SHRIMP IN HÚNAFLÓI – RÆKJA Í HÚNAFLÓA
Pandalus borealis

THE FISHERY

Shrimp fishing started in Húnaflói in the 1960's. Annual catches were 1900-3100 tonnes in 1978-1985, but in 1986-1998 the catches fluctuated between 550 and 2700 tonnes. No shrimp fishing has been allowed since 1999 due to low biomass indices (Figure 1). The quota year was from early winter (following the survey in October) until 30 April. From 1978 to 1991 CPUE fluctuated between 260 and 560, except in 1984 when it was exceptionally high and in 1986 when it was lower. Between 1992 and 1996 CPUE increased sharply but declined after 1996.

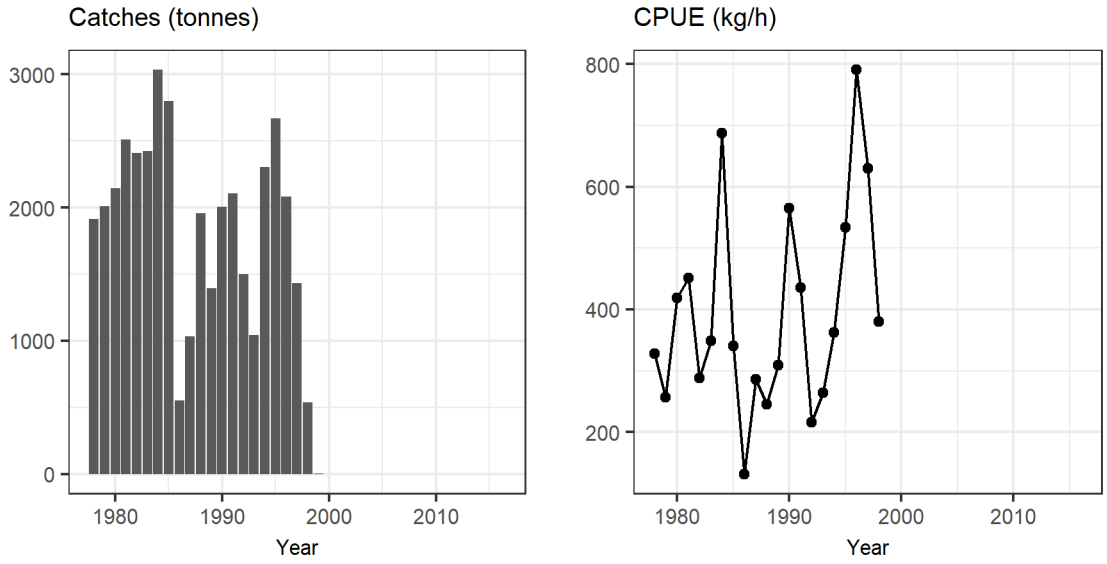

Figure 1. Shrimp in Húnaflói. Total catch and catch per unit effort.

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

SURVEY DATA

The annual Icelandic shrimp survey has been conducted since 1988 in Húnaflói. Until 2004, a total of 38 fixed station were sampled annually but after that 17 fixed stations have been sampled. The 2018 survey was conducted on 17–19 October and included 17 fixed at depths of 45–190 m. Information on sampling procedure can be found in the report 'Northern shrimp research in Icelandic waters, 1988-2015' (Jónsdóttir et al. 2017). No survey was conducted in Húnaflói in 2004 and 2017.

From 1988-1999, shrimp was found within the inner part of the fjord. However, following the decrease in biomass index the distributional area of shrimp changed (Figure 2). Now, shrimp is only found at the outer part of Húnaflói and at the mouth of Steingrímsfjörður.

