

## Greenland halibut in Division 1A inshore - Upernavik

Advice June 2020 for 2021 – 2022

### Recommendation for 2021 - 2022

Scientific Council recommends that catch should not exceed 5 068 tonnes. This is a reduction over the previous advice accounting for the reduction in mean individual size in the recent catches

### Management objectives

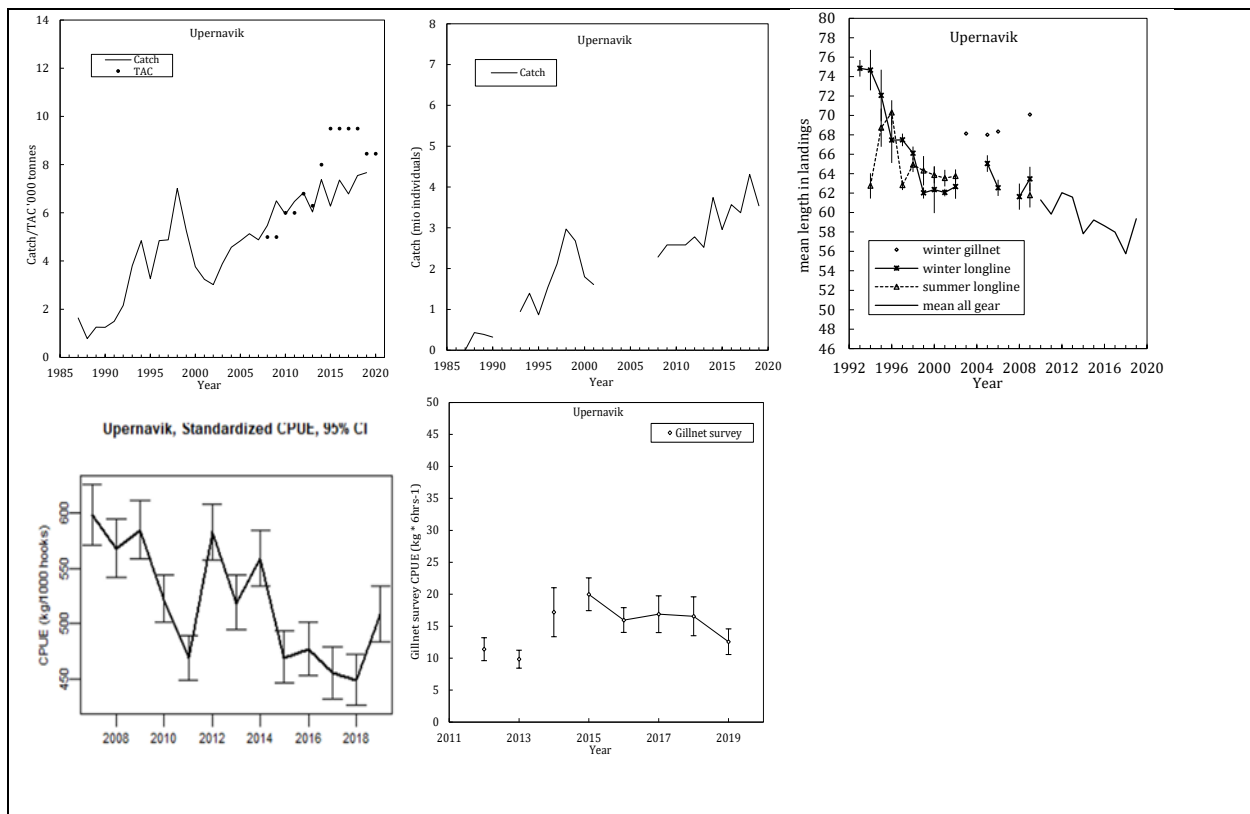
No explicit management plan or management objectives have been defined by the Government of Greenland.

### Management unit

The three stocks in Div. 1A inshore fjords (Disko Bay, Uummanaq and Upernavik) are believed to recruit from the Subarea 0+1 offshore spawning stock (in the Davis Strait) and there is little migration between the separate areas and the stock in SA 0+1 offshore. Separate advice is given for each management unit in Subarea 1A inshore.

### Stock status

The catch in tonnes and in numbers of fish has been record high since 2014. Mean length in the fish landings decreased in the 1990s but stabilized from 1999 to 2009. Since then, until 2018, length in the fish landings has decreased from 74-76 cm to 56-58 cm. The mean length increased in 2019, but this value is questionable because the sample size was smaller than usual. The standardized longline CPUE index decreased until 2018 reaching the lowest value of the time series. CPUE increased in 2019 but remains within the decreasing trend for year to year variation. The gillnet survey has shown some stability since 2015. The decrease observed in 2019 is uncertain due to a lower number of stations than usual.



