

LOÐNAN Á MÖRKUM TVEGGJA HEIMA



Birkir Bárðarson



HAFRANNSÓKNASTOFNUN

Rannsókn- og ráðgjafarstofnun hafs og vatna

YFIRLIT

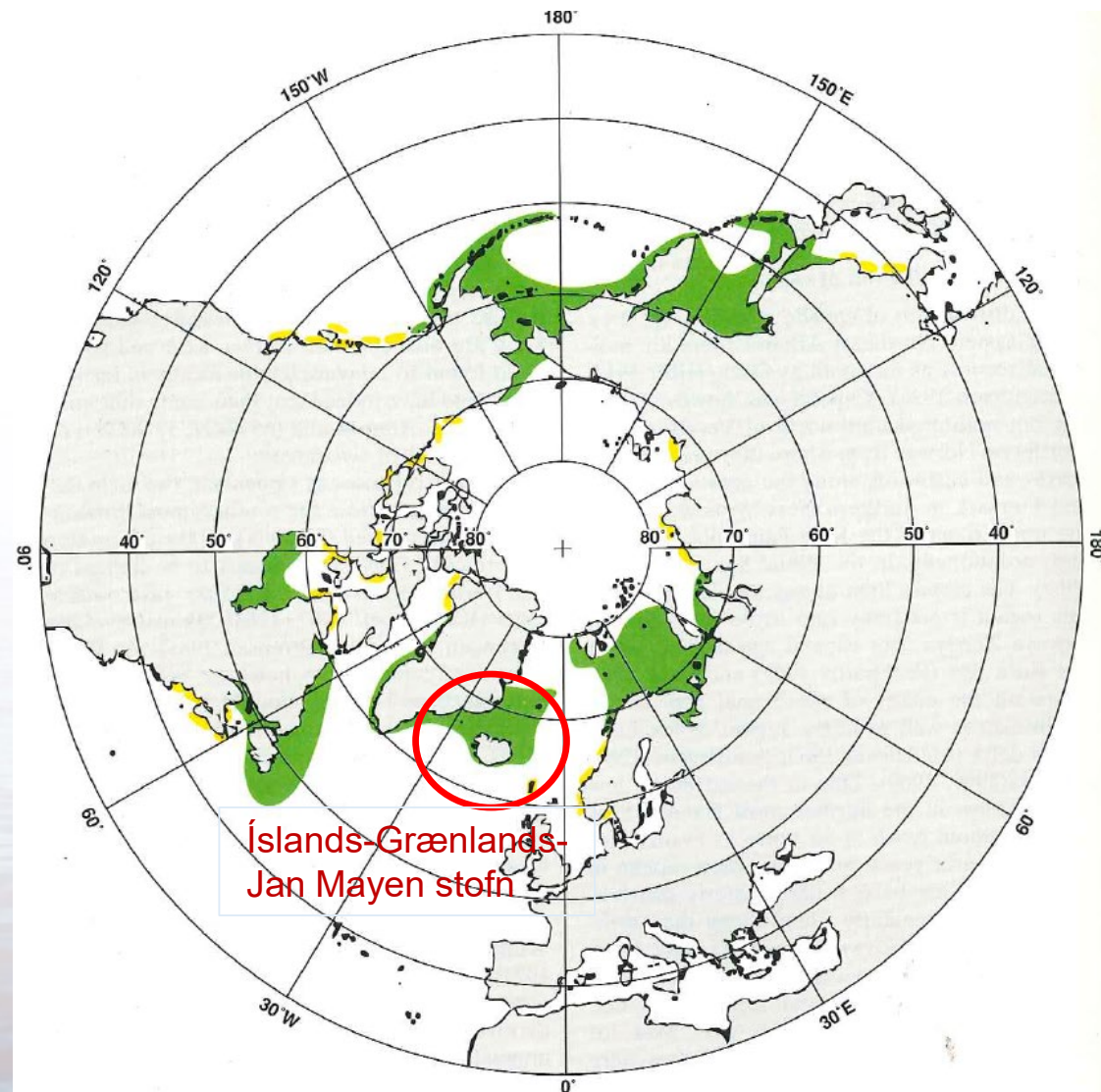
- Loðnan
- Umhverfisbreytingar á búsvæðum loðnu
- Útbreiðsla og göngur loðnu
- Hlutverk loðnu í vistkerfinu
- Framtíðin



LOÐNAN Á MÖRKUM TVEGGJA HEIMA

PÓLHVERF ÚTBREIÐSLA Á NORÐURHVELI

- Kyrrahafsloðna
- 4 Aðskildir stofnar í Atlantshafi
 - Nýjasjáland og Kanada
 - Vestur Grænland
 - Barentshaf
 - Ísland-Grænland-Jan Mayen



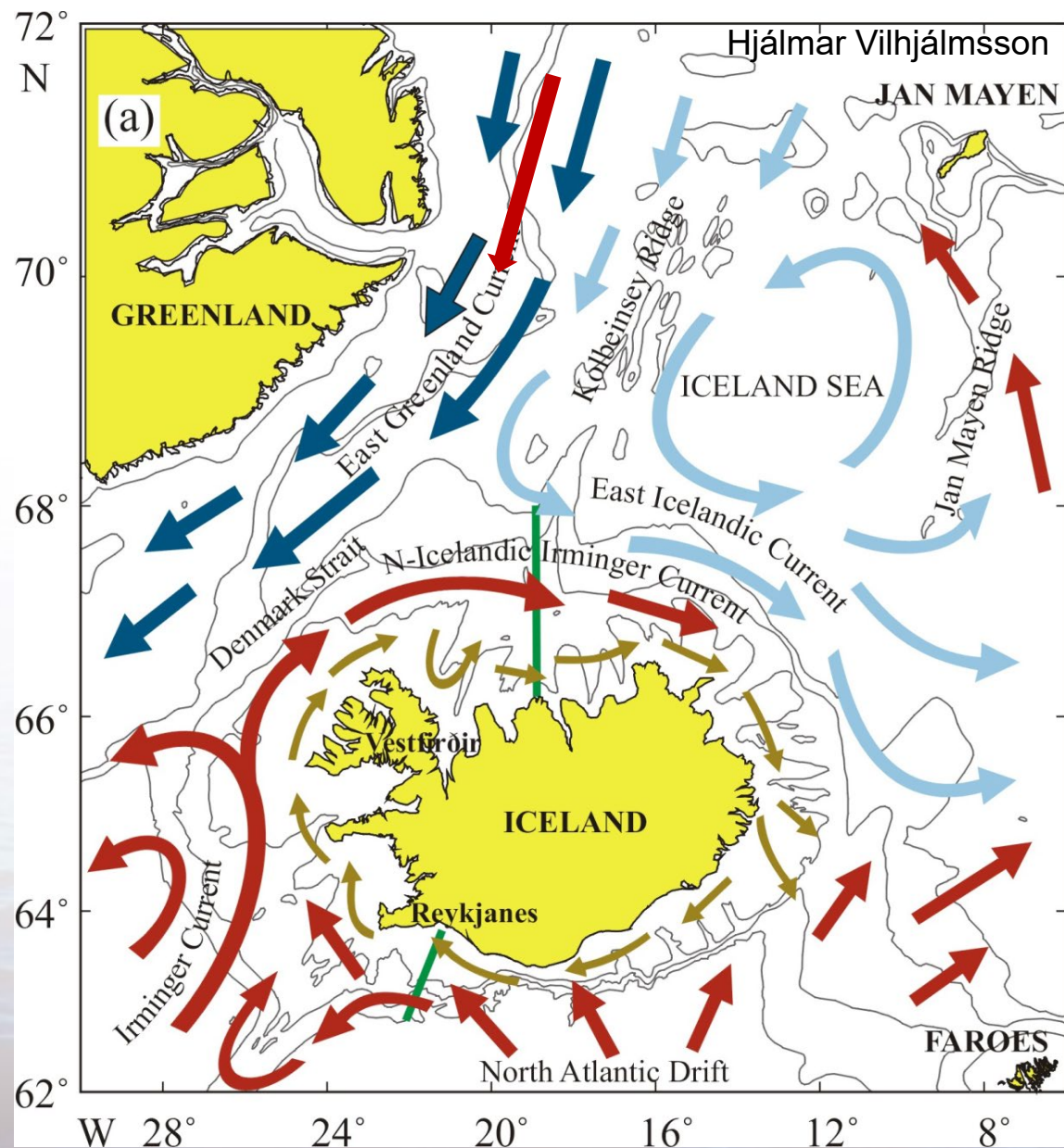
LOÐNAN

- Búsvæði milli Íslands, Austur Grænlands og Jan Mayen og aðlægum landgrunnssvæðum
- Hrygnir 3ja ára við suður- og vesturströnd Íslands, aðallega í mars en þó einnig í auknum mæli fyrir norðan land
- Hrygnir á grunnsævi (10-80 m)
- Drepst að lokinni hrygningu
- Kjörhiti á fæðugöngu 1-3°C
- Lykilfæðutegund í vistkerfinu
- Vex hratt að sumri
- Mjög mikilvægur nytjastofn

