
Distribution Mapping and Analysis Portal (DisMAP)

INTRODUCTION

1. Background

Understanding how species are distributed in space and time and the factors which drive spatial patterns in distribution and abundance are central questions in ecology and important for species conservation and management. In fisheries stock assessments species distribution knowledge is used to identify stock structure and boundaries. Species distribution information also comes into play when making large scale marine spatial planning decisions, such as Marine Protected Area designations, or locations of human activities such as off-shore wind-farms or shipping lanes. However, as climatic and environmental conditions change, fish species may see changes in their productivity or their preferred locale (Pinsky et al. 2013, Poloczanska et al. 2016, Barange et al. 2018). Shifts in species distributions are already occurring at alarming rates, with one estimate placing it at 72 km/decade on average (Poloczanska et al. 2013). Well known examples of these shifts include mackerel in the eastern Atlantic and blueline tilefish and black sea bass in the western Atlantic which have all seen northward shifts in their distributions.

These shifts in distribution pose a central challenge to fisheries managers (Karp et al. 2019) as they can and already are having significant impacts on key management decisions. For instance, if a species moves out of its historical range, it may not be adequately sampled by research surveys, leading to biases in the index of abundance obtained from the survey data. Another complication can occur when a species shifts across management boundaries. This can be particularly challenging when the species is new to the management area into which it is shifting, and therefore no management regime is in place for it. Allocation also becomes an issue when species shift across management boundaries, as the fishermen in the species' historic range may want to maintain their historical allocation, and the fishermen in the area into which it has moved may also wish to be allocated some quota.

Given the potential impacts of shifting distributions on sustainable fisheries management, marine spatial planning and the cross-jurisdictional nature of the issue, it is crucial that scientists and managers have access to information on historic and projected stock distributions for use in decision-making. In a 2016 questionnaire, information on shifts in fish distributions ranked in the top two most important information needs among both fishers and non-fishers (MAFAC 2017). Although NMFS and partners collect extensive information on the distribution of species through surveys, and are increasingly conducting research into the distributions of fish stocks, this information is not currently available in a consistent, useful, easy to access format across regions. Species distribution modeling (SDM) analysis is done within a region on an ad hoc basis for specific stocks, generally relying on data from surveys from within that region. The primary public outlet for much of this SDM research is through peer-reviewed publications, ecosystem status reports, and/or stock assessment reports. However, there are several examples of online platforms which present species distribution modeling results to the public and resource managers, such as [OceanAdapt](#) and [Mid-Atlantic Ocean Data Portal](#). These portals have shown promise as decision support tools for fisheries managers, however these existing platforms and outlets do not enable easy

comparison between stocks within and across regions, or for the interactive exploration of results. Additionally, the SDM results and information are scattered between these various outlets making it challenging to find and compare information across stocks and regions.

Considering the large amounts of research on understanding species distributions, advancements in species distribution modeling, the clear management implications of shifting distributions, and the cross-jurisdictional nature of the issue, NMFS initiated development of a new portal building off of existing platforms to pull together the wealth of information on species distributions and provide robust information on marine species distributions to support science and management spanning across regions. The goal of the portal is to enable improved data integration, access to model results, and knowledge sharing across regions, to enhance not only NMFS ability to track species distribution shifts as they move across management boundaries or out of or into survey domains, but to also track NMFS progress and efforts to understand and account for these shifts.

This NMFS Technical Memorandum summarizing the data processing, quality control, analyses, and content of the DisMAP as of **December 15th, 2022**.

2. Revision History

March 2022: Portal published.
December 2022: Hawaii Deep 7 distribution products and BFISH survey data added to portal

SPECIES DISTRIBUTION PRODUCTS

3. Data sources and Data Processing

In this latest version of the portal, species distribution products are derived from regional fishery-independent survey data. For the continental U.S., the survey data comes from regional fishery-independent bottom-trawl surveys. Survey data for Hawai'i is for the Deep-7 species complex only and comes from the Bottomfish Fishery-independent Survey in Hawai'i (a.k.a., BFISH). When more than one survey is conducted in a region (e.g. spring, summer, and fall) we analyze each season separately.

These survey data can be accessed through regional databases (see Table 1) or through reaching out to survey leads and exist in many different tables and formats. The first step in making these data available in DisMAP and in a format which can be used to develop the subsequent species distribution products, is compiling and processing the data into a standard format with common data structure and variable names. This was carried out using an R script originally developed by the Ocean Adapt team at Rutgers University (OceanAdapt 2021) and modified to meet the needs of DisMAP. For each survey data set, the code corrects for errors such as typos in species names, rows with column headers in them (e.g. Alaska), and changes -9999 to NA. The code also combines the various tables for each region, removes unnecessary columns, and renames columns as necessary to have standard column names across the regions. Additionally, for three regions (Southeast, West Coast (annual and triennial), and Gulf of Mexico) the wtcpue is not reported and therefore is calculated in the R script. This involves calculating the area swept for each haul associated with each weight, and then dividing the weight by the calculated area swept, to get the weight per unit effort (kg per ha). To ensure that changes in survey extent over time do not impact the estimate of distribution shifts, we also standardize each survey to a consistent spatial

Region	Season	Duration	Taxa > 3/4 of years	Taxa > 1x/year	Data filtering notes	Data Source
Aleutian Islands	Summer	1983-2018	132	51	none	https://www.fisheries.noaa.gov/alaska/commercial-fishing/alaska-groundfish-bottom-trawl-survey-data#all-alaska-groundfish-bottom-trawl-survey-data-sets
Eastern Bering Sea	Summer	1982-2019	125	64	remove strata 90, 82	
Gulf of Alaska	Summer	1984-2019	181	97	remove year 2001; strata > 510	
West Coast Triennial	Summer	1977-2004	93	69	keep only strata sampled all 10 years of survey	https://www.webapps.nwfsc.noaa.gov/data/map
West Coast Annual	Summer	2003-2018	312	216	Remove year 2019; strata sampled in 14 of the 16 years	
Gulf of Mexico	Summer	1982-2019	356	179	keep years >= 2008; keep strata sampled 11 of years 2008-2019	https://seamap.gsmfc.org/
Southeast U.S. Shelf	Fall	1989-2019	105	77	remove years 1986, 1978, 2018, 2019	http://www.seamap.org/datapage.html
	Spring	1989-2019	99	63	keep only strata sampled all years of survey	
	Summer	1989-2019	96	71	none	
Northeast U.S. Shelf	Fall	1963-2019	95	55	keep years > 1973, dropped 2017; keep strata sampled all years	https://www.fisheries.noaa.gov/inport/item/22560
	Spring	1968-2019	73	53	keep years > 1973, drop 2020, 2014, 1975; keep strata sampled all years	https://www.fisheries.noaa.gov/inport/item/22561
Hawai'i Islands	Fall	2016-2021	7	7		https://www.fisheries.noaa.gov/inport/item/20969

Table 1: NOAA Fisheries fishery-independent surveys compiled for this analysis, including season of the survey, duration, number of taxa sampled in at least 3/4th of the survey years or at least once every year, notes on which strata and years were kept or removed through the data processing, and links to the original data source for each survey.

footprint by removing strata which have poor temporal coverage. Years with poor sampling coverage are also removed from the dataset used for analysis (see Table 1 for notes on data filtering in each region). In Alaska and the West Coast, we combine some species into species complexes due to difficulty in distinguishing them to the species level and/or to keep consistency with how they are assessed for management purposes.

After this data cleaning process, the following standard set of columns are selected for each region: region, sampleid, year, lat, lon, stratum, stratumarea, depth, spp, wtcpue. At this point the cleaned and filtered regional datasets are combined into one table, and a final taxonomic QA/QC is conducted. This QA/QC involves removing higher taxon codes (such as family or order level classifications), which are generally used as a ‘catch all’ for hard to identify specimens within those families or orders, and species that are poorly sampled by the trawl gear (see Appendix I for list of taxon removed). The data is further trimmed to only include species which are caught in at least 3/4th of the survey years in each region (see Appendix II for complete list of retained species). Lastly, the dataset is expanded to include zeros for when a species that is found in the region is not caught in a particular trawl. The compiled, filtered, trimmed and zero expanded dataset is then sent through a Python script to provide the spatial distribution products described in the following sections.

4. Bubble Plot

Each raw observation of wtcpue for a species from the compiled dataset is provided and can be plotted as a circle on the map, where the circle size is proportional to the wtcpue (kg per ha).

5. Interpolated Biomass Distributions

The distribution surface is generated by using the inverse distance weighting (IDW) interpolation method in a Python script. The IDW approach is used as it is a simple, relatively easy approach to apply across the large number of species collected in the surveys. The approach makes it possible to predict and interpolate unobserved densities at any location in the survey area. For this approach the wtcpue data from the compiled dataset described in section 2.1 is cube-root transformed prior to interpolation, and transformed back to original units (cubed back to kg/ha (wtcpue) values) for all further analysis described below. However, the raster displayed on the map is the cubed root values for improved visualization. Interpolation weights in IDW are computed as a function of the distance between observed sample sites and the site at which the prediction is to be made, with the weight being the inverse distance raised the the power of 2. The search radius used with IDW was 200,000 m (200 km), with 10 being the minimum and 15 being the maximum number of sampling sites included in the interpolation.

In addition to spatial weighting, the IDW approach used here includes temporal weighting. A five year window of data is used, with data from the mapped year having the highest weight in the interpolation and data from 2 years prior to and after the mapped year having much lower weights. This weighting is determined as follows:

$$\text{YearWeights} = 3 - (\text{abs}(\text{Tc} - \text{Ti}))$$

where T_c is the year being mapped T_i is the year of the samples. This year weighting is then applied to the weighting scheme by multiplying the year weighting by the distance weighting in the mapping. Note for surveys that don't sample annually (e.g. West Coast Tri-annual, Aleutian islands, Gulf of Alaska) this weighting results in the use of only the data for the year being mapped, as the other years are further than 2 years out on either side of the year being mapped so are given a weight of zero. The interpolation is carried out using a 2km x 2km grid cell size for the bottom trawl survey data and a 500m x 500m grid cell size for the BFISH survey. The interpolation boundaries were either provided by regional survey subject matter experts, or when not available, were determined by examination of the full survey footprint and the available observations from the trimmed dataset (e.g. in some regions the full survey footprint is trimmed to account for the removal of certain strata from the dataset due to poor temporal coverage in those strata). It is important to note that the choices of weighting, transformation, and pixel cell size, can have significant impacts on the resulting interpolation surfaces.