## Reference points

Could not be established.

## Assessment

No analytical assessment was performed. Survey indices, commercial CPUE, and mean length in the landings were considered the best information to monitor the stock.

### *Human impact*

Mainly fishery-related mortality. Other mortality sources (e.g. pollution, shipping, oil-industry) are undocumented.

### *Environmental impact*

Unknown

## Fishery

Catches increased from the mid 1980s and peaked in 1998 at a level of 7 000 t. Landings then decreased sharply, but during the past 15 years, they have gradually returned to a higher level. Average catch in the most recent 5 years has been 7 169 t.

Recent catch estimates ('000 tonnes) are as follows:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>TAC</b>	6.5	6.5	8	9.5	9.5	9.5	9.5	9.5	8.5	8.5
<b>STACFIS</b>	6.5	6.8	6	7.4	6.3	7.4	6.8	7.5	7.6	

## Effects of the fishery on the ecosystem

Greenland halibut in the area is targeted with longlines and gillnets. Both gears select adult fish with large body size and do not retain recruits or small-sized fish. Ghost fishing by lost gillnets has been observed, but its effects are unknown.

## Special comments

The ICES Harvest Control Rule 3.2 for data-limited stocks could not be used since the survey time series was too short to be applied.

Recruits are mainly received from the offshore stock in SA 0 + 1 offshore.

## Sources of Information

SCR Doc. 20/006, 016, 043; SCS Doc. 20/012.

## Greenland halibut in Division 1A inshore - Uummannaq

Advice June 2020 for 2021 – 2022

**Recommendation for 2021 - 2022**

Scientific Council recommends that catch should not exceed 5153 tonnes. This recommendation is a reduction over the previous advice accounting for the decrease in the mean size in the recent catches.

**Management objectives**

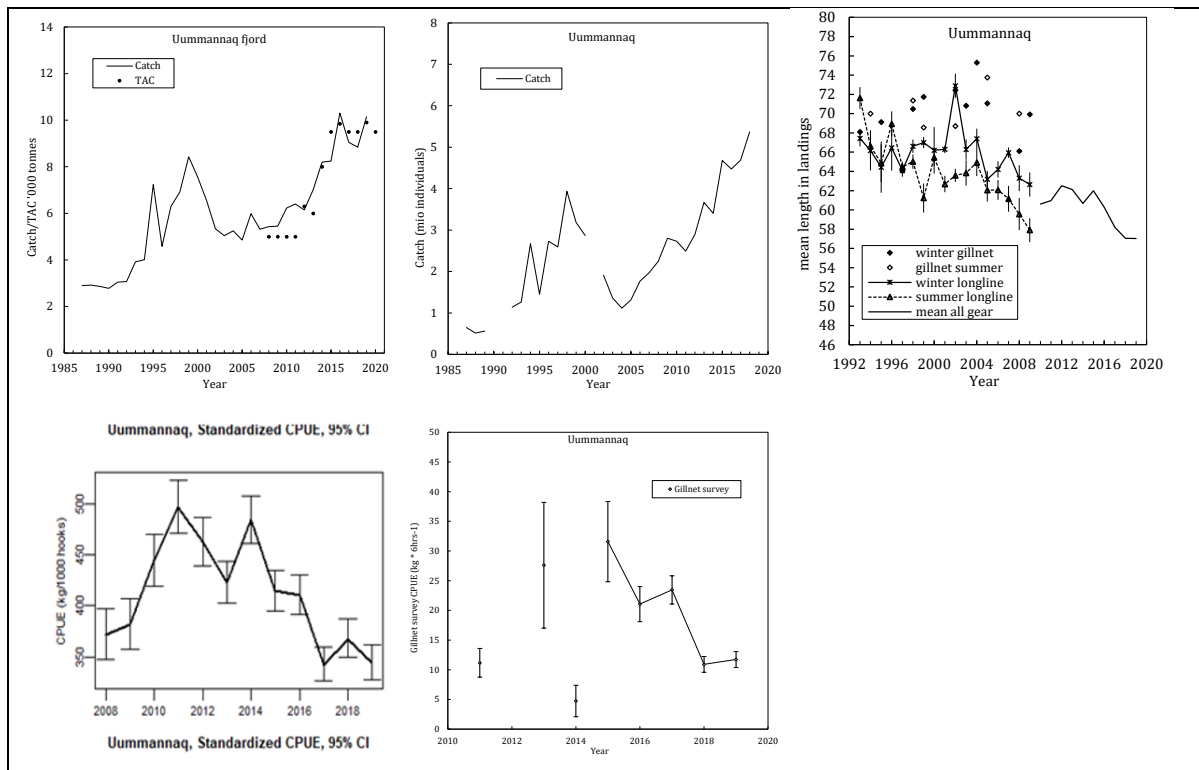
No explicit management plan or management objectives has been defined by the Government of Greenland.