UMHVERFISBREYTINGAR Á BÚSVÆÐUM LOÐNUNNAR

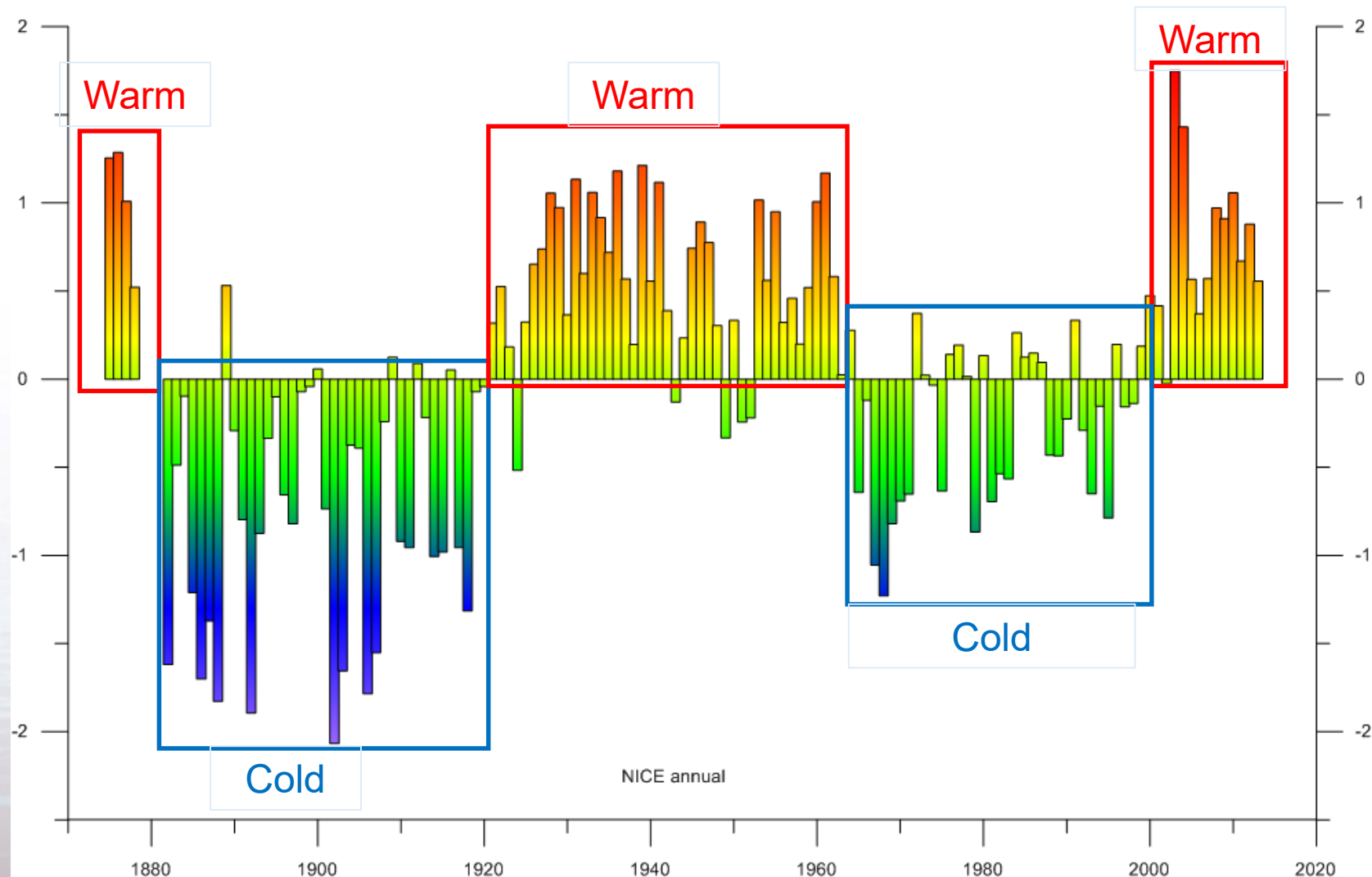


YFIRBORDSSTRAUMAR



YFIRBORÐSHITI NORUÐUR AF ÍSLANDI

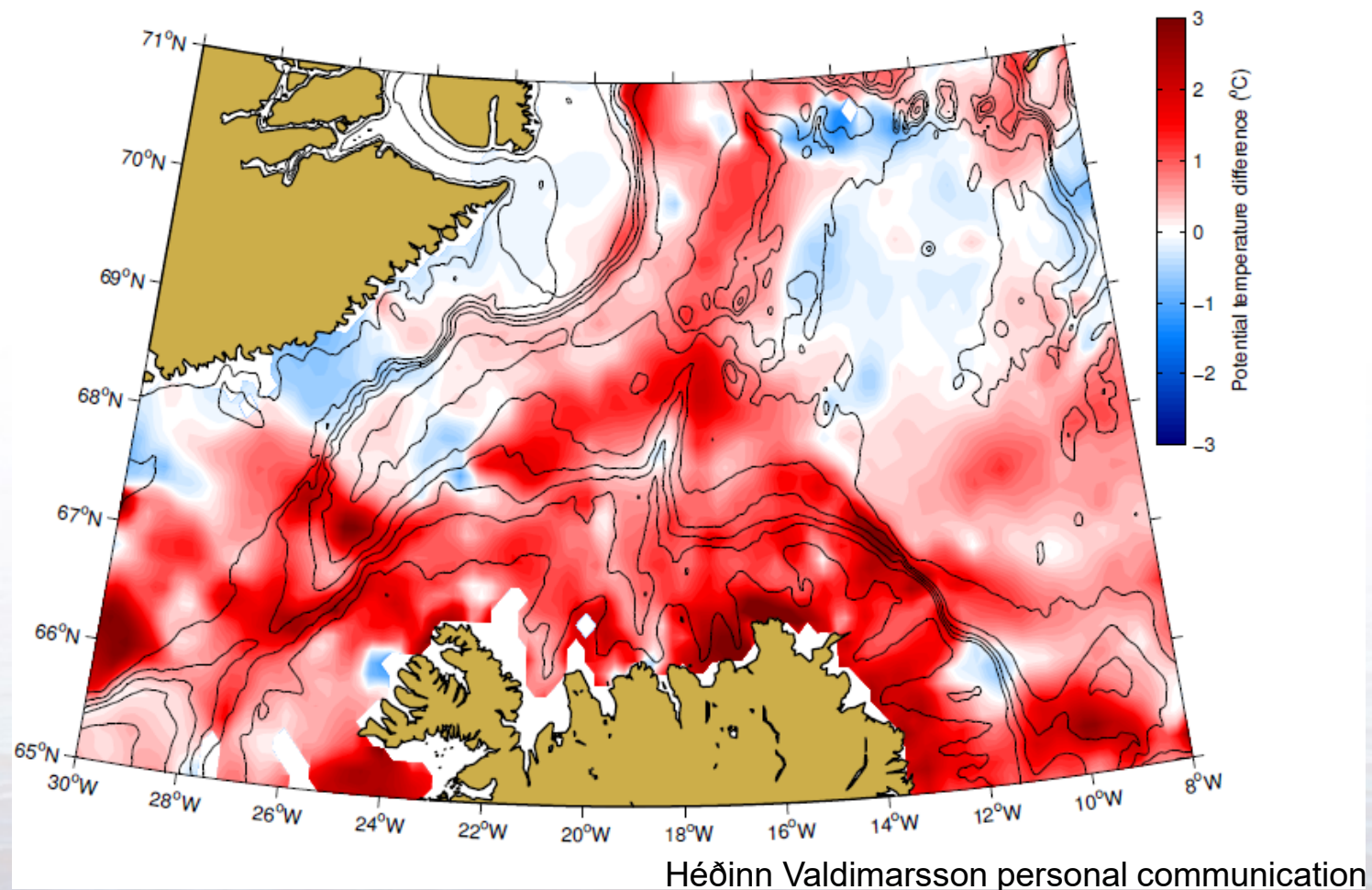
GÖGN VEÐURSTÖÐVA OG MÆLINGAR HAFRÓ



HITABREYTINGAR

MILLI 1980-1995 OG 2000-2012

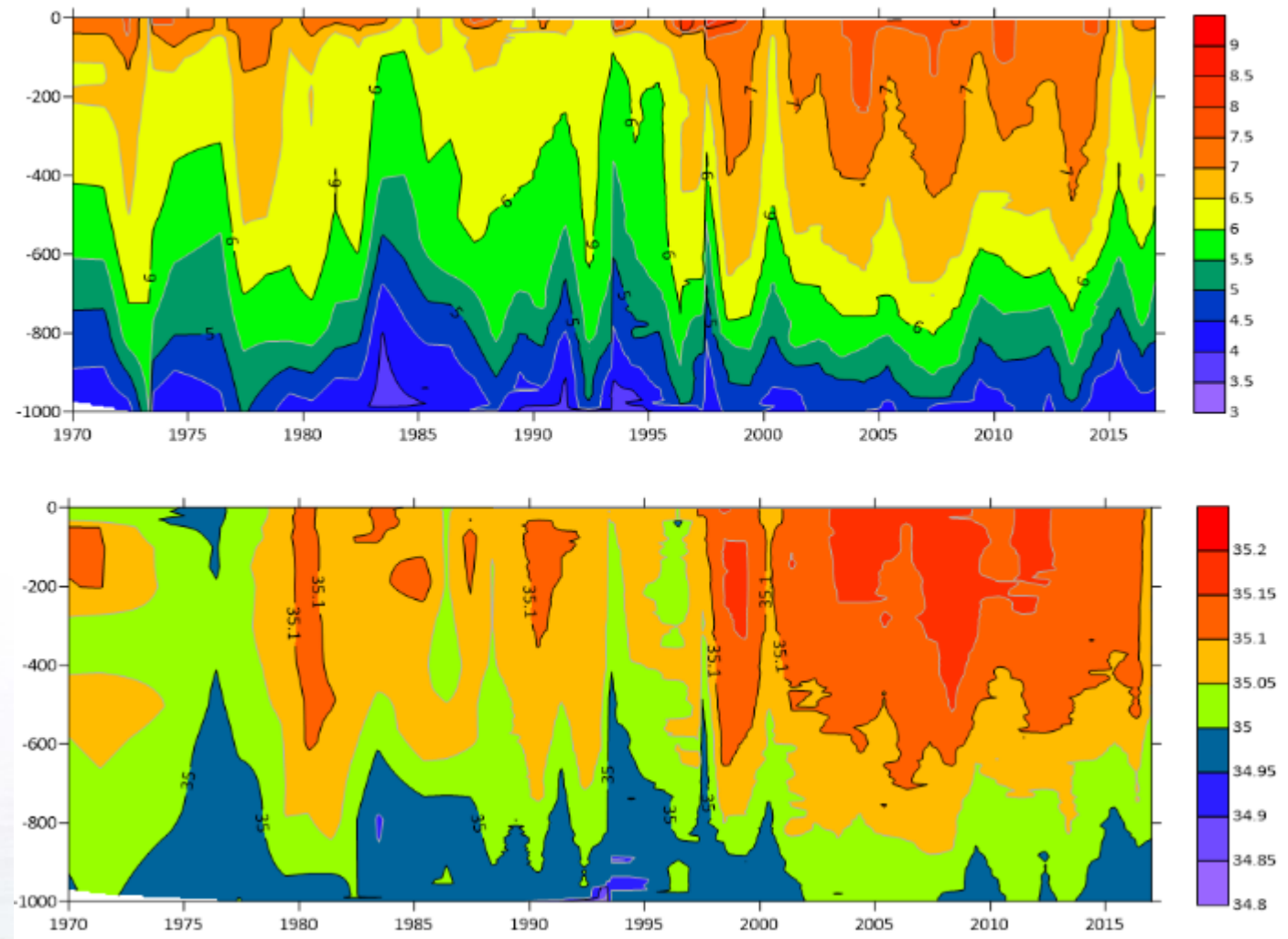
50-100M DÝPI



Rautt sýnir hlýnun á 50-100m dýpi

Blikur á lofti

Faxaflóasnið 1970-2016
Hiti (efri)
Selta (neðri)



