NA	Not assessed ir	NA	NA	NA	WoRMS
Lycoteuthis lorig	adult		NA	NA	NA	WoRMS
Mastigoteuthis	adult; juvenile		mastigoteuthid s	NA	SeaLifeBase	WoRMS
Mastigoteuthis s	adult		whip-lash squid	NA	Wikipedia	WoRMS
Oegopsida spp.	adult		Oegopsid unkn	NA	NA	WoRMS
Octopoteuthis s	adult; juvenile		pelagic squid	NA	SeaLifeBase	WoRMS
Octopoteuthis n	juvenile		oceanic squid	NA	uniprot	WoRMS
Octopoteuthis ru	NA	Not assessed ir	rough-skin octo	NA	SeaLifeBase	WoRMS
Octopoteuthis s	adult		Rüppell's octop	NA	SeaLifeBase	WoRMS
Taningia danae	NA	Not assessed ir	Dana octopus s	NA	SeaLifeBase	WoRMS
Ocythoe tubercu	adult		tuberculate pela	football octopus	wikipedia	WoRMS
Dosidicus gigas	adult		jumbo flying squ	Humboldt squid	SeaLifeBase, W	WoRMS
Eucleoteuthis lu	adult		luminous flying	Striped flying sc	SeaLifeBase, W	WoRMS
Hyaloteuthis pe	adult		glassy flying squ	NA	SeaLifeBase	WoRMS
Illex argentinus	adult		Argentine short	NA	SeaLifeBase	WoRMS
Illex coindetii	adult		shortfin squid	NA	SeaLifeBase	WoRMS
Ommastrephida	adult; juvenile		Ommaestrephic	NA	NA	WoRMS
Ommastrephes	adult		NA	NA	NA	WoRMS
Ommastrephes	adult		neon flying squi	NA	SeaLifeBase	WoRMS
Ornithoteuthis a	adult		bird squid	NA	SeaLifeBase	WoRMS
Ornithoteuthis v	adult		shiny bird squid	NA	SeaLifeBase	WoRMS
Sthenoteuthis s	adult		purpleback flyin	NA	SeaLifeBase	WoRMS
Sthenoteuthis o	adult		purpleback flyin	NA	SeaLifeBase	WoRMS
Todarodes paci	adult		Japanese flying	NA	SeaLifeBase	WoRMS
Todarodes sagi	adult; juvenile		European flying	NA	SeaLifeBase	WoRMS
Todarodes spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Todaropsis ebla	adult		lesser flying squ	NA	SeaLifeBase	WoRMS
Ancistroteuthis l	adult		angel squid	angel clubhook	SeaLifeBase/W	WoRMS
Onychoteuthida	adult; juvenile		hooked squid	NA	Wikipedia	WoRMS
Onychoteuthis b	NA	Not assessed ir	common clubhook squid			
Onychoteuthis b	adult; juvenile		common clubhc	NA	Wikipedia	WoRMS
Onychoteuthis b	adult; juvenile		boreal clubhook	NA	SeaLifeBase	WoRMS
Onychoteuthis s	adult		NA	NA	NA	WoRMS
Onykia loennbe	NA	Not assessed ir	Japanese hook	NA	SeaLifeBase	WoRMS
Onykia robusta	adult; juvenile		robust clubhook	NA	SeaLifeBase	WoRMS