6. Single Species Distribution Metrics

6.1. Latitudinal center of gravity

The latitudinal center of gravity is the center of a population's distribution as indicated by the average latitude weighted by the biomass at each latitude within the survey domain. It is the geographic center of the total weight of the entire population. This metric is calculated using a Python script after the interpolated distribution surface is generated. The latitudinal center of gravity is the mean latitude of the species distribution, where each raster cell latitude is weighted by the value of w_{tcpu} for that cell. This is shown in the formula below:

$$COG_{year} = \frac{\sum_{i=1}^k (d_i \times t_i)}{\sum_{i=1}^k t_i}$$

where d_i is a value of latitude associated with a raster (estimation) grid cell i . t_i denotes predicted (interpolated) w_{tcpu} value at each raster (estimation) grid i . k is the total number of estimation grid cells in the study area. The result is one COG value for each year in the time series, for each species.

6.2. Range Limits

The species range limits are the geographic boundary beyond which a species does not occur. This can also be thought of as a measure of the location of the leading and trailing edges of a species' range. This metric is calculated based on the interpolated biomass raster layers. The min latitude (southern range limit) is the latitude where 95% of the species distribution/biomass (or latitudes where $w_{tcpu} > 0$) are north or this value (so it's the 5th percentile), and the max latitude (northern range limit) is the lat where 95% of the species biomass is south of (below) this latitude.

6.3. Depth center of gravity

This metric is similar to the latitudinal center of gravity, but instead of being the average latitude weighted by biomass, it is the average depth weighted by biomass. This metric is calculated in Python after the interpolated distribution surface is generated. It is the mean depth where each raster cell depth,

taken from bathymetry values within each 2 km grid cell, is weighted by the value of wtcpue for that cell, and follows the same formulation as Lat COG, but the di value is the depth of the grid cell, instead of lat. The result is one depth value for each year in the time series, for each species. Bathymetry data was obtained for the Aelution Islands, Eastern Bering Sea, and the Gulf of Alaska from the Alaska Fisheries Science Center, for BFISH from the Pacific Islands Fisheries Science Center for the BFISH data, and for the remaining regions from GEBCO (GEBCO 2021).

6.4. Area Analysis

This analysis is conducted based on the interpolated distribution surface layers, and is done in real-time based on user selected species and either selected or drawn area of interest. Two area analysis are calculated as:

- a. the proportion of the selected area where the species is present (i.e., wtcpue > 0 (or some other threshold?). Area of grid cells within selected area where wtcpue>0 divided by total area of selected area (in km²).

$$= A_{\text{area,species}}/A_{\text{area}}$$

- b. the proportion of the species biomass distribution found in (or covered by) the area of interest. This is calculated by summing the biomass for grid cells found within the area of interest, and dividing by the total biomass of the species in each year.

$$= \text{Biomass}_{\text{area,species}}/\text{Biomass}_{\text{species}}$$

7. Regional Summary Products

7.1. Species Richness Maps

Species richness maps are calculated for each region separately, and display the number of species present in each raster cell within a given region's survey domain. These maps are calculated by stacking each individual species' IDW biomass raster layers and counting the total number of species present in each cell. A species is considered present in a cell if the wtcpue > 0. It's important to note that these maps provide the predicted species richness, or number of species expected to encounter in the trawl survey at a given location, and do not reflect the species richness for the ecosystem as a whole.

7.2. Distribution Metric Regional Averages

For each region the average change in center of biomass is calculated (in terms of both Latitude and Depth) of a core set of species, defined as species that are caught every year in the survey. This is done by calculating the 'offset' or difference between each year's center of gravity and that of the starting year. Thus the first year is standardized to zero and all other years are calculated as the difference from that starting year. The annual average of these individual species offsets is then calculated for the core set of species in each region, and then plotted on a time-series graph to enable evaluation of the overall change in center of biomass of species for a given region.

FUTURE DIRECTIONS

8. Additional data types

This first release focuses on fisheries-independent survey data in the US, but future iterations of the portal will seek to include additional survey data and model outputs both within the US regions and Canada. We will build off existing partnerships between the Ocean Adapt team and Canadian researchers in the Department of Fish and Oceanography (DFO) to explore ways to incorporate Canadian survey data and models into the portal. In addition to expanding the surveys covered in this portal, we will also be exploring ways to bring in results of environmentally-linked species distribution models for display within the portal. Incorporating these model outputs not only will serve to improve access to and sharing of model code and results, but will also enable us to present predicted future shifts in distributions.

Our goal with working to incorporate these additional data sources and types is to help advance a community of practice among researchers and managers from around the U.S. and internationally who deal with the issue of shifting species distributions.

9. Additional functionality

9.1. Multispecies overlap analysis

We expect species interactions and community composition to change along with climate-driven distribution shifts in individual species (Santora et al. 2017, Pinsky et al. 2020). These changes in species interactions can lead to changes in the productivity of predators and prey. For example, the expansion of Atlantic cod into Arctic waters resulted in increased overlap with its prey which enabled greater reproductive potential and higher biomass of cod (Howell and Filin 2014). However, in the case of walleye pollock, increased overlap with a key predator, arrowtooth flounder, resulted in higher mortality of juvenile walleye pollock (Hunsicker et al. 2013). Therefore, enabling multispecies analysis and exploration of changes in species overlap and interactions is important, as species are unlikely to shift their distributions in isolation. Future iterations of the portal will enable users to explore species interactions, such as area or range overlap, within an area of interest and evaluate how those interactions have or may change over time.

9.2. Species shifts & human interactions

As species distributions shift, target species biomass may become less available to ports that have historically targeted a species, and more available to others. Changes in species distribution can also exacerbate or mitigate the effects of regional stock declines (or increases) for specific ports (Selden et al. 2019). To allow users to examine how shifting species distributions will alter availability to focal ports, a future module will be developed to allow users to choose a target species, a port of interest, and a specified radius from port. The analysis will then calculate the sum of the predicted biomass within the radius of the selected port as a metric of availability to port. Users will be able to examine how availability to ports has changed or is projected to change under future conditions for different ports.

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APPENDIX I: REMOVED TAXON

Region Dataset	Taxon name	Common Name
Aleutian Islands	Actinaria	Anemones
Aleutian Islands	Ammodytes sp.	Na
Aleutian Islands	Anthomastus sp.	Na
Aleutian Islands	Asciacea	Tunicates
Aleutian Islands	Asteroidea	Sea stars
Aleutian Islands	Balanus sp.	Barnacle
Aleutian Islands	Bathypotes sp.	Sea cucumber
Aleutian Islands	Beringius sp.	True whelks
Aleutian Islands	Bryozoa	Bryozoan shrimp
Aleutian Islands	Buccinum sp.	True whelks
Aleutian Islands	Careproctus sp.	Snailfishes
Aleutian Islands	Ceramaster sp.	Cookie star
Aleutian Islands	Chlamys sp.	Scallops
Aleutian Islands	Decapodiformes	Squids
Aleutian Islands	Eunoe sp.	Na
Aleutian Islands	Gastropoda	Gastropods
Aleutian Islands	Gorgonacea	Soft corals
Aleutian Islands	Henricia sp.	Sea star
Aleutian Islands	Hippasteria sp.	Na
Aleutian Islands	Hirudinea	Na
Aleutian Islands	Holothuroidea	Sea cucumbers
Aleutian Islands	Hydroidolina	Na
Aleutian Islands	Isopoda	Pill bugs, wood lice and sea slaters
Aleutian Islands	Leptasterias sp.	Six-rayed sea stars
Aleutian Islands	Liparidae	Snailfishes
Aleutian Islands	Myctophidae	Lanternfishes
Aleutian Islands	Neptunea sp.	True whelks
Aleutian Islands	Nudibranchia	Nudibranchs
Aleutian Islands	Octopodidae	Octopuses
Aleutian Islands	Ophiuroidea	Brittle stars
Aleutian Islands	Polychaeta	Polychaetes
Aleutian Islands	Polynoidae	Scaleworms
Aleutian Islands	Porifera	Sponges
Aleutian Islands	Psolus sp.	Sea cucumber
Aleutian Islands	Pteraster sp.	Slime stars
Aleutian Islands	Scyphozoa	Jellyfishes
Aleutian Islands	Sebastes sp.	Rockfishes
Aleutian Islands	Sipuncula	Peanut worms
Aleutian Islands	Solaster sp.	Sea stars
Aleutian Islands	Solaster sp. A (Clark 1997)	Na
Aleutian Islands	Stenobranchius sp.	Na

Aleutian Islands	Stylaster sp.	Na
Aleutian Islands	Thaliacea	Pelagic tunicates
Aleutian Islands	Volutopsius sp.	True whelks
Eastern Bering Sea	Actiniaria	Anemones
Eastern Bering Sea	Ammodytes sp.	Na
Eastern Bering Sea	Aphroditidae	Sea mice
Eastern Bering Sea	Aplidium sp. A (Clark 2006)	Ascidians
Eastern Bering Sea	Argis sp.	Argid shrimps
Eastern Bering Sea	Asciacea	Tunicates
Eastern Bering Sea	Beringius sp.	True whelks
Eastern Bering Sea	Bivalvia	Bivalves
Eastern Bering Sea	Boltenia sp.	Sea squirt
Eastern Bering Sea	Bryozoa	Bryozoan shrimp
Eastern Bering Sea	Buccinum sp.	True whelks
Eastern Bering Sea	Chionoecetes hybrid	Snow crabs
Eastern Bering Sea	Chlamys sp.	Scallops
Eastern Bering Sea	Clinocardium sp.	Nuttall cockle
Eastern Bering Sea	Colus sp.	True whelks
Eastern Bering Sea	Crangon sp.	Shrimps
Eastern Bering Sea	Ctenodiscus crispatus	Mud star
Eastern Bering Sea	Gastropoda	Gastropods
Eastern Bering Sea	Gersemia sp.	Sea strawberry
Eastern Bering Sea	Halocynthia sp.	Tunicates
Eastern Bering Sea	Henricia sp.	Sea star
Eastern Bering Sea	Holothuroidea	Sea cucumbers
Eastern Bering Sea	Hydroidolina	Na
Eastern Bering Sea	Leptasterias sp.	Six-rayed sea stars
Eastern Bering Sea	Macoma sp.	Tellins
Eastern Bering Sea	Metridium sp.	Plumose anemones
Eastern Bering Sea	Neptunea sp.	True whelks
Eastern Bering Sea	Nudibranchia	Nudibranchs
Eastern Bering Sea	Octopodidae	Octopuses
Eastern Bering Sea	Ophiuroidea	Brittle stars
Eastern Bering Sea	Paguridae	Right-handed hermit crabs
Eastern Bering Sea	Pennatulacea	Sea panzies
Eastern Bering Sea	Plicifusus sp.	Na
Eastern Bering Sea	Polychaeta	Polychaetes
Eastern Bering Sea	Porifera	Sponges
Eastern Bering Sea	Psolus sp.	Sea cucumber
Eastern Bering Sea	Pteraster sp.	Slime stars
Eastern Bering Sea	Scyphozoa	Jellyfishes
Eastern Bering Sea	Serripes sp.	Cockle
Eastern Bering Sea	Sipuncula	Peanut worms
Eastern Bering Sea	Solaster sp.	Sea stars

