SHRIMP IN ÖXARFJÖRÐUR – RÆKJA Í ÖXARFIRÐI

Pandalus borealis

THE FISHERY

Shrimp fishing started in Öxarfjörður in the 1978. The catch was in at maximum 700 tonnes. No shrimp was landed between 1985 and 1989. In 1990 fishing started again and catches increased from 150 tonnes to a maximum of 1760 tonnes in 1996/1997. The catches remained high between 1994 and 1997 but decreased sharply until 2002 when commercial fishing stopped due to low biomass indices (Figure 1). The quota year has been from early winter (following the survey in October) until 30th April. CPUE increased steadily from 1979 until 1998 when it decreased.

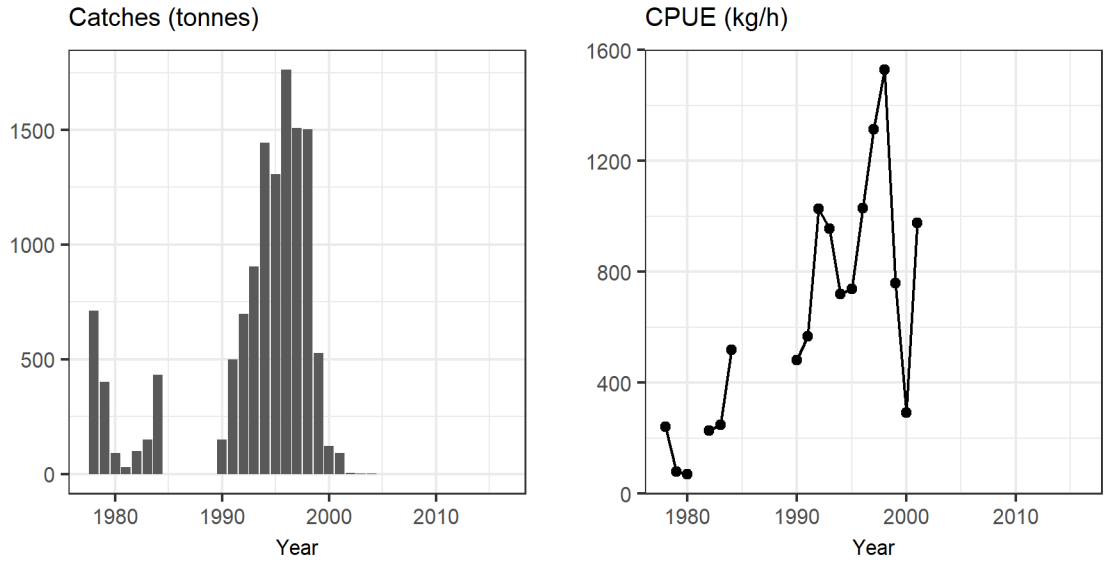

Figure 1. Shrimp in Öxarfjörður. Total catch and catch per unit effort.

Mynd 1. Rækja í Öxarfirði. Heildarafli og afli á sóknareiningu.

SURVEY DATA

The annual Icelandic shrimp survey has been conducted since 1990 in Öxarfjörður. No survey was conducted in the area in 2004 and 2017. The 2018 survey was conducted on 23-24 October and included 12 fixed stations at depths of 60–209 m. Information on sampling procedure can be found in the report 'Northern shrimp research in Icelandic waters, 1988-2015' (Jónsdóttir et al. 2017).

From 1990, highest density of shrimp was found within the inner part of the fjord. However, following the decrease in biomass index the distributional area of shrimp decreased (Figure 2). Since 2007, shrimp has been found at the eastern part of the fjord.

Figure 2. Shrimp in Öxarfjörður. Distribution and abundance of shrimp in the annual shrimp survey. X denotes stations where no northern shrimp was found.

Mynd 2. Rækja í Öxarfirði. Útbreiðsla og magn rækju í stofnmælingu. x sýnir stöðvar þar sem engin rækja fékkst.