Walvisteuthis ra	NA	Not assessed ir	NA	NA	NA	WoRMS
Pyroteuthidae s	adult		NA	NA	NA	WoRMS
Pterygioteuthis	adult		roundear enope	NA	SeaLifeBase	WoRMS
Pterygioteuthis	juvenile		pyroteuthid squi	NA	NA	WoRMS
Pterygioteuthis	adult		pyroteuthid squi	NA	NA	WoRMS
Pyroteuthis mar	adult		jewel enope sq	NA	SeaLifeBase	WoRMS
Thysanoteuthis	NA	Not assessed ir	rhomboid squid	diamondback s	SeaLifeBase	WoRMS
Heteroteuthis di	adult; juvenile		odd bobtail	NA	SeaLifeBase	WoRMS
Heteroteuthis sp	adult		bobtail squid	NA	Wikipedia	WoRMS
Sepiolidae spp.	adult		bobtail squid	NA	Wikipedia	WoRMS
Sepietta spp.	adult		bobtail squid	NA	Wikipedia	WoRMS
Sepietta owenia	adult		common bobtail	NA	SeaLifeBase	WoRMS
Spirula spirula	NA	Not assessed ir	ram's horn squi	NA	SeaLifeBase	WoRMS
Teuthida spp.	adult		squids	NA	Wikipedia	WoRMS
Vampyroteuthis	adult; juvenile		vampire squid	NA	Wikipedia	WoRMS
Squalidae spp.	adult		dogfish sharks	NA	FishBase	WoRMS
Janthina exigua	adult	NA	dwarf janthina	NA	SeaLifeBase	WoRMS
Janthina spp.	adult	NA	purple shells	violet shells	Wikipedia	WoRMS
Unidentified Mo	NA	Not assessed ir	molluscs unknown			
Atlanta peronii	adult	NA	NA	NA	NA	WoRMS
Atlantidae spp.	adult		Atlantid unknow	NA	NA	WoRMS
Carinaria lamar	adult		NA	NA	NA	WoRMS
Littorinimorpha	adult		gastropod unkn	NA	Wikipedia	WoRMS
Gastropoda spp	adult		Gastropod unkr	NA	NA	WoRMS
Cavolinia spp.	adult	Not assessed ir	NA	NA	NA	WoRMS
Calanus finmar	adult	NA	NA	NA	NA	WoRMS
Cosmocalanus	adult		NA	NA	NA	WoRMS
Clausocalanus	adult		NA	NA	NA	WoRMS
Clausocalanus	adult		NA	NA	NA	WoRMS
Calanoida spp.	adult; larvae; eg	adult; nauplii; e	NA	NA	NA	WoRMS
Paracalanus sp	adult		NA	NA	NA	WoRMS
Copepoda spp.	adult; larvae	nauplius; naupli	copepods	NA	Wikipedia	WoRMS
Oithona spp.	adult		copepods	NA	Wikipedia	WoRMS
Corycaeus spp.	adult		NA	NA	NA	WoRMS
Farranula gibbu	adult		NA	NA	NA	WoRMS
Cyclopoida spp.	adult		NA	NA	NA	WoRMS
Chelophyes apr	adult	NA	NA	NA	NA	WoRMS
Diphyes spp.	adult		colonial jellyfish	NA	gbri	WoRMS
Sulculeolaria sp	adult	NA	NA	NA	NA	WoRMS
Brachyscelus cr	adult		NA	NA	NA	WoRMS
Brachyscelus m	adult		NA	NA	Wikipedia	WoRMS
Brachyscelus sp	adult		NA	NA	NA	WoRMS
Cyphocaris faur	NA	Not assessed ir	NA	NA	NA	WoRMS
Cyproidea spp.	adult		NA	NA	NA	WoRMS
Parapronoe cru	adult		NA	NA	NA	WoRMS
Parapronoe spp	adult		NA	NA	NA	WoRMS
Gammaridae sp	adult		scuds	NA	Wikipedia	WoRMS
Hyperia galba	adult		NA	NA	NA	WoRMS
Hyperiidae spp.	adult		amphipods unk	NA	NA	WoRMS
Themisto gaudi	adult		NA	NA	NA	WoRMS
Lanceola sayan	adult	NA	NA	NA	NA	WoRMS
Lycaeidae spp.	adult		lycaeid unknow	NA	Wikipedia	WoRMS
Amphipoda spp	adult		amphipods unk	NA	NA	WoRMS
Leptocotis tenui	adult		NA	NA	NA	WoRMS
Streetsia challe	adult		NA	NA	NA	WoRMS
Streetsia spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Anchylomera bl	adult		NA	NA	NA	WoRMS
Phrosinidae spp	adult		NA	NA	NA	WoRMS

