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Diet of Nineteen Mesopelagic Fishes in the Gulf of Alaska

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U.S. DEPARTMENT OF COMMERCE
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ABSTRACT

A total of 1,607 stomachs from 19 species were analyzed to describe the food habits of the mesopelagic fishes in the Gulf of Alaska in 2007. Longfin dragonfish (*Tactostoma macropus)*, Pacific viperfish (*Chauliodus macouni*), scaly wearyfish (*Scopelosaurus adleri*), Alaska dreamer (*Oneirodes thompsoni*), and northern pearleye (*Benthalbella dentata*) were the main piscivores observed. Myctophids were the dominant prey fish. Garnet lampfish (*Stenobrachius nannochir*), bigeye lanternfish (*Protomyctophum thompsoni*), brokenline lanternfish (*Lampanyctus jordani*), highsnout bigscale (*Melamphaes lugubris*), shining tubeshoulder (*Sagamichthys abei*), and northern lampfish (*Stenobrachius leucopsarus*), fed mainly on calanoid copepods. Blue lanternfish (*Tarletonbeania crenularis*) and bluethroat argentine (*Nansenia candida*), fed mainly on larvaceans. California headlightfish (*Diaphus theta)*, northern smoothtongue (*Leuroglossus schmidti*), Bathylagidae, and crested bigscale (*Poromitra curilensis*) ate different combinations of larvacean, euphausiids, calanoids, ostracods, gastropods, and chaetognaths. Pinpoint lampfish (*Nannobrachium regale*) consumed large amounts of shrimp and cephalopods. Barreleye (*Macropinna microstoma*) fed only on jellyfish.

CONTENTS

INTRODUCTION

Mesopelagic (200 – 1,000 m depth) fishes include lanternfish (Myctophidae), deep-sea smelts (Bathylagidae), bigscale (Melamphaidae), viperfish (Stomiidae), spookfish (Opisthoproctidae), longfin dragon (Stomiidae), pearleye (Scopelarchidae), tubeshoulder (Platytroctidae), and anglerfish (Oneirodidae). They may have unusual adaptations to life in deepwater such as luminescent organs (photophores), fangs, anglers on their heads, or barrel eyes. They are usually less than 15 cm long and have no commercial value. Therefore, little attention has been focused on them. However, they are an important part of marine ecosystems (Sinclair and Stabeno 2002, Uchikawa et al. 2008, Raring and Stevenson 2010), and they play an important role as food for many marine fishes (Yang et al. 2006), seabirds (Vermeer and Devito 1988), and marine mammals (Kajimura and Loughlin 1988, Zeppelin and Ream 2006). They are, in turn, the primary consumers of zooplankton, euphausiids, larval, and juvenile fishes, and squids (Beamish et al. 1999). Sinclair and Stabeno (2002) pointed out that the nekton of the mesopelagic zone played an important role in the transport and redistribution of the organic matter from the rich surface waters to the benthos in the oceans. The total biomass of mesopelagic fishes appears to be large relative to the total catches of other fish in the same areas (Beamish et al. 1999).

Global warming and the ice retreat in the Arctic area may create dramatic changes of the ecosystem. The large biomass of mesopelagic fishes present there may eventually attract commercial interest. Therefore, it is important to learn more about the biology and ecology of mesopelagic fishes and their relationships with other species.

Most studies about the mesopelagic fishes in the North Pacific have focused on myctophids, primarily *Stenobrachius leucopsarus*, *Stenobrachius nannochir*, *Lampanyctus jordani*, and *Diaphus theta* in the western North Pacific (Moku et al. 2000, Sassa and Kawaguchi 2005, Uchikawa et al. 2008) and Bering Sea (Balanov 1994). However, little is known of the diets of the mesopelagic fishes in the Gulf of Alaska. The objective of this study is to compare the diets of 19 mesopelagic species in the Gulf of Alaska. Diet variations at different depths and diel variations are also discussed.

METHODS

Stomach Collection and Stomach Contents Analysis

In 2007, scientists from the Alaska Fisheries Science Center (AFSC) conducted a mesopelagic survey on board the NOAA ship *Miller Freeman* in the central Gulf of Alaska. The study was conducted from 31 March to 6 April in the area along the 1,500 m isobath between the eastern edge of Kodiak Island and the eastern edge of Prince William Sound (Fig. 1).

The sampling gear for the mesopelagic survey was a 30/26 Aleutian wing trawl equipped with a 1.2 cm stretched-mesh liner in the codend. The headrope and footrope each measured 81.7 m. Mesh size tapered from 3.25 m stretched-mesh at the forward end of the trawl to 0.1 m forward of the codend. The net was spread using 5 m^2, 1,247-kg steel doors. Midwater trawl tows were performed at six stations (Fig. 1) and targeted the 250 m, 500 m, and 1,000 m depth at each station. Day (1000 – 1800 ADT) and night (2200 – 0600) tows at each depth in each station were executed. The net was towed at a constant speed of 3 knots for 30 minutes. Because the net used was not designed for

discrete depth sampling, specimens from a given haul may not have been caught at the target depth. However, every effort was made to minimize sample contamination by deploying and retrieving the net as quickly as possible (Raring and Stevenson 2010).

After retrieving the trawl, the catch was sorted to species, counted, and weighed. For each species, 15 whole fish specimens were put in a large muslin or plastic bag along with a label indicating vessel, cruise, haul, species name, and number collected. The bags were then put in a 5 gallon bucket with 10% buffered formalin solution.

When the whole fish specimens arrived in the laboratory, they were transferred into 70% ethanol before the stomach contents were analyzed. Stomachs were excised in the lab. Each stomach was cut open; the contents were removed and gently blotted with a paper towel. The wet weight was recorded to the nearest 0.001 g. After obtaining the total weight for a stomach's contents, the contents were placed in a Petri dish and examined under a microscope. Each prey item was classified to the lowest practical taxonomic level. The prey items were weighed and enumerated whenever possible. If the prey items were too small (e.g., less than 0.001 g) to be weighed, the percent volume of these prey items was visually estimated and then converted to prey weights. Standard lengths of prey fishes were recorded.

Data Analysis

The general diet of each species was analyzed to show the percent frequency of occurrence and the percent total weight of each prey item in the stomach. Diet variations (percent weight) within each species were analyzed by each of the three depths (250 m,

500 m, and 1,000 m) and each of the two towing-modes (day-tow and night-tow), when data were available. Diet overlaps were analyzed among all the species.

RESULTS and DISCUSSION

Northern Lampfish

Northern lampfish (*Stenobrachius leucopsarus*) and its congener, the garnet lampfish (*S. nannochir*), are morphologically similar species, but the northern lampfish is much more abundant in the Gulf of Alaska area (Raring and Stevenson 2010).

Of the 210 specimens collected in 14 hauls, 110 had food in their stomachs and 100 had empty stomachs. Specimens were collected from 250 m to 1,052 m depth. The average fork length (FL) for specimens with food was 10.1 $\pm$ 0.93 cm (range 7.0 – 12.0 cm). Calanoid copepods comprised the highest amount (53%) of the total stomach contents weight (Table 1a), while *Pleuromamma* sp. was the most frequently occurring (32%) prey species. Other prey items included euphausiids (36%), ostracods (3%), chaetognaths (1%), and larvaceans (1%).

Table 1b lists the prey items of the northern lampfish collected at different depths (250 m, 500 m, or 1,000 m) and at different times (day or night). At the 250 m depth, no stomachs were collected during daytime, whereas 47% of the stomachs collected at night were empty. At 500 m 52% and 56% of stomach were empty, in day and night samples, respectively. In 1,000 m depth samples, northern lampfish had less empty stomachs in night collections (33%) than day collections (67%). This is probably because northern lampfish fed more at night. Euphausiids were only found in the northern lampfish stomachs collected at night at the 500 m and 1,000 m depths tows.

Moku et al. (2000) noted that northern lampfish (in the western North Pacific) fed mainly on euphausiids, *Neocalanus* sp., and amphipods. Sobolevskii and Senchenko (1996) also found that northern lampfish (in eastern Kamchatka) fed mainly on euphausiids (87% by weight), copepods (7%), and amphipods (5%).

Northern lampfish and garnet lampfish are congeneric species; however, the diets of these two species were quite different. The main difference in diets between northern lampfish and garnet lampfish (see detailed description below) was the lack of euphausiids in the stomachs of garnet lampfish. This is because garnet lampfish did not migrate to the shallower depths at night and euphausiids were only found in the stomachs of northern lampfish collected at night.

Garnet Lampfish

Garnet lampfish (*Stenobrachius nannochir*) and its congeneric species, the northern lampfish (*S. leucopsarus*) are morphologically similar species. They both occurred in the western North Pacific, Kurile-Kamchatka area, Bering Sea, and Gulf of Alaska (Pearcy et al. 1979). However, the northern lampfish is much more abundant in the Gulf of Alaska (Raring and Stevenson 2010).

A total of 28 garnet lampfish specimens were collected from five hauls. Nine specimens had food in their stomachs and 19 were empty. Specimens were collected from four hauls that were deeper than 750 m and one haul that was 488 m. The average fork length for the fish with food was 11.3 $\pm$ 0.71 cm (range 10.0 – 12.0 cm). *Neocalanus* sp. comprised the majority by weight (74%) of the total stomach contents of garnet lampfish (Table 2a). Other prey items included unknown calanoids (15%), *Euchaeta* sp. (9%), and ostracods (3%).

No diet variations by depth or by time were found for *S. nannochir* collected from 500 m and 1,000 m. Calanoid copepods made up more than 95% of the total stomach contents of *S. nannochir* collected from either 500 m or 1,000 m deep, during the day or night (Table 2b). No empty stomachs were found in the 500 m depth collection. However, the sample size was too small (N=3) to verify this finding. In the 1,000 m depth, either in day-tow or night-tow, about 75% of the stomachs were empty. This is probably because the garnet lampfish did not migrate to shallower water to feed (Gorbatenko and Il'inskii 1992).

Balanov et al. (1994) found that, in the Bering Sea area, garnet lampfish fed mainly on calanoid copepods, euphausiids, and chaetognaths. Moku et al. (2000) found that copepods, including *Neocalanus* sp., *Pleuromamma* sp., and *Metridia* sp., were the most important food of garnet lampfish in the North Pacific. No euphausiids were found in *S. nannochir*, but euphausiids constituted 36% of the total stomach contents weight of *S. leucopsarus*. Gorbatenko and Il'inskii (1992) also did not find euphausiids in the stomachs of *S. nannochir*. They pointed out that *S. nannochir* did not migrate to the epipelagic layer (0-200 m) at night and usually stayed in the deeper area, whereas *S. leucopsarus* did migrate to the upper layer at night. Peden et al. (1985) found that hauls in northeastern North Pacific from below 500 m captured proportionally many more *S. nannochir* than *S. leucopsarus*.

The main difference between diets of garnet lampfish and northern lampfish was the lack of euphausiids in the stomachs of garnet lampfish since they don't migrate to the upper water column at night.

Pinpoint Lampfish

The pinpoint lampfish (*Nannobrachium regale*) has the smallest photophores within the Family Myctophidae; however, it is the largest myctophid in Alaska. It can reach a length of 20 cm (from this study). In the Alaskan waters, pinpoint lampfish were found in the Bering Sea, Gulf of Alaska, and the Aleutian Islands (Mecklenburg et al. 2002). Out of the 160 specimens collected from 11 hauls, 26 specimens had food, and 134 were empty. The average fork length of the 26 specimens was 13.9 $\pm$ 1.88 cm (range 10.0-18.0 cm). Shrimp (mainly *Hymenodora frontalis*) made up the highest amount (45%) of the total stomach contents weight (Table 3a). Cephalopods (32%), mysids (9%), and fish (9%) were also important food of pinpoint lampfish. *Neocalanus cristatus* occurred most frequently (19%) in the stomachs of pinpoint lampfish, but they accounted for only 3% of the total stomach contents weight.

A high proportion ($\geq$ 80%) of pinpoint lampfish had empty stomach at all depths (either from day or night tows) (Table 3b). There were four specimens (all empty) collected from a night tow at 250 m deep (not shown in Table 3b). A high percentage (67%) of mysids was found in the stomachs collected during daytime at 500 m. Unidentified fish were found mainly in the stomachs collected during the nighttime at both 500 m and 1,000 m deep (46% and 5% of the total stomach contents weight, respectively). Shrimp were found in the stomachs of pinpoint lampfish collected from the 1,000 m depth, both during day and night tows (19% and 51%, respectively). Cephalopods were not found to occur frequently in the stomachs, but they comprised 31% of the total stomach contents weight of the specimens collected during the daytime tow from the 1,000 m depth.

The diet of pinpoint lampfish has not been studied in many areas; however, Collard (1970) reported a specimen from California that fed mainly on euphausiids.