**Management unit**

The three stocks in Div. 1A inshore fjords (Disko Bay, Uummannaq, and Upernavik) are believed to recruit from the Subarea 0 + 1 offshore spawning stock (in the Davis Strait), and there is little migration between the separate areas and the stock in SA 0 + 1 offshore. Separate advice is given for each area, within the specific management unit, in Subarea 1A inshore.

**Stock status**

The catch in tonnes and numbers of fish has been increasing since 2009, reaching record high values in 2016 and 2019. Mean length in the landings has gradually decreased. From 2011, the standardized commercial longline CPUE index decreased gradually, being 2017 and 2019 the years with the lowest values observed in the time series. The gillnet survey has shown a substantial decrease in CPUE due to a lower number of large fish in the survey, until 2018, and it remained almost stable in 2019.



## Reference points

Could not be established.

## Assessment

No analytical assessment was performed. Mean length in the landings, commercial CPUE, and survey indices were considered the best information to monitor the stock.

### *Human impact*

Mainly fishery-related mortality. Other mortality sources (e.g. pollution, shipping, oil-industry) are undocumented.

### *Environmental impact*

Unknown

## Fishery

Catches in the Uummannaq fjord gradually increased from the 1980s, reaching 8425 t in 1999, but then decreased and remained between 5000 t and 6000 t from 2002 to 2009. Since 2009 catches gradually increased, reaching 10 243 t in 2019, the second-highest value of the time series.

Recent catch estimates ('000 tonnes) are as follows:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>TAC</b>	6	6	7.4	8.4	9.5	9.9	9.5	9.5	9.9	9.5
<b>STACFIS</b>	6.4	6.1	7	8.2	8.2	10.3	9	8.8	10.2	

## Effects of the fishery on the ecosystem

Greenland halibut in the area is targeted with longlines and gillnets. Both gears select adult fish with large body size and do not retain recruits or small-sized fish. Ghost fishing by lost gillnets has been observed, but its effects are unknown.

## Special comments

The ICES Harvest Control Rule 3.2 for data-limited stocks was not be used since the survey time-series is still relatively short.

Recruits are mainly received from the offshore stock in SA 0 + 1 offshore.

## Sources of Information

SCR Doc. 20/006, 016, 043; SCS Doc. 20/12.

**Greenland halibut in Division 1A inshore - Disko Bay**

Advice June 2020 for 2021 – 2022

**Recommendation for 2021 - 2022**

The Scientific Council advises that the TAC should not exceed 4346 tonnes.

**Management objectives**

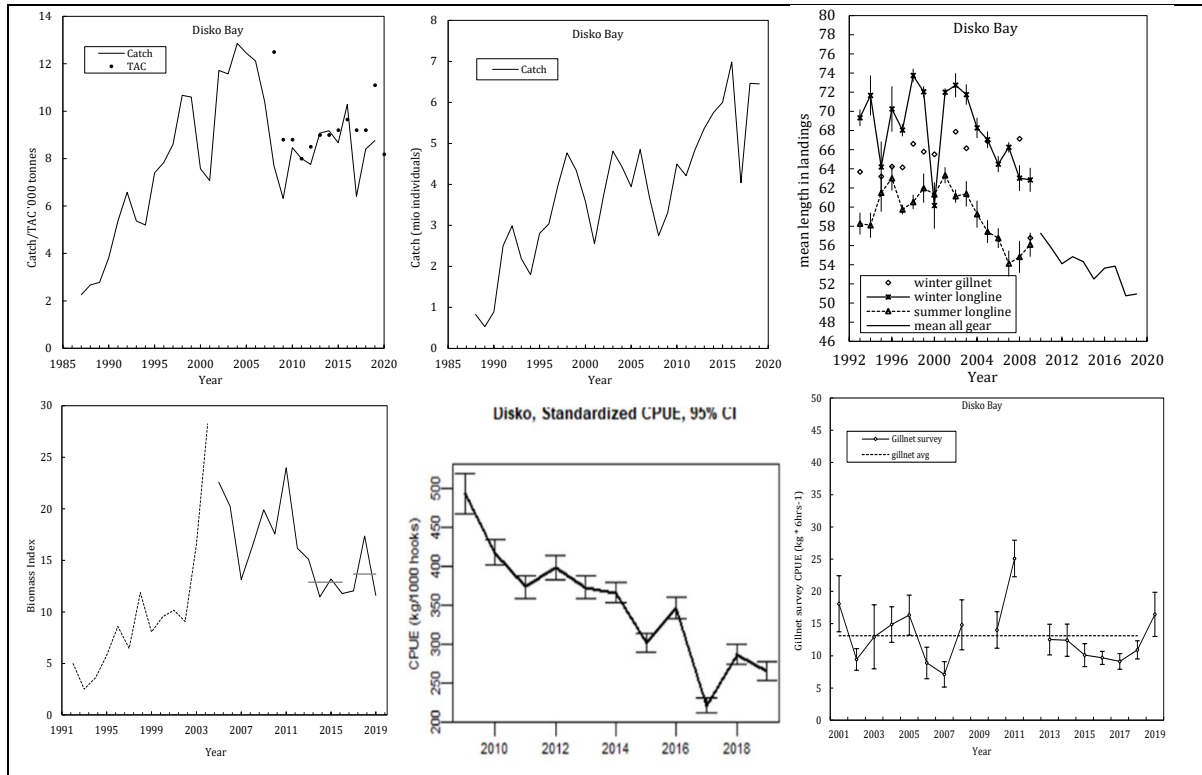
No explicit management plan or management objectives has been defined by the Government of Greenland.