Phrosina spp.	adult		NA	NA	NA	WoRMS
Phrosina semilu	adult		NA	NA	NA	WoRMS
Primno macropa	adult		NA	NA	NA	WoRMS
Primno spp.	adult		NA	NA	NA	WoRMS
Platyscelus arm	adult		NA	NA	NA	WoRMS
Platyscelus spp	adult		NA	NA	NA	WoRMS
Platyscelus ovo	adult		NA	NA	NA	WoRMS
Platyscelus serr	adult		NA	NA	NA	WoRMS
Vibilia gibbosa	adult		NA	NA	NA	WoRMS
Acanthephyra p	adult; juvenile		deep-sea shrim	NA	Wikipedia	WoRMS
Acanthephyrida	adult; juvenile		deep-sea shrim	NA	Wikipedia	WoRMS
Alpheus glaber	juvenile; larvae		red snapping sh	NA	SeaLifeBase	WoRMS
Axius stirhynchu	juvenile	NA	shrimp	NA	NA	WoRMS
Gennadas elega	adult		shrimp	NA	NA	WoRMS
Gennadas spp.	juvenile		shrimp	NA	Wikipedia	WoRMS
Enoplometopus	NA	Not assessed ir	reef lobsters	NA	Wikipedia	WoRMS
Enoplometopida	adult		reef lobsters	NA	inaturalist	WoRMS
Homolidae spp.	adult		carrier crabs	NA	Wikipedia	WoRMS
Pleuroncodes s	adult		tuna crabs	NA	Wikipedia	WoRMS
Pleuroncodes p	adult		pelagic red crat	tuna crab	SeaLifeBase	WoRMS
Achelata spp.	adult; larvae		spiny lobsters, slipper lobsters &		Wikipedia	WoRMS
Anomura spp.	larvae	larvae	anomuran crabs	NA	Wikipedia	WoRMS
Brachyura spp.	adult; larvae		crabs	NA	Wikipedia	WoRMS
Caridea spp.	adult		caridean shrimp	NA	Wikipedia	WoRMS
Decapoda spp.	adult; larvae		decapod unkno	NA	NA	WoRMS
Majoidea spp.	adult		spider crabs	NA	Wikipedia	WoRMS
Paguroidea spp	adult; post-larvae		hermit crab	NA	Wikipedia	WoRMS
Nephropidae sp	adult		lobsters	NA	Wikipedia	WoRMS
Janicella spinic	NA	Not assessed ir	NA	NA	NA	WoRMS
Oplophoridae sp	NA	Not assessed ir	NA	NA	NA	WoRMS
Oplophorus typi	NA	Not assessed ir	NA	NA	NA	WoRMS
Oplophorus spp	NA	Not assessed ir	NA	NA	NA	WoRMS
Systellaspis det	adult	NA	NA	NA	NA	WoRMS
Paguridae spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Jasus spp.	NA	Not assessed ir	NA	NA	NA	WoRMS
Palinuridae spp	adult		spiny lobsters	NA	Wikipedia	WoRMS
Palinurus mauri	adult; larvae; juvenile		pink spiny lobst	NA	SeaLifeBase	WoRMS
Heterocarpus sp	adult		deep-sea shrim	NA	Wikipedia	WoRMS
Heterocarpus la	NA	Not assessed ir	smooth nylon sh	NA	SeaLifeBase	WoRMS
Thalassocaris s	adult		NA	NA	NA	WoRMS
Pasiphaea spp.	adult		glass shrimp	NA	SeaLifeBase	WoRMS
Parapasiphae s	adult		grooveback shr	NA	SeaLifeBase	WoRMS
Pasiphae spp.	adult		NA	NA	NA	WoRMS
Funchalia taani	NA	Not assessed ir	prawn	NA	SeaLifeBase	WoRMS
Funchalia wood	NA	Not assessed ir	Woodward's pe	NA	SeaLifeBase	WoRMS
Penaeidae spp.	adult		penaeid shrimp	NA	Wikipedia	WoRMS
Polybius henslo	adult; larvae; ju	megalopa + adu	Henslow's swim	NA	Wikipedia	WoRMS
Portunidae spp.	adult		swimming crabs	NA	Wikipedia	WoRMS
Scyllaridae spp.	adult; larvae; ju	nisto	slipper lobster	NA	Wikipedia	WoRMS
Parribacus anta	NA	Not assessed ir	sculptured mitte	sculptured slipp	SeaLifeBase	WoRMS
Scyllarus arctus	adult; juvenile; l	nisto; phylloson	small European	NA	SeaLifeBase	WoRMS
Eusergestes ar	adult; juvenile; l	NA	sergestid shrim	NA	NA	WoRMS
Eusergestes sin	adult		sergestid shrim	NA	SeaLifeBase, M	WoRMS
Sergestidae spp	adult		prawns	NA	Wikipedia	WoRMS
Robustosergia r	adult		sergestid shrim	NA	Wikipedia	WoRMS
Euphausia spp.	adult		NA	NA	NA	WoRMS
Euphausia paci	adult		isada krill	North Pacific kri	SeaLifeBase, W	WoRMS
Meganyctiphan	adult	adult; larvae?	Norwegian Krill	NA	SeaLifeBase	WoRMS