California Headlightfish

The California headlightfish (*Diaphus theta*) is a small myctophid. The maximum length is about 10 cm FL (this study). Of the 206 specimens collected from 18 hauls, 192 had food, and 14 were empty. The average length of specimens with food was 7.7 $\pm$ 0.66 cm FL (range 6.0-10.0 cm). Larvaceans comprised the highest amount (41%) of the total stomach contents weight (Table 4a). Calanoid copepods (19%), euphausiids (18%), pteropods (9%) and myctophid (5%) were also important prey of California headlightfish. California headlightfish had the most diverse prey items (50 different prey items in total) among the species studied, followed by bluethroat argentine (31 prey items), *Poromitra curilensis* (30 prey items), northern smoothtongue and Bathylagidae (each had 28 different prey items), bigeye lanternfish (25 prey items) and northern lampfish (24 prey items).

Moku et al. (2000) reported that California headlightfish, in the western North Pacific, fed mainly on euphausiids, copepods (mainly *Metridia* sp. and *Neocalanus* sp.) and amphipods. Sobolevskii and Senchenko (1996) also found that euphausiids (72% by weight) and hyperiids (19%) were important food of California headlightfish in the eastern Kamchatka.

Larvaceans made up a high percentage (about 45%) of the stomach contents of California headlightfish collected in the 250 m deep area (Table 4b). Euphausiids were a more important prey item for the fish collected at 500 m and 1,000 (especially at night tow) than at 250 m. The night-tow data shows that 7%, 12%, and 14% of the specimens collected in the 250 m, 500 m,

and 1,000 m depth, respectively had empty stomachs. The proportion of empty stomachs increased with depth.

Bigeye Lanternfish

The bigeye lanternfish (*Protomyctophum thompsoni*) is a small myctophid (≤ 7 cm; Hart 1973). It occurs off Baja California, Oregon, and Washington, and in the Gulf of Alaska, Bering Sea, and Kuril-Kamchatka Islands (Hart 1973). In this study, 59 specimens were collected from nine hauls; 57 specimens had food and 2 were empty. The average length of specimens with food was 4.7 ± 0.69 cm FL (range 3.0 – 6.0 cm). Calanoid copepods comprised the highest amount (72%) of the total stomach contents weight (Table 5a). Euphausiids (18%) and amphipods (9%) were also important prey of bigeye lanternfish.

More bigeye lanternfish were collected from day tows (52) than from night tows (7), and more were collected from the 250 m and 500 m than 1,000 m depths. Only one stomach with food was collected from the 1,000 m depth in a night tow (Table 5b). The diet of bigeye lanternfish did not vary much between 250 m and 500 m. Specimens captured at both depths consumed a large amount of calanoid copepods and some euphausiids. Calanoids were the only prey item found in the stomachs of bigeye lanternfish caught in the 1,000 m depth at night. However, the small sample size (N = 2) in the 1,000 m collection needs to be taken into account.

Sassa and Kawaguchi (2005) found that the most important prey for bigeye lanternfish larvae (≤ 7.9 mm) were nauplii and *Oithona* spp., which were replaced by calanoid copepodites and ostracods as bigeye lanternfish size increased. Watanabe et al. (1999) found the bigeye lanternfish was not a vertical migrator.

Brokenline Lanternfish

Brokenline lanternfish (*Lampanyctus jordani*) occurs across the North Pacific from Japan through the subarctic realm, and in the Okhotsk Sea, Aleutian Islands, and the Gulf of Alaska (Uchikawa et al. 2008, Mecklenburg et al. 2002).

A total of nine specimens were collected: four (44%) were empty and five had food in their stomachs. Because of the small sample size (9), all stomach contents data were combined for the diet analysis. The average length for the specimens with food was 11.2 $\pm$ 0.84 cm FL with a range between 10 and 12 cm. About 62% of the total stomach contents weight comprised copepods, of which *Neocalanus cristatus* made up the highest percentage (36%) (Table 6a). *Primno macropa* (hyperiid amphipod) constituted 29% of the diet of the fish. Ostracods were common prey and occurred in 60% of all brokenline lanternfish, but they accounted for only 4% of the total stomach contents weight.

No diet variations by depth and time were observed for the brokenline lanternfish since the sample sizes were too small (Table 6b). Uchikawa et al. (2008) found that, in the continental slope off the Tohoku area in northern Japan, *Lampanyctus jordani* fed mainly on crustaceans like copepods, amphipods, euphausiids, and decapods.

Blue Lanternfish

A total of three specimens of blue lanternfish (*Tarletonbeania crenularis*) were collected. The fork lengths of all three blue lanternfish were 6 cm. The specimens were collected from one haul made at 250 m during a day tow on 2 April, 2007. Diet of these three blue lanternfish consisted of 91% (by weight) larvaceans, 3% calanoid copepods *Metridia* sp., 3% hyperiid amphipods, and 3% euphausiids (Table 7). Aughtry (1953) found that blue lanternfish around Pebble Beach, California, fed mainly on euphausiids.

Diet of blue lanternfish was very similar to that of blue argentine (see below). Larvaceans made up a high percentage of the total stomach contents weight of blue lanternfish and blue argentine (91% and 88%, respectively).

Highsnout Bigscale

There are two species of bigscale in the Gulf of Alaska; highsnout bigscale (*Melamphaes lugubris*) and crested bigscale[1] (*Poromitra curilensis*). The crested bigscale has been used in the past as the common name for *Poromitra crassiceps* in Alaskan waters. This species was recently identified as *P. curilensis* and it is believed that *P. crassiceps* is restricted to the Atlantic Ocean. In this study, we use the crested bigscale as the common name for the species, *P. curilensis*, found in the Gulf of Alaska. In general, highsnout bigscale is smaller than crested bigscale and the color is lighter. Highsnout bigscale reached a maximum size of 10 cm.

[1] D.E. Stevenson, Alaska Fisheries Science Center, 7600 Sand Point Way NE., Seattle, WA 98115. Pers. commun., September 2010.

There were 142 specimens of highsnout bigscale collected from 10 hauls: 141 specimens had food and only one was empty. The average length of the 141 specimens was 7.6 $\pm$ 0.89 cm FL (range 5.0 – 10.0 cm). Calanoid copepods comprised the highest amount (60%) of the total stomach contents weight (Table 8a). Chaetognaths made up only 12% of the total stomach contents weight, but they were the most frequently occurring (53%) food item found in the stomach samples. Euphausiids (6%), ostracods (6%), mysids (5%), shrimps (4%, mainly *Hymenodora* sp.), amphipods (1%), and pelagic polychaetes (1%) were also the prey of highsnout bigscale. All but one haul for highsnout bigscale were collected during night time, and all but one haul of the night collections were from 500 m and 1,000 m depths.

Day-tow data were only collected from the 1,000 m depth. Calanoid copepods comprised 60% of the total stomach contents weight (Table 8b). Night-tow data covered all three depths. Calanoid copepods were also important food of highsnout bigscale collected from night-tows. However, chaetognaths constituted a high proportion (33%) of the stomach contents of the highsnout bigscale collected at the 250 m depth from night-tows (Table 8b). Euphausiids were mainly found in the stomachs of highsnout bigscale collected at night at 1,000 m. They comprised 9% of the total stomach contents weight of that group. Out of 142 specimens, only one stomach collected from the 1,000 m depth at night was empty; all of the rest had food in them.

Crested bigscale is a similar species to highsnout bigscale. However, their diets were quite different. High percentage (about 60%) of calanoid copepods was found in highsnout bigscale diet, whereas calanoid copepods made up only 12% of the crested bigscale diet. Instead, crested

bigscale consumed relatively high percentages of larvaceans, chaetognaths, and fishes (15, 13, and 12%, respectively) (Table 12a).

Crested Bigscale

Two species, crested bigscale (*Poromitra curilensis*) and highsnout bigscale (*Melamphaes lugubris*), of the family Melamphaidae were collected in the AFSC's 2007 Gulf of Alaska mesopelagic survey. In general, the crested bigscale is larger than the highsnout bigscale. Crested bigscale reached a maximum 18 cm SL (Parin and Ebeling 1980). Out of 106 specimens collected from eight hauls, 54 had food in their stomachs and 52 were empty. The average length of the 54 specimens was 10.2 $\pm$ 1.08 cm FL (range 8.0-12.0 cm). Larvaceans made up the greatest amount (15%) of the total stomach contents weight (Table 9a). Chaetognaths (13%), calanoid copepods (12%), polychaetes (9%), ostracods (9%), and pelagic salps (7%) were also important prey of crested bigscale. Unknown fish accounted for 12% of the total stomach contents weight, but they were not the common prey of the crested bigscale (they only occurred in 2% of the stomachs examined). Day-tow specimens were only collected from the 1,000 m depth.

Diet of the crested bigscale collected from this category included mainly ostracods (35%) and larvaceans (33%). At night, at both the 500 m and 1,000 m depths, diets were mainly zooplankton such as salps, chaetognaths, and larvaceans (Table 9b). No specimens were collected from the 250 m depth. Fitch and Lavenberg (1968) noted that small crustaceans were the most abundant food found in crested bigscale stomachs they sampled.

Shining Tubeshoulder

Shining tubeshoulders (*Sagamichthys abei*) have a tube-like projection pointing posteriorly just above the pectoral fin. They occur throughout the north Pacific Ocean (Fitch and Lavenberg 1968). Of the 24 specimens collected in six hauls, 14 had food in their stomachs and 10 were empty (42%). The average length of the 14 specimens with food was 10.5 $\pm$ 3.48 cm FL (range 6.0-20.0 cm). *Neocalanus* sp. comprised the highest amount (48%) of the total stomach contents weight (Table 10a). Chaetognaths (27%), larvaceans (13%), and *Pleuromamma* sp. (5%) were also important prey of shining tubeshoulders. Fitch and Lavenberg (1968) found that shining tubeshoulder fed mainly on crustaceans.

Table 10b lists the prey items of the shining tubeshoulder collected at 500 m at different times (day or night). There were more empty stomachs collected during the night (56%) than the day (29%). *Neocalanus* sp. and chaetognaths comprised 84% of the diet of the shining tubeshoulder collected during the daytime, whereas larvacean made up the highest amount (75%) of the diet of the fish collected at night. One specimen with an empty gut was collected at the 1,000 m depth (not listed in Table 10b).

Bluethroat Argentine

The bluethroat argentine (*Nansenia candida*) belongs to the Family Microstomatidae. Microstomatidae and Bathylagidae, along with three other families, belong to the Suborder Argentinoidei. They are small (usually less than 30 cm), silvery fishes. The maximum length for bluethroat argentine is about 24 cm SL (Mecklenburg et al. 2002). In Alaskan waters, they are found in the Bering Sea and Gulf of Alaska, although the catch records are rare (Mecklenburg

et al. 2002). In this study, 84 specimens were collected from 11 hauls; 76 specimens had food and 8 were empty. The average length of the 76 specimens was 12.7 $\pm$ 1.17 cm FL (range 10.0 - 16.0 cm). Larvaceans made up the highest amount (89%) of the total stomach contents weight (Table 11a). Pteropods (4%) and euphausiids (2%) were also food of bluethroat argentine.

Bluethroat argentine specimens collected from different depths or times showed no large diet variations (Table 11b). Larvaceans were the dominant food (more than 82% by weight) of the bluethroat argentine. Less than 15% of the stomachs collected from 250 m and 500 m depth were empty; however, more empty stomachs (25%) were found in the sample collected at night at the 1,000 m depth.

Taylor (1967) reported that this species was taken by a midwater trawl off the Queen Charlotte Islands, British Columbia, but no diet information was included. Balanov and Fedorov (1996) also reported the occurrence of the bluethroat argentine in the Bering Sea, but they also did not provide diet data.

Northern Smoothtongue

The northern smoothtongue (*Leuroglossus schmidti*) belongs to the Family Bathylagidae (deepsea smelts). It has a pointed head, projecting lower jaw, and no teeth on the tongue. The maximum length is about 20 cm (Mecklenburg et al. 2002). Of the 130 specimens collected from 13 hauls, 88 had food and 42 were empty. The average length of the 88 specimens was 15.5 $\pm$ 1.01 cm FL (range 11.0-18.0 cm). Ostracods made up the highest amount (42%) of the total stomach contents weight (Table 12a). Larvaceans (36%), calanoid copepods (9%), and chaetognaths (6%) were also important food of northern smoothtongue.

Gorbatenko and Il'inskii (1992) found that northern smoothtongue in the Bering Sea area fed mainly on calanoid copepods (52% by weight), larvaceans (12%), euphausiids (7%), and chaetognaths (5%), whereas ostracods (contrary to our results) comprised only 1% of the total stomach contents weight.

Table 12b indicates that ostracods made up a high percentage of the stomach contents of northern smoothtongue collected at night, especially at the 250 m depth (63%). Larvaceans were the other important food of northern smoothtongue collected at all different depths. They comprised a high percentage ($\geq$ 69%) of the stomach contents weight of the specimens collected during the day at the 500 m and 1,000 m depths. Empty stomachs comprised 34% and 32% of the specimens collected in the day and night, respectively. More empty stomachs occurred when the sampling depth increased. It is important to note the small (5) sample size of specimens collected at 1,000 m in the day time.

Balanov et al. (1994) noted that northern smoothtongue came into the epipelagic zone at night and fed intensively in the upper mesopelagic zone at night and during the day.