INDICES

Four indices are used to assess the state of the stock; total biomass, fishable biomass, female biomass and juvenile biomass. Juveniles include all individuals equal to and below 13 mm carapace length while the fishable biomass index includes all individuals equal to and above 15.5 mm carapace length. Individuals between 13 and 15.5 mm carapace length are divided between the juvenile and fishable biomass indices. The female biomass includes all females.

All the indices decreased sharply from 1998 to 2000 and have flucuated at low levels since then (Figure 3). In 2018 the fishable index was below the reference level where the state of the stock is considered critical.

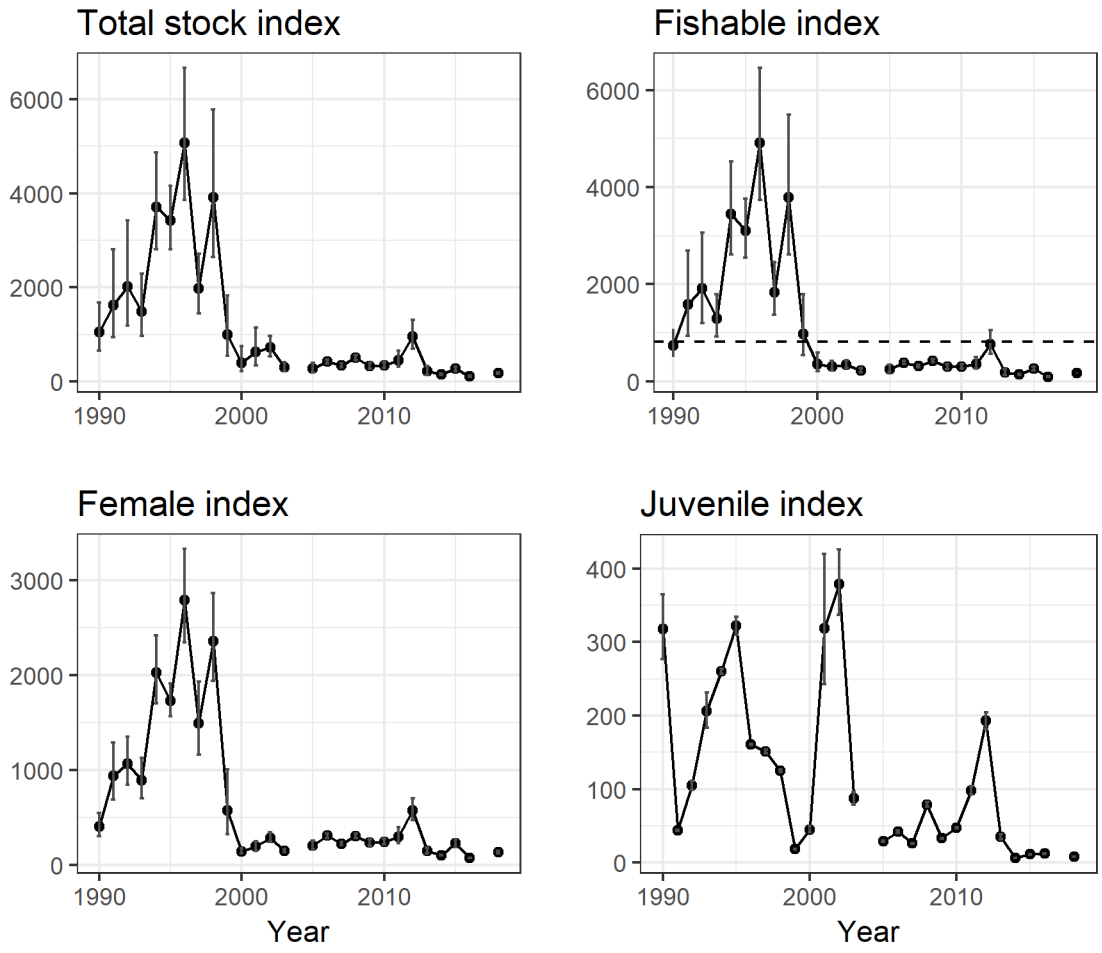

Figure 3. Shrimp in Öxarfjörður. Stock biomass index, fishable biomass index, female biomass index and juvenile biomass index of shrimp. The horizontal line indicates a value where the state of the stock is considered to be critical (20% of the mean of the three highest indices).