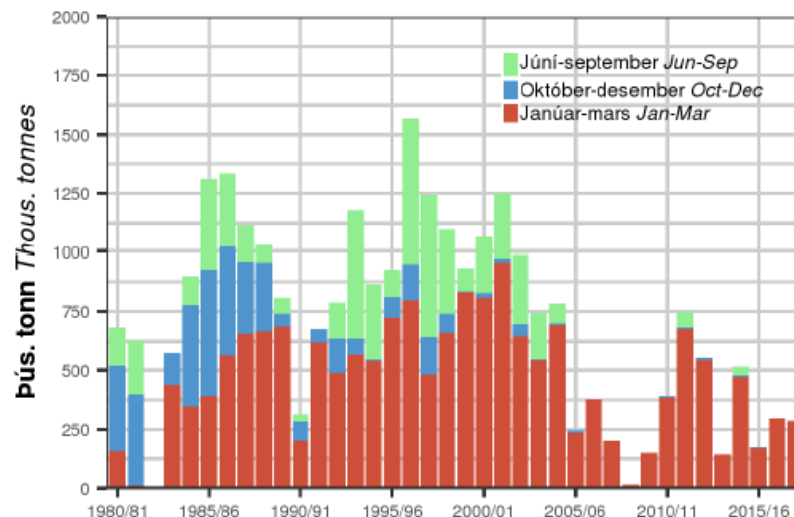
ÚTBREIÐSLA OG GÖNGUR LOÐNU



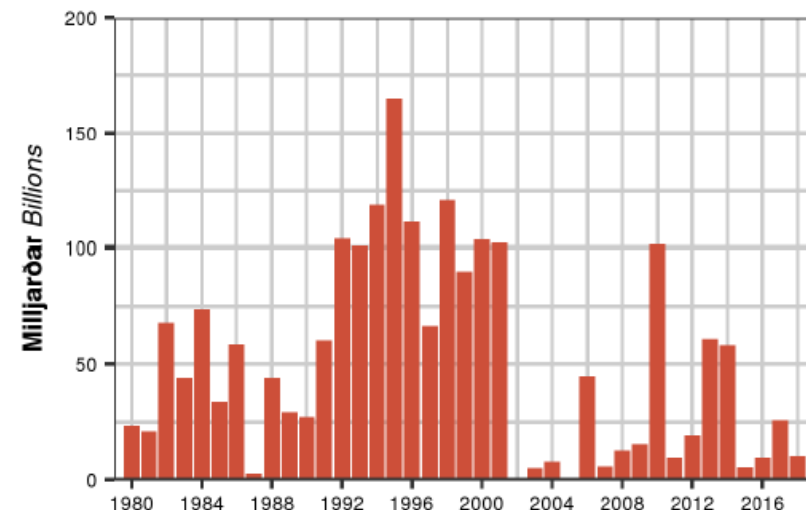
STOFNÞRÓUN

- Afli
- Vísitala ókynþroska loðnu samkvæmt bergmálsmælingum að hausti
- Stærð hrygningarstofns á hrygningartíma að loknum veiðum (90% öryggismörk frá og með 2016). Mat á hrygningarstofni 2016 og síðar er ekki sambærilegt við fyrri ár vegna breyttra viðmiða um náttúrulegan dauða.
- Samkvæmt framreikningum munu markmið aflareglu ekki nást, jafnvel þótt engar veiðar verði stundaðar á vertíðinni 2018/2019
- Vísitala ungfisks var mjög lág, líkt og verið hefur undanfarin ár

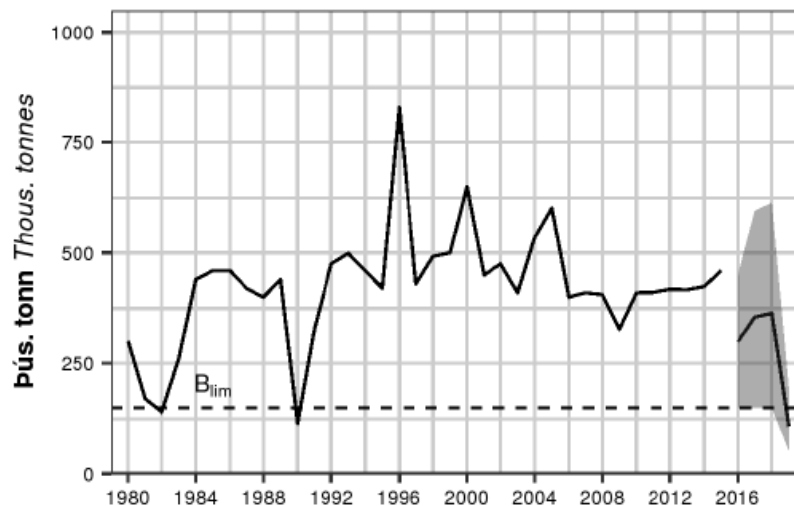
Afli Catches



Vísitala ungfisks Juvenile index



Hrygningarstofn SSB

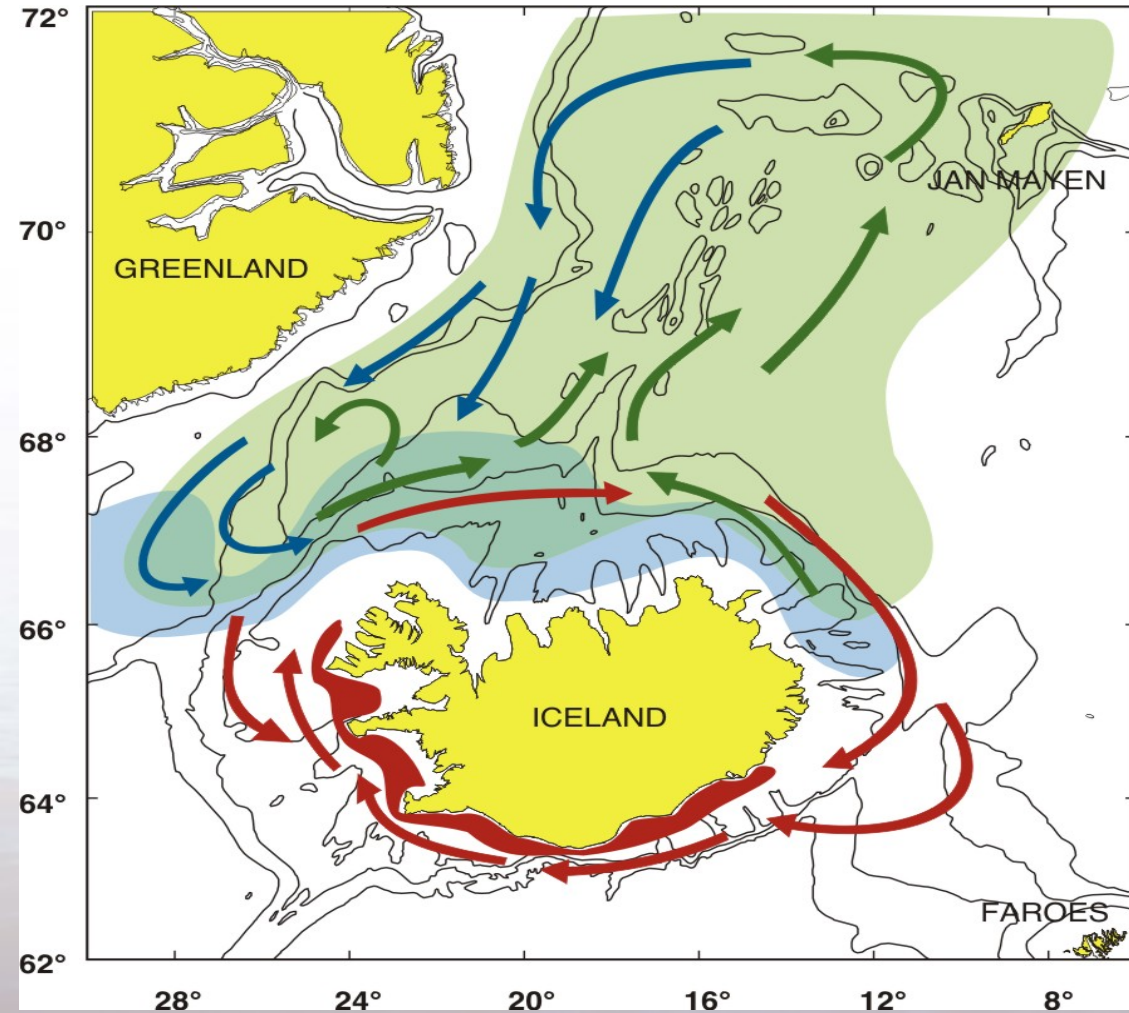


LOÐNUGÖNGUR

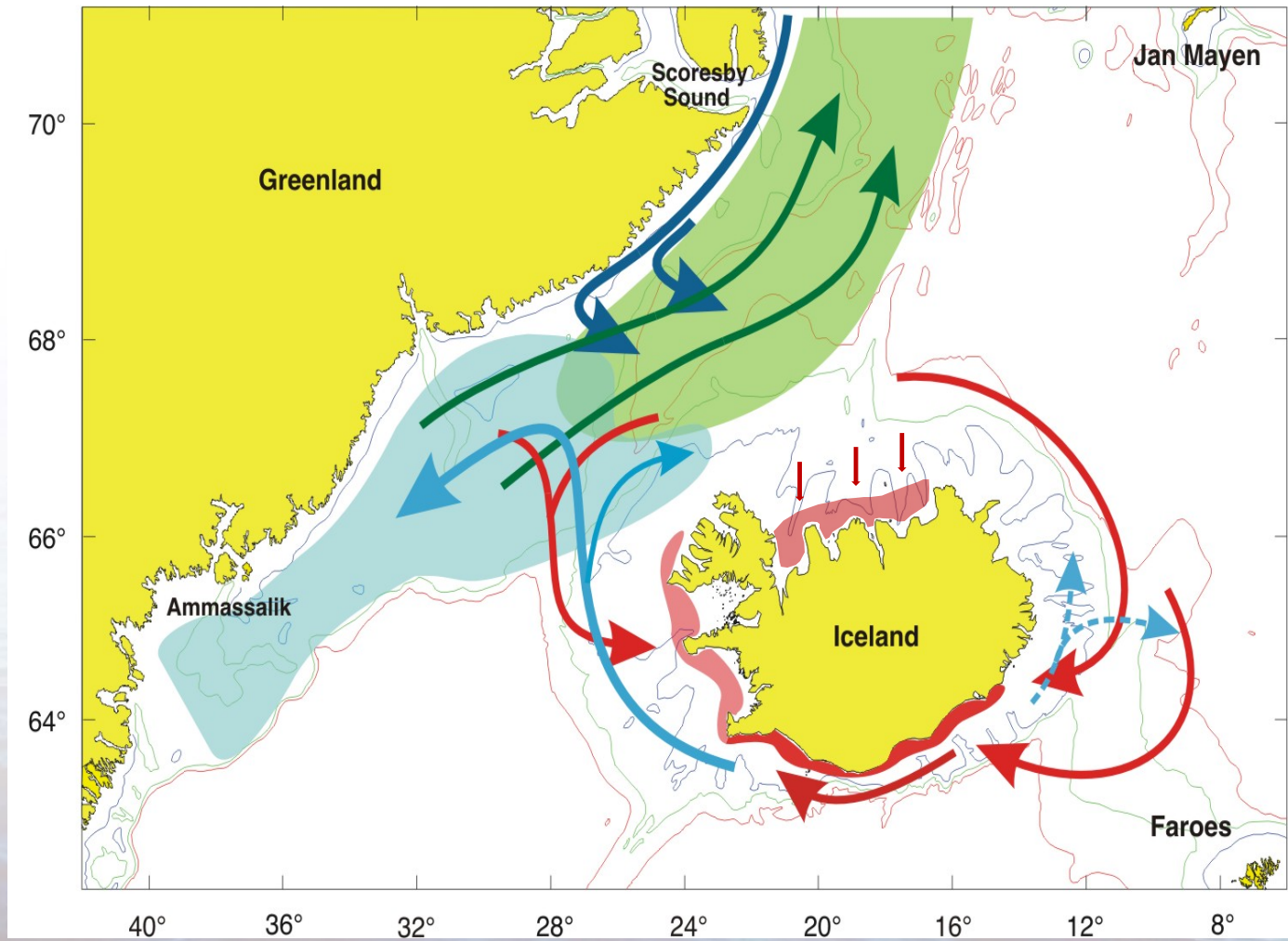
Græn þekja: Fæðuslóð fullorðinna
Blá þekja: Útbreiðsla ungloðnu
Grænar örvar: Fæðugöngur
Bláar örvar: Göngur af fæðuslóð
Rauðar örvar: Hrygningargöngur
Ljósbláar örvar: Seiðarek