Bathylagidae

Two dark bathylagid species, *Pseudobathylagus milleri* and *Bathylagus pacificus*, inhabit the Gulf of Alaska. They frequently occurred in the catch during the 2007 mesopelagic survey. We were not able to identify the specimens to the species taxonomic level; hence, we categorized them as unknown bathylagids in the Family Bathylagidae.

Out of 153 bathylagid specimens collected from 11 hauls, 71 had food in the stomachs, and 82 were empty. These bathylagids were mainly collected from the area deeper than 485 m and

only one haul was 250 m. The average length for the fish with food was 13.8 $\pm$ 2.75 cm FL (range 5.0-18.0 cm). Larvaceans comprised the highest amount (25%) of the total stomach contents weight of bathylagids (Table 13a). Other prey included calanoid copepods (19%), euphausiids (13%), amphipods (7%), and ostracods (5%). Fish and unknown mollusks (9% by weight, respectively) were also found in bathylagid stomachs, but they occurred less frequently in the stomachs (only 1% for each).

Larvacean were important ($\geq$ 30% by weight) food of bathylagids in the area between 250 m and 500 m in both day and night tows (Table 13b). Diet of bathylagids at the 1,000 m depth varied greatly depending on the collecting time. During the daytime, the diet included 34% mollusks, 35% cephalopods, and 19% calanoids. However, at night, the diet included 23% euphausiids, 16% larvaceans, and 16% amphipods, respectively. Empty stomachs increased as the sampling depth increased during the night tows. Empty stomachs were found in 20%, 47%, and 56% of the specimens collected at night from the depths 250 m, 500 m, and 1,000 m, respectively.

Balanov et al. (1994) found that *Bathylagus pacificus* fed mainly on jellyfish (24%), copepods (3%), and amphipods (3%) in the Bering Sea. Sobolevskii and Senchenko (1996) noted that jellyfish comprised high percentages (48% and 86% by weight) of the stomach contents of *Bathylagus pacificus* and *Pseudobathylagus milleri*, respectively. Calanoid copepods (16%) were also important food of *Bathylagus pacificus* in their study.

Northern Pearleye

The northern pearleye (*Benthalbella dentata)* is a small, compressed, elongate fish with large mouth and eyes with a glistening, pearly area on them. The maximum length is about

28 cm total length (Mecklenburg et al. 2002). Out of the 121 specimens collected from eight hauls, 11 specimens had food and 110 were empty. The average length of the 11 specimens was 15.1 $\pm$ 2.66 cm FL (range 10.0-19.0 cm). Prey fish (mainly *Stenobrachius* sp.) made up 67% of the total stomach contents weight of northern pearleye (Table 14a). Shrimp (*Sergestes similis*) comprised the second highest amount (28%). Calanoid copepods and euphausiids together comprised only 5% of the food of northern pearleye.

No northern pearleye were collected at the 250 m depth. In the other two depth strata (500 m and 1,000 m), empty stomachs constituted more than 85% of the samples, respectively (Table 14b). Northern pearleye consumed a high percentage (>98%) of prey fish during the night tow (both in the 500 m and 1,000 m depth), whereas the fish collected during the day (at 500 m deep) consumed a high percentage (51%) of shrimp (*Sergestes similis*). Nevertheless, we need to note that these results were based on relatively small numbers of specimens that had food in their stomachs.

Pacific Viperfish

The Pacific viperfish (*Chauliodus macouni*) has a slender body. It can be recognized by the fanglike teeth on the jaws. The maximum size of Pacific viperfish is 27 cm SL. In Alaskan waters, they were found in Bering Sea, Gulf of Alaska, and the Aleutian Islands (Mecklenburg et al., 2002). Out of the 118 specimens collected from 7 hauls, 16 specimens had food and 102 were empty. The average length of the 16 specimens was 15.9 $\pm$ 2.87 cm FL (range 12.0-20.0 cm). The diet of Pacific viperfish was exclusively fish (Table 15a). Myctophids were the most important prey fish of Pacific viperfish, making up 67% of the total stomach contents weight. One 24 mm (SL) northern lampfish (*Stenobrachius leucopsarus*) was found in the stomach of a

13 cm (FL) specimen. Other fish consumed by Pacific viperfish included one 91 mm (SL) slender fangjaw (*Sigmops gracilis*). It was consumed by one 18 cm (FL) specimen.

Table 15b lists the prey items found in Pacific viperfish stomachs collected at different depths and time. In general, a high percentage (≥80%) of empty stomachs were found in samples collected from all depths and times. No major diet variations of the Pacific viperfish were found between the specimens collected at different depths or times. They all fed mainly on fish, including myctophids and slender fangjaw (Table 15b).

Sobolevskii and Senchenko (1996) noted that Pacific viperfish was caught mostly in the deeper water of the mesopelagic area in daylight, and actively migrated to the upper water in the evening and late night. The migration might be related to feeding, but they did not provide any diet information in that study. Balanov (1994) found that, in the southwestern Bering Sea, fish (mainly myctophids and bathylagids) comprised 86-93% of the total stomach contents weight of Pacific viperfish, depending on the size of the predator.

Scaly Wearyfish

There are two valid species in the genus *Scopelosaurus*: *Scopelosaurus harryi* and *Scopelosaurus adleri* (Balanov and Saviniykh 1999). Specimens collected from the 2007 mesopelagic survey in the Gulf of Alaska were all *S. adleri*.

A total of 19 specimens of scaly wearyfish were collected from four hauls. No empty stomachs were found in these 19 specimens. The average length of the specimens was 21.37 ± 2.65 cm FL (range 19.0-30.0 cm). Chaetognaths were the most frequent (63%) prey of *S. adleri*; however, they comprised only 2% of the total stomach contents weight (Table 16a). Calanoid copepods comprised 3% of the stomach contents weight. Pacific viperfish (91% by weight) and

northern lampfish (1% by weight) were the prey fish consumed by *S. adleri*. The Pacific viperfish (109 mm SL) was consumed by a 30 cm scaly wearyfish, and the northern lampfish (23 mm SL) was consumed by a 21 cm specimen.

We collected 17 specimens with food from the 500 m depth (at night) and only two specimens with food from the 1,000 m depth (also at night) (Table 16b). In the 500 m sample, jellyfish, calanoid copepods, euphausiids, and chaetognaths comprised 94% of the total stomach contents weight, whereas northern lampfish comprised 6% of the diet weight. In the 1,000 m sample, Pacific viperfish comprised 50% of the total stomach contents weight.

Fitch and Lavenberg (1968), based on the size of the mouth, assumed that adult *S. harryi* fed on small fish and the younger fish fed on crustaceans. Il'inskiy et al. (1995) found that, in the southern Bering Sea, calanoid copepods (*Neocalanus cristatus*) and euphausiids (*Thysanoessa longipes*) were the most abundant food of *S. harryi*. Many calanoid copepod species and *Thysanoessa spinifera* were also found in the diet of scaly wearyfish in my study. Balanov (1994) reported that *S. adleri*, in the southwestern Bering Sea, fed mainly on *Stenobrachius* sp. They comprised 70% and 99% of the total stomach contents weight of *S. adleri* for fish size 20-25 cm and 25-30 cm, respectively.

Longfin Dragonfish

Longfin dragonfish (*Tactostoma macropus*) have a very elongate body with numerous large teeth in both jaws. They can reach up to 41 cm. A total of 10 specimens of longfin dragonfish were collected from three hauls. Two specimens (19 and 22 cm fork length) had food in their stomachs and eight were empty. Nine of the specimens were collected from the 500 m deep day tow. Seven of the nine fish had empty stomachs (77%). Fish (probably myctophids) was the only

prey item found in the stomachs of the two fish collected from a day-tow at a depth of 481 m on 1 April 2007. Fisher and Pearcy (1983) found that, on the Oregon continental slope, smaller specimens of longfin dragonfish (51 to 150 mm) fed mainly on euphausiids, and larger specimens (> 200 mm) fed mainly on myctophids and shrimp. Il'inskiy et al. (1995) also found that myctophids (*Stenobrachius leucopsarus*) were food of longfin dragonfish.

Alaska Dreamer

Three specimens of Alaska dreamer (*Oneirodes thompsoni*) were collected in this study, one from the 500 m depth during a night tow and the other two from the 1,000 m depth at night. The Alaska dreamer has an average length of 8 $\pm$ 2.83 cm FL with a range between 6 and 10 cm. One of the specimens collected from the 1,000 m depth had an empty stomach. Unknown teleost was the food of the specimen collected from the 500 m depth and squid was the food of the Alaska dreamer collected from the 1,000 m depth at night. Fitch and Lavenberg (1968) found that this species fed heavily on crustaceans in the California deep water.

Barreleye

A total of 22 barreleye (*Macropinna microstoma*) specimens were collected from five hauls. Three specimens had food in the stomachs and 19 were empty. The specimens with food were collected from the 500 m deep water during the day. Of the empty stomachs, 3 were collected from the 500 m depth during the night, 14 were collected from the 500 m day tow, and 2 were collected from the 1000 m depth night tow. Because of the small sample sizes, it is not clear if there is any diel feeding behavior. The average length of the three barreleye with food was 10.67 $\pm$ 3.21 cm (range 7.0-13.0 cm). Jellyfish was the only food found in barreleye in this study.

Robison and Reisenbichler (2008) noted that barreleyes are some of the few fish known to eat these gelatinous midwater animals.

Important Prey of Mesopelagic Fish

A total of 1,607 stomachs from 19 species were analyzed to describe the food habits of mesopelagic species in the Gulf of Alaska in 2007. The total number of stomachs analyzed and the main prey or prey groups of each species are summarized in Table 17.

In this study, 708 out of 1,607 stomachs were empty (44%). Many piscivores, like northern pearleye, Pacific viperfish, and longfin dragonfish had a high percentage (> 80%) of empty stomachs, whereas some planktivores like bigeye lanternfish, highsnout bigscale, bluethroat argentine, and California headlightfish had fewer empty stomachs (< 10%). All specimens in this study were collected in early spring (from 1 April to 4 April). The high percentage of empty stomachs found in the fish eaters might have something to do with regurgitation of the fish. It was hard to detect the regurgitation of the mesopelagic fish since most of them were in bad shape when they were brought up to the surface from the deep water. We found many photophores on myctophids were lost, especially from fish from deeper waters (500-1,000 m).

Longfin dragonfish, Pacific viperfish, *Scopelosaurus adleri*, northern pearleye, and Alaska dreamer were the main predators in the mesopelagic area in the Gulf of Alaska that consumed fish (> 65% by weight). Northern lampfish, garnet lampfish, bigeye lanternfish, brokenline lanternfish, highsnout bigscale, and shining tubeshoulder fed mainly on calanoid copepods (> 50% by weight). Blue lanternfish and bluethroat argentine fed mainly on larvaceans (> 88% by weight). California headlightfish, northern smoothtongue, Bathylagidae, and crested bigscale (*Poromitra curilensis*) can be categorized in a group that ate different combinations of

larvaceans, euphausiids, calanoids, ostracods, gastropods, and chaetognaths. Pinpoint lampfish seemed not to belong to any of the other groups since they consumed high amounts of shrimp and cephalopods (45% and 32%, respectively). Barreleye also did not belong to any other groups. Their only food was jellyfish.

Diet Overlap

There were 13 main prey items or prey groups: jellyfish, polychaetes, gastropods, cephalopods, ostracods, calanoids, mysids, amphipods, euphausiids, shrimp, chaetognaths, larvaceans, and miscellaneous fishes.

The percent similarity index (PSI) was calculated by using the proportions of the prey items in the stomachs (values in Table 17) to show diet overlap between the mesopelagic species in the Gulf of Alaska.

The upper diagonal section in Figure 2 shows the percent similarity values between different mesopelagic species. The lower diagonal section shows diet overlap between species by categorizing the percent similarities into low (< 34%), medium (34-66%), and high (> 66%) levels of dietary overlap.

Three main groups showed medium to high diet overlap (Fig. 2). On the right side of the figure, high (> 66%) diet overlap values were among longfin dragonfish (TM), Pacific viperfish (CM), *Scopelosaurus adleri* (SC), Alaska dreamer (OT), and northern pearleye (BD) since a high percentage of fish were found in their diets. The highest overlap values (> 90%) were among longfin dragonfish, Pacific viperfish, and *Scopelosaurus adleri*.

On the left side of Figure 2, the overlap values among northern lampfish (SL), garnet lampfish (SN), bigeye lanternfish (PT), brokenline lanternfish (LJ), highsnout bigscale (ML), and shining tubeshoulder (SA) were either medium (34-66%) or high (> 66%) since they fed mainly on calanoids. The highest diet overlap value (76%) was between northern lampfish and bigeye lanternfish, followed by garnet lampfish and bigeye lanternfish (74%).

The diet overlap values between the species in the middle of Figure 2 were mainly medium (34-66%) or low (< 34%). Those species included blue lanternfish (TC), bluethroat argentine (NC), California headlightfish (DT), the unknown bathylagid (UB), crested bigscale (PC), northern smoothtongue (LS), and pinpoint lampfish (NR). Within this middle area, only two overlap values were high; they were 92% between blue lanternfish (TC) and bluethroat argentine (NC), and 78% between California headlightfish (DT) and Bathylagidae (UB).