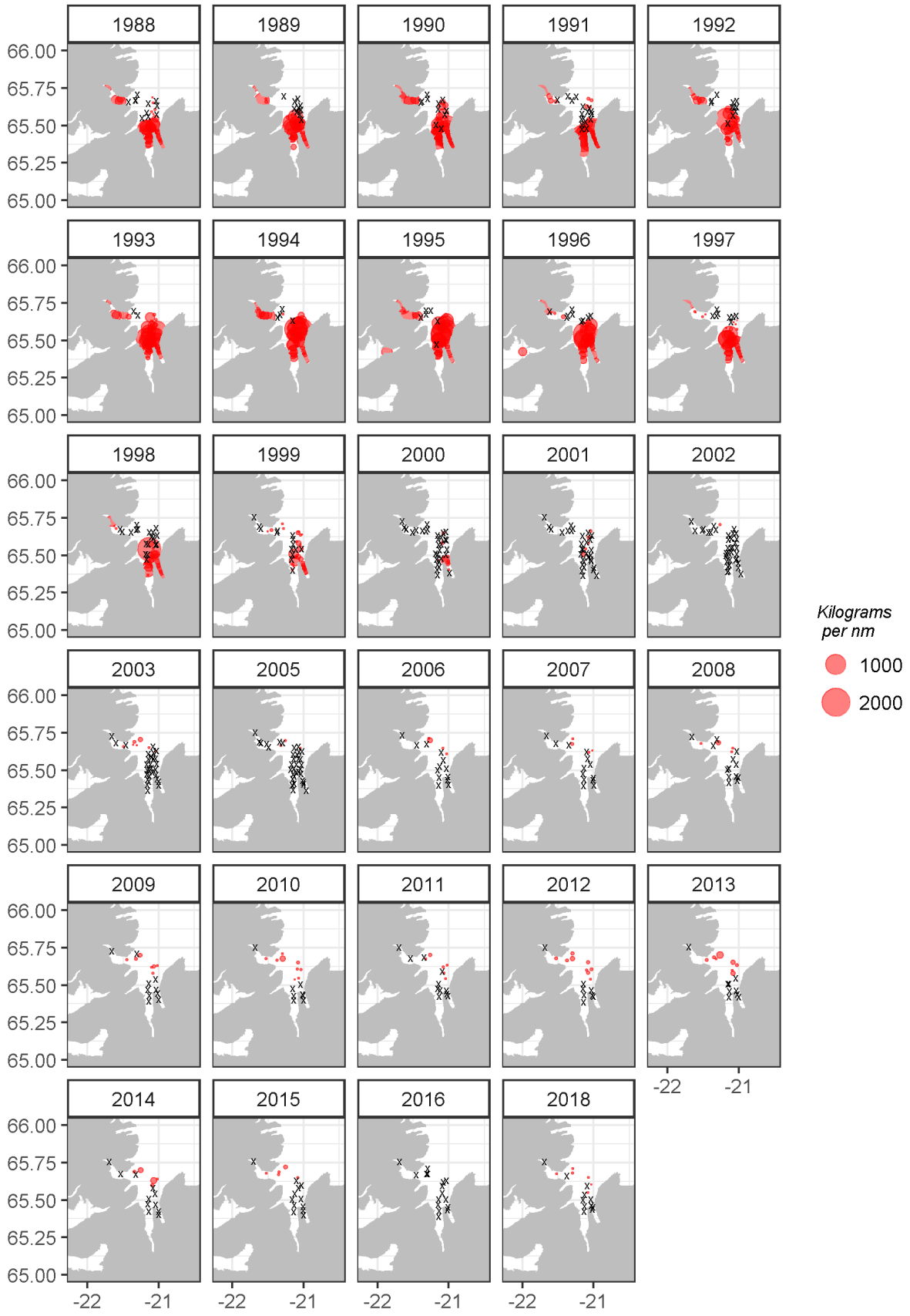

Figure 2. Shrimp in Húnaflói. Distribution and abundance of shrimp in the annual shrimp survey. X denotes stations where no northern shrimp was found.

Mynd 2. Rækja í Húnaflóa. 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 1995 to 2000 when they reached historically low levels (Figure 3). Since then, the indices have remained very low and the fishable index has been well below the reference level where the state of the stock is considered critical.