**Management unit**

The three stocks in Div. 1A inshore (Disko Bay, Uummanaq and Upernavik) are believed to recruit from the SA 0+ 1 offshore spawning stock (in the Davis Strait), and there is little migration between the separate areas and the stock in SA 0 + 1 offshore. Separate advice is given for each area, within the specific management unit, in Subarea 1A inshore.

**Stock status**

Mean length of the fish landed has gradually decreased over 10 to 15 years. Although the catches have remained at a level of around 8 400 t per year in the recent decade, the number fish caught has gradually increased due to a decrease in the size in the landings. The number of fish landed remains high. The trawl survey biomass index has gradually decreased since 2009, with few years falling outside the decreasing trend. The commercial CPUE for longline vessels has decreased by about 50% since 2009. The Gillnet survey CPUE, originally designed for pre-fishery recruits, indicate stable recruitment at higher ages. The gillnet survey index in 2019 was above the average levels, but the comparability of the 2019 value with the earlier time series is questionable.



## Reference points

Could not be established.

## Assessment

No analytical assessment was performed. Mean length in the landings, survey indices and commercial CPUE was considered the best information to monitor the stock.

The next assessment is planned for 2022.

### *Human impact*

Mainly fishery related mortality. Other mortality sources (e.g. pollution, shipping, oil-industry) are undocumented.

### *Environmental impact*

Since 1997 bottom temperatures have remained stable at a level of 2-3 degrees in the Disko Bay.

## Fishery

Catches increased in the 1980s, peaked from 2004 to 2006 at more than 12 000 tonnes, but then decreased substantially. From 2009, catches gradually increased, reaching 8 759 tonnes in 2019.

Recent catch estimates ('000 tonnes) are as follows:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TAC	8	8	9	9	9.2	9.7	9.2	9.2	11.1	8.2
STACFIS	8	7.8	9.1	9.2	8.7	10.8	6.4	8.4	8.8	

## Effects of the fishery on the ecosystem

Greenland halibut in the area is targeted with longlines and gillnets. Both gears select adult fish with large body size and do not retain recruits or small sized fish. Ghost fishing by lost gillnets has been observed but its effects are unknown.

## Basis for advice

The application of the ICES guidance on data limited stocks (DLS) method 3.2 (ICES 2012a and 2012b, ICES 2014) using the Greenland Shrimp and Fish survey (Div. 1A-F) was accepted by SC in 2016, as the basis for giving TAC advice on Greenland halibut in the Disko Bay. This method was applied again to provide the following advice for the next two years. This rule was developed and tested as an empirical approach that uses the trend in the stock response to fishing pressure (ICES 2012a, Jardim et al. 2015). The empirical basis was given a generic expression

$$C_{y+1} = \text{advice}_{\text{recent}} * r$$

where  $r = \text{index mean for 2017-2019} / \text{index mean for 2013-2016} = 1.061$

Should changes in excess of +/- 20% be generated using this rule, a 20% cap is applied. In 2016 or 2018, no precautionary buffer was applied. Since both the mean length in the fish landings and the commercial CPUE's have decreased in both 2018 and 2019 and stock status relative to reference points is unknown, a PA buffer (i.e. a 0.8 factor) was applied this year. This results in the following advised catch:

$\text{advice}_{\text{recent}} = 5120$  tonnes (catch advised for 2019 and 2020).