All other diet overlap values between the fish eaters (on the right side of Fig. 2) and the calanoid feeders (on the left side of Fig. 2) were mainly low (white or blank cells in Fig. 2).

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Table 1a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Stenobrachius leucopsarus* (northern lampfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Conchoecia sp. (ostracod)	19.09	3.46
Calanoida (copepod)	50.91	22.81
Neocalanus sp. (copepod)	3.64	1.84
Neocalanus cristatus (copepod)	2.73	2.30
Eucalanidae (copepod)	1.82	1.38
Eucalanus sp. (copepod)	8.18	3.00
Eucalanus bungii (copepod)	3.64	3.23
Euchaeta sp. (copepod)	4.55	2.07
Euchaeta elongata (copepod)	1.82	2.53
Metridiidae (copepod)	1.82	0.46
Metridia sp. (copepod)	4.55	0.92
Pleuromamma sp. (copepod)	31.82	9.22
Pleuromamma scutullata	1.82	0.69
Heterorhabdus sp. (copepod)	3.64	1.84
Heterorhabdus tanneri (copepod)	0.91	0.46
Mysidae (mysid)	0.91	0.92
Parandania boecki (amphipod)	0.91	2.30
Hyperiidea (amphipod)	2.73	1.61
Euphausiacea (euphausiid)	2.73	5.30
Thysanoessa sp. (euphausiid)	0.91	13.13
Thysanoessa spinifera (euphausiid)	0.91	17.97
Chaetognatha (arrow worm)	2.73	0.69
Copelata (larvacea)	2.73	1.15
Teleostei (fish)	0.91	0.69
Total non-empty stomachs = 110		
Total prey number = 207		
Total prey weight = 0.434 g		
Total empty stomachs = 100		
Number of hauls = 14		

Table 1b . -- Prey items (expressed in percent total weight) of *Stenobrachius leucopsarus* (northern lampfish) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey.
Day, day-tow; Night, night-tow.

	Day			Night			
Prey items	**500 m**	**1,000 m**	**Total**	**250 m**	**500 m**	**1,000 m**	**Total**
Conchoecia sp.	5.7	0.0	4.5	14.1	6.4	3.4	6.8
Calanoida unidentified	33.0	36.4	33.7	14.8	19.8	38.3	26.9
Neocalanus sp.	9.1	18.2	10.9	0.0	0.0	0.0	0.0
Neocalanus cristatus	11.1	0.0	8.9	0.0	1.1	3.6	2.0
Eucalanus bungii	0.0	0.0	0.0	31.2	0.0	14.9	13.6
Euchaeta sp.	3.6	0.0	2.9	9.5	5.6	0.0	4.0
Euchaeta elongata	7.1	0.0	5.7	0.0	0.0	1.1	0.5
Metridia sp.	4.5	9.1	5.4	3.3	0.4	0.0	0.9
Pleuromamma sp.	10.8	18.2	12.3	12.9	7.5	17.9	13.3
Heterorhabdus sp.	6.9	0.0	5.5	0.0	1.6	1.1	1.0
Mysid	0.0	0.0	0.0	9.5	0.0	0.0	2.1
Amphipoda	0.0	0.0	0.0	0.0	0.0	5.6	2.5
Hyperiidea	3.6	0.0	2.9	0.0	1.2	1.7	1.2
Thysanoessa sp.	0.0	0.0	0.0	0.0	52.7	11.2	22.6
Chaetognatha	2.9	9.1	4.1	0.0	0.0	0.0	0.0
Larvacean	1.8	9.1	3.3	4.8	0.0	0.0	1.1
Teleostei	0.0	0.0	0.0	0.0	3.7	1.1	1.2
Stomach with food	29	5	34	16	20	40	76
Empty stomachs	31	10	41	14	25	20	59
Total stomachs	60	15	75	30	45	60	135
% of empty stomachs	52	67	55	47	56	33	44
Number of hauls	4	1	5	2	3	4	9
Average of fork length	10.2	10.8	10.3	9.8	9.8	10.0	9.9
Minimum fork length	8	10	8	7	7	7	7
Maximum fork length	11	12	12	11	11	11	11
SD of fork length	0.25	0.84	0.24	0.55	0.69	0.45	0.49

Table 2a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Stenobrachius nannochir* (garnet lampfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Conchoecia sp. (ostracod)	11.11	2.94
Calanoida (copepod)	44.44	14.71
Neocalanus sp. (copepod)	33.33	73.53
Euchaeta sp. (copepod)	11.11	8.82
Total non-empty stomachs = 9		
Total prey number = 10		
Total prey weight = 0.034 g		
Total empty stomachs = 19		
Number of hauls = 5		

Table 2b. -- Prey items (expressed in percent total weight) of *Stenobrachius nannochir* (garnet lampfish) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day			Night
Prey items	**500 m**	**1,000 m**	**Total**	**1,000 m**
Conchoecia sp.	4.2	0	2.1	0.0
Neocalanus sp.	95.8	100	97.9	0.0
Unknown calanoid	0.0	0	0.0	83.3
Euchaeta sp.	0.0	0	0.0	16.7
Stomach with food	3	1	4	5
Empty stomachs	0	3	3	16
Total stomachs	3	4	7	21
% of empty stomachs	0	75	43	76
Number of hauls	1	1	2	3
Average fork length	11.0	12.0	11.5	11.4
Minimum fork length	10	12	10	11
Maximum fork length	12	12	12	12
SD of fork length	1.00	0.00	0.96	0.55

Table 3a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Nannobrachium regale* (pinpoint lampfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Cephalopoda (squid and octopus)	3.85	0.03
Teuthida (squid)	3.85	31.58
Crustacea	3.85	0.1
Conchoecia sp. (Ostracoda)	7.69	0.1
Calanoida (copepod)	3.85	0.42
Neocalanus sp. (copepod)	7.69	1.32
Neocalanus cristatus (copepod)	19.23	1.16
Eucalanus sp. (copepod)	3.85	0.06
Gaidius sp. (copepod)	3.85	0.13
Gnathophausia gigas (mysid)	3.85	5.84
Eucopia grimaldii (mysid)	3.85	2.74
Amphipoda (amphipod)	3.85	0.74
Primno macropa (amphipod)	3.85	0.1
Euphausiacea (euphausiid)	7.69	1.45
Hymenodora frontalis (shrimp)	7.69	20.63
Hippolytidae (shrimp)	3.85	13.24
Eualus pusiolus (shrimp)	3.85	11.43
Teleostei (fish)	11.54	8.91
Total non-empty stomachs = 26		
Total prey number = 29		
Total prey weight = 3.097 g		
Total empty stomachs = 134		
Number of hauls = 11		

Table 3b. -- Prey items (expressed in percent total weight) of *Nannobrachium regale* (pinpoint lampfish) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey.
Day, day-tow; Night, night-tow.

	Day			Night		
Prey items	**500 m**	**1,000 m**	**Total**	**500 m**	**1,000 m**	**Total**
Cephalopod	0.2	30.6	12.3	0.0	0.0	0.0
Conchoecia sp.	0.0	0.1	0.1	0.0	1.5	0.9
Unknown calanoid	0.0	0.0	0.0	0.0	0.5	0.3
Neocalanus sp.	31.7	0.0	19.0	0.0	4.4	2.6
Neocalanus cristatus	0.0	35.7	14.3	10.4	0.4	4.4
Gaidius sp.	0.0	0.0	0.0	0.0	1.8	1.1
Neognathophausia gigas	66.5	0.0	39.9	0.0	0.0	0.0
Eucopia grimaldii	0.0	0.0	0.0	0.0	31.5	18.9
Amphipoda	0.0	0.0	0.0	15.3	0.0	6.1
Euphausiacea	1.6	0.0	1.0	28.7	0.0	11.5
Hymenodora frontalis	0.0	19.4	7.8	0.0	27.5	16.5
Hippolytidae	0.0	0.0	0.0	0.0	14.6	8.8
Eualus pusiolus	0.0	0.0	0.0	0.0	12.6	7.6
Teleostei	0.0	14.3	5.7	45.7	5.3	21.4
Stomach with food	4	5	9	6	9	15
Empty stomachs	16	25	41	39	37	76
Total stomachs	20	30	50	45	46	91
% of empty stomachs	80	83	82	87	80	84
Number of hauls	3	2	5	3	3	6
Average fork length	15.3	13.6	14.3	15.0	13.3	14.0
Minimum fork length	12	12	12	14	11	11
Maximum fork length	18	15	18	17	15	17
SD of fork length	2.75	1.52	2.18	1.1	1.32	1.46

Table 4a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Diaphus theta* (California headlightfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Tomopteridae (polychaete)	0.52	0.02
Gastropoda (snail)	1.04	0.05
Pteropoda (pteropod)	2.08	0.48
Thecosomata (pteropod)	4.17	1.91
Limacina sp. (pteropod)	0.52	0.02
Limacina helicina (pteropod)	14.58	6.97
Clione limacina (pteropod)	0.52	0.02
Cephalopoda (squid and octopus)	0.52	0.01
Crustacea	0.52	0.1
Ostracoda	3.65	0.46
Myodocopa (ostracod)	0.52	0.03
Cypridina sp. (ostracod)	1.04	0.06
Conchoecia sp. (ostracod)	38.54	2.31
Calanoida (copepod)	31.25	3.1
Calanus sp. (copepod)	2.6	0.06
Calanus marshallae (copepod)	2.08	0.1
Neocalanus sp. (copepod)	18.75	1.99
Neocalanus cristatus (copepod)	4.17	0.32
Eucalanidae (copepod)	6.25	0.87
Eucalanus sp. (copepod)	21.88	2.05
Eucalanus bungii (copepod)	4.69	0.62
Gaetanus sp. (copepod)	1.56	0.05
Gaidius sp. (copepod)	7.29	0.26
Euchaeta sp. (copepod)	8.33	0.69
Euchaeta elongata (copepod)	2.6	0.3
Metridiidae (copepod)	1.56	0.11
Metridia sp. (copepod)	39.06	3
Pleuromamma sp. (copepod)	46.88	4.55
Pleuromamma scutullata (copepod)	3.65	0.32
Centropages sp. (copepod)	0.52	0.01
Lucicutia sp. (copepod)	0.52	0.02
Heterorhabdus sp. (copepod)	12.5	0.66
Heterorhabdus tanneri (copepod)	0.52	0.03
Candacia sp. (copepod)	0.52	0.02
Candacia columbiae (copepod)	1.56	0.03
Tortanus discaudatus (copepod)	0.52	0.02
Amphipoda (amphipod)	0.52	0.08
Gammaridea (amphipod)	0.52	0.02
Hyperiidea (amphipod)	5.73	0.53
Phronima sp. (amphipod)	0.52	0.1
Primno macropa (amphipod)	1.04	0.24
Euphausiacea (euphausiid)	12.5	6.04
Thysanoessa sp. (euphausiid)	1.04	2.56
Thysanoessa inermis (euphausiid)	0.52	0.88
Thysanoessa inspinata (euphausiid)	0.52	1.75
Thysanoessa raschi (euphausiid)	1.56	1.25
Thysanoessa spinifera (euphausiid)	2.6	5.78

Table 4a.--Continued.

Prey items	Frequency (%)	Weight (%)
Natantia (shrimp)	0.52	0.02
Caridea (shrimp)	0.52	0.06
Chaetognatha (arrow worm)	15.63	3.65
Copelata (larvacea)	64.06	37.45
Oikopleura sp. (larvacea)	2.6	3.17
Teleostei (fish)	0.52	0.1
Myctophidae (lanternfish)	0.52	4.76
Total non-empty stomachs = 192		
Total prey number = 1,253		
Total prey weight = 6.241 g		
Total empty stomachs = 14		
Number of hauls = 18		

Table 4b. -- Prey items (expressed in percent total weight) of *Diaphus theta* (California headlightfish) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow, Night, night-tow.