Euphausiidae s	adult		krill	NA	Wikipedia	WoRMS
Nematoscelis m	adult		krill	NA	Wikipedia	WoRMS
Nematoscelis s	adult		NA	NA	NA	WoRMS
Nyctiphanes au	adult		NA	NA	NA	WoRMS
Stylocheiron ab	adult		NA	NA	NA	WoRMS
Euphausiacea s	adult		krill	NA	Wikipedia	WoRMS
Idotea metallica	adult	NA	NA	NA	NA	WoRMS
Idoteidae spp.	adult		isopod	NA	Wikipedia	WoRMS
Isopoda spp.	adult		isopod unknowr	NA	NA	WoRMS
Neognathophau	adult		NA	NA	NA	WoRMS
Neognathophau	adult	NA	giant red mysid	NA	SeaLifeBase	WoRMS
Mysidae spp.	adult		mysid shrimp	NA	NA	WoRMS
Mysida spp.	adult		opossum shrim	NA	Wikipedia	WoRMS
Malacostraca s	adult; larvae		crustaceans unl	NA	NA	WoRMS
Coronida spp.	adult		Coronid unknov	NA	NA	WoRMS
Lysiosquilla trec	NA	Not assessed ir	NA	NA	NA	WoRMS
Lysiosquilla spp	adult		mantis shrimp	NA	Sealifebase	WoRMS
Stomatopoda s	adult		mantis shrimp	NA	Wikipedia	WoRMS
Odontodactylus	adult		NA	NA	NA	WoRMS
Odontodactylus	adult		mantis shrimp	NA	Wikipedia	WoRMS
Odontodactylus	NA	Not assessed ir	reef odontodact	peacock mantis	SeaLifeBase	WoRMS
Pseudosquilla s	adult		mantis shrimp	NA	Wikipedia	WoRMS
Squillidae spp.	adult		squillid mantis s	NA	SeaLifeBase	WoRMS
Natosquilla inve	NA	Not assessed ir	NA	NA	NA	WoRMS
Squilla spp.	adult		mantis shrimp	NA	SeaLifeBase	WoRMS
Neoanchisquilla	NA	Not assessed ir	NA	NA	NA	WoRMS
Gonodactylus s	adult		mantis shrimp	NA	Wikipedia	WoRMS
Echinosquilla gu	adult		urchin mantis sl	NA	Sealifebase	WoRMS
Gelatinous zoop		0	jellyfish & zoopl	NA	NA	NA
Mollusca spp.	adult		molluscs unkno	NA	NA	WoRMS
Unidentified ren	adult		Unidentified ren	NA	NA	NA
Invertebrates ur	NA		Invertebrates ur	NA	NA	NA
Salpa maxima	NA	Not assessed ir	big salp	NA	Atlantic Gozo	WoRMS
Coastal and ree	NA	Not assessed in	paper			
Open-ocean fisl	NA	Not assessed in	paper			
Hepatoxylon sp	adult	NA	tapeworm	NA	NA	WoRMS
Cirripedia spp.	adult		barnacle	NA	Wikipedia	WoRMS
Dosima fascicul	adult		buoy barnacle	floating barnacl	Wikipedia	WoRMS
Lepas anatifera	adult	NA	pelagic goosen	NA	Wikipedia	WoRMS
Lepadidae spp.	adult	NA	goose barnacle	NA	Wikipedia	WoRMS
Pyrgopsella spp	juvenile		NA	NA	NA	WoRMS
Pennella filosa	adult		NA	NA	NA	WoRMS
Pseudocycnus a	adult		NA	NA	NA	WoRMS
Velella velella	adult		Sea raft	NA	Wikipedia	WoRMS
Calycophorae s	adult		NA	NA	NA	WoRMS
Siphonophorae	adult		siphonophores	NA	Wikipedia	WoRMS
Oxycephalus sp	adult		NA	NA	NA	WoRMS
Phronimidae sp	adult		amphipod crust	NA	Wikipedia	WoRMS
Phronima atlant	adult		NA	NA	NA	WoRMS
Phronima spp.	adult		NA	NA	NA	WoRMS
Phronima seder	adult		parasitic hyperii	NA	SeaLifeBase	WoRMS
Conchoecia spp	adult	NA	NA	NA	NA	WoRMS
Parasite	adult		Parasite	NA	NA	NA
Plastics	NA		Plastics	NA	NA	NA
Seaweed		0	Seaweed	NA	NA	NA
Trash	NA		Trash	NA	NA	NA
Unidentified Pla	NA	Not assessed ir	Plants	NA	NA	NA
Unidentified Bir	NA	Not assessed ir	Birds	NA	NA	NA

