

A Comparison of Feeding Patterns Between Larval and Juvenile Walleye Pollock and Pacific Cod in the Eastern Bering Sea

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Introduction:

The goal of this study is to compare feeding patterns of larval and juvenile walleye pollock (*Theragra chalcogramma*) and Pacific cod (*Gadus macrocephalus*). Poor recruitment success during warm years (e.g., 2001-2005) lead to reduced pollock biomass in the eastern Bering Sea (Iannelli et al. 2007). Feeding success, thus growth, during the first summer is an important pre-requisite for overwinter survival and subsequent recruitment success (Sogard 1997; Sogard and Olla 2000). While age-0 cod rarely co-occurred with peak abundances of pollock, age-0 pollock were ubiquitous and were collected at all stations over the entire eastern Bering Sea shelf from 1996-2000 (Duffy-Anderson et al. 2006). These observations suggest that larval and juvenile pollock and cod may exploit similar prey fields, presenting a potential for dietary overlap and possible competition for prey resources.

Results:

April/May:

Pollock and cod had similar feeding success rates at 59% (n=54) and 60% (n=47), respectively

The diet composition differed significantly between pollock and cod preflexion larvae (ANOSIM, p<0.05)

Pollock ingested significantly smaller prey items than cod (t-test, p<0.05)

No significant difference in average number of prey items per stomach (t-test, p>0.05)

September:

Pollock and cod had similar feeding success rates at 95.2% (n=59) and 95.7% (n=43), respectively

The diet composition differed significantly between juvenile pollock and cod (ANOSIM, p<0.05)

Pollock ingested significantly smaller prey items than cod (t-test, p<0.05)

Pollock ingested a significantly higher number of prey items per stomach than cod (t-test, p<0.05)

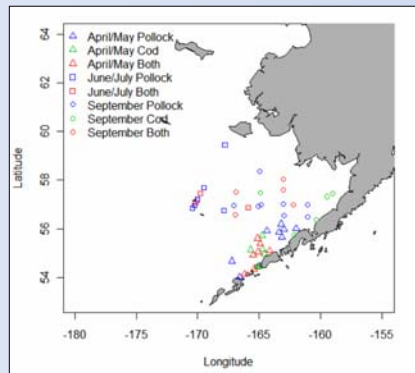


Figure 1. Sample stations

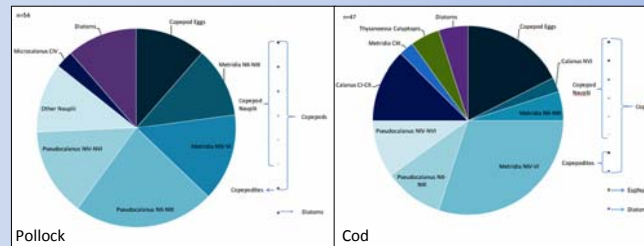


Figure 2. Percent frequency of occurrence April/May

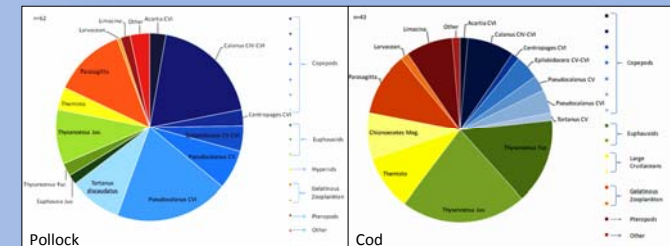


Figure 4. Percent frequency of occurrence September

June/July:

Pollock had a feeding success rate of 86.7% (n=113), while cod were found to have a feeding success rate of 100% (n=5)

The diet composition differed significantly between pollock and cod flexion larvae (ANOSIM, p<0.05)

Pollock ingested significantly smaller prey items than cod (t-test, p<0.05)

No significant difference in average number of prey items per stomach (t-test, p>0.05)

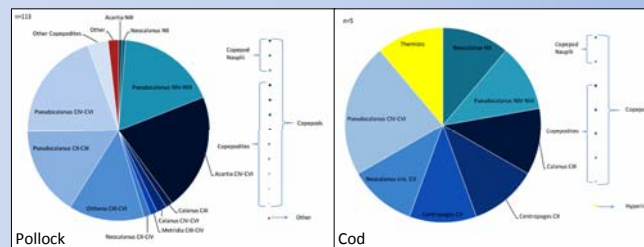


Figure 3. Percent frequency of occurrence June/July

Summary:

While pollock and cod had similar feeding success rates in every season, the dietary composition of these two gadoid fishes were significantly different in every season. Spring larvae consumed similar numbers of prey items, but the prey items ingested by cod were found to be significantly larger than those ingested by pollock. In summer, pollock and cod consumed similar numbers of prey items; although only five cod were sampled, the prey items found were significantly larger than the prey items found in pollock. During the fall, pollock were concentrating on high numbers of smaller prey items, while cod were eating fewer, larger items.

Although these two species utilize similar life histories, both developmentally and spatially, the results of this study indicate that the potential for dietary competition is minimal during a cold year in the eastern Bering Sea.

Results from this study provide insight into resource allocation between pollock and cod and can be incorporated into trophic interaction models in the Bering Sea, thereby informing the management of these important groundfish species.

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 Thank You

Methods:

Samples were received from four cruises during April through September 2008 (Figure 1)

April/May Cruise: FOCI (Preflexion Larvae)
 June/July Cruise: BEST/BSIERP (Flexion Larvae)
 September Cruises: BASIS (Juveniles)
 FOCI (Juveniles)

Stomachs were excised from the esophagus to the pylorus and prey items were identified to lowest taxonomic and developmental levels possible

Feeding success was calculated as the number of stomachs containing at least one prey item divided by the total number of stomachs

Percent frequency of occurrence (%FO) was calculated as the proportion of non-empty stomachs containing a given prey item or category (Figures 2, 3, 4)

Analysis of Similarities (ANOSIM) was used to test for significant differences between the dietary composition of pollock and cod within each season (PRIMER V.6, Clarke and Gorley 2006)

T-tests were performed to test for significant differences between pollock and cod in the average number and average size of prey items per stomach

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