	Day				Night			
Prey items	**250 m**	**500 m**	**1,000 m**	**Total**	**250 m**	**500 m**	**1,000 m**	**Total**
Tomopteridae	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Gastropoda	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1
Pteropoda	0.0	0.4	0.3	0.2	0.0	0.1	0.9	0.4
Thecosomata	0.0	0.1	0.0	0.0	0.0	10.6	1.1	3.6
Limacina sp.	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Limacina helicina	1.6	10.0	2.5	5.0	0.4	4.9	19.4	9.3
Clione limacina	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
Cephalopoda	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
Crustacea	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2
Ostracoda	0.0	0.0	0.0	0.0	0.0	1.8	0.6	0.8
Myodocopa	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Cypridina sp.	0.0	0.4	0.0	0.2	0.0	0.0	0.0	0.0
Conchoecia sp.	1.0	4.0	3.8	2.8	5.0	3.1	3.2	3.7
Calanoida	1.0	4.8	2.8	2.9	8.4	7.1	4.3	6.4
Calanus sp.	0.0	0.1	0.0	0.0	0.7	0.2	0.0	0.3
Calanus marshallae	0.3	0.4	0.0	0.3	0.0	0.0	0.0	0.0
Neocalanus sp.	2.0	2.9	4.3	2.9	1.9	0.6	0.9	1.1
Neocalanus cristatus	0.0	1.0	0.3	0.4	0.8	1.1	0.0	0.6
Pseudocalanus sp.	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1
Eucalanidae	0.0	0.0	5.1	1.3	0.0	1.0	1.0	0.7
Eucalanus sp.	11.2	1.5	0.0	4.8	3.5	0.0	0.9	1.4
Eucalanus bungii	0.0	1.6	0.8	0.8	0.3	0.0	1.3	0.6
Gaetanus sp.	0.1	0.1	0.0	0.1	0.5	0.0	0.0	0.2
Gaidius sp.	0.3	0.8	0.2	0.5	1.6	0.0	0.0	0.5
Euchaeta sp.	0.5	0.4	2.0	0.9	1.2	1.8	0.6	1.2
Euchaeta elongata	2.1	0.2	0.0	0.9	0.2	0.0	0.9	0.4
Metridiidae	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Metridia sp.	5.1	3.9	1.3	3.7	6.2	1.1	0.5	2.4
Pleuromamma sp.	1.9	3.3	11.4	4.8	11.9	3.6	5.2	6.7
Pleuromamma scutullata	0.0	2.0	0.0	0.8	0.0	0.0	0.0	0.0
Centropages sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lucicutia sp.	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0
Heterorhabdus sp.	0.6	1.0	1.5	1.0	1.5	0.2	0.8	0.8
Heterorhabdus tanneri	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.2
Candacia sp.	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0
Candacia columbiae	0.0	0.1	0.0	0.0	0.1	0.4	0.0	0.1
Tortanus discaudatus	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Amphipoda	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.4
Gammaridea	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyperiidea	0.2	0.0	0.0	0.1	0.4	0.8	1.5	1.0
Phronima sp.	0.0	0.0	1.0	0.3	0.0	0.0	0.0	0.0
Primno macropa	2.8	0.0	0.0	1.1	0.0	0.0	0.0	0.0
Euphausiacea	1.1	12.4	1.3	5.4	0.6	2.8	15.9	7.4
Thysanoessa sp.	0.0	0.0	0.0	0.0	5.3	4.1	0.0	2.8
Thysanoessa inermis	0.0	4.8	0.0	1.8	0.0	0.0	0.0	0.0
Thysanoessa inspinata	0.0	0.0	0.0	0.0	0.0	0.0	3.9	1.6
Thysanoessa raschi	0.0	0.0	0.0	0.0	0.4	4.1	1.3	1.9
Thysanoessa spinifera	0.0	0.0	6.2	1.5	0.0	8.5	9.0	6.1

Table 4b.--Continued.

	Day				Night			
Prey items	**250 m**	**500 m**	**1,000 m**	**Total**	**250 m**	**500 m**	**1,000 m**	**Total**
Natantia	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Caridea	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1
Chaetognatha	22.4	8.1	8.9	13.7	1.6	0.3	1.4	1.1
Copelata (larvacea)	36.3	35.5	45.8	38.4	41.1	26.0	21.7	28.8
Oikopleura sp.	9.1	0.0	0.0	3.4	2.5	0.0	2.9	1.9
Teleostei	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.5
Myctophidae	0.0	0.0	0.0	0.0	0.0	15.3	0.0	4.6
Stomach with food	33	35	15	83	42	30	37	109
Empty stomachs	0	1	0	1	3	4	6	13
Total stomachs	33	36	15	84	45	34	43	122
% of empty stomachs	0	3	0	1	7	12	14	11
Number of hauls	3	3	2	8	3	3	4	10
Average fork length	7.8	7.9	7.6	7.8	7.7	7.6	7.6	7.6
Minimum fork length	7	7	7	7	7	7	6	6
Maximum fork length	10	10	9	10	10	9	9	10
SD of fork length	0.48	0.26	0.63	0.70	0.66	0.57	0.64	0.19

Table 5a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Protomyctophum thompsoni* (bigeye lanternfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Crustacea	3.51	0.78
Cypridina sp. (ostracod)	1.75	0.19
Conchoecia sp. (ostracod)	12.28	0.58
Calanoida (copepod)	52.63	12.09
Calanus sp. (copepod)	1.75	0.01
Neocalanus sp. (copepod)	14.04	3.51
Eucalanus bungii (copepod)	5.26	0.78
Gaetanus sp. (copepod)	3.51	0.39
Gaidius sp. (copepod)	19.3	3.70
Euchaeta sp. (copepod)	14.04	5.07
Euchaeta elongata (copepod)	21.05	16.96
Metridia sp. (copepod)	26.32	22.61
Pleuromamma sp. (copepod)	8.77	0.01
Pleuromamma scutullata (copepod)	1.75	0.39
Heterorhabdus sp. (copepod)	10.53	1.95
Heterorhabdus tanneri (copepod)	3.51	0.39
Candacia columbiae (copepod)	12.28	4.09
Epilabidocera sp. (copepod)	1.75	0.39
Hyperiidea (amphipod)	3.51	2.92
Primno sp. (amphipod)	5.26	2.34
Primno macropa (amphipod)	5.26	3.31
Euphausiacea (euphausiid)	5.26	5.85
Thysanoessa inspinata (euphausiid)	3.51	6.82
Thysanoessa raschi (euphausiid)	1.75	4.87
Chaetognatha (arrow worm)	3.51	0.01

Total non-empty stomachs = 57
Total prey number = 404
Total prey weight = 0.513 g
Total empty stomachs = 2
Number of hauls = 9

Table 5b. -- Prey items (expressed in percent total weight) of bigeye lanternfish (*Protomyctophum thompsoni*) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day			Night		
Prey items	**250 m**	**500 m**	**Total**	**500 m**	**1,000 m**	**Total**
Crustacea	0.0	0.0	0.0	50.0	0.0	33.3
Cypridina sp.	0.9	0.0	0.5	0.0	0.0	0.0
Conchoecia sp.	1.0	1.5	1.2	0.0	0.0	0.0
Calanoida	19.6	11.1	15.4	23.6	100.0	49.1
Calanus sp.	0.5	0.0	0.2	0.0	0.0	0.0
Neocalanus sp.	1.4	12.2	6.8	0.0	0.0	0.0
Eucalanus bungii	3.1	0.0	1.5	0.0	0.0	0.0
Gaetanus sp.	0.5	0.4	0.4	0.0	0.0	0.0
Gaidius sp.	3.8	1.8	2.8	2.8	0.0	1.9
Euchaeta sp.	1.0	24.7	12.8	0.0	0.0	0.0
Euchaeta elongata	17.3	6.5	11.9	0.0	0.0	0.0
Metridia sp.	20.9	3.2	12.1	0.0	0.0	0.0
Pleuromamma sp.	1.0	0.7	0.9	0.0	0.0	0.0
Pleuromamma scutullata	0.0	0.7	0.4	0.0	0.0	0.0
Heterorhabdus sp.	1.3	2.6	1.9	0.0	0.0	0.0
Heterorhabdus tanneri	0.0	1.1	0.5	0.0	0.0	0.0
Candacia columbiae	5.0	0.0	2.5	9.7	0.0	6.5
Epilabidocera sp.	0.3	0.0	0.1	0.0	0.0	0.0
Hyperiidea	0.0	7.5	3.7	0.0	0.0	0.0
Primno sp.	9.3	2.5	5.9	0.0	0.0	0.0
Primno macropa	1.5	2.9	2.2	0.0	0.0	0.0
Euphausiacea	0.0	8.0	4.0	13.9	0.0	9.3
Thysanoessa inspinata	11.8	0.0	5.9	0.0	0.0	0.0
Thysanoessa raschi	0.0	12.4	6.2	0.0	0.0	0.0
Chaetognatha	0.0	0.4	0.2	0.0	0.0	0.0
Stomach with food	39	13	52	4	1	5
Empty stomachs	0	0	0	1	1	2
Total stomachs	39	13	52	5	2	7
% of empty stomachs	0	0	0	20	50	29
Number of hauls	3	3	6	2	1	3
Average fork length	4.6	5.1	4.7	4.8	4.0	4.6
Minimum fork length	3	4	3	4	4	4
Maximum fork length	6	6	6	6	4	6
SD of fork length	0.64	0.64	0.67	0.96	0.00	0.89

Table 6a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Lampanyctus jordani* (Brokenline lanternfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Crustacea	20.00	3.92
Conchoecia sp. (Ostracoda)	60.00	3.92
Calanoida (copepod)	20.00	13.73
Neocalanus cristatus (Copepoda)	20.00	36.25
Euchaeta sp. (Copepoda)	20.00	9.80
Pleuromamma sp. (Copepoda)	20.00	1.96
Primno macropa (amphipod)	20.00	29.41
Chaetognatha (arrow worm)	20.00	0.01

Total non-empty stomachs = 5
Total prey number = 11
Total prey weight = 0.051 g
Total empty stomachs = 4
Number of hauls = 5

Table 6b. -- Prey items (expressed in percent total weight) of *Lampanyctus jordani* (brokenline myctophid) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day		Night	
Prey items	**500 m**	**500 m**	**1,000 m**	**Total**
Crustacea	0.0	0.0	100.0	25.0
Conchoecia sp.	22.2	6.7	0.0	5.0
Calanoida	77.8	33.3	0.0	25.0
Neocalanus cristatus	0.0	16.7	0.0	12.5
Euchaeta sp.	0.0	23.8	0.0	17.9
Pleuromamma sp.	0.0	4.8	0.0	3.6
Primno macropa	0.0	14.7	0.0	11.0
Chaetognatha	0.0	0.0	0.0	0.0
Stomach with food	1	3	1	4
Empty stomach	1	3	0	3
Total stomach	2	6	1	7
% of empty stomach	50.00	50	0	43
Number of hauls	1	3	1	4
Average fork length	11.0	11.3	11.0	11.3
Minimum fork length	11	11	11	10
Maximum fork length	11	12	11	12
SD of fork length	0.00	1.15	0.00	0.96

Table 7. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Tarletonbeania crenularis* (blue lanternfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Metridia sp. (copepod)	33.33	2.94
Hyperiidea (amphipod)	33.33	2.94
Euphausiacea (euphausiid)	33.33	2.94
Copelata (larvacea)	100	91.18
Total non-empty stomachs = 3		
Total prey number = 3		
Total prey weight = 0.102 g		
Total empty stomachs = 0		
Number of hauls = 1		

Table 8a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Melamphaes lugubris* (highsnout bigscale) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Polychaeta (polychaete)	4.26	0.42
Tomopteris sp. (polychaete)	0.71	0.08
Spionidae (polychaete)	0.71	0.03
Cephalopoda (squid and octopus)	2.13	0.17
Crustacea	0.71	0.34
Ostracoda	3.55	0.34
Myodocopa (ostracoda)	0.71	0.03
Cypridina sp.	4.26	0.68
Conchoecia sp.	43.26	4.49
Calanoida (copepod)	43.97	20.15
Calanus sp. (copepod)	0.71	0.68
Calanus marshallae (copepod)	4.26	0.54
Calanus pacificus (copepod)	0.71	0.01
Neocalanus sp. (copepod)	31.91	15.52
Neocalanus cristatus (copepod)	31.21	14.05
Eucalanus sp. (copepod)	7.8	2.03
Eucalanus bungii (copepod)	4.96	0.96
Gaidius sp. (copepod)	2.84	0.08
Euchaeta sp. (copepod)	14.19	2.9
Euchaeta elongata (copepod)	7.8	2.09
Metridia sp. (copepod)	5.67	0.59
Pleuromamma sp. (copepod)	2.13	0.17
Pleuromamma scutullata (copepod)	0.71	0.03
Candacia sp. (copepod)	0.71	0.03
Eucopia sp. (mysid)	2.13	1.41
Eucopia unguiculata (mysid)	0.71	3.89
Mysida (mysid)	0.71	0.11
Amphipoda (amphipod)	0.71	0.06
Rhachotropis sp. (amphipod)	0.71	0.51
Hyperiidea (amphipod)	0.71	0.03
Primno macropa (amphipod)	0.71	0.71
Euphausiacea (euphausiid)	4.96	5.7
Thysanoessa spinifera (euphausiid)	0.71	0.59
Caridea (shrimp)	1.42	0.56
Hymenodora sp. (shrimp)	0.71	0.45
Hymenodora frontalis (shrimp)	2.84	2.68
Chaetognatha (arrow worm)	53.19	12.47
Thaliacea (pelagic salp)	0.71	0.2
Copelata (larvacea)	7.8	1.69
Unidentified organic material	1.42	2.54
Total non-empty stomachs = 141		
Total prey number = 549		
Total prey weight = 3.544 g		
Total empty stomachs = 1		
Number of hauls = 10		