Eastern Bering Sea	Thoracica	Barnacles
Eastern Bering Sea	Urticina sp.	Na
Eastern Bering Sea	Volutopsius sp.	True whelks
Gulf of Alaska	Actiniaria	Anemones
Gulf of Alaska	Ammodytes sp.	Na
Gulf of Alaska	Aphroditidae	Sea mice
Gulf of Alaska	Argis sp.	Argid shrimps
Gulf of Alaska	Asciadiacea	Tunicates
Gulf of Alaska	Asteroidea	Sea stars
Gulf of Alaska	Balanus sp.	Barnacle
Gulf of Alaska	Bathyploetes sp.	Sea cucumber
Gulf of Alaska	Bivalvia	Bivalves
Gulf of Alaska	Brachiopoda	Brachiopods
Gulf of Alaska	Bryozoa	Bryozoan shrimp
Gulf of Alaska	Buccinum sp.	True whelks
Gulf of Alaska	Ceramaster sp.	Cookie star
Gulf of Alaska	Chauliodontinae	Viperfishes
Gulf of Alaska	Chlamys sp.	Scallops
Gulf of Alaska	Crangon sp.	Shrimps
Gulf of Alaska	Crossaster sp.	Sunstar
Gulf of Alaska	Ctenophora	Na
Gulf of Alaska	Decapodiformes	Squids
Gulf of Alaska	Echinacea	Sea urchin
Gulf of Alaska	Gastropoda	Gastropods
Gulf of Alaska	Henricia sp.	Sea star
Gulf of Alaska	Hexactinellida	Sea sponge
Gulf of Alaska	Holothuroidea	Sea cucumbers
Gulf of Alaska	Hydroidolina	Na
Gulf of Alaska	Isopoda	Pill bugs, wood lice and sea slaters
Gulf of Alaska	Liparidae	Snailfishes
Gulf of Alaska	Luidia foliolata	Sand star
Gulf of Alaska	Metridium sp.	Plumose anemones
Gulf of Alaska	Modiolus modiolus	Northern horse mussel
Gulf of Alaska	Myctophidae	Lanternfishes
Gulf of Alaska	Neptunea pribiloffensis	Pribilof whelk
Gulf of Alaska	Neptunea sp.	True whelks
Gulf of Alaska	Nudibranchia	Nudibranchs
Gulf of Alaska	Octopodidae	Octopuses
Gulf of Alaska	Ophiuroidea	Brittle stars
Gulf of Alaska	Osmeridae	Smelts
Gulf of Alaska	Paguridae	Right-handed hermit crabs
Gulf of Alaska	Pagurus ochotensis	Alaskan hermit crab
Gulf of Alaska	Pagurus sp.	Hermit crabs
Gulf of Alaska	Pandalus sp.	Shrimp

Gulf of Alaska	Pennatulacea	Sea panzies
Gulf of Alaska	Polychaeta	Polychaetes
Gulf of Alaska	Polyplacophora	Chitons
Gulf of Alaska	Porifera	Sponges
Gulf of Alaska	Psolus sp.	Sea cucumber
Gulf of Alaska	Pteraster sp.	Slime stars
Gulf of Alaska	Pteraster tessellatus	Cushion star
Gulf of Alaska	Scyphozoa	Jellyfishes
Gulf of Alaska	Sebastes sp.	Rockfishes
Gulf of Alaska	Solaster sp.	Sea stars
Gulf of Alaska	Stenobranchius sp.	Na
Gulf of Alaska	Thaliacea	Pelagic tunicates
Gulf of Alaska	Thoracica	Barnacles
Gulf of Alaska	Tritonia sp.	Nudibranch
Gulf of Mexico	APLYSIA	Na
Gulf of Mexico	ASCIDIACEA	Na
Gulf of Mexico	ASTROPECTEN	Na
Gulf of Mexico	AURELIA	Moon jellies
Gulf of Mexico	BOTHUS	Na
Gulf of Mexico	CALLIACTIS	Na
Gulf of Mexico	CARETTA CARETTA	Loggerhead sea turtle
Gulf of Mexico	CLYPEASTER	Sea biscuits
Gulf of Mexico	CONUS	Na
Gulf of Mexico	CYNOSCION	Weakfishes
Gulf of Mexico	ECHINASTER	Na
Gulf of Mexico	EUCINOSTOMUS	Mojarras
Gulf of Mexico	HALIEUTICHTHYS	Na
Gulf of Mexico	HOLOTHURIA	Na
Gulf of Mexico	HOLOTHUROIDEA	Sea cucumbers
Gulf of Mexico	LOLIGO	Loligo squids
Gulf of Mexico	LUIDIA	Na
Gulf of Mexico	MOLPADIA	Na
Gulf of Mexico	OPHIDION	Na
Gulf of Mexico	OPHIOTHRIX	Na
Gulf of Mexico	OPSANUS	Na
Gulf of Mexico	POLYCHAETA	Na
Gulf of Mexico	PORIFERA	Sponges
Gulf of Mexico	PORIFERBALL	Na
Gulf of Mexico	PORIFERBARREL	Na
Gulf of Mexico	PORIFERENCOTH	Na
Gulf of Mexico	PORIFERFINBRA	Na
Gulf of Mexico	PORIFERVASTUB	Na
Gulf of Mexico	SICYONIA	Na
Gulf of Mexico	SOLENOCERA	Shrimps

Gulf of Mexico	TRACHYPENEUS	Trachypeneid shrimps
Gulf of Mexico	TUNICATA	Na
Northeast US Fall	MACROURIDAE	Na
Northeast US Fall	MYCTOPHIDAE	Lanternfishes
Northeast US Spring	MACROURIDAE	Na
Northeast US Spring	MYCTOPHIDAE	Lanternfishes
Southeast US Fall	CARETTA CARETTA	Loggerhead sea turtle
Southeast US Spring	CARETTA CARETTA	Loggerhead sea turtle
Southeast US Summer	CARETTA CARETTA	Loggerhead sea turtle
West Coast Annual	Actiniaria	Anemones
West Coast Annual	Aphrodita	Na
West Coast Annual	Asteroidea	Sea stars
West Coast Annual	Aurelia	Na
West Coast Annual	Benthoctopus	Na
West Coast Annual	Brachiopoda	Brachiopods
West Coast Annual	Brisaster	Na
West Coast Annual	Ceramaster	Na
West Coast Annual	Chrysaora	Na
West Coast Annual	Corallimorphus	Na
West Coast Annual	Crangon	Na
West Coast Annual	Florometra	Na
West Coast Annual	Gastropoda	Gastropods
West Coast Annual	Gorgonacea	Soft corals
West Coast Annual	Halipteris	Na
West Coast Annual	Henricia	Na
West Coast Annual	Hexactinosida	Sponge
West Coast Annual	Hormathiidae	Sea anemone
West Coast Annual	Invertebrata	Invertebrate
West Coast Annual	Isopoda	Pill bugs, wood lice and sea slaters
West Coast Annual	Mediaster	Na
West Coast Annual	Myctophidae	Lanternfishes
West Coast Annual	Myxinidae	Hagfishes
West Coast Annual	Neptunea	Na
West Coast Annual	Nudibranchia	Nudibranchs
West Coast Annual	Ophiopholis	Na
West Coast Annual	Ophiurida	Na
West Coast Annual	Paguridae	Right-handed hermit crabs
West Coast Annual	Pennatulacea	Sea panzies
West Coast Annual	Porifera	Sponges
West Coast Annual	Pseudarchaster	Na
West Coast Annual	Pteraster	Na
West Coast Annual	Rossellinae	Sea sponge
West Coast Annual	Scyphozoa	Jellyfishes
West Coast Annual	Sebastes	Rockfishes

West Coast Annual	Sipuncula	Peanut worms
West Coast Annual	Solaster	Na
West Coast Annual	Stomphia	Na
West Coast Annual	Strongylocentrotus	Na
West Coast Annual	Terebratellacea	Brachiopod
West Coast Annual	Thaliacea	Pelagic tunicates
West Coast Annual	Tunicata	Tunicates
West Coast Annual	unsorted shab	Na
West Coast Annual	Urticina	Na
West Coast Triennial	Actiniaria	Anemones
West Coast Triennial	Aphroditidae	Sea mice
West Coast Triennial	Asteroidea	Sea stars
West Coast Triennial	Brachiopoda	Brachiopods
West Coast Triennial	Cottidae	Sculpins
West Coast Triennial	Decapodiformes	Squids
West Coast Triennial	Echinacea	Sea urchin
West Coast Triennial	Gastropoda	Gastropods
West Coast Triennial	Holothuroidea	Sea cucumbers
West Coast Triennial	Myctophidae	Lanternfishes
West Coast Triennial	Nudibranchia	Nudibranchs
West Coast Triennial	Octopodidae	Octopuses
West Coast Triennial	Paguridae	Right-handed hermit crabs
West Coast Triennial	Pennatulacea	Sea panzies
West Coast Triennial	Porifera	Sponges
West Coast Triennial	Scyphozoa	Jellyfishes
West Coast Triennial	Sebastes sp.	Rockfishes
West Coast Triennial	Solaster sp.	Sea stars
West Coast Triennial	Thaliacea	Pelagic tunicates