Mynd 3. Rækja í Öxarfirði. Heildarstofnsvísitala, veiðistofnsvísitala, kvendýravísitala og vísitala ungrækju. Lárétt lína sýnir viðmiðunargildi fyrir ástand stofnsins (20% af meðaltali þriggja hæstu vísitalna).

LENGTH DISTRIBUTION

Since 2000, no large females have been observed in the survey. However, males have been larger since 2014 but their number has remained low since 2013 (Figure 4).

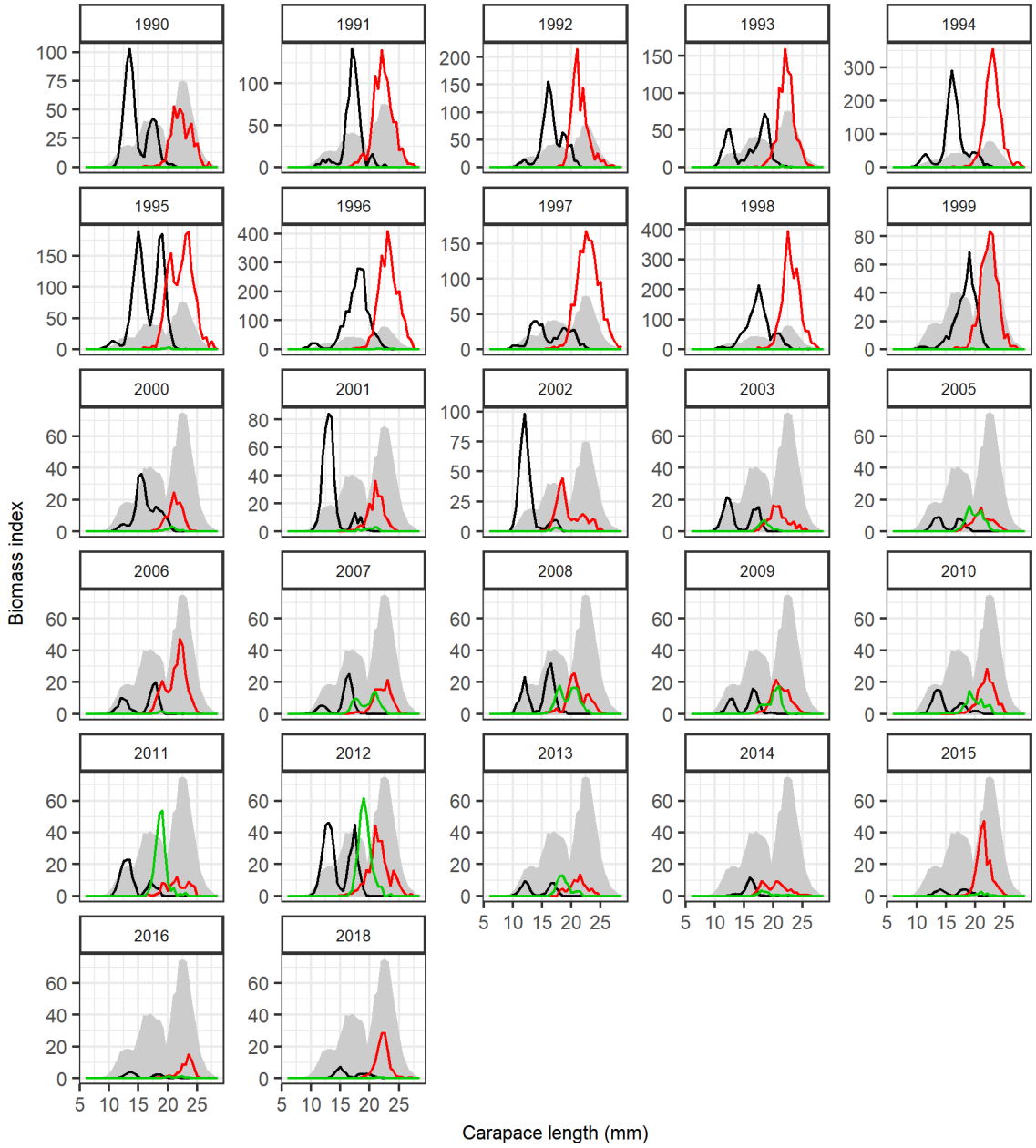

Figure 4. Shrimp in Öxarfjörður. Length distribution of shrimp. The black line indicates males, the green immature females, and the red line mature females. The grey area is the mean length distribution of both sexes for the whole study period. Note different scales on y-axes.

Mynd 4. Rækja í Öxarfirði. Lengdardreifing rækju í stofnmælingu. Svört lína sýnir karldýr, græn lína ókynþroska kvendýr og sú rauða kynþroska kvendýr. Gráa svæðið sýnir meðallengdardreifingu beggja kynja allt rannsóknatímabilið. Ath. mismunandi skala á y-ás.

ABUNDANCE OF COD AND HADDOCK

Juvenile cod and haddock abundance indices have fluctuated without trend throughout the study period (Figure 5). Cod abundance index increased in 1998, remained higher in three years and then decreased again. The haddock abundance index increased from 1998 to 2006 when it reached a maximum. It decreased steadily until 2014. Since 2015 it has remained stable at higher levels (Figure 5).