Table 8b. -- Prey items (expressed in percent total weight) of *Melamphaes lugubris* (highsnout bigscale) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day		Night		
Prey items	**1,000 m**	**250 m**	**500 m**	**1,000 m**	**Total**
Polychaeta	1.1	0.0	0.2	1.0	0.6
Tomopteris sp.	0.0	0.0	0.3	0.0	0.1
Spionidae	0.0	0.4	0.0	0.0	0.0
Cephalopoda	0.0	0.0	0.1	0.2	0.2
Crustacea	0.0	0.0	0.8	0.0	0.3
Ostracoda	0.0	0.0	0.7	0.2	0.4
Myodocopa	0.0	0.0	0.1	0.0	0.1
Cypridina sp.	0.0	0.0	0.0	1.1	0.5
Conchoecia sp.	5.4	11.4	4.3	5.8	5.7
Calanoida	12.5	20.7	16.4	20.3	18.7
Calanus sp.	0.0	0.0	0.0	1.2	0.5
Calanus marshallae	0.0	0.0	0.0	1.1	0.5
Calanus pacificus	0.0	0.0	0.0	0.0	0.0
Neocalanus sp.	19.6	0.0	23.8	11.5	15.7
Neocalanus cristatus	23.9	14.0	17.3	10.0	13.7
Eucalanus sp.	0.0	10.0	0.1	8.2	4.8
Eucalanus bungii	0.0	0.0	0.4	1.6	0.8
Gaidius sp.	0.0	0.0	0.1	0.2	0.1
Euchaetidae	0.0	0.0	0.2	0.0	0.1
Euchaeta sp.	3.8	3.0	4.5	1.8	3.1
Euchaeta elongata	0.0	0.0	3.4	1.7	2.2
Metridia sp.	0.0	0.0	1.1	0.3	0.6
Pleuromamma sp.	0.0	0.0	0.1	0.2	0.1
Pleuromamma scutullata	0.0	0.0	0.0	0.0	0.0
Candacia sp.	0.0	0.0	0.0	0.1	0.0
Eucopia sp.	0.0	4.1	0.0	1.6	1.2
Eucopia unguiculata	0.0	0.0	0.0	5.4	2.4
Mysida	0.0	0.0	0.4	0.0	0.2
Amphipoda	0.0	0.0	0.2	0.0	0.1
Rhachotropis sp.	0.0	0.0	1.2	0.0	0.6
Hyperiidea	0.0	0.4	0.0	0.0	0.0
Primno macropa	0.0	0.0	2.1	0.0	0.9
Euphausiacea	1.1	0.0	3.4	8.8	5.4
Thysanoessa spinifera	0.0	0.0	1.4	0.0	0.6
Caridea	0.0	0.0	0.7	0.3	0.4
Hymenodora sp.	0.0	0.0	0.7	0.0	0.3
Hymenodora frontalis	15.2	0.0	1.4	3.3	2.1
Chaetognatha	8.2	32.5	12.5	9.8	13.5
Thaliacea	0.0	0.0	0.4	0.0	0.2
Larvacean	7.1	3.7	1.7	0.8	1.5
Unidentified organic material	2.2	0.0	0.0	3.4	1.5
Total empty stomachs = 1					
Number of hauls = 10					

Table 8b.--Continued.

	Day		Night		
Prey items	**1,000 m**	**250 m**	**500 m**	**1,000 m**	**Total**
Stomach with food	15	15	60	51	126
Empty stomachs	0	0	0	1	1
Total stomachs	15	15	60	52	127
% of empty stomachs	0	0	0	2	1
Number of hauls	1	1	4	4	9
Average fork length	8.1	6.5	7.8	7.6	7.6
Minimum fork length	7	5	6	6	5
Maximum fork length	9	9	10	10	10
SD of fork length	0.46	0.99	0.88	0.72	0.92

Table 9a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Poromitra curilensis* (crested bigscale) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Polychaeta (polychaete)	11.11	5.54
Alciopidae (polychaete)	1.85	1.62
Tomopteridae (polychaete)	3.7	0.92
Tomopteris sp. (polychaete)	1.85	0.46
Mollusca	1.85	0.46
Gastropoda (snail)	3.7	2.31
Clione sp. (naked pteropod)	1.85	3.23
Cephalopoda (squid and octopus)	1.85	2.31
Crustacea	3.7	1.15
Ostracoda	3.7	2.08
Cypridina sp. (ostracod)	1.85	0.46
Conchoecia sp. (ostracod)	31.48	6.47
Calanoida (copepod)	5.56	1.85
Calanus sp. (copepod)	3.7	1.15
Calanus marshallae (copepod)	1.85	0.23
Neocalanus sp. (copepod)	1.85	1.39
Neocalanus cristatus (copepod)	1.85	0.69
Eucalanus sp. (copepod)	1.85	0.92
Eucalanus bungii (copepod)	1.85	1.39
Euchaeta elongata (copepod)	1.85	2.54
Metridia sp. (copepod)	7.41	2.31
Pseudolubbockia dilitata (cyclopoid)	1.85	0.46
Amphipoda (amphipod)	1.85	0.69
Hyperiidea (amphipod)	1.85	0.23
Chaetognatha (arrow worm)	5.56	12.93
Thaliacea (pelagic salp)	1.85	1.39
Salpa sp. (pelagic salp)	1.85	5.54
Copelata (larvacea)	11.11	15.47
Teleostei (fish)	1.85	11.55
Unidentified organic material	14.81	12.24
Total non-empty stomachs = 54		
Total prey number = 105		
Total prey weight = 0.433 g		
Total empty stomachs = 52		
Number of hauls = 7		

Table 9b. -- Prey items (expressed in percent total weight) of *Poromitra curilensis* (crested bigscale) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day		Night	
Prey items	**1,000 m**	**500 m**	**1,000 m**	**Total**
Polychaeta	7.3	2.2	3.1	3.0
Alciopidae	0.0	0.0	4.5	3.6
Tomopteridae	2.2	0.0	5.3	4.2
Tomopteris sp.	0.0	0.0	0.0	0.0
Mollusca	0.0	0.0	2.6	2.1
Gastropoda	0.0	0.0	6.4	5.1
Clione sp.	0.0	0.0	9.0	7.2
Cephalopoda	0.0	11.0	0.0	2.2
Crustacea	0.0	0.0	1.5	1.2
Ostracoda	0.0	0.0	3.3	2.6
Cypridina sp.	0.0	0.0	0.5	0.4
Conchoecia sp.	34.9	14.3	3.5	5.7
Calanoida	0.7	3.3	5.1	4.7
Calanus sp.	0.0	0.0	2.0	1.6
Calanus marshallae	6.3	0.0	0.0	0.0
Neocalanus sp.	0.0	0.0	7.9	6.3
Neocalanus cristatus	2.2	0.0	0.0	0.0
Eucalanus sp.	0.0	0.0	0.6	0.5
Eucalanus bungii	0.0	6.6	0.0	1.3
Euchaeta elongata	0.0	0.0	1.7	1.4
Metridia sp.	0.0	2.2	1.8	1.9
Pseudolubbockia dilitata	12.5	0.0	0.0	0.0
Amphipoda	0.0	0.0	1.5	1.2
Hyperiidea	0.7	0.0	0.0	0.0
Chaetognatha	0.0	0.0	8.6	6.9
Thaliacea	0.0	6.6	0.0	1.3
Salpa sp.	0.0	0.0	8.7	7.0
Larvacea	33.3	53.9	12.4	9.9
Teleostei	0.0	0.0	7.7	6.2
Unidentified organic material	0.0	0.0	2.5	12.7
Stomach with food	14	10	30	40
Empty stomachs	16	6	30	36
Total stomachs	30	16	60	76
% of empty stomachs	53	38	50	47
Number of hauls	2	1	4	5
Average fork length	10.2	10.6	10.1	10.2
Minimum fork length	9	9	8	8
Maximum fork length	12	12	12	12
SD of fork length	0.97	1.07	1.14	0.12

Table 10a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Sagamichthys abei* (shining tubeshoulder) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Crustacea	7.14	1.33
Cypridina sp. (ostracod)	7.14	1.33
Conchoecia sp. (ostracod)	7.14	1.33
Calanoida (copepod)	7.14	1.33
Neocalanus sp. (copepod)	14.29	48.00
Pleuromamma sp. (copepod)	21.43	5.33
Pleuromamma scutullata (copepod)	7.14	0.01
Heterorhabdus sp. (copepod)	7.14	1.33
Chaetognatha (arrow worm)	57.14	16.00
Sagitta sp. (arrow worm)	7.14	10.67
Copelata (larvacea)	42.86	13.33
Total non-empty stomachs = 14		
Total prey number = 20		
Total prey weight = 0.075 g		
Total empty stomachs = 10		
Number of hauls = 6		

Table 10b. -- Prey items (expressed in percent total weight) of *Sagamichthys abei* (shining tubeshoulder) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day	Night
Prey items	**500 m**	**500 m**
Crustacea	0.0	4.8
Cypridina sp.	0.6	0.0
Conchoecia sp.	0.0	9.5
Calanoida	3.3	0.0
Neocalanus sp.	21.1	0.0
Pleuromamma sp.	10.1	0.0
Pleuromamma scutullata	3.3	0.0
Heterorhabdus sp.	8.3	0.0
Chaetognatha	45.7	0.0
Sagitta sp.	4.7	0.0
Larvacea	2.9	85.7
Stomach with food	10	4
Empty stomachs	4	5
Total stomachs	14	9
% of empty stomachs	29	56
Number of hauls	3	3
Average fork length	9.9	12.0
Minimum fork length	6	8
Maximum fork length	13	20
SD of fork length	2.33	5.66

Table 11a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Nansenia candida* (bluethroat argentine) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Polychaeta (polychaete)	2.63	0.28
Alciopidae (polychaete)	2.63	0.52
Tomopteridae (polychaete)	3.95	0.14
Tomopteris sp. (polychaete)	1.32	0.01
Gastropoda (snail)	2.63	0.14
Heteropod (snail)	1.32	1.15
Pteropoda (snail)	1.32	0.03
Thecosomata (shelled pteropod)	1.32	0.14
LImacina helicina (shelled pteropod)	14.47	0.69
Gymnosomata (naked pteropod)	7.89	1.07
Clione sp. (naked pteropod)	11.84	0.68
Clione limacina (naked pteropod)	10.53	1.37
Octopoda (octopus)	1.32	0.09
Conchoecia sp. (ostracod)	2.63	0.02
Calanoida (copepod)	1.32	0.02
Neocalanus sp. (copepod)	1.32	0.01
Neocalanus cristatus (copepod)	3.95	0.16
Euchaeta elongata (copepod)	2.63	0.06
Amphipoda (amphipod)	1.32	0.04
Gammaridea (amphipod)	1.32	0.01
Cyphocaris sp. (amphipod)	1.32	0.01
Hyperiidea (amphipod)	2.63	0.16
Hyperiidae (amphipod)	1.32	0.01
Euphausiacea (euphausiid)	6.58	0.67
Thysanoessa inermis (euphausiid)	3.95	0.41
Thysanoessa longipes (euphausiid)	1.32	0.24
Thysanoessa raschi (euphausiid)	1.32	0.25
Thysanoessa spinifera (euphausiid)	2.63	0.72
Copelata (larvacea)	48.68	35.72
Oikopleura sp. (larvacea)	47.37	52.96
Unidentified organic material	6.58	2.23
Total non-empty stomachs = 76		
Total prey number = 105		
Total prey weight = 16.981 g		
Total empty stomachs = 8		
Number of hauls = 11		

Table 11b. -- Prey items (expressed in percent total weight) of *Nansenia candida* (bluethroat argentine) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day			Night			
Prey items	**250 m**	**500 m**	**Total**	**250 m**	**500 m**	**1,000 m**	**Total**
Polychaeta	0.0	0.6	0.5	0.7	0.0	0.0	0.2
Alciopidae	0.0	1.3	1.0	0.0	0.0	0.0	0.0
Tomopteridae	0.0	0.0	0.0	0.6	0.2	0.0	0.3
Tomopteris sp .	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gastropoda	0.8	0.3	0.4	0.0	0.0	0.0	0.0
Heteropod	0.0	1.7	1.4	0.0	0.0	0.0	0.0
Pteropoda	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Thecosomata	0.0	0.2	0.2	0.0	0.0	0.0	0.0
LImacina helicina	0.0	0.9	0.7	0.9	0.0	0.0	0.3
Gymnosomata	0.0	1.4	1.1	0.0	0.7	0.0	0.3
Clione sp.	0.0	0.8	0.7	0.0	1.7	18.3	3.9
Clione limacina	1.6	2.2	2.1	0.0	0.6	0.0	0.3
Octopoda	0.0	0.2	0.1	0.0	0.0	0.0	0.0
Conchoecia sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calanoida	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neocalanus sp.	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Neocalanus cristatus	0.0	0.0	0.0	1.0	0.8	0.0	0.7
Euchaeta elongata	0.0	0.1	0.1	0.6	0.0	0.0	0.2
Amphipoda	0.0	0.0	0.0	0.0	0.5	0.0	0.2
Gammaridea	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cyphocaris sp.	0.2	0.0	0.1	0.0	0.0	0.0	0.0
Hyperiidea	0.0	0.0	0.1	0.0	0.7	0.0	0.3
Hyperiidae	0.0	0.0	0.0	0.0	0.2	0.0	0.1
Euphausiacea	0.0	1.0	0.8	0.0	0.0	0.0	0.0
Thysanoessa inermis	0.0	0.4	0.3	1.2	0.0	0.0	0.4
Thysanoessa longipes	0.0	0.2	0.1	0.0	0.0	0.0	0.0
Thysanoessa raschi	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Thysanoessa spinifera	0.0	0.5	0.4	0.0	0.7	0.0	0.3
Larvacea	97.3	19.2	34.8	55.9	78.2	26.8	62.2
Oikopleura sp.	0.0	68.1	54.5	27.3	12.3	54.9	24.4
Unidentified organic material	0.0	0.5	0.4	11.5	3.4	0.0	5.5
Stomach with food	3	51	54	7	12	3	22
Empty stomachs	0	5	5	1	1	1	3
Total stomachs	3	56	59	8	13	4	25
% of empty stomachs	0	9	8	13	8	25	12
Number of hauls	1	4	5	2	3	1	6
Average fork length	13.0	12.8	12.8	11.9	13.0	12.0	12.5
Minimum fork length	12	11	11	10	10	10	10
Maximum fork length	14	16	16	14	16	14	16
SD of fork length	1.00	0.97	0.97	1.21	1.60	2.00	1.57