**APPENDIX II: LIST OF THE 943 UNIQUE SPECIES RETAINED AND PRESENTED
ON DISMAP**

Species Scientific Name	Common Name
Acantholithodes hispidus	Spiny lithode crab
Anoplopoma fimbria	Sablefish
Aphareus rutilans	Lehi
Aphrocallistes vastus	Cloud sponge
Aptocyclus ventricosus	Smooth lumpsucker
Arctomelon stearnsii	Alaska volute
Atheresthes stomias and A. evermanni	Arrowtooth and kamchatka flounders
Bathyagonus nigripinnis	Blackfin poacher
Bathymaster caeruleofasciatus	Alaskan ronquil
Bathymaster signatus	Searcher
Bathyraja spp.	Skate complex
Beringraja binoculata	Big skate
Berryteuthis magister	Magister armhook squid
Bolinia euryptera	Sculpin
Bryozoichthys marjorius	Pearly prickleback
Glebocarcinus oregonensis	Pygmy rock crab
Careproctus melanurus	Blacktail snailfish
Careproctus rastrinus	Salmon snailfish
Ceramaster japonicus	Red cookie star
Ceramaster patagonicus	Cookie star
Chauliodus macouni	Pacific viperfish
Cheiraster dawsoni	Sea star
Chionoecetes bairdi	Tanner crab
Chirona evermanni	Deepwater giant barnacle
Chorilia longipes	Longhorn decorator crab
Cladaster validus	Na
Albatrossia pectoralis	Giant grenadier
Crossaster papposus	Common sunstar
Crystallichthys cyclospilus	Blotched snailfish
Ctenodiscus crispatus	Mud star
Cucumaria fallax	Sea cucumber
Dasycottus setiger	Spinyhead sculpin
Diaphus theta	California headlightfish
Diplopteraster multipes	Cushion star
Dipsacaster borealis	Northern sand star
Enteroctopus dofleini	North pacific giant octopus
Erimacrus isenbeckii	Hair crab
Etelis carbunculus	Ehu
Etelis coruscans	Onaga
Eumicrotremus orbis	Pacific spiny lumpsucker

<i>Fusitriton oregonensis</i>	Oregon triton
<i>Gadus chalcogrammus</i>	Walleye pollock
<i>Gadus macrocephalus</i>	Pacific cod
<i>Gephyreaster swifti</i>	Gunpowder star
<i>Glyptocephalus zachirus</i>	Rex sole
<i>Gonatopsis borealis</i>	Boreopacific gonate squid
<i>Gorgonocephalus eucnemis</i>	Basket star
<i>Gymnocanthus galeatus</i>	Armorhead sculpin
<i>Halichondria panicea</i>	Breadcrumb sponge
<i>Halocynthia aurantium</i>	Sea peach
<i>Hemilepidotus jordani</i>	Yellow irish lord
<i>Hemilepidotus zapus</i>	Longfin irish lord
<i>Hemitripterus bolini</i>	Bigmouth sculpin
<i>Hexagrammos decagrammus</i>	Kelp greenling
<i>Hiatella arctica</i>	Arctic hiatella
<i>Hippasteria phrygiana</i>	Trojan star
<i>Hippoglossoides elassodon</i>	Flathead sole
<i>Hippoglossus stenolepis</i>	Pacific halibut
<i>Hyas lyratus</i>	Pacific lyre crab
<i>Hyporthodus quernus</i>	Hapu'upu'u
<i>Hypsagonus quadricornis</i>	Fourhorn poacher
<i>Icelus spiniger</i>	Thorny sculpin
<i>Isopsetta isolepis</i>	Butter sole
<i>Lebbeus groenlandicus</i>	Spiny lebbeid
<i>Lepidopsetta</i> sp.	Rock soles
<i>Sarritor frenatus</i>	Sawback poacher
<i>Leptychaster arcticus</i>	Arctic sand star
<i>Lethasterias nanimensis</i>	Black spined star
<i>Lethotremus muticus</i>	Docked snailfish
<i>Leuroglossus schmidti</i>	Northern smoothtongue
<i>Limanda aspera</i>	Yellowfin sole
<i>Lithodes aequispinus</i>	Golden king crab
<i>Lycodes beringi</i>	Bering eelpout
<i>Lycodes brevipes</i>	Shortfin eelpout
<i>Lycodes concolor</i>	Ebony eelpout
<i>Lycodes palearis</i>	Wattled eelpout
<i>Malacocottus zonurus</i>	Darkfin sculpin
<i>Mallotus villosus</i>	Capelin
<i>Microstomus pacificus</i>	Dover sole
<i>Modiolus modiolus</i>	Northern horsemussel
<i>Mycale loveni</i>	Tree sponge
<i>Myoxocephalus polyacanthocephalus</i>	Great sculpin
<i>Nautichthys oculofasciatus</i>	Sailfin sculpin
<i>Notostomum cyclostomum</i>	Annelid

<i>Oncorhynchus keta</i>	Chum salmon
<i>Ophiopholis aculeata</i>	Daisy brittle star
<i>Ophiura sarsi</i>	Notched brittle star
<i>Opisthoteuthis californiana</i>	Flapjack octopus
<i>Oregonia gracilis</i>	Graceful decorator crab
<i>Pagurus aleuticus</i>	Aleutian hermit
<i>Pagurus brandti</i>	Sponge hermit
<i>Pandalopsis dispar</i>	Sidestripe shrimp
<i>Pandalus eous</i>	Alaskan pink shrimp
<i>Pandalus tridens</i>	Yellowleg pandalid
<i>Paragorgia arborea</i>	Bubblegum coral
<i>Paralithodes camtschaticus</i>	Red king crab
<i>Parophrys vetulus</i>	English sole
<i>Placetron wosnessenskii</i>	Scaled crab
<i>Platichthys stellatus</i>	Starry flounder
<i>Pleurogrammus monopterygius</i>	Atka mackerel
<i>Pododesmus macrochisma</i>	Green falsejingle
<i>Podothecus accipenserinus</i>	Sturgeon poacher
<i>Porella compressa</i>	Flattened bryozoan
<i>Poromitra curilensis</i>	Crested bigscale
<i>Pristipomoides filamentosus</i>	Opakapaka
<i>Pristipomoides sieboldii</i>	Kalekale
<i>Pristipomoides zonatus</i>	Gindai
<i>Protomyctophum thompsoni</i>	Bigeye lanternfish
<i>Pseudarchaster parelii</i>	Northern scarlet star
<i>Pteraster militaris</i>	Wrinkled star
<i>Pteraster tessellatus</i>	Cushion star
<i>Pycnopodia helianthoides</i>	Sunflower sea star
<i>Rastrinus scutigera</i>	Roughskin sculpin
<i>Reinhardtius hippoglossoides</i>	Greenland halibut
<i>Rhamphostomella costata</i>	Ribbed bryozoan
<i>Rhinolithodes wosnessenskii</i>	Rhinoceros crab
<i>Rossia pacifica</i>	Eastern pacific bobtail
<i>Sclerocrangon boreas</i>	Sculptured shrimp
<i>Sebastes alutus</i>	Pacific ocean perch
<i>Sebastes babcocki</i>	Redbanded rockfish
<i>Sebastes borealis</i>	Shortraker rockfish
<i>Sebastes melanostictus</i> and <i>S. aleutianus</i>	Blackspotted and rougheye rockfish
<i>Sebastes polyspinis</i>	Northern rockfish
<i>Sebastes variabilis</i> and <i>S. ciliatus</i>	Dusky and dark rockfish
<i>Sebastes variegatus</i>	Harlequin rockfish
<i>Sebastobus alascanus</i>	Shortspine thornyhead
<i>Solaster hypothrissus</i>	White sun star
<i>Somniosus pacificus</i>	Pacific sleeper shark

<i>Stegophiura ponderosa</i>	Sea star
<i>Stenobranchius leucopsarus</i>	Northern lampfish
<i>Strongylocentrotus droebachiensis</i>	Green sea urchin
<i>Styela rustica</i>	Sea potato
<i>Thaleichthys pacificus</i>	Eulachon
<i>Thyriscus anoplus</i>	Sponge sculpin
<i>Triglops forficatus</i>	Scissortail sculpin
<i>Triglops macellus</i>	Roughspine sculpin
<i>Triglops pingelii</i>	Ribbed sculpin
<i>Triglops szepticus</i>	Spectacled sculpin
<i>Zaprora silenus</i>	Prowfish
<i>Aforia circinata</i>	Keeled aforia
<i>Anarhichas orientalis</i>	Bering wolffish
<i>Argis dentata</i>	Artic argid
<i>Aspidophoroides monopterygius</i>	Alligatorfish
<i>Asterias amurensis</i>	North pacific seastar
<i>Beringius behringi</i>	True whelk
<i>Boltenia ovifera</i>	Stalked sea squirt
<i>Boreogadus saida</i>	Arctic cod
<i>Buccinum angulosum</i>	Angular whelk
<i>Buccinum plectrum</i>	Sinuuous whelk
<i>Buccinum polare</i>	Polar whelk
<i>Buccinum scalariforme</i>	Ladder whelk
<i>Chionoecetes opilio</i>	Snow crab
<i>Ciliatoclinocardium ciliatum</i>	Hairy cockle
<i>Clinopegma magnum</i>	Helmet whelk
<i>Clupea pallasii</i>	Pacific herring
<i>Colus halli</i>	Snail
<i>Colus herendeenii</i>	Thin-ribbed whelk
<i>Cryptonatica russa</i>	Rusty moonsail
<i>Echinarachnius parma</i>	Common sand dollar
<i>Eleginus gracilis</i>	Saffron cod
<i>Eunoe depressa</i>	Depressed scale worm
<i>Eunoe nodosa</i>	Giant scale worm
<i>Evasterias echinosoma</i>	Sea star
<i>Flustra serrulata</i>	Bryozoan
<i>Grandicrepidula grandis</i>	Great slippersnail
<i>Gymnocanthus pistilliger</i>	Threaded sculpin
<i>Hemilepidotus papilio</i>	Butterfly sculpin
<i>Hexagrammos stelleri</i>	Whitespotted greenling
<i>Hippoglossoides elassodon</i> and <i>H. robustus</i>	Flathead sole-bering flounder
<i>Hyas coarctatus</i>	Arctic lyre crab
<i>Leptasterias arctica</i>	Sea star