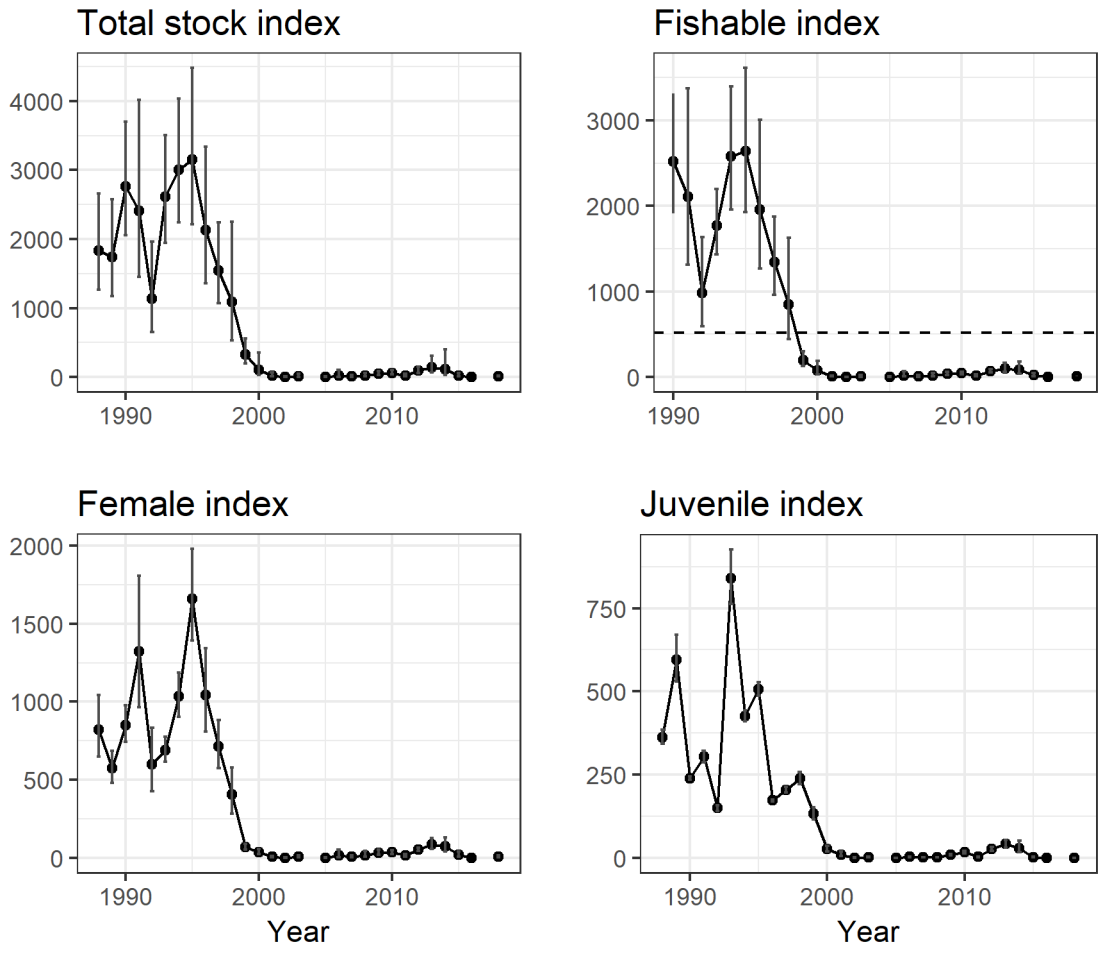

Figure 3. Shrimp in Húnaflói. Stock biomass index, fishable biomass index, female biomass index and juvenile biomass index of shrimp. The horizontal line indicates a value where the state of the stock is considered to be critical (20% of the mean of the three highest indices).

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

LENGTH DISTRIBUTION

The numbers of both males and females were very low in 2018 (Figure 4).