Vilhjálmsson (2002)
Vilhjálmsson (2007)
Carscadden et al. (2013)

Fyrir 2000

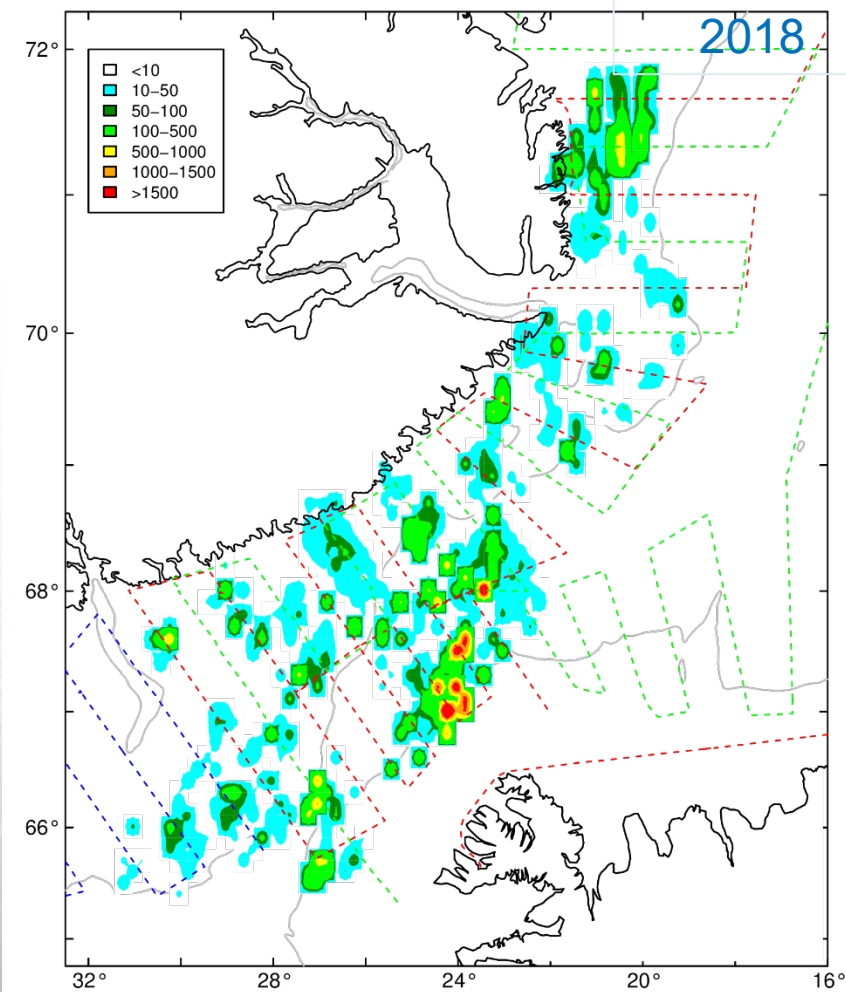
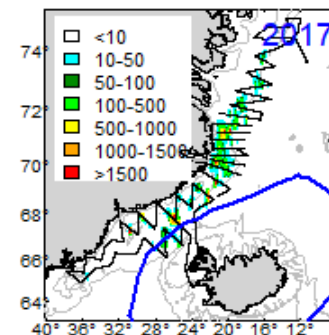
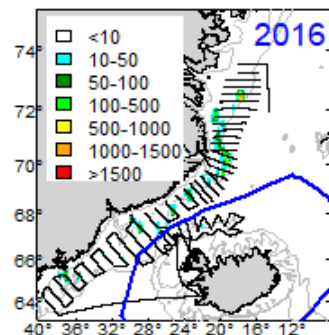
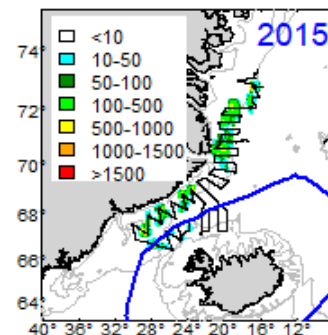
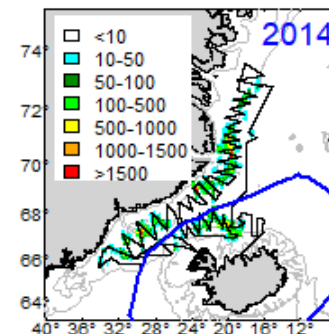
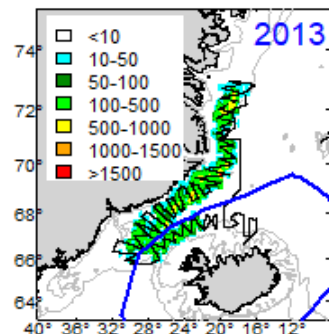
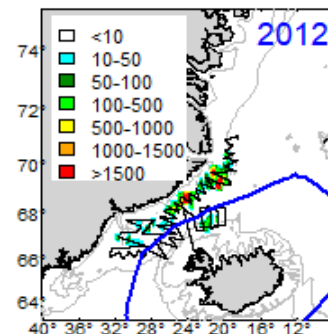
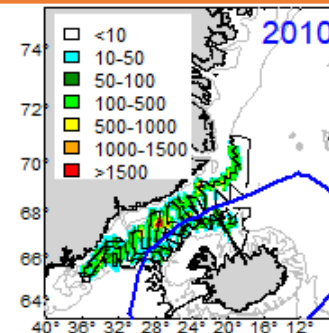
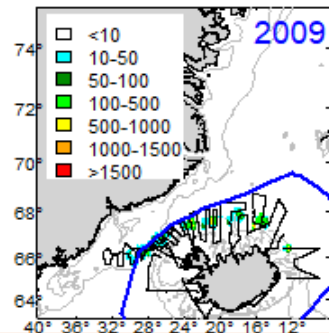
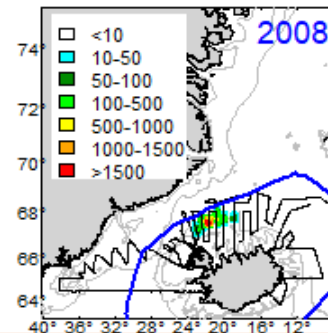
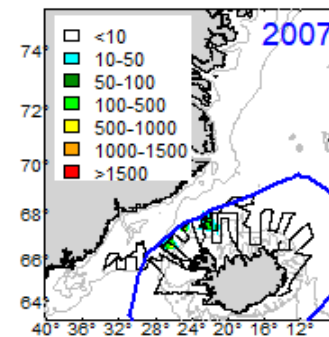
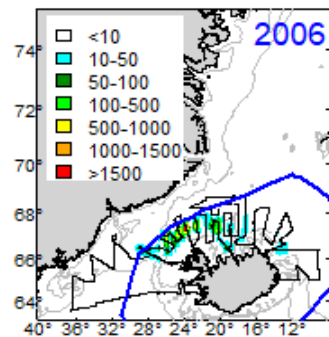
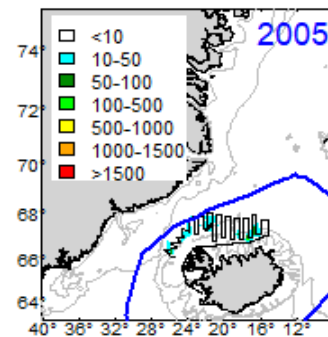