Amphipods, sea	NA	NA	Amphipods, sea	NA	NA	NA
Polychaeta spp.	adult		Bristle worms	polychaetes	Wikipedia	WoRMS
Naiades cantrai	adult		pelagic polycha	NA	NA	WoRMS
Torrea candida	adult	NA	NA	NA	NA	WoRMS
Pelagia noctiluc	adult		purple-striped je	purple stinger	Wikipedia	WoRMS
Thaliacea spp.	adult		tunicates unkno	NA	NA	WoRMS
Salpidae spp.	adult		salp	NA	Wikipedia	WoRMS
Didymocystis sp	adult		trematode	NA	FishBase	WoRMS
Hirudinella vent	adult	NA	NA	NA	NA	WoRMS
Chiroteuthis spp	NA	Not assessed ir	chiroteuthid squid			
Chiroteuthis spp	NA	Not assessed ir	chiroteuthid squid			
Cavolinia triden	adult		sea butterfly	NA	Wikipedia	WoRMS
Diacria trispinos	adult	NA	three-spine cav	NA	SeaLifeBase	WoRMS
Diacria spp.	adult		cavolines	NA	Wikipedia	WoRMS
Clio pyramidata	adult	NA	sea butterfly	NA	Wikipedia	WoRMS
Pyrosoma atlan	adult	NA	NA	NA	NA	WoRMS
Soestia zonaria	adult	NA	NA	NA	NA	WoRMS