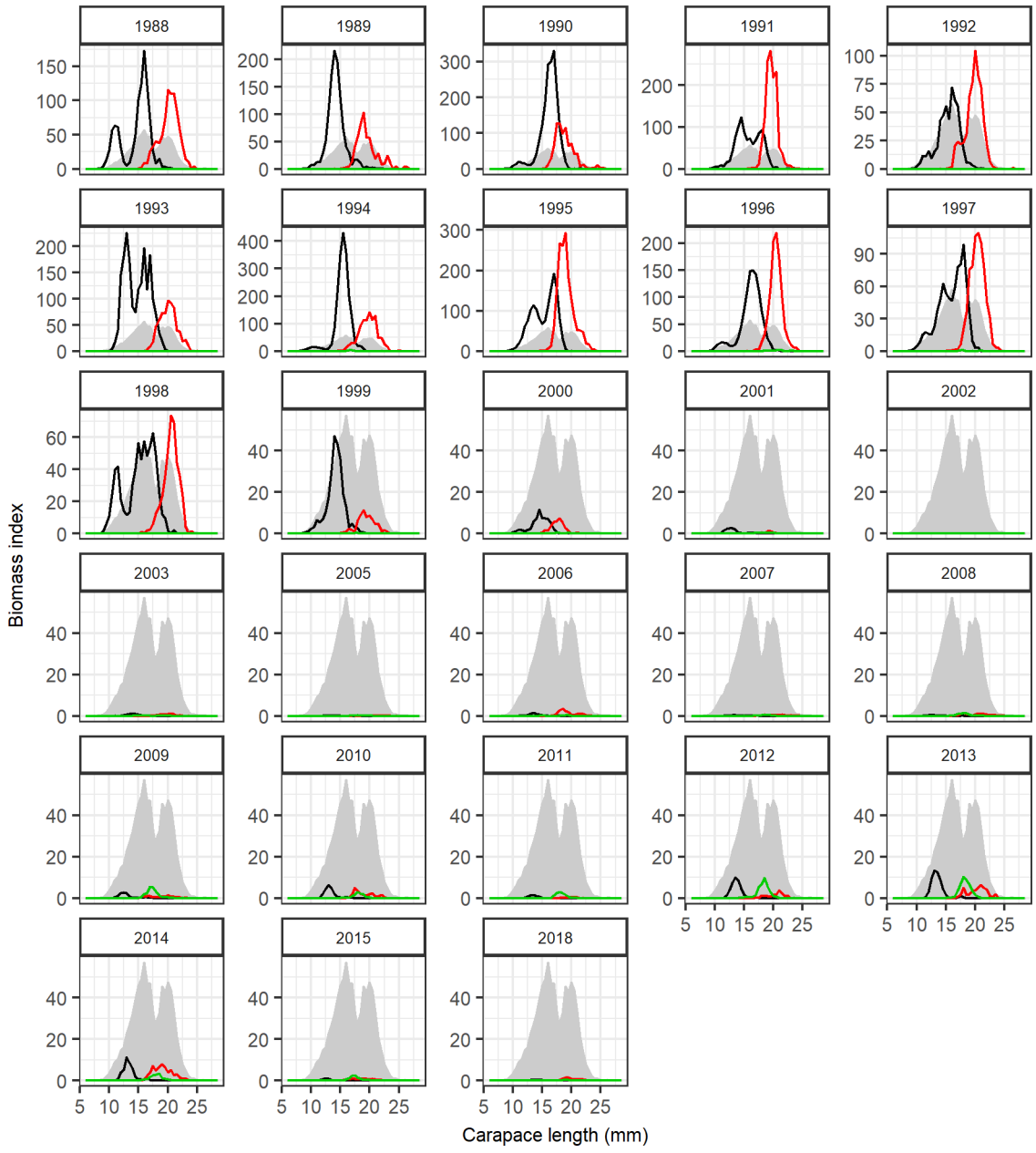

Figure 4. Shrimp in Húnaflói. Length distribution of shrimp. The black line indicates males, the green immature females, and the red line mature females. The grey area is the mean length distribution of both sexes for the whole study period. Note different scales on y-axes.

Mynd 4. Rækja í Húnaflóa. 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

Cod juvenile index has been lower after 2000 than in 1994-2000 (Figure 5). Haddock juvenile index has fluctuated without a trend with a peak in 2003. Cod abundance index increased between 1994 and 1996, when it decreased and remained relatively low until 2011 when it started to increase again (Figure 5). Haddock abundance index was low between 1994 and 1999 but in 2000 it increased sharply until it reached a maximum in 2007. Haddock abundance index decreased for a few years but increase again and has remained high since 2015.