Eftir 2000

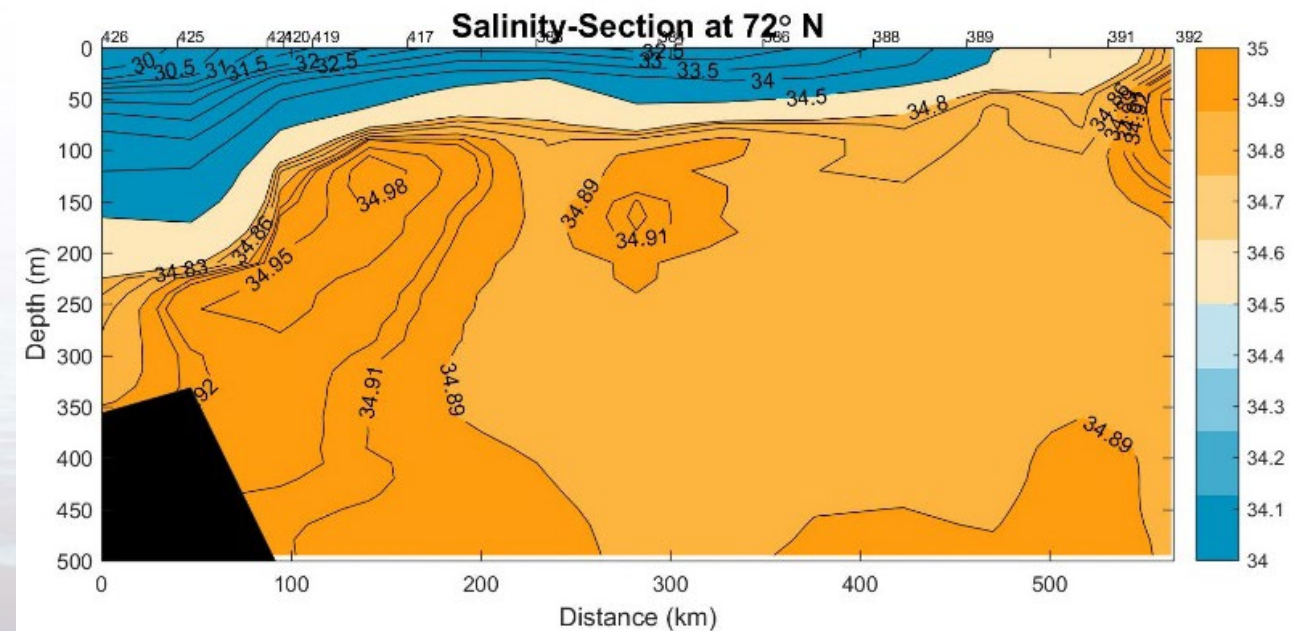
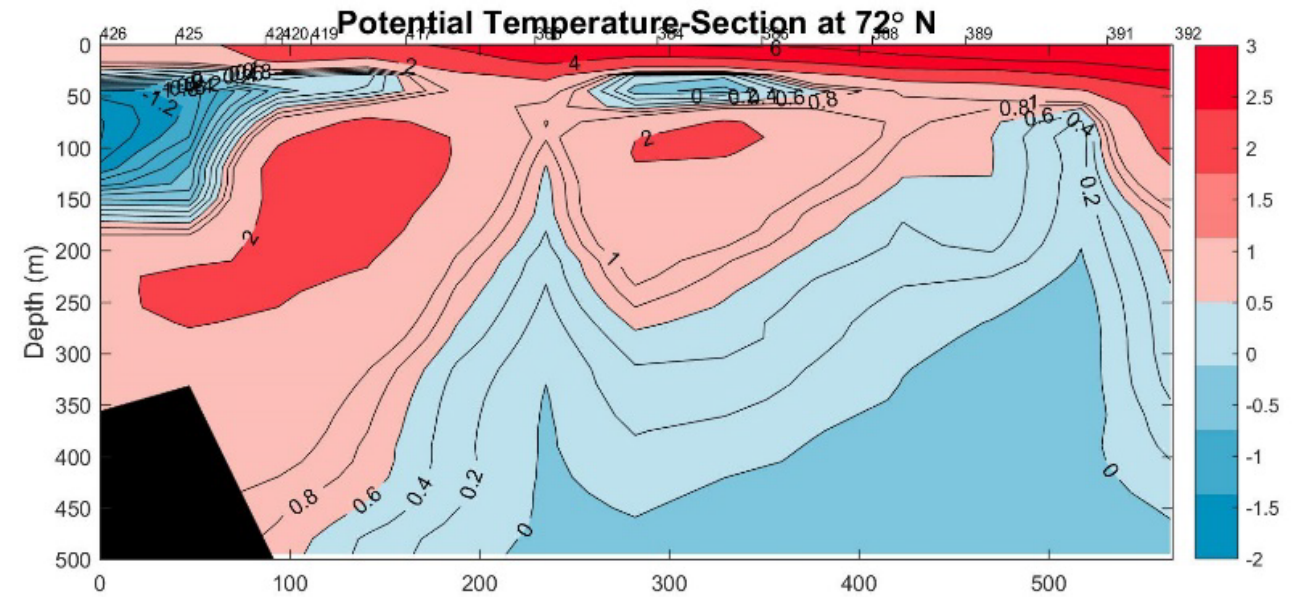
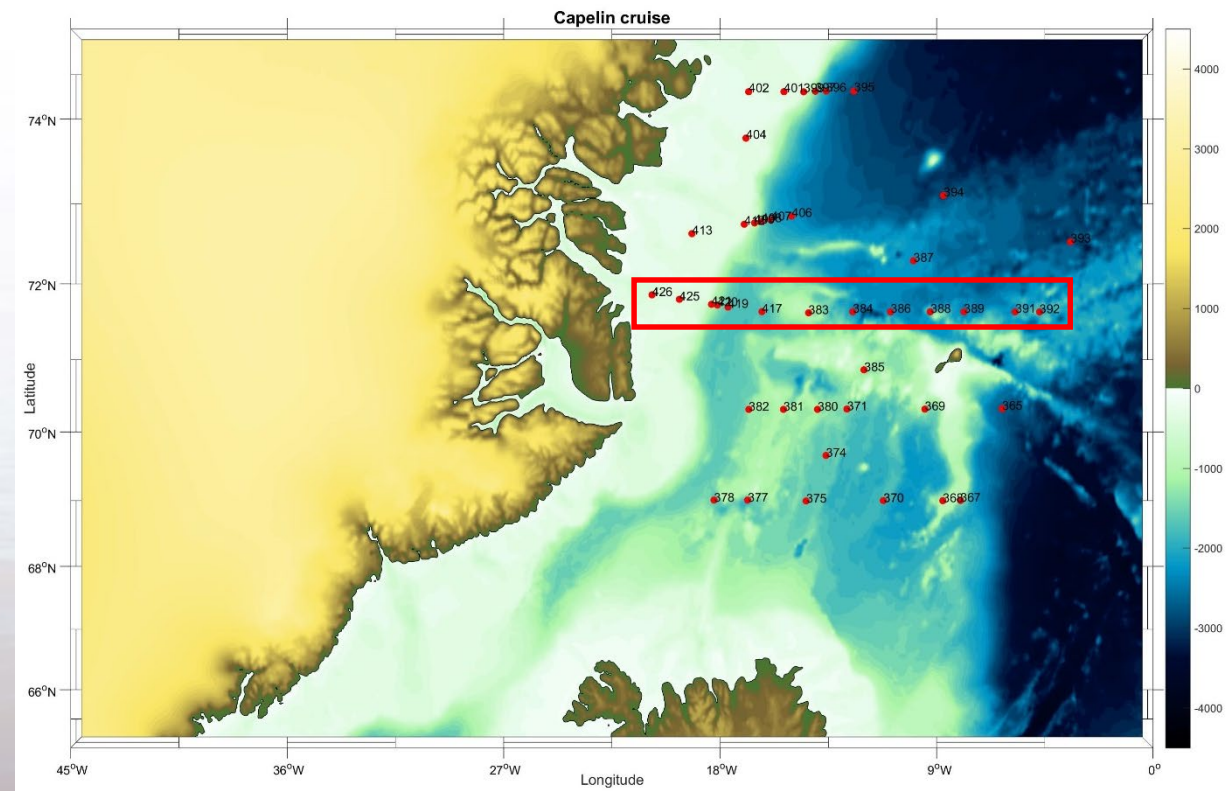




HAUSTLEIÐANGRAR 2005-2018



Á MÖRKUM PÓLSJÁVAR

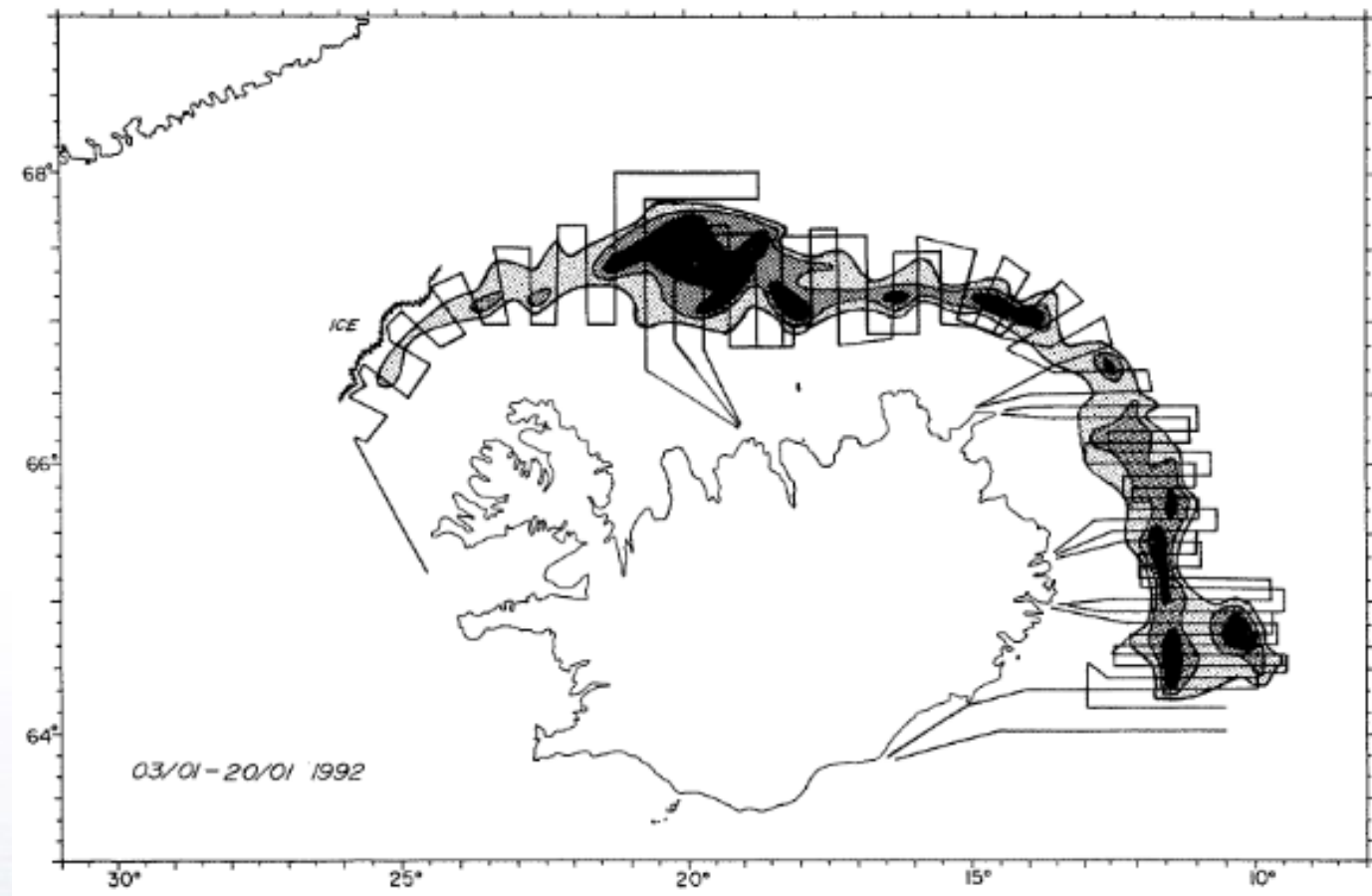


Maria Dolores Péñez-Hernandez: Autumn capelin survey 2017 (Preliminary data).