Catch in 2021 and 2022 =  $\text{advice}_{\text{recent}} * r * \text{PA buffer} = 5120 \text{ tonnes} * 1.061 * 0.8 = 4346$  tonnes

Multi-year advice is recommended when applying this index-ratio based rule. Also, Greenland has requested advice for as many years as is considered appropriate. A two year advice cycle is suggested at this time.

**Special comments**

Although the index provided by the Greenland shrimp and fish trawl survey experienced vessel changes in 2018 and 2019, the results are considered to be comparable with those from earlier years.

Recruits are mainly received from the offshore stock in SA 0 + 1 offshore.

**Sources of Information**

SCR Doc. 20/006, 016, 043; SCS Doc. 20/012.

**Greenland halibut in Subarea 1 Division 1BC inshore**

Advice June 2020 for 2021 – 2022

**Recommendation for 2021 and 2022**

The Scientific Council recommends that catch in each of the years 2021 and 2022 should not exceed 300 tonnes, which corresponds to the Depletion Corrected Average Catch (DCAC).

**Management objectives**

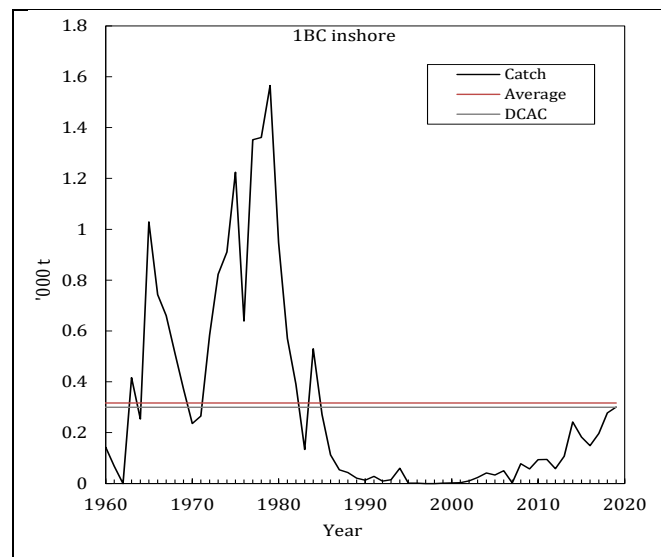
No explicit management plan or management objectives have been defined by the Government of Greenland.

**Management unit**

The stocks are believed to recruit from the offshore spawning stock in Subarea 0+1 (the Davis Strait) or offshore spawning stock in ICES Subareas 5, 6, 12 and 14 (East Greenland-Iceland-Faroes). There is little migration of adults between the fjords and the stock in SA 0 + 1 offshore. Fjords are assigned to a NAFO division based on the location of the mouth of each fjord. Combined catch advice is given for all fjords within the specified management unit.

**Stock status**

The catch was at a low level for two decades from the end of the 1980's. During the recent decade the catch has gradually increased to the estimated sustainable level of catch.

**Reference points**

The Depletion Corrected Average Catch method was used to estimate a sustainable level of catch.

**Projections**

Quantitative assessment of risk at various catch options is not possible at this time.

**Assessment**

The assessment is considered data limited and as such associated with a relatively high uncertainty. The assessment is based upon a catch history from 1960 to 2019. During this period the stock has gone through a



period of intensive fishery and 3 decades of rebuilding. There are currently no survey data and commercial data is limited.

The next assessment is planned for 2022.

#### *Human impact*

Mainly fishery related mortality. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

#### *Biological and environmental interactions*

No specific studies were reviewed during this assessment.

#### **Fishery**

Catches increased in the area from the 1960's reaching more than 1,000 tonnes in 1965. Catches decreased thereafter but returned to a higher level from 1973 to 1980. After this intense fishing period, catches decreased and were almost non-existing for two decades from 1987. From 2008, catches have gradually increased, reaching 300 tonnes in 2019.

A TAC has not previously been set for the stocks in Divisions 1B to 1F inshore. The fishery has never been quota regulated.

Recent catch estimates and TACs (tonnes) are as follows:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>TAC</b>										
<b>STACFIS</b>	95	58	107	242	183	149	197	278	301	

#### **Effects of the fishery on the ecosystem**

Greenland halibut in the area is targeted with longlines only in deep water and on muddy bottom. The gear is light with low risk of bycatch of birds and marine mammals and with low impact on the seabed.