<i>Leptasterias polaris</i>	Polar six-rayed star
<i>Leptoclinus maculatus</i>	Daubed shanny
<i>Limanda proboscidea</i>	Longhead dab
<i>Limanda sakhalinensis</i>	Sakhalin sole
<i>Lunatia pallida</i>	Pale moonsail
<i>Lycodes raridens</i>	Sparse-toothed lycod
<i>Mactromeris polynyma</i>	Arctic surfclam
<i>Musculus discors</i>	Discordant mussel
<i>Myoxocephalus jaok</i>	Plain sculpin
<i>Myoxocephalus scorpius</i>	Shorthorn sculpin
<i>Neptunea borealis</i>	True whelk
<i>Neptunea heros</i>	True whelk
<i>Neptunea lyrata</i>	Lyre whelk
<i>Neptunea pribiloffensis</i>	Pribilof whelk
<i>Neptunea ventricosa</i>	Fat whelk
<i>Ocella dodecaedron</i>	Bering poacher
<i>Osmerus mordax</i>	Rainbow smelt
<i>Pagurus ochotensis</i>	Alaskan hermit crab
<i>Pandalus goniurus</i>	Humpy shrimp
<i>Paralithodes platypus</i>	Blue king crab
<i>Patinopecten caurinus</i>	Weathervane scallop
<i>Pleuronectes quadrituberculatus</i>	Alaska plaice
<i>Plicifusus kroeyeri</i>	True whelk
<i>Poroclinus rothrocki</i>	Whitebarred prickleback
<i>Pteraster obscurus</i>	Obscure cushion star
<i>Pyrulofusus deformis</i>	Warped whelk
<i>Pyrulofusus melonis</i>	Melon shaped whelk
<i>Serripes groenlandicus</i>	Greenland cockle
<i>Siliqua alta</i>	Alaska razor
<i>Tellina lutea</i>	Alaska great tellin
<i>Telmessus cheiragonus</i>	Helmet crab
<i>Trichodon trichodon</i>	Pacific sandfish
<i>Tritonia diomedea</i>	Rosy tritonia
<i>Volutopsius fragilis</i>	Fragile whelk
<i>Alloccentrotus fragilis</i>	Fragile urchin
<i>Anarrhichthys ocellatus</i>	Wolf-eel
<i>Atheresthes stomias</i>	Arrowtooth flounder
<i>BathYGONUS pentacanthus</i>	Bigeye poacher
<i>Benthooctopus leioderma</i>	Smoothskin octopus
<i>Brisaster latifrons</i>	Northern heart urchin
<i>Metacarcinus magister</i>	Dungeness crab
<i>Crangon communis</i>	Gray shrimp
<i>Crangon dalli</i>	Ridged crangon
<i>Crossaster borealis</i>	Grooved sun star

<i>Cryptacanthodes giganteus</i>	Giant wrymouth
<i>Cyanea capillata</i>	Lion's mane
<i>Eopsetta jordani</i>	Petrale sole
<i>Hemilepidotus hemilepidotus</i>	Red irish lord
<i>Henricia leviuscula</i>	Pacific blood star
<i>Hydrolagus colliei</i>	Spotted ratfish
<i>Labidochirus splendescens</i>	Splendid hermit
<i>Laqueus californianus</i>	California lamp shell
<i>Lopholithodes foraminatus</i>	Brown box crab
<i>Lumpenella longirostris</i>	Longsnout prickleback
<i>Lumpenus sagitta</i>	Snake prickleback
<i>Lycodes pacificus</i>	Blackbelly eelpout
<i>Lyopsetta exilis</i>	Slender sole
<i>Mediaster aequalis</i>	Vermilion star
<i>Merluccius productus</i>	Pacific hake
<i>Microgadus proximus</i>	Pacific tomcod
<i>Molpadia intermedia</i>	Sweet potato sea cucumber
<i>Munida quadrispina</i>	Squat lobster sp.
<i>Neptunea amianta</i>	True whelk
<i>Oncorhynchus gorbuscha</i>	Pink salmon
<i>Oncorhynchus kisutch</i>	Coho salmon
<i>Oncorhynchus tshawytscha</i>	Chinook salmon
<i>Ophiodon elongatus</i>	Lingcod
<i>Orthasterias koehleri</i>	Rainbow star
<i>Pagurus capillatus</i>	Fuzzy hermit crab
<i>Pagurus confragosus</i>	Knobbyhand hermit
<i>Pandalus hypsinotus</i>	Coonstriped shrimp
<i>Pandalus jordani</i>	Ocean shrimp
<i>Pandalus platyceros</i>	Spot shrimp
<i>Pasiphaea pacifica</i>	Pacific glass shrimp
<i>Poraniopsis inflata</i>	Spiny sea star
<i>Psettichthys melanostictus</i>	Pacific sand sole
<i>Ptilosarcus gurneyi</i>	Gurney's sea pen
<i>Pyrulofusus harpa</i>	Left-hand whelk
<i>Beringraja rhina</i>	Longnose skate
<i>Rhamphocottus richardsoni</i>	Grunt sculpin
<i>Sebastes brevispinis</i>	Silvergray rockfish
<i>Sebastes crameri</i>	Darkblotched rockfish
<i>Sebastes diploproa</i>	Splitnose rockfish
<i>Sebastes elongatus</i>	Greenstriped rockfish
<i>Sebastes entomelas</i>	Widow rockfish
<i>Sebastes flavidus</i>	Yellowtail rockfish
<i>Sebastes helvomaculatus</i>	Rosethorn rockfish
<i>Sebastes maliger</i>	Quillback rockfish

Sebastes melanops	Black rockfish
Sebastes pinniger	Canary rockfish
Sebastes proriger	Redstripe rockfish
Sebastes reedi	Yellowmouth rockfish
Sebastes ruberrimus	Rasphead rockfish
Sebastes wilsoni	Pygmy rockfish
Sebastes zacentrus	Sharpchin rockfish
Solaster stimpsoni	Stimpson's sun star
Spirinchus thaleichthys	Longfin smelt
Squalus suckleyi	Pacific spiny dogfish
Stylasterias forreri	Velcro star
Terebratalia transversa	Common lamp shell
Tochuina gigantea	Giant orange tochui
Acanthocarpus alexandri	Gladiator box crab
Acanthostracion quadricornis	Scrawled cowfish
Aequipecten muscosus	Mossy scallop
Aluterus heudelotii	Dotterel filefish
Aluterus schoepfii	Orange filefish
Aluterus scriptus	Scribbled leatherjacket filefish
Amusium papyraceum	Paper scallop
Anadara baughmani	Skewed ark
Anasimus latus	Stilt spider crab
Anchoa hepsetus	Striped anchovy
Anchoa mitchilli	Bay anchovy
Ancylopsetta dilecta	Three-eye flounder
Ancylopsetta ommata	Ocellated flounder
Antennarius ocellatus	Ocellated frogfish
Antennarius radiosus	Singlespot frogfish
Antennarius striatus	Striated frogfish
Anthenoides peircei	Sea star
Apogon affinis	Bigtooth cardinalfish
Apogon aurolineatus	Bridle cardinalfish
Apogon pseudomaculatus	Twospot cardinalfish
Apogon quadrisquamatus	Sawcheek cardinalfish
Arbacia punctulata	Purple-spined sea urchin
Arca zebra	Turkey wing
Arenaeus cribrarius	Speckled swimming crab
Argopecten gibbus	Calico scallop
Ariopsis felis	Hardhead catfish
Asteroporpa annulata	Brittle star
Astrapogon alutus	Bronze cardinalfish
Astropecten articulatus	Royal sea star
Astropecten cingulatus	Sea star
Astropecten duplicatus	Two-spined star fish

<i>Astrophyton muricatum</i>	Giant basket star
<i>Atrina serrata</i>	Sawtooth penshell
<i>Bagre marinus</i>	Gafftopsail catfish
<i>Bairdiella chrysoura</i>	Silver perch
<i>Balistes capriscus</i>	Gray triggerfish
<i>Bathyanthias mexicanus</i>	Yellowtail bass
<i>Bellator militaris</i>	Horned searobin
<i>Bollmannia communis</i>	Ragged goby
<i>Bregmaceros atlanticus</i>	Antenna codlet
<i>Brevoortia patronus</i>	Gulf menhaden
<i>Brotula barbata</i>	Bearded brotula
<i>Calamus arctifrons</i>	Grass porgy
<i>Calamus bajonado</i>	Jolthead porgy
<i>Calamus leucosteus</i>	Whitebone porgy
<i>Calamus nodosus</i>	Knobbed porgy
<i>Calamus penna</i>	Sheepshead porgy
<i>Calamus proridens</i>	Littlehead porgy
<i>Calappa flammea</i>	Flame box crab
<i>Calappa sulcata</i>	Yellow box crab
<i>Calliactis tricolor</i>	Hermit anemone
<i>Callinectes sapidus</i>	Blue crab
<i>Callinectes similis</i>	Lesser blue crab
<i>Cantharus cancellarius</i>	Cancellate cantharus
<i>Canthigaster rostrata</i>	Caribbean sharpnose-puffer
<i>Caranx crysos</i>	Blue runner
<i>Caranx hippos</i>	Crevalle jack
<i>Carcharhinus acronotus</i>	Blacknose shark
<i>Caulolatilus cyanops</i>	Blackline tilefish
<i>Caulolatilus intermedius</i>	Anchor tilefish
<i>Centropristis ocyurus</i>	Bank sea bass
<i>Centropristis philadelphica</i>	Rock sea bass
<i>Centropristis striata</i>	Black sea bass
<i>Chaetodipterus faber</i>	Atlantic spadefish
<i>Chaetodon ocellatus</i>	Spotfin butterflyfish
<i>Chaetodon sedentarius</i>	Reef butterflyfish
<i>Chicoreus florifer-dilectus</i>	Flowery lace murex
<i>Chilomycterus schoepfii</i>	Striped burrfish
<i>Chione clenchii</i>	Na
<i>Chloroscombrus chrysurus</i>	Atlantic bumper
<i>Chromis enchrysurus</i>	Yellowtail reeffish
<i>Chrysaora quinquecirrha</i>	Sea nettle
<i>Citharichthys cornutus</i>	Horned whiff
<i>Citharichthys gymnorhinus</i>	Anglefin whiff
<i>Citharichthys macrops</i>	Spotted whiff