Table 12a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Leuroglossus schmidti* (northern smoothtongue) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Gastropoda (snail)	1.14	0.15
Limacina helicina (pteropod)	1.14	0.67
Clione limacina (pteropod)	2.27	1.71
Myodocopa (ostracoda)	1.14	0.07
Cypridina sp. (ostracod)	6.82	4.98
Conchoecia sp. (ostracod)	56.82	37.3
Calanoida (copepod)	17.05	0.96
Calanus sp. (copepod)	2.27	0.22
Neocalanus sp. (copepod)	1.14	0.22
Eucalanus sp. (copepod)	3.41	0.59
Eucalanus bungii (copepod)	1.14	0.22
Gaidius sp. (copepod)	1.14	0.01
Euchaeta sp. (copepod)	1.14	0.15
Metridia sp. (copepod)	20.45	1.04
Pleuromamma sp. (copepod)	14.77	2.97
Pleuromamma scutullata (copepod)	7.95	2.15
Heterorhabdus tanneri (copepod)	1.14	0.07
Heterostylites major (copepod)	1.14	0.07
Amphipoda (amphipod)	5.68	0.37
Gammaridea (amphipod)	1.14	0.07
Cyphocaris sp. (amphipod)	2.27	0.52
Parandania boecki (amphipod)	1.14	0.45
Hyperiidea (amphipod)	1.14	0.01
Scina sp. (amphipod)	1.14	0.15
Euphausiacea (euphausiid)	3.41	1.78
Chaetognatha (arrow worm)	9.09	5.5
Copelata (larvacea)	57.95	35.74
Marine snow	9.09	1.86
Total non-empty stomachs = 88		
Total prey number = 781		
Total prey weight = 1.346 g		
Total empty stomachs = 42		
Number of hauls = 13		

Table 12b. -- Prey items (expressed in percent total weight) of *Leuroglossus schmidti* (northern smoothtongue) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day			Night			
Prey items	**500 m**	**1,000 m**	**Total**	**250 m**	**500 m**	**1,000 m**	**Total**
Gastropoda	0.0	0.0	0.0	0.0	0.5	0.0	0.2
Limacina helicina	0.0	0.0	0.0	3.4	0.0	0.0	0.8
Clione limacina	0.0	0.0	0.0	0.0	5.8	0.0	2.0
Myodocopa	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Cypridina sp.	0.0	0.0	0.0	8.5	2.0	1.1	3.0
Conchoecia sp.	3.0	6.3	3.8	63.0	28.4	13.4	29.4
Calanoida	0.0	0.0	0.0	1.0	2.9	1.7	1.9
Calanus sp.	0.0	0.0	0.0	0.0	0.0	3.5	1.6
Neocalanus sp.	0.9	0.0	0.7	0.0	0.0	0.0	0.0
Eucalanus sp.	1.8	0.0	1.4	1.6	0.0	0.0	0.4
Eucalanus bungii	0.0	0.0	0.0	0.0	0.0	0.5	0.2
Gaidius sp.	0.0	0.0	0.0	0.3	0.0	0.0	0.1
Euchaeta sp.	0.0	0.0	0.0	0.0	0.6	0.0	0.2
Metridia sp.	0.6	0.0	0.5	1.8	5.0	0.7	2.4
Pleuromamma sp.	3.1	0.0	2.3	2.7	6.2	0.4	2.8
Pleuromamma scutullata	0.0	0.0	0.0	0.0	15.2	8.8	9.0
Heterorhabdus tanneri	0.0	0.0	0.0	0.0	1.0	0.0	0.3
Heterostylites major	1.0	0.0	0.8	0.0	0.0	0.0	0.0
Amphipoda	0.0	0.0	0.0	0.0	1.5	2.5	1.6
Gammaridea	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Cyphocaris sp.	0.0	0.0	0.0	0.7	0.0	1.1	0.6
Parandania boecki	1.6	0.0	1.2	0.0	0.0	0.0	0.0
Hyperiidea	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scina sp.	0.0	0.0	0.0	0.0	0.4	0.0	0.1
Euphausiacea	0.0	0.0	0.0	0.7	0.0	5.5	2.6
Chaetognatha	1.2	0.0	0.9	0.7	8.1	19.5	11.5
Larvacea	84.4	68.8	80.5	10.8	22.6	41.5	28.4
Marine snow	2.4	25.0	8.0	4.7	0.0	0.0	1.0
Stomach with food	23	2	25	23	21	19	63
Empty stomachs	10	3	13	1	12	16	29
Total stomachs	33	5	38	24	33	35	92
% of empty stomachs	30	60	34	4	36	46	32
Number of hauls	3	1	4	2	3	4	9
Average fork length	15.6	17.0	15.7	15.2	15.6	15.5	15.4
Minimum fork length	11	17	11	13	14	14	13
Maximum fork length	18	17	18	17	16	16	17
SD of fork length	1.34	0	1.34	1.04	0.68	0.70	0.84

Table 13a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of unknown bathylagid collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Polychaeta (polychaete)	1.41	1.33
Mollusca	1.41	9.66
Pteropoda	1.41	0.57
Cephalopoda (squid and octopus)	1.41	4.92
Cypridina sp. (ostracod)	2.82	0.76
Conchoecia sp. (ostracod)	30.99	4.55
Calanoida (copepod)	26.76	7.39
Neocalanus sp. (copepod)	2.82	1.33
Eucalanus bungii (copepod)	1.41	0.38
Gaidius sp. (copepod)	9.86	2.27
Euchaetidae (copepod)	1.41	0.19
Euchaeta sp. (copepod)	2.82	1.70
Metridiidae (copepod)	1.41	0.01
Metridia sp. (copepod)	11.27	1.52
Pleuromamma sp. (copepod)	9.86	1.33
Pleuromamma scutullata (copepod)	5.63	1.70
Heterorhabdus sp. (copepod)	4.23	1.14
Oncaea sp. (copepod)	1.41	0.01
Corycaeus sp. (copepod)	1.41	0.01
Amphipoda (amphipod)	4.23	6.82
Euphausiacea (euphausiid)	2.82	4.55
Euphausia pacifica (euphausiid)	1.41	1.70
Thysanoessa spinifera (euphausiid)	1.41	7.01
Chaetognatha (arrow worm)	1.41	0.57
Thaliacea (pelagic salp)	1.41	0.57
Copelata (larvacea)	28.17	24.62
Teleostei (fish)	1.41	8.52
Unidentified organic material	4.23	4.84
Total non-empty stomachs = 71		
Total prey number = 123		
Total prey weight = 0.528 g		
Total empty stomachs = 82		
Number of hauls = 11		

Table 13b. -- Prey items (expressed in percent total weight) of unknown bathylagid collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day			Night			
Prey items	**500 m**	**1,000 m**	**Total**	**250 m**	**500 m**	**1,000 m**	**Total**
Polychaeta	0.0	0.0	0.0	0.0	2.5	0.0	0.9
Mollusca	0.0	33.6	22.4	0.0	0.0	0.0	0.0
Pteropoda	0.0	0.0	0.0	0.0	2.1	0.0	0.8
Cephalopoda	0.0	35.1	23.4	0.0	0.0	0.0	0.0
Cypridina sp.	0.0	0.0	0.0	0.0	0.0	1.5	0.8
Conchoecia sp.	0.0	8.1	5.4	17.0	3.2	4.2	5.4
Calanoida	0.0	9.3	6.2	7.6	11.6	7.9	9.3
Neocalanus sp.	0.0	0.0	0.0	0.0	0.0	4.3	2.1
Eucalanus bungii	0.0	0.0	0.0	0.0	0.0	0.6	0.3
Gaidius sp.	0.0	0.0	0.0	0.0	4.6	1.5	2.5
Euchaetidae	0.0	0.0	0.0	3.8	0.0	0.0	0.5
Euchaeta sp.	0.0	3.3	2.2	0.0	0.0	10.0	5.0
Metridiidae	0.0	0.0	0.0	0.0	0.7	0.0	0.3
Metridia sp.	0.0	2.7	1.8	0.0	1.1	4.5	2.6
Pleuromamma sp.	0.0	2.7	1.8	7.6	0.0	1.4	1.6
Pleuromamma scutullata	0.0	0.0	0.0	0.0	5.0	8.4	1.9
Heterorhabdus sp.	0.0	0.7	0.4	0.0	0.0	0.0	4.2
Oncaea sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Corycaeus sp.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Amphipoda	0.0	0.0	0.0	0.0	3.9	15.5	9.2
Euphausiacea	0.0	0.0	0.0	0.0	0.0	7.3	3.7
Euphausia pacifica	0.0	0.0	0.0	0.0	3.6	0.0	1.3
Thysanoessa spinifera	0.0	0.0	0.0	0.0	0.0	15.7	7.8
Chaetognatha	0.0	0.0	0.0	0.0	0.0	1.3	0.6
Thaliacea	0.0	0.0	0.0	0.0	1.4	0.0	0.5
Larvacea	100.0	0.0	33.3	64.2	30.6	16.0	27.5
Teleostei	0.0	0.0	0.0	0.0	16.3	0.0	6.1
Unidentified organic material	0.0	4.6	3.1	0.0	4.3	0.0	1.6
Marine snow	0.0	0.0	0.0	0.0	9.2	0.0	3.5
Stomach with food	2	11	13	8	24	26	58
Empty stomachs	7	18	25	2	21	33	56
Total stomachs	9	29	38	10	45	59	114
% of empty stomachs	78	62	66	20	47	56	50
Number of hauls	1	2	3	1	3	4	8
Average fork length	11.5	14.9	14.4	8.8	14.6	14.2	13.6
Minimum fork length	9	12	9	5	9	10	5
Maximum fork length	14	17	17	12	18	18	18
SD of fork length	3.54	1.51	2.14	2.38	1.86	2.26	2.87

Table 14a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Benthalbella dentata* (northern pearleye) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Euchaeta elongata (copepod)	9.09	2.22
Thysanoessa sp. *(euphausiid)*	9.09	2.77
Sergestes similis (Pacific sergestid)	9.09	28.12
Teleostei (fish)	18.18	0.35
Myctophidae (lanternfish)	27.27	5.06
Stenobrachius sp. (lanternfish)	18.18	31.58
Stenobrachius leucopsarus (northern lampfish)	18.18	29.92
Total non-empty stomachs = 11		
Total prey number = 19		
Total prey weight = 1.444 g		
Total empty stomachs = 110		
Number of hauls = 8		

Table 14b. -- Prey items (expressed in percent total weight) of *Benthalbella dentata* (northern pearleye) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. D, day-tow; N, night-tow.

	Day		Night	
Prey items	**500 m**	**500 m**	**1,000 m**	**Total**
Euchaeta elongata	14.5	0.0	0.0	0.0
Thysanoessa sp.	17.5	0.0	0.0	0.0
Sergestes similis	33.3	0.0	0.0	0.0
Teleostei	33.3	0.0	1.4	0.6
Myctophidae	1.3	0.0	48.6	19.4
Stenobrachius sp.	0.0	33.3	50.0	40.0
Stenobrachius leucopsarus	0.0	66.7	0.0	40.0
Stomach with food	4	3	4	7
Empty stomachs	47	41	22	63
Total stomachs	51	44	26	70
% of empty stomachs	92	93	85	90
Number of hauls	3	3	2	5
Average fork length	14.8	14.0	16.3	15.3
Minimum fork length	12	10	15	10
Maximum fork length	18	18	19	19
SD of fork length	2.75	4.00	1.89	2.93

Table 15a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Chauliodus macouni* (Pacific viperfish) collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Calanoida (copepod)	6.25	0.02
Teleostei (fish)	12.5	3.25
Sigmops gracilis (slender fangjaw)	6.25	30.06
Myctophidae (lanternfish)	31.25	3.02
Stenobrachius sp. (lanternfish)	37.5	60.65
Stenobrachius leucopsarus (northern lampfish)	6.25	3.00
Total non-empty stomachs = 16		
Total prey number = 17		
Total prey weight = 11.47 g		
Total empty stomachs = 102		
Number of hauls = 7		

Table 15b. -- Prey items (expressed in percent total weight) of *Chauliodus macouni* (Pacific viperfish) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey. Day, day-tow; Night, night-tow.