#### **Special comments**

Until 2020 this stock was considered to be part of the stock in SA 0 + 1 offshore .

Available data until June 1<sup>st</sup> indicated a 30% reduction in catch compared to 2019, but the catches remain within the level observed within the recent 4 seasons. ICES DLS Guidance report 2012 p. 19-21 suggest a method to provide advice from the sustainable level catch estimated by the DCAC model. The method uses two scenarios and an adaptation period of 3-5 years following a "fast down"- "slow up" (catches should decrease to the DCAC value quickly if they are above it and could increase slowly towards it if below) approach taking into account that stocks with a low biomass cannot sustain MSY.

#### **Sources of information**

SCR Doc. 20/006 020 038 043; SCS Doc. 20/012.

**Greenland halibut in Subarea 1 Division 1D inshore**

Advice June 2020 for 2021 – 2022

**Recommendation for 2021 and 2022**

The Scientific council recommends a reduction of catches in this area to reach the 398 tonnes, corresponding to the Depletion Corrected Average Catch (DCAC), by 2023. The SC recommends to reduce catches to 647 tonnes in 2021 and 522 tonnes in 2022.

**Management objectives**

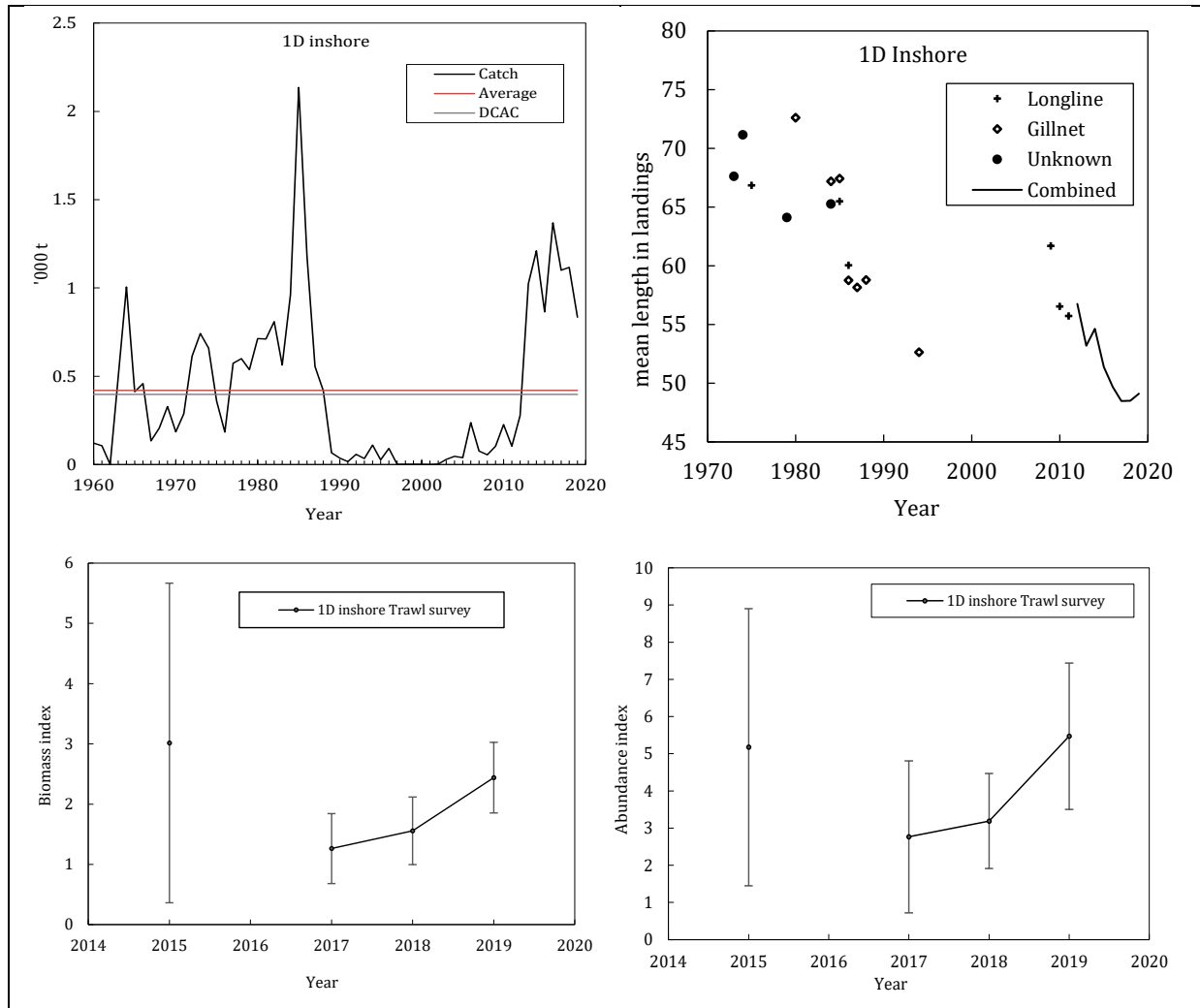
No explicit management plan or management objectives have been defined by the Government of Greenland.