Citharichthys spilopterus	Bay whiff
Collodes robustus	Robust crab
Cryptotomus roseus	Bluelip parrotfish
Cyclopsetta chittendeni	Mexican flounder
Cyclopsetta fimbriata	Spotfin flounder
Dardanus fucosus	Bareye hermit
Dardanus insignis	Red brocade hermit
Decapterus punctatus	Round scad
Decodon puellaris	Red hogfish
Diplectrum bivittatum	Dwarf sand perch
Diplectrum formosum	Sand perch
Diplodus holbrookii	Spottail seabream
Distorsio clathrata	Atlantic distorsio
Dromidia antillensis	Hairy sponge crab
Echeneis naucrates	Sharksucker
Echeneis neucratoides	Whitefin sharksucker
Echiophis intertinctus	Spotted spoon-nose eel
Encope aberrans	Sand dollar
Encope michelini	Notched sand dollar
Engyophrys senta	Spiny flounder
Epinephelus morio	Red grouper
Pareques iwamotoi	Blackbar drum
Equetus lanceolatus	Jackknife-fish
Pareques umbrosus	Cubbyu
Ethusa microphthalma	Broadback sumo crab
Etropus crossotus	Fringed flounder
Etropus cyclosquamus	Shelf flounder
Etropus rimosus	Gray flounder
Etrumeus teres	Round herring
Eucidaris tribuloides	Slate pencil urchin
Eucinostomus argenteus	Silver mojarra
Eucinostomus gula	Silver jenny
Eucinostomus harengulus	Tidewater mojarra
Euphrosynoplax clausa	Craggy bathyal crab
Ficus communis	Atlantic figsnail
Fistularia petimba	Red cornetfish
Gastropsetta frontalis	Shrimp flounder
Gobiesox strumosus	Skilletfish
Goniaster tessellatus	Giant sunfish
Gonodactylus bredini	Split-Thumb mantis shrimp
Gymnachirus melas	Naked sole
Gymnachirus texae	Fringed sole
Gymnothorax kolpos	Blacktail moray
Gymnothorax nigromarginatus	Blackedge moray

Gymnothorax saxicola	Honeycomb moray
Haemulon aurolineatum	Tomtate
Haemulon plumieri	White grunt
Haemulon striatum	Striped grunt
Halieutichthys aculeatus	Pancake batfish
Harengula jaguana	Scaled sardine
Hemicaranx amblyrhynchus	Bluntnose jack
Xyrichtys novacula	Pearly razorfish
Hepatus epheliticus	Calico box crab
Hermodice carunculata	Bearded fireworms
Rhynchoconger flavus	Yellow conger
Hippocampus erectus	Lined seahorse
Holacanthus bermudensis	Blue angelfish
Holocentrus bullisi	Deepwater squirrelfish
Hoplunnis diomediana	Blacktail pikeconger
Hoplunnis macrura	Freckled pike-conger
Iliacantha liodactylus	Na
Iliacantha subglobosa	Longfinger purse crab
Isostichopus badionotus	Chocolate chip sea cucumber
Kathetostoma albigutta	Lancer stargazer
Lachnolaimus maximus	Hogfish
Lactophrys polygonia	Honeycomb cowfish
Laevicardium laevigatum	Eggcockle
Laevicardium mortoni	Yellow eggcockle
Lagocephalus laevigatus	Smooth puffer
Lagodon rhomboides	Pinfish
Larimus fasciatus	Banded drum
Leiolambrus nitidus	White elbow crab
Leiostomus xanthurus	Spot
Lepophidium brevibarbe	Blackedge cusk-eel
Lepophidium jeannae	Mottled cusk-eel
Libinia emarginata	Portly spider crab
Lobopilumnus agassizii	Areolated hairy crab
Doryteuthis (Amerigo) pealeii	Longfin inshore squid
Doryteuthis (Loligo) plei	Slender inshore squid
Lolliguncula brevis	Atlantic brief squid
Lonchopisthus micrognathus	Swordtail jawfish
Luidia alternata	Banded sea star
Luidia clathrata	Lined sea star
Lutjanus campechanus	Red snapper
Lutjanus griseus	Gray snapper
Lutjanus synagris	Lane snapper
Lytechinus variegatus	Variiegated urchin
Macoma brevifrons	Short macoma

Macoma pulleyi	Delta macoma
Macrocoeloma trispinosum	Spongy decorator crab
Menticirrhus americanus	Southern kingfish
Mesopenaeus tropicalis	Salmon shrimp
Metapenaeopsis goodei	Carribean velvet shrimp
Metoporphaphis calcarata	False arrow crab
Micropogonias undulatus	Atlantic croaker
Mithrax forceps	Red ridged clinging crab
Mithrax hispidus	Coral clinging crab
Mithrax pleuracanthus	Shaggy clinging crab
Monacanthus ciliatus	Fringed filefish
Stephanolepis hispidus	Planehead filefish
Mullus auratus	Red goatfish
Munida forceps	Squat lobster sp.
Munida pusilla	Squat lobster sp.
Muricanthus fulvescens	Giant eastern murex
Mustelus canis	Smooth dogfish
Mycteroperca microlepis	Gag
Mycteroperca phenax	Scamp
Myropsis quinquespinosa	Fivespine purse crab
Narcine brasiliensis	Lesser electric ray
Narcissia trigonaria	Na
Neobythites gilli	Twospot brotula
Neomerinthe hemingwayi	Spinycheek scorpionfish
Nicholsina usta	Emerald parrotfish
Octopus joubini	Pygmy octopus
Octopus vulgaris	Common octopus
Ogcocephalus corniger	Longnose batfish
Ogcocephalus declivirostris	Slantbrow batfish
Ogcocephalus pantostictus	Spotted batfish
Ogcocephalus parvus	Roughback batfish
Ogcocephalus radiatus	Polka-dot batfish
Ophichthus gomesii	Shrimp eel
Ophichthus puncticeps	Palespotted eel
Ophidion spp.	Cusk-eels
Ophidion beani	Longnose cusk-eel
Ophidion grayi	Blotched cusk-eel
Ophidion holbrookii	Bank cusk-eel
Ophidion selenops	Mooneye cusk-eel
Ophidion welshi	Crested cusk-eel
Ophioderma appressa	Harlequin brittle star
Ophioderma brevispinum	Brittle star
Ophiolepis elegans	Elegant brittle star
Ophiothrix angulata	Angular brittle star

Opisthonema oglinum	Atlantic thread herring
Oreaster reticulatus	Cushioned star
Orthopristis chrysoptera	Pigfish
Otophidium omostigma	Polka-dot cusk-eel
Ovalipes floridanus	Florida lady crab
Pagrus pagrus	Red porgy
Paguristes sericeus	Blue-eyed hermit
Paguristes triangulatus	Hermit crab
Pagurus bullisi	Hermit crab
Palicus alternatus	Labile stilt crab
Parablennius marmoreus	Seaweed blenny
Paraconger caudilimbatus	Margintail conger
Paralichthys albigutta	Gulf flounder
Paralichthys lethostigma	Southern flounder
Paralichthys squamilentus	Broad flounder
Parapenaeus politus	Rose shrimp
Parthenope agonus	Elbow crab
Parthenope fraterculus	Elbow crab
Platylambrus granulata	Bladetooth elbow crab
Pecten ravenelli	Ravenel scallop
Farfantepenaeus aztecus	Brown shrimp
Farfantepenaeus duorarum	Pink shrimp
Litopenaeus setiferus	Northern white shrimp
Peprilus paru	Harvestfish
Peprilus burti	Gulf butterfish
Peristedion gracile	Slender searobin
Persephona crinita	Pink purse crab
Persephona mediterranea	Mottled purse crab
Pentrochirus diogenes	Giant hermit
Phaeoptyx xenus	Sponge cardinalfish
Physiculus fulvus	Hakeling
Pilumnus sayi	Spineback hairy crab
Pitar cordatus	Na
Plesionika longicauda	Shrimp
Podochela sidneyi	Shortfinger neck crab
Polystira albida	White giant-turris
Polystira tellea	Delicate giant-turris
Pomacanthus arcuatus	Gray angelfish
Pomacentrus variabilis	Cocoa damselfish
Pomatomus saltatrix	Bluefish
Pontinus longispinis	Longspine scorpionfish
Porcellana sayana	Spotted porcelain crab
Porcellana sigsbeiana	Striped porcelain crab
Porichthys plectrodon	Atlantic midshipman

<i>Portunus gibbesii</i>	Iridescent swimming crab
<i>Portunus ordwayii</i>	Redhair swimming crab
<i>Portunus sayi</i>	Sargassum swimming crab
<i>Achelous spinicarpus</i>	Longspine swimming crab
<i>Achelous spinimanus</i>	Blotched swimming crab
<i>Priacanthus arenatus</i>	Atlantic bigeye
<i>Prionotus alatus</i>	Spiny searobin
<i>Prionotus longispinosus</i>	Bigeye searobin
<i>Prionotus martis</i>	Gulf of mexico barred searobin
<i>Prionotus ophryas</i>	Bandtail searobin
<i>Prionotus paralatus</i>	Mexican searobin
<i>Prionotus roseus</i>	Bluespotted searobin
<i>Prionotus rubio</i>	Blackfin searobin
<i>Prionotus scitulus</i>	Leopard searobin
<i>Prionotus stearnsi</i>	Shortwing searobin
<i>Prionotus tribulus</i>	Bighead searobin
<i>Pristigenys alta</i>	Short bigeye
<i>Pristipomoides aquilonaris</i>	Wenchman
<i>Pseudomedeus agassizii</i>	Rough rubble crab
<i>Pseudorhombila quadridentata</i>	Flecked squareback crab
<i>Pseudupeneus maculatus</i>	Spotted goatfish
<i>Pteria colymbus</i>	Atlantic wing-oyster
<i>Pterois volitans</i>	Red lionfish
<i>Raja eglanteria</i>	Clearnose skate
<i>Raja texana</i>	Roundel skate
<i>Raninoides louisianensis</i>	Gulf frog crab
<i>Renilla mulleri</i>	Sea pansy
<i>Rhinobatos lentiginosus</i>	Atlantic guitarfish
<i>Rhinoptera bonasus</i>	Cownose ray
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose shark
<i>Rhomboplites aurorubens</i>	Vermilion snapper
<i>Rossia spp.</i>	Benthic bobtail squid
<i>Rypticus bistrispinus</i>	Freckled soapfish
<i>Rypticus maculatus</i>	Whitespotted soapfish
<i>Sardinella aurita</i>	Spanish sardine
<i>Saurida brasiliensis</i>	Largescale lizardfish
<i>Saurida normani</i>	Shortjaw lizardfish
<i>Scomberomorus cavalla</i>	King mackerel
<i>Scomberomorus maculatus</i>	Spanish mackerel
<i>Sconsia striata</i>	Royal bonnet
<i>Scorpaena agassizii</i>	Longfin scorpionfish
<i>Scorpaena brasiliensis</i>	Barbfish
<i>Scorpaena calcarata</i>	Smoothhead scorpionfish
<i>Scyllarides nodifer</i>	Ridged slipper lobster