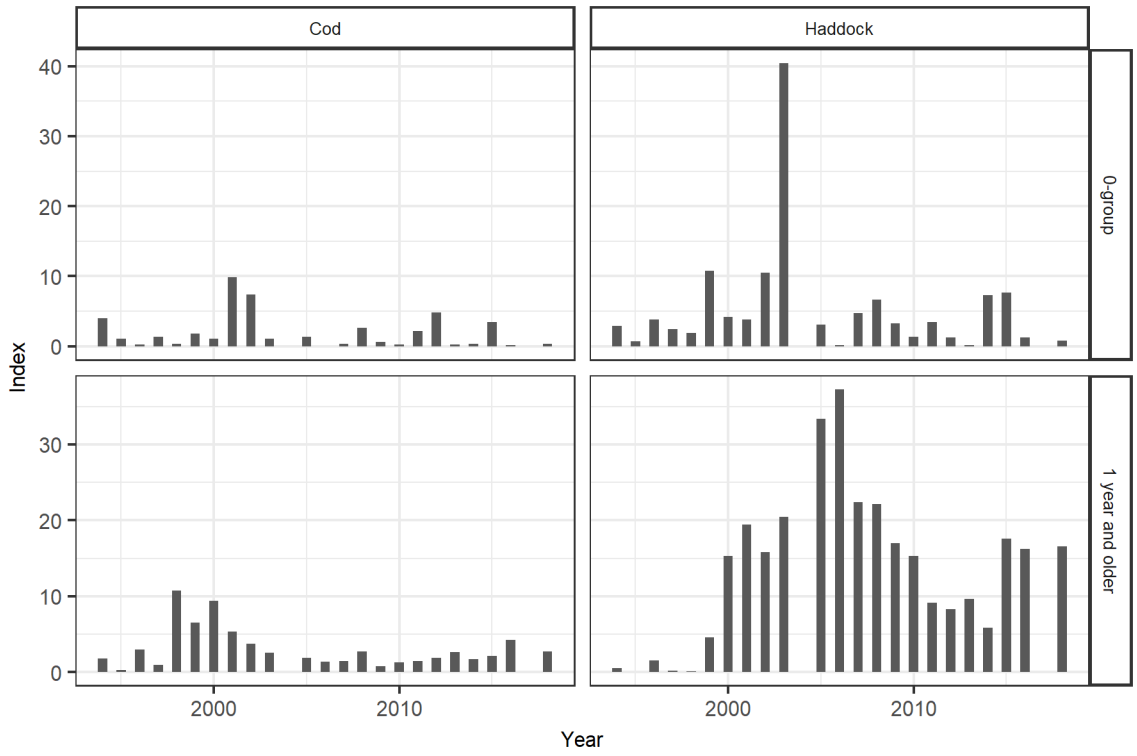

Figure 5. Cod and haddock in Öxarfjörður. Abundance indices of cod and haddock in the annual shrimp survey.

Mynd 5. Þorskur og ýsa í Öxarfirði. Vísitala þorsks og ýsu í stofnmælingu rækju.

MANAGEMENT

The Ministry of Industries and Innovation is responsible for management of all marine fisheries in Iceland and implementation of legislation. The fishing season was from early winter (following the annual Icelandic shrimp survey in September/October) until 30 April.

Table 1. Shrimp in Öxarfjörður. Fishable biomass index, state of the stock (relative to the mean of the three highest indices), advice, catch (tonnes in fishing year) and F_{proxy}.

Tafla 1. Rækja í Öxarfirði. Heildarstofnsvísitala, ástand stofns (vísitala miðað við meðaltal þriggja hæstu vísitölu gilda), ráðgjöf, afli og vísitala veiðihlutfalls (F_{proxy}).

Year	Biomass index	Relative state	Rec. TAC	National TAC	Catch	F_{proxy}
1988						
1989						
1990/91	730	0.18	150	150	151	0.21
1991/92	1583	0.39	500	500	500	0.32
1992/93	1912	0.47	700	700	697	0.36
1993/94	1286	0.32	900	900	905	0.70
1994/95	3445	0.85	1450	1450	1445	0.42
1995/96	3097	0.77	1300	1300	1308	0.42
1996/97	4910	1.21	1750	1750	1762	0.36
1997/98	1833	0.45	1500	1500	1509	0.82
1998/99	3785	0.94	1500	1500	1504	0.40