**Management unit**

The stock in the fjords in Division 1D are believed to recruit from the offshore spawning stock in ICES Subareas 5, 6, 12 and 14 (East Greenland-Iceland-Faroes). There is little migration of adults between the fjords and the stock in SA 0 + 1 offshore. The stock is furthermore believed to be constituted of several isolated fjord stocks, with little migration between the fjords. Fjords are assigned to a NAFO division based on the location of the mouth of each fjord. Combined catch advice is given for all fjords within the specified management unit.

**Stock status**

The catch was at a low level for two decades from the end of the 1980's. Since 2013 the catches have been about twice as high as the DCAC estimated sustainable level of catch. During this period, a decrease in size composition in the catch has been observed. The trawl survey for Greenland halibut in the fjords in 1D indicated a decrease in the number of fish in the commercial size range since 2015. However, the biomass indices in the survey increased from 2017 to 2019, due to higher numbers of pre fishery recruits in the range 30-40 cm. The survey furthermore indicated presence of recruits in the area although the stocks are believed to be dependent on recruitment from the stock in ICES Subareas 5, 6, 12 and 14.



### Reference points

The Depletion Corrected Average Catch method was used to estimate a sustainable level of catch.

### Projections

Quantitative assessment of risk at various catch options is not possible at this time.

### Assessment

The assessment is considered data limited and as such associated with a relatively high uncertainty. The assessment is based upon a catch history from 1960 to 2019. During this period the stock has gone through a period of intensive fishery and 3 decades of rebuilding. The assessment is further supported by a trawl survey (since 2015) and length frequencies from the fishery are available from 1973 to present.

The next assessment is planned for 2022.

### Human impact

Mainly fishery related mortality. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

### Biological and environmental interactions

No specific studies were reviewed during this assessment

## Fishery

Catches in 1D inshore were around 500 tonnes annually from 1966 to the end the 1980's, peaking in 1985 with 2,136 tonnes. After this intense fishing period, the fishery was virtually non-existing for two decades. From 2003 catches gradually increased, reaching 1,369 tonnes in 2016. In 2019, the catch decreased to 834 tonnes from 1117 tonnes in the preceding year. A TAC has not previously been set for the stock in Division 1D inshore. The fishery has never been quota regulated.

Recent catch estimates and TACs (tonnes) are as follows:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>TAC</b>										
<b>STACFIS</b>	104	277	1,024	1,211	864	1,369	1,100	1,117	834	

### Effects of the fishery on the ecosystem

Greenland halibut in the area is targeted with longlines only in deep water and on muddy bottom. The gear is light, with low risk of bycatch of birds and marine mammals and with low impact on the seabed.

### Special comments

Until 2020 this stock was considered to be part of the stock in SA 0 + 1 offshore.

ICES DLS Guidance report 2012 p. 19-21 suggests a method to provide advice from the sustainable level catch estimated by the DCAC model. The method uses two scenarios and an adaptation period of 3-5 years following a "fast down" – "slow up" (catches should decrease to the DCAC value quickly if they are above it and could increase slowly towards it if below) approach taking into account that stocks with a low biomass cannot sustain MSY.

Available data until June 1<sup>st</sup> indicated a 7.5% reduction in catch in 2020 compared to 2019. Assuming the same degree of catch reduction through the year, the full year catch for 2020 is estimated to be 771 tonnes. SC recommends reducing catches from the 2020 level to the DCAC estimated catch (398 tonnes) by 2023, a decrease of 124 tonnes per year over the next three years. This results in catches of 647 tonnes in 2021 and 522 tonnes in 2022

### Sources of information

SCR Doc. 20/ 003, 006, 020, 038, 043; SCS Doc. 20/012.

## Greenland halibut in Subarea 1 Division 1EF inshore

Advice June 2020 for 2021 – 2022

### Recommendation for 2021 and 2022

The Scientific Council recommends a reduction of catches in this area to reach 222 tonnes, corresponding to the Depletion Corrected Average Catch (DCAC), over a period of three years (2021-2023).