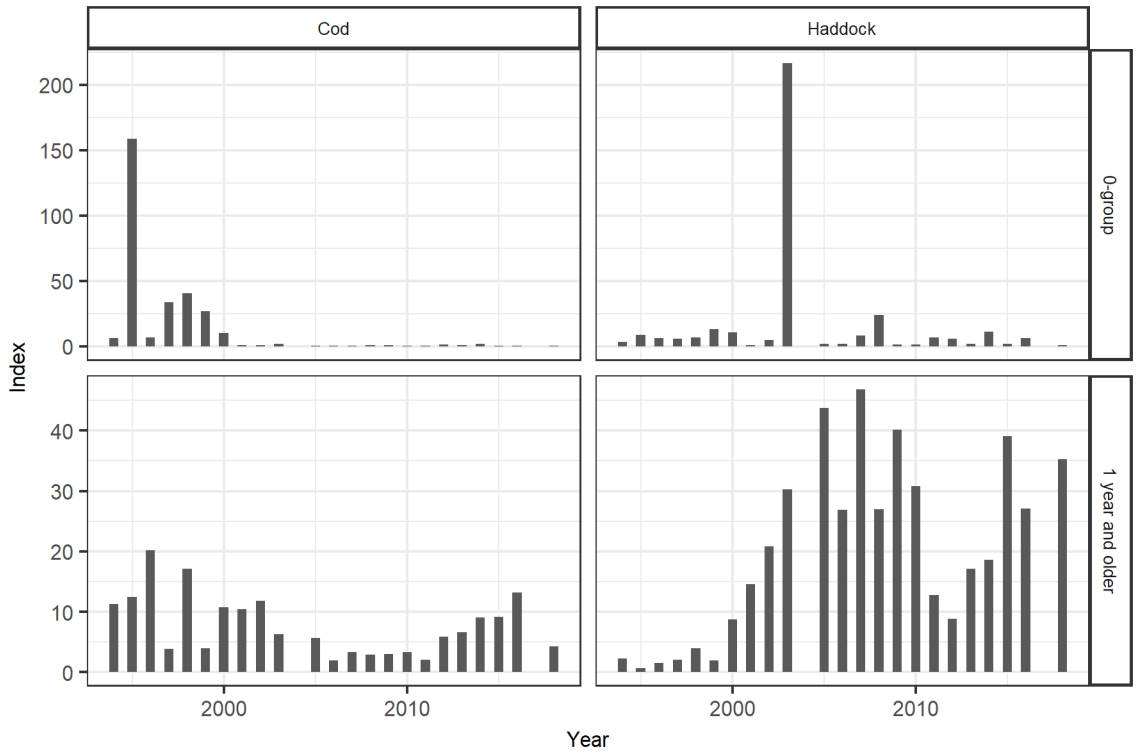

Figure 5. Cod and haddock in Húnaflói. Abundance indices of cod and haddock in the annual shrimp survey.

Mynd 5. Þorskur og ýsa í Húnaflóa. 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. No fishing has been conducted in Húnaflói since the quota year 1998/1999. The fishing season was from early winter (following the annual Icelandic shrimp survey in September/October) until 30 April.

Table 1. Shrimp in Húnaflói. 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 Húnaflóa. 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	1471	0.57				
1989	1146	0.44				
1990/91	2517	0.98	2000	2000	2004	0.80
1991/92	2107	0.82	2000	2000	2107	1.00
1992/93	984	0.38	1500	1500	1500	1.52
1993/94	1773	0.69	1000	1000	1044	0.59
1994/95	2580	1.00	2300	2300	2305	0.89
1995/96	2642	1.02	2500	2500	2670	1.01
1996/97	1955	0.76	2100	2100	2084	1.07
1997/98	1344	0.52	1400	1400	1432	1.07
1998/99	851	0.33	500	500	536	0.63
1999/00	199	0.08	0	0	3	0.02
2000/01	77	0.03	0	0	0	-
2001/02	12	0.00	0	0	0	-
2002/03	1	0.00	0	0	0	-
2003/04	11	0.00	0	0	0	-
2004/05	-	-	-	-	0	-
2005/06	2	0.00	0	0	0	-
2006/07	20	0.01	0	0	0	-
2007/08	9	0.00	0	0	0	-
2008/09	19	0.01	0	0	0	-
2009/10	38	0.01	0	0	0	-
2010/11	43	0.02	0	0	0	-
2011/12	18	0.01	0	0	0	-
2012/13	68	0.03	0	0	0	-
2013/14	102	0.04	0	0	0	-
2014/15	84	0.03	0	0	0	-
2015/16	21	0.01	0	0	0	-
2016/17	0	0.00	0	0	0	-
2017/18	-	-	-	-	0	-
2018/19	10	0.00	*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 516 (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 516 can therefore be considered a proxy for B_{lim} or I_{lim}. If the total biomass index is below 516, 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 516. Hence, MFRI advices zero catch in the quota year 2018/2019 in Húnaflói.