VETRARMÆLINGAR

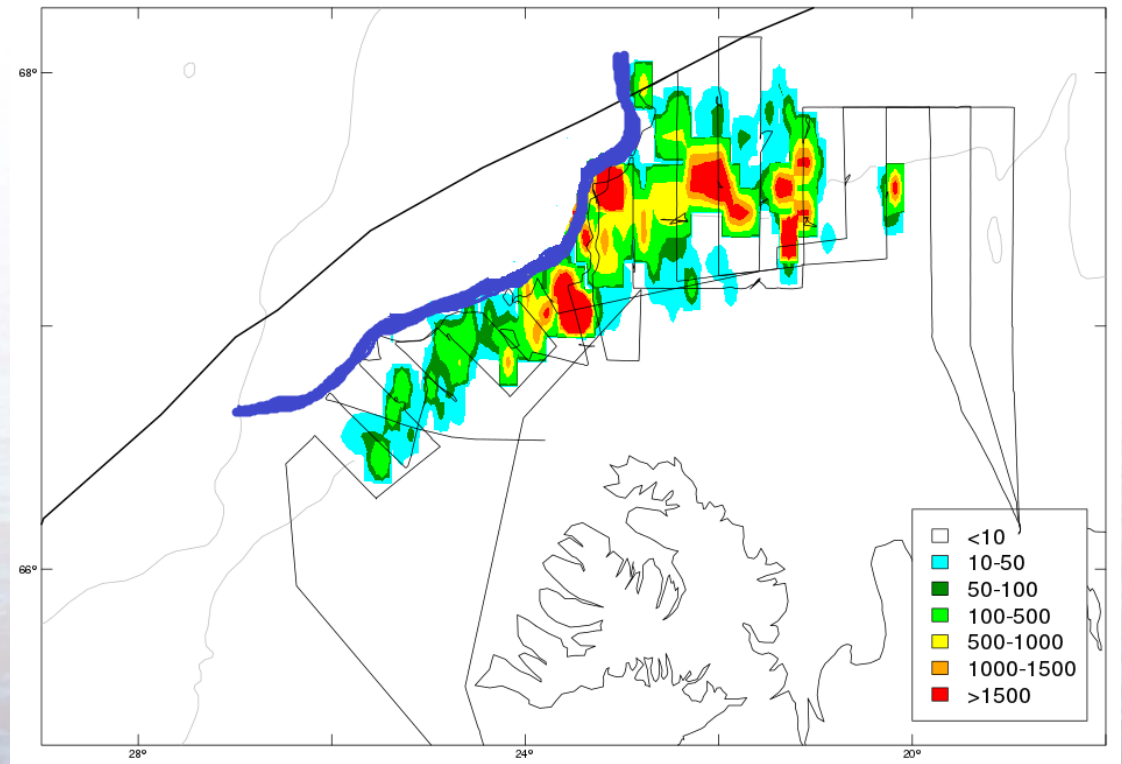
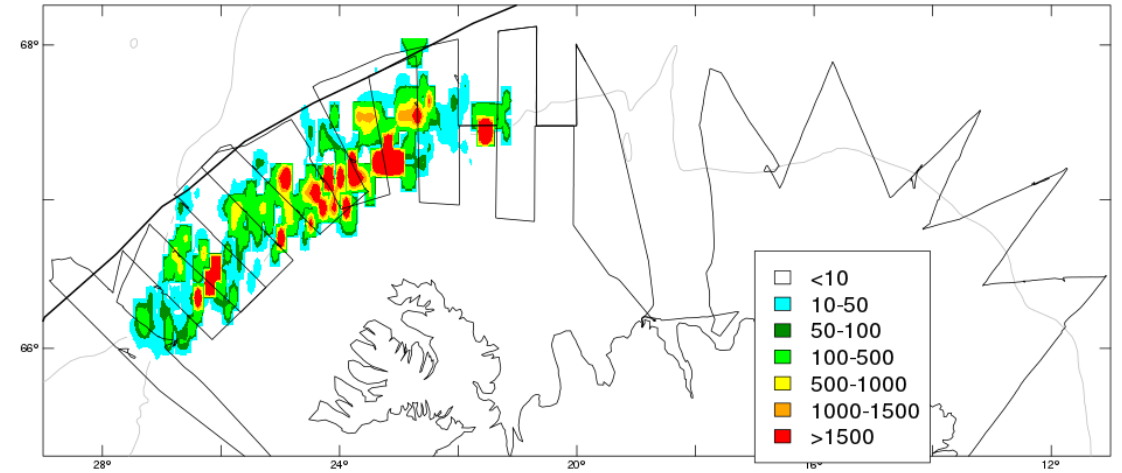
Janúar 1992

1 milljón tonn



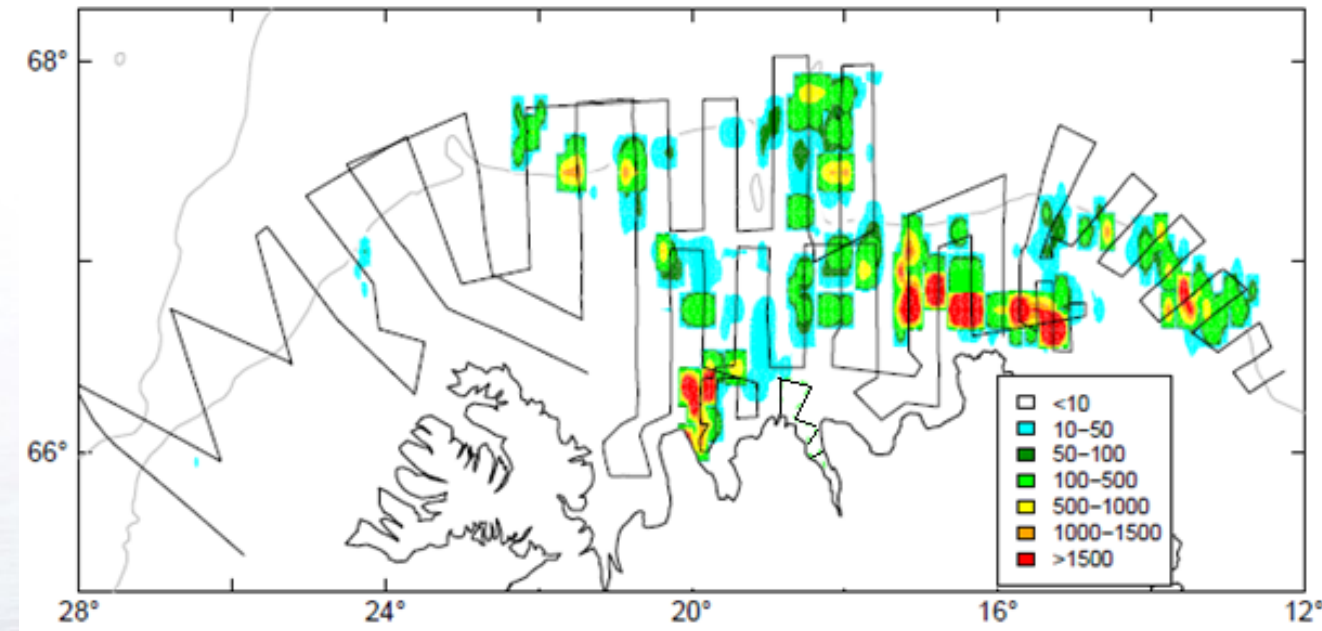
Winter 2017: Survey I

- Arni Fridriksson, Bjarni Saemundsson, Polar Amaroq (11. – 21. jan)
- Immature: 7.2 billions
- Total biomass: 511 000 tonnes
- SSB first: 399 000 tonnes
- SSB second: 494 000 tonnes
- **SSB mean: 446 000 tonnes**
- **Used** for Final Advice (replacing Intermediate Advice).
- Age composition:
 - 2year = 26.6%, 3year = 54.4%, 4year = 19%
- Drift-ice hindered second coverage



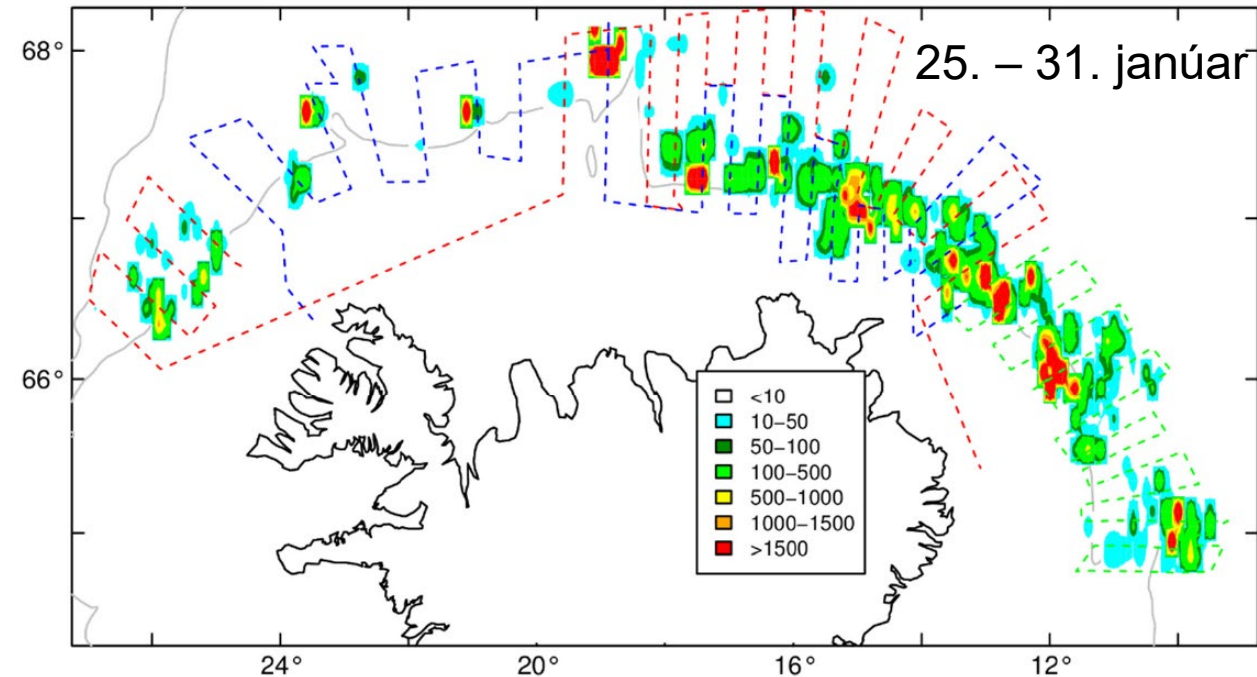
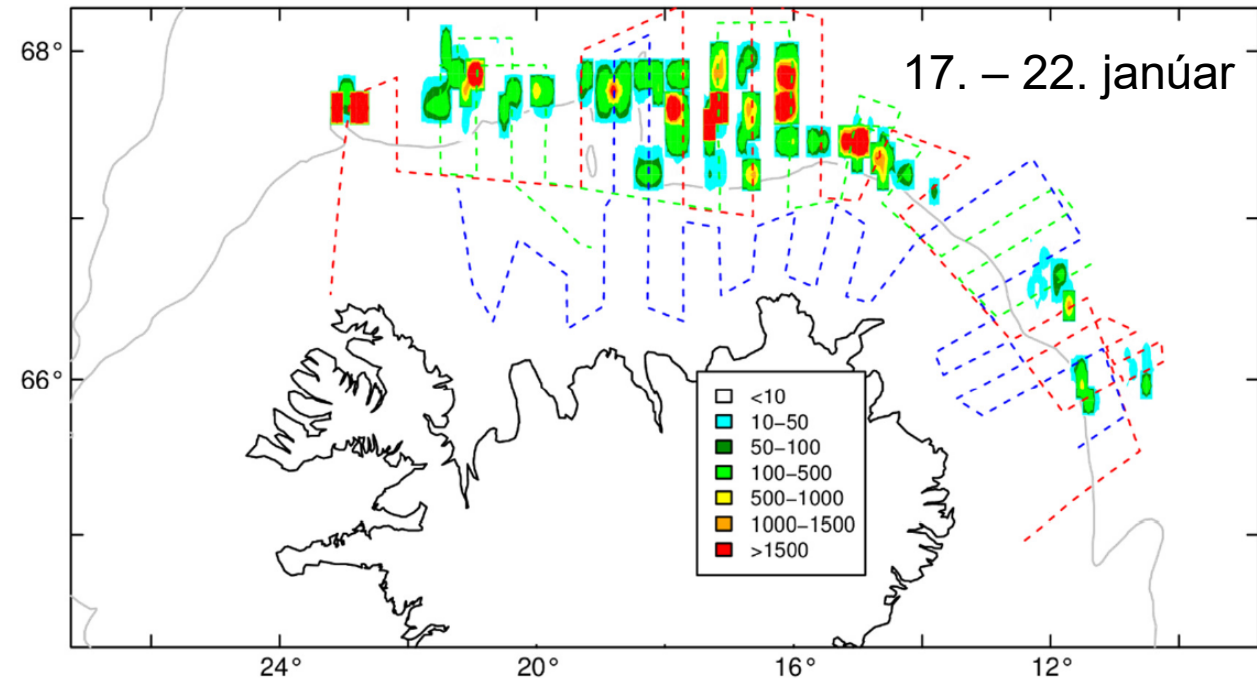
Winter 2017: Survey II

