

# Length-weight-age relationships of demersal fishes in the Chukchi Sea



Brenda L Norcross, Brenda A Holladay, Christy Gleason – School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, Fairbanks, Alaska  
Corresponding author: bnorcross@alaska.edu

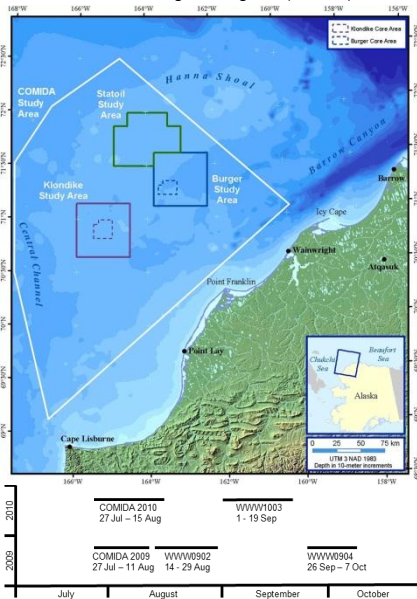
## Abstract

This study provides updated life history information for important and ecologically representative demersal fish species in the Chukchi Sea. Basic body measurements were examined from fishes that were collected in the northeastern Chukchi Sea. We used a small mesh bottom trawl during six cruises from two separate studies in 2009 and 2010. These studies were the Chukchi Sea Environmental Studies Program (CSESP) and fisheries investigations supplemental to Chukchi Sea Offshore Monitoring in Drilling Area (COMIDA).

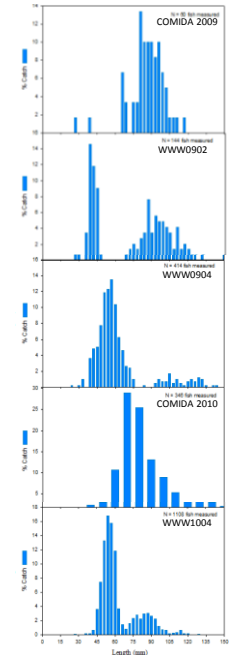
Length-weight relationships were calculated for 18 species of fish. Ages were estimated from otoliths of six abundant species representing five families. All the fishes were small, though not all were young. Arctic cod (cod, *Boreogadus saida*) 20-150 mm were ages 0-3. Arctic staghorn sculpin (sculpin, *Gymnocephalus tricuspidus*) 20-120 mm were ages 0-4. Shorthorn sculpin (sculpin, *Myoxocephalus scorpius*) 20-110 mm were ages 0-2. Stout eelblenny (prickleback, *Anisarchus medius*) 40-140 mm were also ages 0-10. Bering flounder (flatfish, *Hippoglossoides robustus*) 15-150 mm were ages 0-5. Polar eelpout (eelpout, *Lycodes polaris*) had the largest size range, 30-200 mm, and were ages 0-10. Ages of Arctic cod were comparable to those of this fish in other circumpolar areas. Seasonal and interannual patterns in length and age distributions were observed.

## Laboratory methods

- Fishes thawed, weighed and measured
- Ages assigned using thin-sectioned otoliths viewed in transmitted and reflected light
- Subsample of otoliths sent for external verification to ADF&G and NOAA aging labs



## Arctic cod – 5 cruises

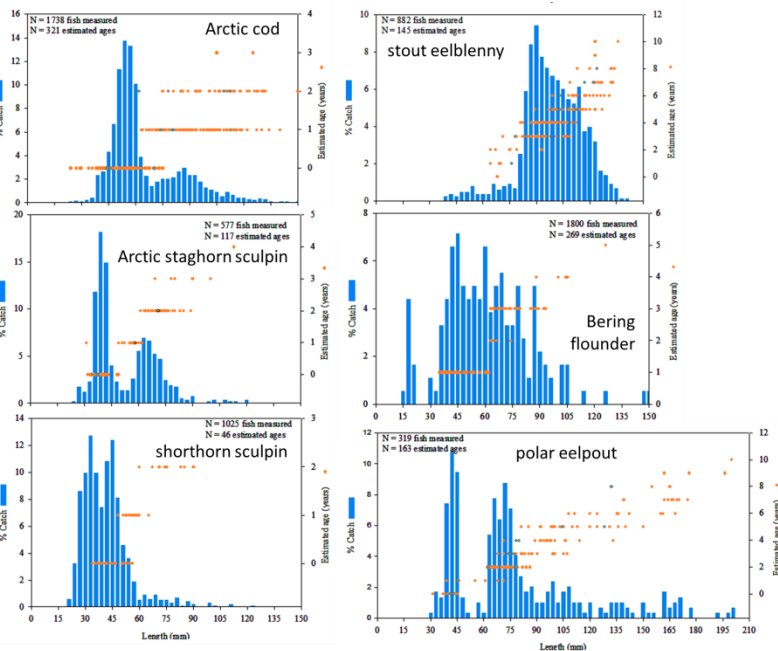


Because of the potential for oil and gas development, interest is increasing in fishes in the US Arctic waters. Little is known about species that are not of commercial or cultural interest or not important in the eastern Arctic.