Scyllarus chacei	Chace slipper lobster
Scyllarus depressus	Scaled slipper lobster
Selar crumenophthalmus	Bigeye scad
Selene setapinnis	Atlantic moonfish
Selene vomer	Lookdown
Seriola dumerili	Greater amberjack
Seriola zonata	Banded rudderfish
Serraniculus pumilio	Pygmy sea bass
Serranus atrobranchus	Blackear bass
Serranus notospilus	Saddle bass
Serranus phoebe	Tattler
Serranus subligarius	Belted sandfish
Sicyonia brevirostris	Brown rock shrimp
Sicyonia burkenroadi	Spiny rock shrimp
Sicyonia dorsalis	Lesser rock shrimp
Sicyonia typica	Kinglet rock shrimp
Speocarcinus lobatus	Gulf squareback crab
Sphoeroides dorsalis	Marbled puffer
Sphoeroides nephelus	Southern puffer
Sphoeroides parvus	Least puffer
Sphoeroides spengleri	Bandtail puffer
Sphyraena borealis	Northern sennet
Sphyraena guachancho	Guachanche barracuda
Sphyrna tiburo	Bonnethead
Spondylus americanus	Atlantic thorny oyster
Squatina dumeril	Sand devil
Squilla chydrea	Offshore mantis shrimp
Squilla deceptrix	Mantis shrimp
Squilla empusa	Mantis shrimp
Squilla neglecta	Mantis shrimp
Squilla rugosa	Mantis shrimp
Steindachneria argentea	Luminous hake
Stellifer lanceolatus	Star drum
Stenocionops coelatus	Spider crab species
Stenocionops furcatus	Furcate spider crab
Stenocionops spinimanus	Prickly spider crab
Stenorhynchus seticornis	Yellowline arrow crab
Stenotomus caprinus	Longspine porgy
Styela plicata	Wrinkled sea squirt
Stylocidaris affinis	Pencil urchin
Syacium gunteri	Shoal flounder
Syacium papillosum	Dusky flounder
Symphurus civitatum	Offshore tonguefish
Symphurus diomedeanus	Spottedfin tonguefish

Symphurus plagiusa	Blackcheek tonguefish
Symphurus urospilus	Spottail tonguefish
Synodus foetens	Inshore lizardfish
Synodus intermedius	Sand diver
Synodus poeyi	Offshore lizardfish
Tamoya haplonema	Box jelly
Tethyaster grandis	Sea star
Tonna galea	Giant tun
Trachinocephalus myops	Snakefish
Trachurus lathami	Rough scad
Trichiurus lepturus	Atlantic cutlassfish
Trichopsetta ventralis	Sash flounder
Upeneus parvus	Dwarf goatfish
Urophycis cirrata	Gulf hake
Urophycis floridana	Southern hake
Urophycis regia	Spotted hake
Xiphopenaeus kroyeri	Atlantic seabob
Alosa aestivalis	Blueback herring
Alosa pseudoharengus	Alewife
Alosa sapidissima	American shad
Amblyraja radiata	Thorny skate
Ammodytes dubius	Northern sand lance
Anarhichas lupus	Atlantic wolffish
Argentina silus	Atlantic argentine
Brosme brosme	Cusk
Cancer borealis	Jonah crab
Cancer irroratus	Atlantic rock crab
Carcharhinus plumbeus	Sandbar shark
Citharichthys arctifrons	Gulf stream flounder
Clupea harengus	Atlantic herring
Conger oceanicus	Conger eel
Crustacea shrimp	Crustaceans
Cryptacanthodes maculatus	Wrymouth
Cyclopterus lumpus	Lumpfish
Cynoscion regalis	Weakfish
Dasyatis centroura	Roughtail stingray
Dasyatis say	Bluntnose stingray
Dipturus laevis	Barndoor skate
Enchelyopus cimbrius	Fourbeard rockling
Gadus morhua	Atlantic cod
Geryon (Chaceon) quinquedens	Red deepsea crab
Glyptocephalus cynoglossus	Witch flounder
Gymnura altavela	Spiny butterfly ray
Helicolenus dactylopterus	Blackbelly rosefish

Hemitripterus americanus	Sea raven
Hippoglossoides platessoides	American plaice
Hippoglossus hippoglossus	Atlantic halibut
Homarus americanus	American lobster
Illex illecebrosus	Northern shortfin squid
Lepophidium profundorum	Fawn cusk-eel
Leucoraja erinacea	Little skate
Leucoraja garmani	Rosette skate
Leucoraja ocellata	Winter skate
Limanda ferruginea	Yellowtail flounder
Limulus polyphemus	Horseshoe crab
Lithodes maja	Norway king crab
Lophius americanus	Goosefish
Zoarces americanus	Ocean pout
Malacoraja senta	Smooth skate
Melanogrammus aeglefinus	Haddock
Menticirrhus saxatilis	Northern kingfish
Merluccius albidus	Offshore hake
Merluccius bilinearis	Silver hake
Myliobatis freminvillei	Bullnose ray
Myoxocephalus octodecemspinosus	Longhorn sculpin
Myxine glutinosa	Atlantic hagfish
Ovalipes ocellatus	Lady crab
Ovalipes stephensoni	Coursehand lady crab
Pandalus borealis	Northern shrimp
Paralichthys dentatus	Summer flounder
Paralichthys oblongus	American fourspot flounder
Peprilus triacanthus	American butterfish
Peristedion miniatum	Armored searobin
Placopecten magellanicus	Sea scallop
Pollachius virens	Pollock
Prionotus carolinus	Northern searobin
Prionotus evolans	Striped searobin
Pseudopleuronectes americanus	Winter flounder
Scomber scombrus	Atlantic mackerel
Scomberesox saurus	Atlantic saury
Scophthalmus aquosus	Windowpane
Scyliorhinus retifer	Chain catshark
Sebastes fasciatus	Acadian redfish
Sphoeroides maculatus	Northern puffer
Squalus acanthias	Spiny dogfish
Stenotomus chrysops	Scup
Tautoglabrus adspersus	Cunner
Triglops murrayi	Moustache sculpin

Phycis chesteri	Longfin hake
Urophycis chuss	Red hake
Urophycis tenuis	White hake
Zenopsis conchifer	Silvery john dory
Menidia menidia	Atlantic silverside
Petromyzon marinus	Sea lamprey
Aetobatus narinari	Spotted eagle ray
Anchoa spp.	Anchovy
Archosargus probatocephalus	Sheepshead
Brevoortia smithi	Yellowfin menhaden
Brevoortia tyrannus	Atlantic menhaden
Callinectes ornatus	Shelligs
Cynoscion nothus	Silver seatrout
Dasyatis americana	Southern stingray
Dasyatis sabina	Atlantic stingray
Eucinostomus spp.	Mojarras
Gibbesia neglecta	Lesser mantis shrimp
Gymnura micrura	Smooth butterfly ray
Libinia spp.	Spider crabs
Loligo spp.	Loligo squids
Menippe mercenaria	Florida stone crab
Menticirrhus littoralis	Gulf kingfish
Mobula hypostoma	Devil ray
Pagurus pollicaris	Gray hermit crab
Pogonias cromis	Black drum
Rachycentron canadum	Cobia
Stenotomus spp.	Porgies
Trachinotus carolinus	Florida pompano
Trinectes maculatus	Hogchoker
Pagurus longicarpus	Longwrist hermit crab
Rimapenaeus constrictus	Roughneck shrimp
Sphyrna lewini	Scalloped hammerhead
Alectis ciliaris	African pompano
Hyleurochilus geminatus	Crested blenny
Acanthephyra curtirostris	Peaked shrimp
Acesta sphoni	Limid clam sp.
Actinauge verrilli	Reticulate anemone
Agonopsis vulsa	Northern spearnose poacher
Alepocephalus tenebrosus	California slickhead
Allosmerus elongatus	Whitebait smelt
Ampheraster marianus	Na
Anisodoris nobilis	Pacific sea-lemon
Anoplogaster cornuta	Common fangtooth
Anthomastus ritteri	Na