	Day		Night	
Prey items	**500 m**	**500 m**	**1,000 m**	**Total**
Calanoida	0.0	0.0	0.3	0.2
Teleostei	25.0	28.7	0.0	9.6
Sigmops gracilis	0.0	0.0	50.0	33.3
Myctophidae	25.0	71.3	30.2	43.9
Stenobrachius sp.	48.0	0.0	19.6	13.1
Stenobrachius leucopsarus	2.0	0.0	0.0	0.0
Stomach with food	8	3	5	8
Empty stomachs	47	12	40	52
Total stomachs	55	15	45	60
% of empty stomachs	85	80	89	86
Number of hauls	4	1	2	3
Average fork length	16.3	13.3	16.8	15.5
Minimum fork length	13	12	12	12
Maximum fork length	20	14	20	20
SD of fork length	2.49	1.15	3.63	3.34

Table 16a. -- Prey items (expressed in percent frequency of occurrence and percent total weight) of *Scopelosaurus adleri* collected in the Gulf of Alaska 2007 mesopelagic survey.

Prey items	Frequency (%)	Weight (%)
Scyphozoa (jellyfish)	5.26	1.70
Calanoida (copepod)	15.79	0.69
Neocalanus cristatus (copepod)	10.53	0.25
Gaidius sp. (copepod)	5.26	0.02
Euchaeta sp. (copepod)	5.26	0.23
Euchaeta elongata (copepod)	26.32	1.42
Metridia sp. (copepod)	26.32	0.08
Pleuromamma sp. (copepod)	5.26	0.02
Heterorhabdus sp. (copepod)	5.26	0.01
Thysanoessa spinifera (euphausiid)	5.26	1.94
Chaetognatha (arrow worm)	63.16	1.70
Chauliodus macouni (Pacific viperfish)	5.26	90.98
Stenobrachius leucopsarus (northern lampfish)	5.26	0.93

Total non-empty stomachs = 19
Total prey number = 76
Total prey weight = 8.094 g
Total empty stomachs = 0
Number of hauls = 4

Table 16b. -- Prey items (expressed in percent total weight) of *Scopelosaurus adleri* (scaly wearyfish) collected in different depths in the Gulf of Alaska 2007 mesopelagic survey.Night, night-tow

	Night		
Prey items	**500 m**	**1,000 m**	**Total**
Syphozoa	11.8	0.0	5.9
Calanoida	32.1	0.0	16.1
Gaidius sp.	0.2	0.0	0.1
Euchaeta sp.	10.0	39.6	24.8
Metridia sp.	0.1	0.0	0.0
Pleuromamma sp.	0.2	0.0	0.1
Heterorhabdus sp.	0.1	0.0	0.0
Thysanoessa spinifera	13.4	0.0	6.7
Chaetognatha	25.8	10.4	18.1
Stenobrachius leucopsarus	6.4	0.0	3.2
Chauliodus macouni	0.0	50.0	25.0
Stomach with food	17	2	19
Empty stomachs	0	0	0
Total stomachs	17	2	10
% of empty stomachs	0	0	0
Number of hauls	2	2	4
Average fork length	20.9	25.5	21.4
Minimum fork length	19	21	19
Maximum fork length	26	30	30
SD of fork length	1.73	6.36	2.65

Table 17. -- Percent by weight of the important prey or prey group consumed by the mesopelagic fish in the Gulf of Alaska in 2007.
AMP, amphipod; BD, *Benthalbella dentata* ; CAN, calanoids; CEP, cephalopod; CHA, chaetognath; CM, *Chauliodus macouni* ; DT, *Diaphus theta* ; EUP, euphausiid; FIS, all fish; GAS, gastropod; JFH, jellyfish; LAR, larvacean; LJ, Lampanyctus jordani; LS, *Leuroglossus schmidti* ; ML, *Melamphaes lugubris* ; MM, *Macropinna microstoma* ;MYS, mysid; NC, *Nansenia candida* ; NR, *Nannobrachium regale; OST, ostracod; OT, Oneirodes thompsoni; PC, Poromitra curilensis; POL, polychaete;* PT, *Protomyctophum thompsoni* ; SA, *Sagamichthys abei* ; SC, *Scopelosaurus adleri* ; SHR, shrimp; SL, *Stenobrachius leucopsarus* ; SN, *Stenobrachius nannochir* ; TC, *Tarletonbeania crenularis* ; TM, *Tactostoma macropus* ; UB, unknown bathylagid.

	Predator																		
Prey	MM	SN	PT	LJ	ML	SA	SL	TC	NC	DT	UB	PC	LS	NR	BD	OT	SC	CM	TM
JFH	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
POL	0	0	0	0	1	0	0	0	1	<1	1	9	0	0	0	0	0	0	0
GAS	0	0	0	0	0	0	0	0	5	9	10	6	3	0	0	0	0	0	0
CEP	0	0	0	0	<1	0	0	0	<1	<1	5	2	0	32	0	25	0	0	0
OST	0	3	1	4	6	3	3	0	<1	3	5	9	42	<1	0	0	0	0	0
CAN	0	97	73	62	60	56	53	3	<1	21	19	12	7	3	2	0	2	<1	0
MYS	0	0	0	0	5	0	1	0	0	0	0	0	0	9	0	0	0	0	0
AMP	0	0	9	29	1	0	4	3	<1	1	7	1	2	1	0	0	0	0	0
EUP	0	0	17	0	6	0	36	3	2	18	13	0	2	1	3	0	2	0	0
SHR	0	0	0	0	4	0	0	0	0	<1	0	0	0	45	28	0	0	0	0
CHA	0	0	<1	<1	12	27	1	0	0	4	1	13	6	0	0	0	2	0	0
LAR	0	0	0	0	1	13	1	91	88	41	25	15	36	0	0	0	0	0	0
FIS	0	0	0	0	0	0	1	0	0	5	9	12	0	9	66	75	92	99	100
Total stomachs	22	28	59	9	142	24	210	3	84	206	153	106	130	160	121	3	19	118	10
Stomachs with food	3	9	57	5	141	14	110	3	76	192	71	54	88	26	11	2	19	16	2
Empty stomachs	19	17	2	4	1	10	100	0	8	14	52	52	42	134	110	1	0	102	8
% of empty	86	61	3	44	1	42	48	0	10	7	34	49	32	84	91	33	0	86	80

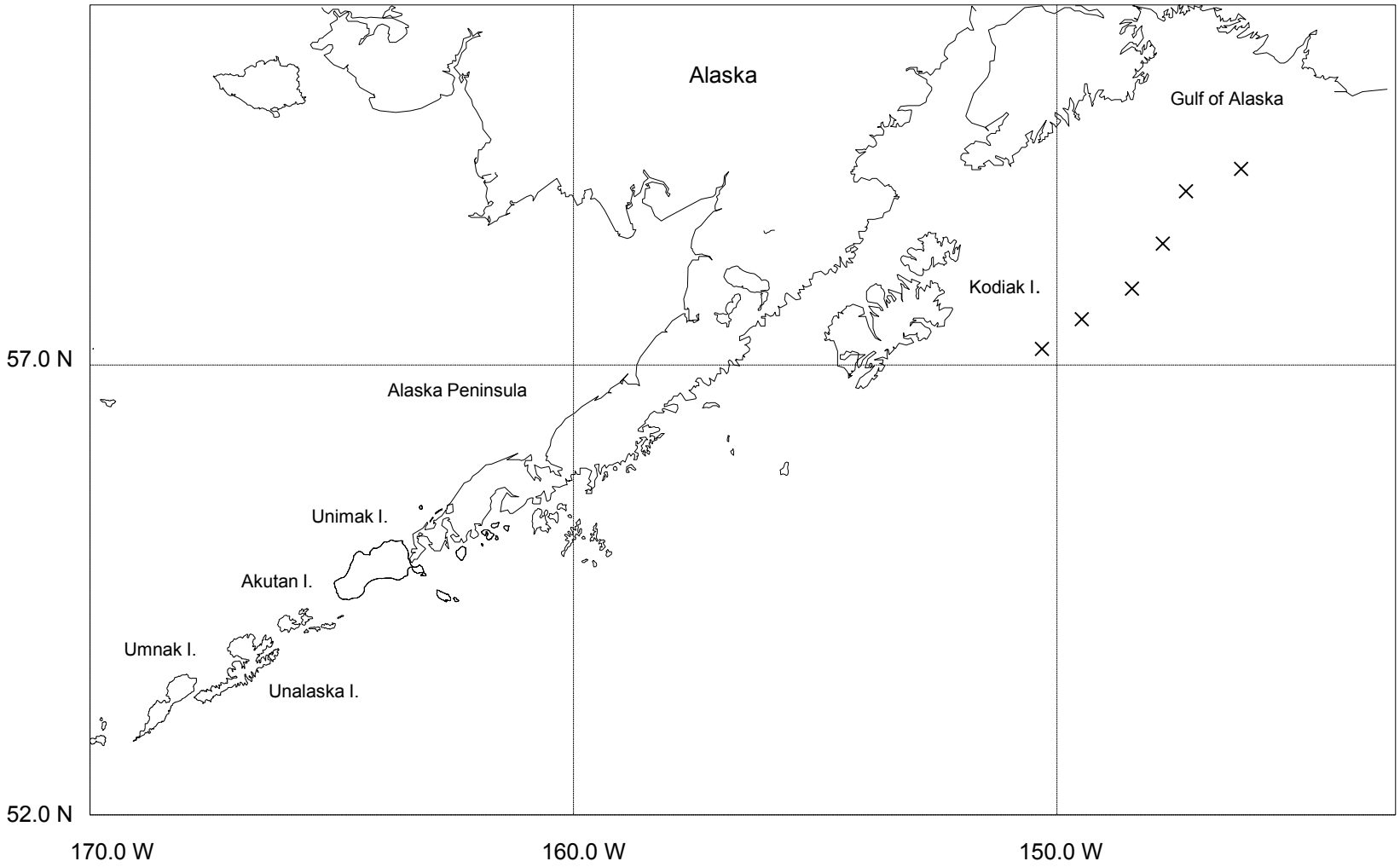

Figure 1.-- Collection locations (X) of specimens in the Gulf of Alaska in 2007 mesopelagic survey.

	MM	SN	PT	LJ	ML	SA	SL	TC	NC	DT	UB	PC	LS	NR	BD	OT	SC	CM	TM
MM		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
SN			74	65	63	59	56	3	1	24	22	15	10	4	2	0	2	0	0
PT				69	69	58	76	9	4	41	41	15	13	6	5	0	5	1	0
LJ					66	60	61	6	3	26	31	18	14	5	2	0	3	1	0
ML						72	66	8	8	39	35	34	23	16	6	1	6	1	0
SA							58	16	2	41	38	29	29	4	2	0	4	1	0
SL								10	6	46	42	19	16	8	6	1	6	2	1
TC									92	53	34	19	43	5	5	0	4	1	0
NC										53	37	25	44	5	3	1	3	1	0
DT											78	48	56	13	11	6	11	6	5
UB												52	45	21	14	14	25	10	9
PC													41	16	14	14	16	13	12
LS														6	4	0	6	1	0
NR															40	34	12	10	9
BD																66	70	67	66
OT																	75	75	75
SC																		93	92
CM																			99
TM																			

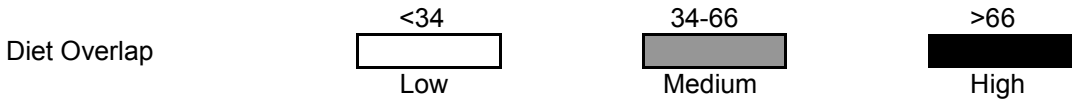

Figure 2. -- Percent Similarity Index (%) of dietary overlap of the mesopelagic fish in the Gulf of Alaska.
BD, *Benthalbella dentata* ; CM, *Chauliodus macouni* ; DT, *Diaphus theta* ; LJ, *Lampanyctus jordani* ;
L S, *Leuroglossus schmidti* ; ML, *Melamphaes lugubris* ; MM, *Macropinna microstoma* ;
NC, *Nansenia candida* ;NR, *Nannobrachium regale; OT, Oneirodes thompsoni;*
PC, *Poromitra curilensis* ; PT, *Protomyctophum thompsoni* ; SA, *Sagamichthys abei* ;
SC, *Scopelosaurus adleri* ; SL, *Stenobrachius leucopsarus* ; SN, *Stenobrachius nannochir* ;
TC, *Tarletonbeania crenularis* ; TM, *Tactostoma macropus* ;UB, unknown bathylagid.

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