## Arctic cod

Because of its numeric and geographic importance, more information exists about length, weight and age of Arctic cod than for other Alaskan Arctic fish species.

- Arctic cod size increased over season.
- Age-at-length of Arctic cod was comparable to those of the eastern Arctic and other collections in the western Arctic



Length weight relationships of fishes in the northeast Chukchi Sea.  $W = aL^b$  where  $W$  = total weight (g) and  $L$  = total length (mm), and the parameters  $a$  and  $b$  are constants estimated by a linear transformation of this equation. Length and weight were log-transformed and fitted with least squares regressions.

Family and common name	Scientific name	N	$a \pm SE$	$b \pm SE$	$r^2$
<b>Cods</b>					
Arctic cod	<i>Boreogadus saida</i>	3648	-5.48 ± 0.02	3.11 ± 0.01	0.95
<b>Sculpins</b>					
hameon	<i>Artedius scaber</i>	492	-5.39 ± 0.05	3.33 ± 0.03	0.96
Arctic staghorn sculpin	<i>Gymnocephalus tricuspidus</i>	574	-5.9 ± 0.05	3.52 ± 0.03	0.97
shorthorn sculpin	<i>Myoxocephalus scorpius</i>	1023	-5.61 ± 0.04	3.36 ± 0.03	0.94
ribbed sculpin	<i>Triglops pingelii</i>	36	-5.61 ± 0.23	3.18 ± 0.13	0.95
<b>Saifin sculpins</b>					
eyeshade sculpin	<i>Nautichthys pribilovius</i>	55	-5.52 ± 0.18	3.34 ± 0.11	0.95
<b>Poachers</b>					
Arctic alligatorfish	<i>Ulcina olrikii</i>	224	-6.04 ± 0.14	3.48 ± 0.08	0.89
<b>Snailfishes</b>					
kelp snailfish	<i>Liparis tunicatus</i>	64	-5.38 ± 0.16	3.24 ± 0.1	0.96
<b>Eelpouts</b>					
halfbarred pout	<i>Gymnelus hemifasciatus</i>	150	-5.73 ± 0.12	3.14 ± 0.06	0.94
fish doctor	<i>Gymnelus virdis</i>	41	-6.04 ± 0.31	3.31 ± 0.16	0.92
polar eelpout	<i>Lycodes polaris</i>	311	-5.79 ± 0.06	3.21 ± 0.03	0.97
marbled eelpout	<i>Lycodes ravidens</i>	129	-5.71 ± 0.1	3.19 ± 0.05	0.97
<b>Pricklebacks</b>					
stout eelblenny	<i>Anisarchus medius</i>	871	-5.54 ± 0.06	2.99 ± 0.03	0.93
fourline snakeblenny	<i>Eumesogrammus praecisus</i>	41	-6.18 ± 0.2	3.53 ± 0.1	0.97
slender eelblenny	<i>Lumpenus fabricii</i>	959	-5.76 ± 0.05	3.09 ± 0.03	0.93
Arctic shanny	<i>Stichaeus punctatus</i>	88	-5.97 ± 0.08	3.35 ± 0.05	0.98
<b>Sand lances</b>					
Pacific sand lance	<i>Ammodytes hexapterus</i>	226	-6.47 ± 0.17	3.47 ± 0.1	0.85
<b>Flatfishes</b>					
Bering flounder	<i>Hippoglossoides robustus</i>	175	-5.67 ± 0.07	3.28 ± 0.04	0.97

## Overall Conclusions:

- Updated life history information for some important and ecologically representative demersal fish species in Chukchi Sea
- Range of lengths of fishes captured: 15 – 200 mm
- Captured small fish because the small sizes are numerically dominant in the northeastern Chukchi Sea
- Captured age-0 fishes unlike previous studies
- Seasonal and interannual variability in lengths of fishes
- Length at age varied by fish species, 150 mm range ages 2 – 10

We recommend examining 20 otoliths per 10 mm length range for each fish species.

## Cite as:

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