- Arni Fridriksson, Bjarni Saemundsson, Polar Amaroq(1.-11. Feb)
- Continuous, mainly westward, coverage in spite of bad weathers in the region
- Immature: 2.4 billions
- Total biomass: 844 000 tonnes
- **SSB: 815 000 tonnes**
- **Used** for Final Advice (replacing the January Final Advice).
- Age composition:
 - 2y = 12.3%, 3y = 56.1%, 4y = 31.6%



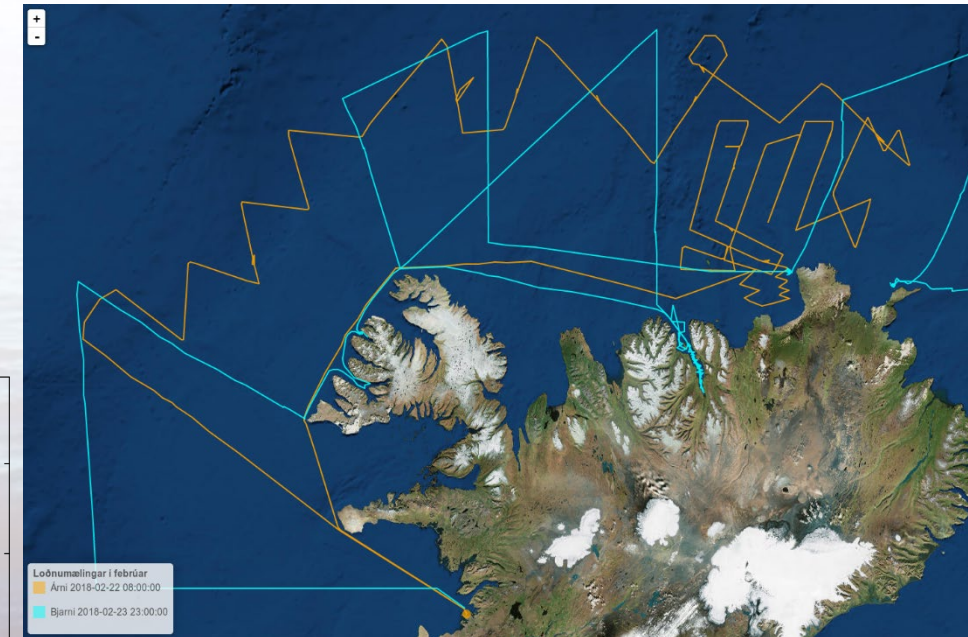
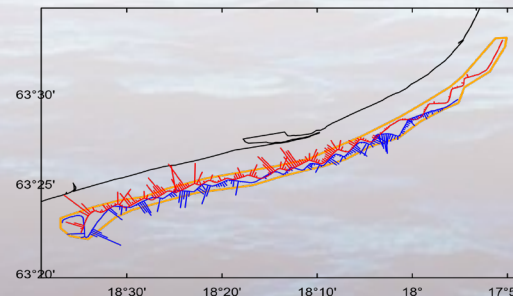
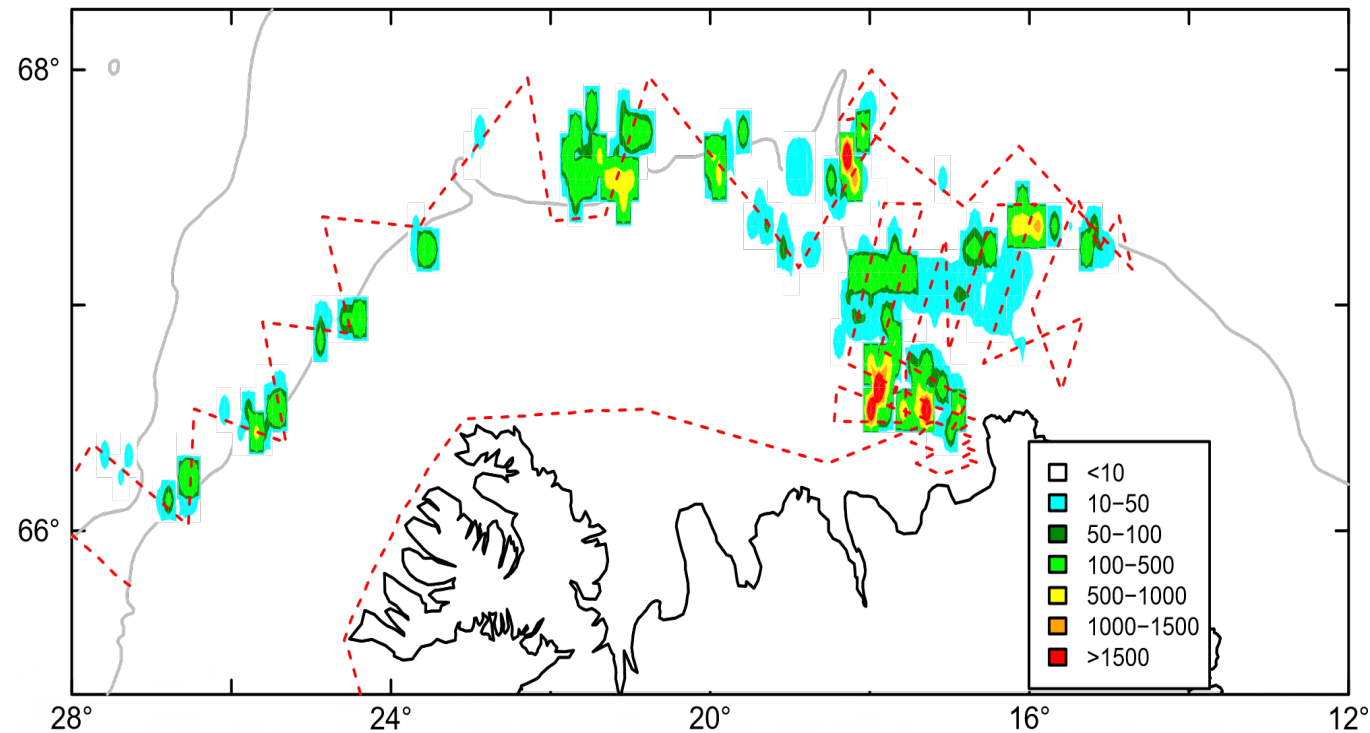
JANUARY 2018

- Arni Fridriksson, Bjarni Saemundsson, Polar Amaroq (17. – 31. Jan)
- Immature: 12.0 milljarðar
- Total biomass: 913 000 tonnes
- SSB first: **849 000 tonnes** (cv0.18)
- **765 000 tonnes** (cv0.38)
- **807 000 tonnes** (cv0.18)
- **Used** for advice along with autumn survey
- Age composition of SSN:
 - 2year = 7.3%, 3year = 85.0%, 4year = 7.7%



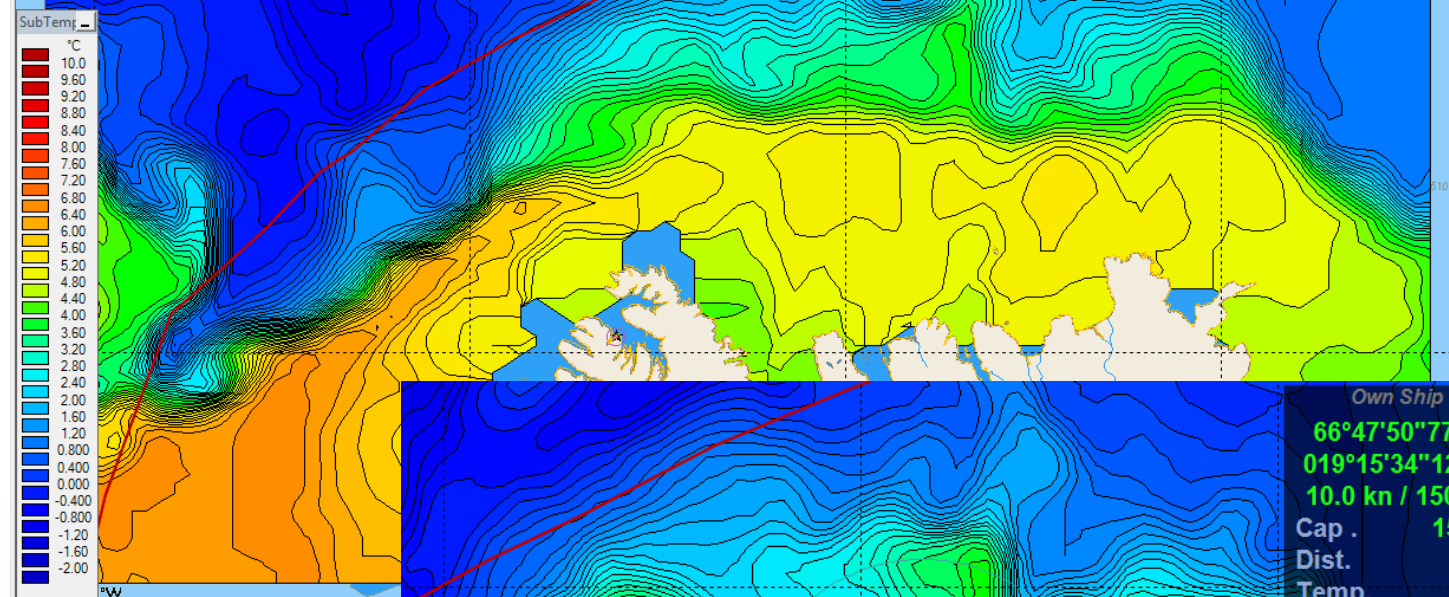
FEBRUARY 2018

- Arni Fridriksson (12. – 22. Feb), Bjarni Saemundsson (09. – 23. Feb)
- Considerable abundance on the shelf north of Iceland.
- Over 200 000 t. west of Langanes while in January over 300 000 t were measured in that region.
- Abundance and distribution north of Iceland, along with age and size composition did not give conclusive evidence of additional migration after last January survey.
- Not reason to change earlier advice.