OldNames	SpRef	IncludeSP
NA		Yes
Leptocephalus congri vulgaris		Yes
NA		Yes
Bathylagus wesethi		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
Atherinopsidae		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
Omosudis lowei		Yes
Paralepis rissoi, Paralepis rissoi		Yes
Lestidium ringens		Yes
Paralepis similis		Yes
NA		Yes
Paralepis intermedius		Yes
NA		Yes
Paralepis atlantica; Magnisudis		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
Dissomma anale		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
Scomberesox saurus saurus		Yes
Caulolepidae spp.		Yes
NA		Yes
NA		Yes
NA		Yes

NA	Yes
NA	Yes
NA	Yes
NA	Yes
Clupea pallasi	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Engraulis encrasicholus	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Onos vulgaris	Yes
Merluccius vulgaris	Yes
Gadidae	Yes
NA	Yes
Haloporphyrus rostrata	Yes
Desmodema polystictus	Yes
Trachypterus spp.	Yes
NA	Yes
Mancalias tentaculatus	Yes
NA	Yes
NA	Yes
Lampanyctus maderensis	Yes
NA	Yes
NA	Yes
Aethoprora lucida	Yes
Diaphus lütkeni	Yes
NA	Yes
Aethoprora effulgens	Yes
NA	Yes
Aethoprora perspicillata	Yes
NA	Yes
Myctophum rissoi	Yes
NA	Yes
Scopelus hygomii	Yes
NA	Yes
Myctophum luminosum	Yes
NA CAN'T FIND OI	Yes
NA	Yes
NA	Yes
NA	Yes
Lampanyctus mexicanus (McHu	Yes
NA	Yes
Diaphus gemellarii	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Lampanyctus regalis (McHugh '	Yes
Lampanyctus ritteri (McHugh 19	Yes
Notoscopelus elongatus kroyeri	Yes

NA	Yes
NA	Yes
NA	Yes
Myctophum evermanni	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Ophidion novaculum	Yes
Bathymacrops macrolepis	Yes
Opisthoproctus grimaldii	Yes
NA	Yes
NA	Yes
Hypoclydonia spp.	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Brama rayi	Yes
Collybus drachme	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Caranx macarellus	Yes
NA	Yes
NA	Yes
Vomer setapinn Matthews (1977	Yes
Lichia glauca	Yes
NA	Yes
NA	Yes
Caranx trachurus	Yes
Centrolophus pompilius, Centro	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Cybium flavobrunneum	Yes
NA	Yes
NA	Yes
NA	Yes

NA	Yes
Thyrsites prometheoides Bleeke	Yes
NA	Yes
NA	Yes
Coryphopterus nicholsi	Yes
NA	Yes
NA	Yes
Tetrapturus mazara	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Mullus barbatus	Yes
NA	Yes
NA	Yes
Atimostoma capensis	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Priacanthus japonicus	Yes
NA	Yes
NA	Yes
NA	Yes
Pneumatophorus japonicus dieg	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Boops vulgaris	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes

Dactylopterus orientalis	Yes
NA	Yes
Scorpaena dactyloptera	Yes
NA	Yes
NA	Yes
NA	Yes
Scorpaenids spp.	Yes
NA	Yes
NA	Yes
Sebastes brevispinus	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Trigla gurnardus	Yes
NA	Yes
NA	Yes
NA	Yes
Gonastomatidae spp.	Yes
NA	Yes
NA	Yes
NA	Yes
Maurolicus borealis; Scopelus b	Yes
Maurolicus pennanti	Yes
NA	Yes
NA	Yes
Sternoptyx spp.	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Balistes maculatus	Yes
NA	Yes
NA	Yes
Orthagoriscus lanceolatus	Yes
NA	Yes
Ostracion laevis	Yes
NA	Yes
NA	Yes
NA	Yes
Lactoria diaphanus	Yes
NA	Yes
NA	Yes
NA	Yes
Tetraodon lagocephalus	Yes

NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Evadne tergestina	Yes
Ctenopteryx siculus	Yes
NA	Yes
Loligo opalescens	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Bolitaenella diaphana (http://tolv	Yes
Bolitaenidae	Yes
NA	Yes
NA	Yes
Argonauta nodosa	Yes
NA	Yes
NA	Yes
Eledone cirrosa	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Scaetgus unicirrhus	Yes
NA	Yes
NA	Yes
Octopus gracilis	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
	Yes
Chiroteuthis veranyi	Yes
Loligopsis bonplandii	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Teuthowenia (Helicocranchia) p	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Romanov2020	Yes
NA	Yes
Taonidium pfefferi	Yes
NA	Yes
NA	Yes
NA	Yes

Abraliopsis (Boreabraliopsis) fel	Yes
NA	Yes
Abraliopsis pfefferi	Yes
NA	Yes
NA	Yes
Romanov2020 -	Yes
Gonatus anonychus	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Gonatus spp. (fabricii), Gonatus	Yes
NA	Yes
Histioteuthis bonelliana	Yes
NA	Yes
NA	Yes
Calliteuthis reversa	Yes
Calliteuthis meleagroteuthis	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Chiroteuthidae	Yes
NA	Yes
NA	Yes
Enoploteuthidae, Octopodoteutl	Yes
NA	Yes
NA	Yes
Octopodeuthis sicula, Octopodc	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Ommatostrephes spp.	Yes
NA	Yes
NA	Yes
NA	Yes
Symplecloteuthis spp.	Yes
NA	Yes
NA	Yes
Ommatostrephes sagittatus	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Romanov2020	Yes
Onychoteuthis banksi	Yes
Onychoteuthis borealijaponicus	Yes
NA	Yes
Moroteuthis loennbergii	Yes
Moroteuthis robusta	Yes

NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Nautilus spirula	Yes
NA	Yes
NA	Yes
NA	Yes
Ianthina exigua	Yes
Ianthina spp.	Yes
	Yes
Atlanta peroni	Yes
NA	Yes
Carinaria lamarcki	Yes
Heteropoda (cf. Iversen 1962)	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Galetta spp.	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Themisto gaudichaudi, Euthemi	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes

NA	Yes
NA	Yes
Euprimno macropus	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Acantephyra multispina, Acanth	Yes
NA	Yes
Alpheus ruber (Anebocaris)	Yes
NA	Yes
Amalopenaeus elegans	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Homaridae spp.	Yes
Oplophorus spinicauda	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Palinurus vulgaris	Yes
Heterocarapus spp.	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
NA	Yes
Scyllarus antarcticus	Yes
NA	Yes
Sergestes arcticus	Yes
Sergestes similis	Yes
NA	Yes
Sergestes robustus; Sergia robu	Yes
NA	Yes
NA	Yes
Meganychtiphanes norvegica	Yes

NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
Idotheidae		Yes
NA		Yes
Gnathophausia gigas		Yes
Gnathophausia ingens		Yes
NA		Yes
Mysidacea spp.		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
NA		Yes
Cancer scyllarus		Yes
NA		Yes
NA		Yes
Squilla investigatoris		Yes
NA		Yes
NA		Yes
Gonadactylus spp.		Yes
Gonadactylus guerinii		Yes
NA	NA	Yes
NA		Yes
NA	NA	Yes
NA	NA	Yes
NA		Yes
	Romanov2020	No
	Romanov2020	No
Dibothryorhynchus spp.		No
NA		No
NA		No
NA		No
NA		No
Pyrgopsis spp. (McHugh 1952)		No
Pennella germonia		No
NA		No
Velella lata		No
NA		No
Siphonophora spp.		No
NA		No
NA		No
NA		No
NA		No
NA		No
NA		No
NA	NA	No
NA		No
NA	NA	No
NA	NA	No
NA		No
NA		No

NA	NA	No
NA		No
Alciopa cantrain	Bisby, F.A., Ruç	No
NA		No
NA		No
NA		No
NA		No
Didymocystis guernei		No
Hirudinella fusca		No
		Maybe
		Maybe
NA		Maybe
NA		Maybe
NA		Maybe
NA		Maybe
NA		Maybe
Salpa zonaria		Maybe