### Management objectives

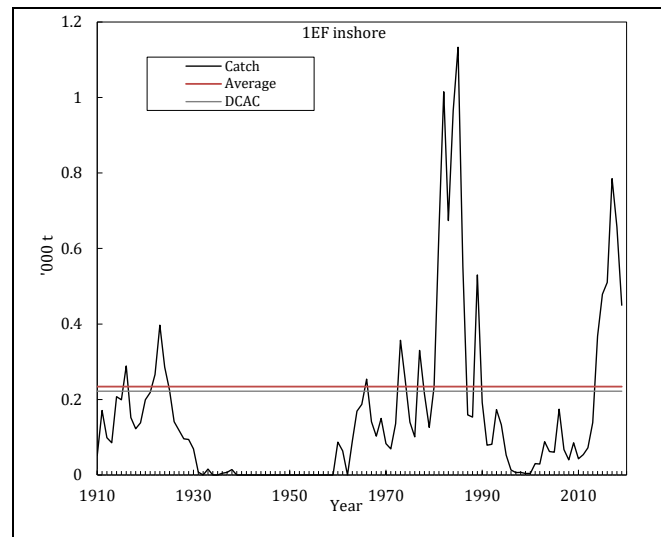
No explicit management plan or management objectives have been defined by the Government of Greenland.

### Management unit

The stocks in the fjords in Division 1EF are believed to recruit from the offshore spawning stock in ICES Subarea 14 (Denmark Strait). There is little migration of adults between the fjords and offshore stocks in SA 0 and 1. The stock is furthermore believed to be constituted of several isolated fjord stocks with little migration between the fjords. Fjords are assigned to a NAFO division based on the location of the mouth of each fjord. Combined catch advice is given for all fjords within the specified management unit.

### Stock status

The catch was at a low level for two decades from the end of the 1980's. Since 2014 the catches have been about 2-3 times higher than the DCAC estimated sustainable level of catch.



### Reference points

The Depletion Corrected Average Catch method was used to estimate a sustainable level of catch.

### Projections

Quantitative assessment of risk at various catch options is not possible at this time.

### Assessment

The assessment is considered data limited and as such associated with a relatively high uncertainty. The assessment is based upon a catch history from 1910-1930 and 1960 to 2019. During this period the stock has gone through 3 periods of fishery and 2 periods of low catches. There are currently no survey data and commercial data is limited.

The next full assessment is planned for 2022.

*Human impact*

Mainly fishery related mortality. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

*Biological and environmental interactions*

No specific studies were reviewed during this assessment.

**Fishery**

A fishery for Greenland halibut took place from 1910-1931 in Division 1F and from 1919 to 1939 in Division 1E. No data are available from 1940 to 1960. From 1960 catches gradually increased and were around 1,000 tonnes per year from 1982 to 1985. From 1990 and the following two decades the average catches were just around 60 t per year, but since 2014 annual catches have been at 400-800 tonnes per year. A TAC has not previously been set for the stocks in Divisions 1B to 1F inshore. The fishery has never been quota regulated.

Recent catch estimates and TACs (tonnes) are as follows:

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>TAC</b>										
<b>STACFIS</b>	54	72	139	368	479	510	785	657	450	

**Effects of the fishery on the ecosystem**

Greenland halibut in the area is targeted with longlines only in deep water and on muddy bottom. The gear is light, with low risk of bycatch of birds and marine mammals and with low impact on the seabed. Bycatch of Greenland sharks can be a concern in the area.

**Special comments**

Until 2020 this stock was considered to be part of the stock in SA 0 + 1 offshore

ICES DLS Guidance report 2012 p. 19-21 suggest a method to provide advice from the sustainable level catch estimated by the DCAC model. The method uses two scenarios and an adaptation period of 3-5 years following a "fast down" – "slow up" (catches should decrease to the DCAC value quickly if they are above it and could increase slowly towards it if below) approach taking into account that stocks with a low biomass cannot sustain MSY.

Available data until June 1<sup>st</sup> indicated a 50% reduction in catch in 2020 compared to 2019. Assuming the same degree of catch reduction through the year, the full year catch for 2020 is assumed to be 218 tonnes. This is very close to the estimated DCAC value (222 tonnes). If the observed catch in 2020 was substantially higher than this value, then a stepped reduction in catch should be implemented so as to reach 222 tonnes by 2023. Catch in Division 1E is currently far below the most recent 4 seasons, whereas Division 1F is similar to the low 2019 season.

**Sources of information**

SCR Doc. 20/006, 020, 038, 043; SCS Doc. 20/012.