1999/00	978	0.24	500	500	527	0.54
2000/01	351	0.09	200	200	121	0.34
2001/02	304	0.08	140	140	92	0.30
2002/03	344	0.09	0	0	5	0.01
2003/04	217	0.05	-	-	2	0.009
2004/05	-		0	0	0	-
2005/06	248	0.06	0	0	0	-
2006/07	383	0.09	0	0	0	-
2007/08	313	0.08	0	0	0	-
2008/09	423	0.10	0	0	0	-
2009/10	297	0.07	0	0	0	-
2010/11	297	0.07	0	0	0	-
2011/12	356	0.09	0	0	0	-
2012/13	767	0.19	0	0	2	0.003
2013/14	180	0.04	0	0	0	-
2014/15	143	0.04	0	0	0	-
2015/16	256	0.06	0	0	0	-
2016/17	93	0.02	0	0	0	-
2017/18	-	-	-	-	0	-
2018/19	173	0.04	*0*			

ADVICE 2018

The Icelandic shrimp survey was used as a biomass indicator. The target F_{proxy} (catch/survey biomass) of 0.5 is considered precautionary based on the historical relationship between catch and survey index.

The state of the stock is considered critical if the total biomass index is below 809 (equivalent to a relative state of 0.2; the biomass index divided with the mean of the three highest indices). The biomass index value of 809 can therefore be considered a proxy for B_{lim} or I_{lim}. If the total biomass index is below 809, zero catch is advised, else the advice is based on multiplying the most recent index value with the target F_{proxy} = 0.5.

In October 2018, the total biomass index was below 809. Hence, MFRI advices zero catch in the quota year 2018/2019 in Öxarfjörður.