<i>Anthopleura xanthogrammica</i>	Giant green anemone
<i>Anthoptilum grandiflorum</i>	Sea pen
<i>Antimora microlepis</i>	Finescale mora
<i>Apristurus brunneus</i>	Brown cat shark
<i>Apristurus kampae</i>	Longnose catshark
<i>Argentina sialis</i>	Pacific argentine
<i>Argyropelecus affinis</i>	Pacific hatchet fish
<i>Aristostomias scintillans</i>	Shiny loosejaw
<i>Armina californica</i>	California armina
<i>Asterina miniata</i>	Na
<i>Asteronyx longifissus</i>	Na
<i>Asteronyx loveni</i>	Na
<i>Astropecten armatus</i>	Spiny sand star
<i>Astropecten verilli</i>	California sand star
<i>Avocettina infans</i>	Avocet snipe eel
<i>Bathybembix bairdii</i>	Na
<i>Bathylagus milleri</i>	Na
<i>Bathylagus pacificus</i>	Slender blacksmelt
<i>Bothrocara brunneum</i>	Twoline eelpout
<i>Brisaster townsendi</i>	Na
<i>Brisingella exilis</i>	Na
<i>Brissopsis pacifica</i>	Na
<i>Calinaticina oldroydii</i>	Oldroyd's fragile moon snail
<i>Cancer anthonyi</i>	Yellow rock crab
<i>Cancer gracilis</i>	Graceful rock crab
<i>Cancer productus</i>	Red rock crab
<i>Careproctus cypselurus</i>	Falcate snailfish
<i>Careproctus gilberti</i>	Smalldisk snailfish
<i>Cataetyx rubrirostris</i>	Rubynose brotula
<i>Centroscyllium nigrum</i>	Combtooth dogfish
<i>Cephaloscyllium ventriosum</i>	Swell shark
<i>Chesnonia verrucosa</i>	Warty poacher
<i>Chiasmodon niger</i>	Black swallower
<i>Chilara taylori</i>	Spotted cusk-eel
<i>Chionoecetes tanneri</i>	Grooved tanner crab
<i>Chiroteuthis calyx</i>	Na
<i>Chitonotus pugetensis</i>	Roughback sculpin
<i>Chrysaora fuscens</i>	Pacific sea nettle
<i>Chrysaora melanaster</i>	Na
<i>Citharichthys sordidus</i>	Pacific sanddab
<i>Citharichthys xanthostigma</i>	Longfin sanddab
<i>Coryphaenoides acrolepis</i>	Pacific grenadier
<i>Coryphaenoides cinereus</i>	Popeye grenadier
<i>Cryptopeltaster lepidonotus</i>	Na

<i>Cymatogaster aggregata</i>	Shiner perch
<i>Delectopecten vancouverensis</i>	Vancouver scallop
<i>Dermasterias imbricata</i>	Leather star
<i>Dipsacaster eximius</i>	Na
<i>Doryteuthis (Loligo) opalescens</i>	California market squid
<i>Dromalia alexandri</i>	Na
<i>Elassodiscus caudatus</i>	Blackbelly snailfish
<i>Embassichthys bathybius</i>	Deep-sea sole
<i>Engraulis mordax</i>	Northern anchovy
<i>Enophrys taurina</i>	Bull sculpin
<i>Eptatretus deani</i>	Black hagfish
<i>Eptatretus stoutii</i>	Pacific hagfish
<i>Eualus macrophthalmus</i>	Bigeye eulid
<i>Euspira lewisii</i>	Lewis' moon snail
<i>Facciolella gilbertii</i>	Dogface witch-eel
<i>Galeorhinus galeus</i>	Tope shark
<i>Genyonemus lineatus</i>	White croaker
<i>Glyptolithodes cristatipes</i>	Peruvian centolla
<i>Gonatus onyx</i>	Clawed armhook squid
<i>Halocynthia igaboja</i>	Bristly tunicate
<i>Hemilepidotus spinosus</i>	Brown irish lord
<i>Heterozonias alternatus</i>	Sea star
<i>Hexanchus griseus</i>	Bluntnose sixgill shark
<i>Hippasteria californica</i>	Californian spiny star
<i>Hippasteria spinosa</i>	Spiny star
<i>Hippoglossina stomata</i>	Bigmouth flounder
<i>Histioteuthis heteropsis</i>	Na
<i>Histioteuthis hoylei</i>	Flowervase jewell squid
<i>Holothuroidea spp.</i>	Sea cucumbers
<i>Icelinus burchami</i>	Dusky sculpin
<i>Icelinus filamentosus</i>	Threadfin sculpin
<i>Icelinus fimbriatus</i>	Fringed sculpin
<i>Icichthys lockingtoni</i>	Medusafish
<i>Idiacanthus antrostomus</i>	Pacific blackdragon
<i>Japetella diaphana</i>	Diaphanous pelagic octopod
<i>Leptocottus armatus</i>	Pacific staghorn sculpin
<i>Leuroglossus stilbius</i>	California smoothtongue
<i>Liponema brevicornis</i>	Tentacle shedding anemone
<i>Lithodes couesi</i>	Scarlet king crab
<i>Lophaster furcilliger</i>	Na
<i>Lophaster vexator</i>	Na
<i>Loxorhynchus crispatus</i>	Moss crab
<i>Loxorhynchus grandis</i>	Sheep crab
<i>Luidia foliolata</i>	Sand star

<i>Lycenchelys camchatica</i>	Na
<i>Lycenchelys crotalinus</i>	Snakehead eelpout
<i>Lycodapus endemoscotus</i>	Deepwater slipskin
<i>Lycodapus mandibularis</i>	Pallid eelpout
<i>Lycodes cortezianus</i>	Bigfin eelpout
<i>Lycodes diapterus</i>	Black eelpout
<i>Lytechinus anamesus</i>	White sea urchin
<i>Mediaster tenellus</i>	Na
<i>Metridium farcimen</i>	Gigantic anemone
<i>Moroteuthis robusta</i>	Robust clubhook squid
<i>Munida hispida</i>	Squat lobster sp.
<i>Mustelus henlei</i>	Brown smooth-hound
<i>Myliobatis californica</i>	Bat eagle ray
<i>Myxoderma platyacanthum</i>	Sea star
<i>Myxoderma sacculatum</i>	Na
<i>Nearchaster aciculosus</i>	Na
<i>Nemichthys scolopaceus</i>	Slender snipe eel
<i>Neognathophausia</i> sp.	Na
<i>Neognathophausia gigas</i>	Na
<i>Neognathophausia ingens</i>	Giant red mysid
<i>Neolithodes diomedea</i>	Na
<i>Nezumia liolepis</i>	Smooth grenadier
<i>Nezumia stelgidolepis</i>	California grenadier
Octopodidae spp.	Octopuses
<i>Octopoteuthis deletron</i>	Octopus squid
<i>Octopus californicus</i>	North pacific bigeye octopus
<i>Octopus rubescens</i>	East pacific red octopus
<i>Ophiomusium jolliensis</i>	Na
<i>Oractis diomedea</i>	Na
<i>Paguristes turgidus</i>	Hermit crab
<i>Pandalopsis ampla</i>	Deepwater bigeye
<i>Pannychia moseleyi</i>	Na
<i>Paractinostola faeculenta</i>	Hobnail vase anemone
<i>Paralichthys californicus</i>	California flounder/halibut
<i>Paraliparis cephalus</i>	Swellhead snailfish
<i>Paraliparis dactylosus</i>	Red snailfish
<i>Paralithodes californiensis</i>	California king crab
<i>Paralithodes rathbuni</i>	Na
<i>Paralomis multispina</i>	Na
<i>Parastichopus californicus</i>	Giant california sea cucumber
<i>Parastichopus leukothele</i>	Giant orange sea cucumber
<i>Parmaturus xaniurus</i>	Filetail catshark
<i>Pasiphaea tarda</i>	Crimson pasiphaeid
<i>Pennatula phosphorea</i>	Phosphorescent sea pen

Peprilus simillimus	Pacific pompano
Periphylla periphylla	Na
Philine bakeri	Na
Physiculus rastrelliger	Hundred fathom mora
Pisaster brevispinus	Giant pink sea star
Platymera gaudichaudii	Armed box crab
Pleurobranchaea californica	Sea slug
Pleuronichthys decurrens	Curlfin sole
Pleuronichthys verticalis	Hornyhead turbot
Polycheles sculptus	Blind lobsters
Porichthys notatus	Plainfin midshipman
Pseudarchaster alascensis	Alaskan scarlet star
Pseudostichopus mollis	Sandy sea cucumber
Psolus squamatus	White creeping pedal sea cucumber
Pteraster jordani	Jordan's cushion star
Pugettia richii	Cryptic kelp crab
Purple striated anemone	Purple striated anemone
Radulinus asprellus	Slim sculpin
Beringraja inornata	California skate
Beringraja stellulata	Starry skate
Rathbunaster californicus	Deep-sea sun star
Red striated anemone	Na
Ronquilus jordani	Northern ronquil
Sagamichthys abei	Shining tubeshoulder
Sardinops sagax	South american pilchard
Scomber japonicus	Chub mackerel
Scorpaena guttata	California scorpionfish
Sebastes auriculatus	Brown rockfish
Sebastes aurora	Aurora rockfish
Sebastes caurinus	Copper rockfish
Sebastes chlorostictus	Greenspotted rockfish
Sebastes constellatus	Starry rockfish
Sebastes dallii	Calico rockfish
Sebastes ensifer	Swordspine rockfish
Sebastes eos	Pink rockfish
Sebastes goodei	Chilipepper
Sebastes hopkinsi	Squarespot rockfish
Sebastes jordani	Shortbelly rockfish
Sebastes levis	Cowcod
Sebastes melanostomus	Blackgill rockfish
Sebastes paucispinis	Bocaccio
Sebastes rosaceus	Rosy rockfish
Sebastes rosenblatti	Greenblotched rockfish
Sebastes rubrivinctus	Flag rockfish

Sebastes rufus	Bank rockfish
Sebastes saxicola	Stripetail rockfish
Sebastes semicinctus	Halfbanded rockfish
Sebastes miniatus and S. crocotulus	Vermillion and Sunset rockfish
Sebastes umbrosus	honeycomb rockfish
Sebastobus altivelis	Longspine thornyhead
Sergestes similis	Midwater shrimp
Sicyonia ingentis	Ridgeback rock shrimp
Solaster exiguus	Na
Spatangus californicus	Na
Spirinchus starksi	Night smelt
Squatina californica	Pacific angelshark
Stomias atriventer	Black-belly dragonfish
Synodus lucioceps	California lizardfish
Tactostoma macropus	Longfin dragonfish
Talismania bifurcata	Threadfin slickhead
Taonius pavo	Na
Tarletonbeania crenularis	Blue lanternfish
Thetys vagina	Virgin salpa
Thrissacanthias penicillatus	Sea star
Torpedo californica	Pacific electric ray
Trachurus symmetricus	Jack mackerel
Urticina columbiana	Crusty red anemone
Urticina crassicornis	Mottled anemone
Vampyroteuthis infernalis	Vampire squid
Xeneretmus latifrons	Blacktip poacher
Xystreurys liolepis	Fantail flounder
Zalembeius rosaceus	Pink seaperch
Zaniolepis frenata	Shortspine combfish
Zaniolepis latipinnis	Longspine combfish
Sagenaster evermanni	Sea star