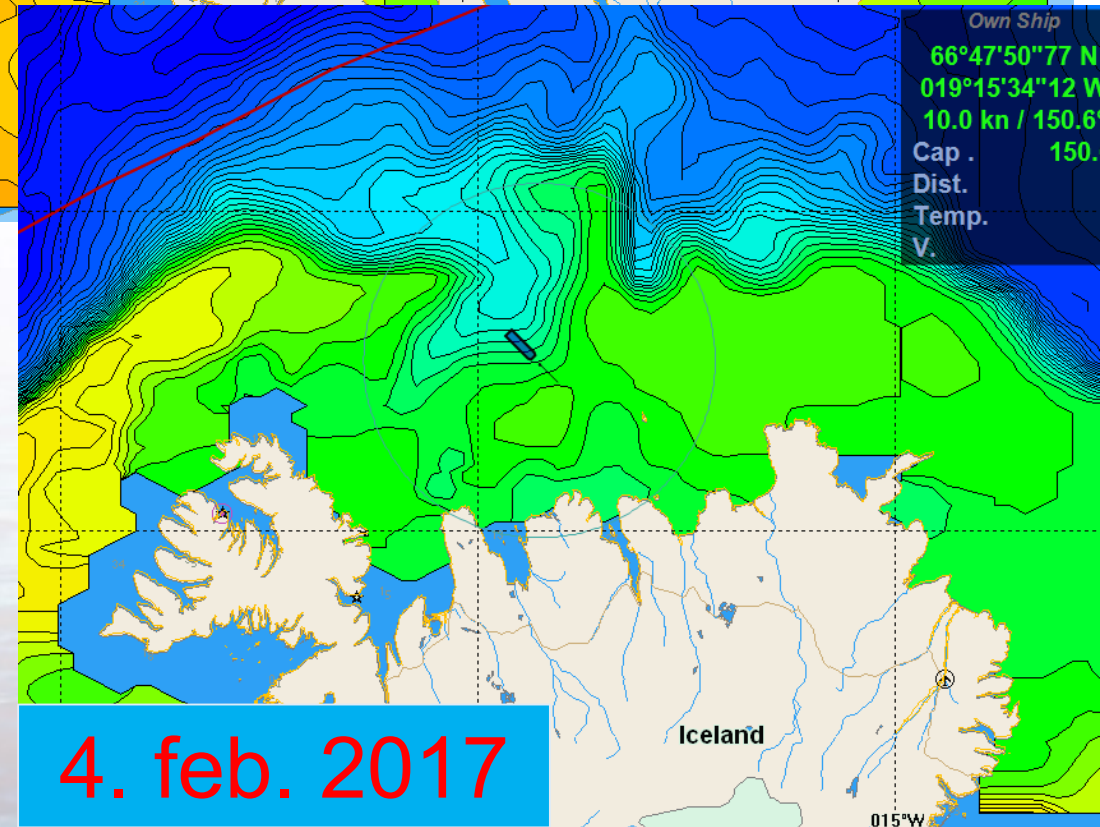


HITI Á 100M

5. jan. 2017



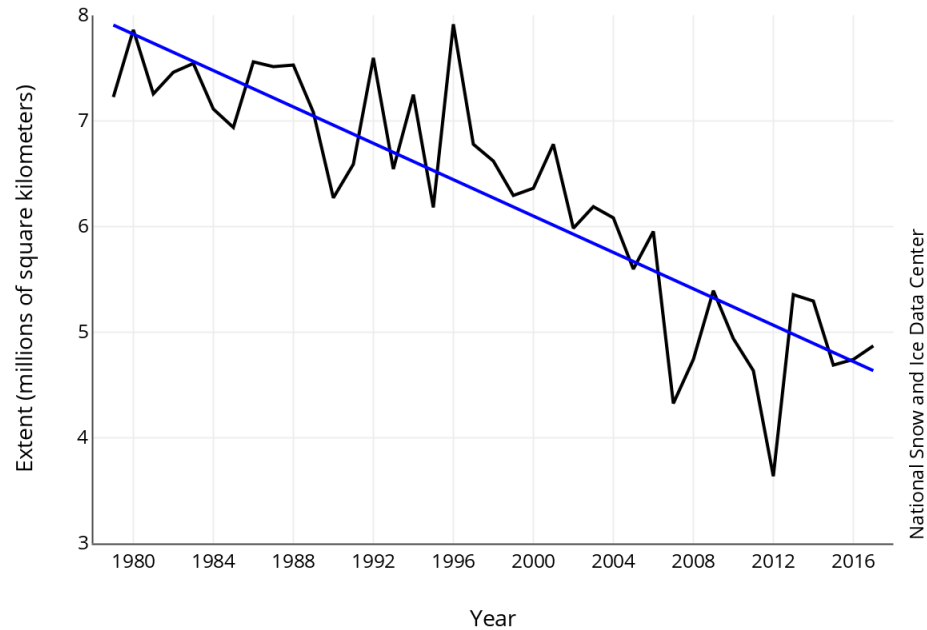
4. feb. 2017



ÁHRIF HAFÍSS Á LOÐNU?

ÚTBREIÐSLA HEIMSKAUTAÍSS

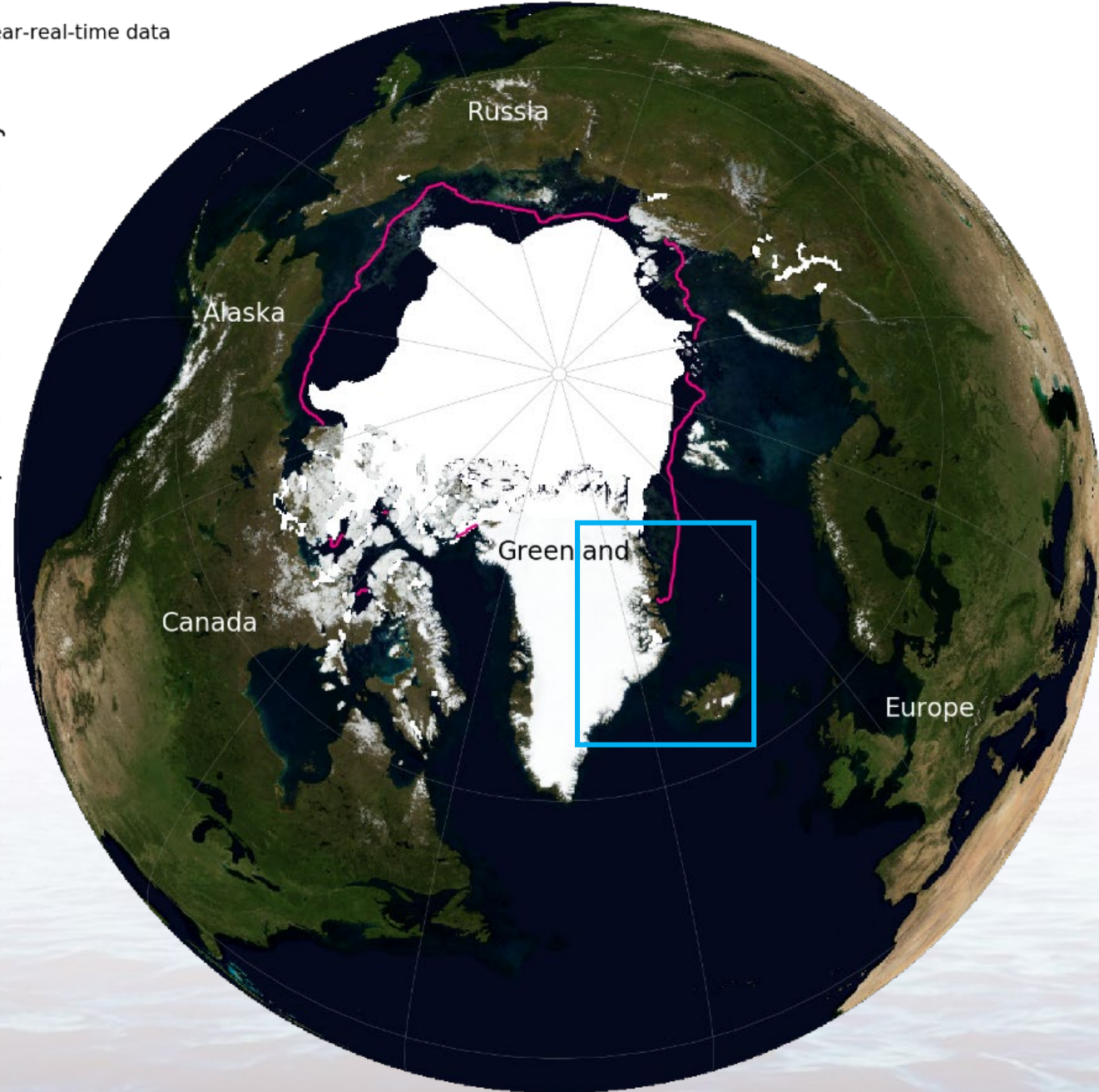
Average Monthly Arctic Sea Ice Extent
September 1979 - 2017



Arctic sea ice extent for September 2017 was 4.87 million square kilometers (1.88 million square miles). The magenta line shows the 1981 to 2010 average extent for that month. Credit: National Snow and Ice Data Center/NASA Earth Observatory.

near-real-time data

National Snow and Ice Data Center/NASA Earth Observatory



September 2017 Total extent = 4.9 million sq km

■ median ice edge 1981-2010

ÁHRIF HAFÍSS Á LOÐNU

- Hvernig hefur rekís áhrif á loðnu?
- Hverjar eru afleiðingar af takmörkuðu ljósi?
 - Hindrar það fæðuöflun loðnunnar?
 - Gefur það “skjól” fyrir afræningjum?
- Er ísbreiðan mikilvæg hindrun fyrir afræningja sem þurfa loft?
- Hvernig hefur takmarkað aðgengi að yfirborði áhrif á sundmaga loðnu (physostomous)?
- Hvaða áhrif hefur útbreiðsla íss á göngur loðnunnar?

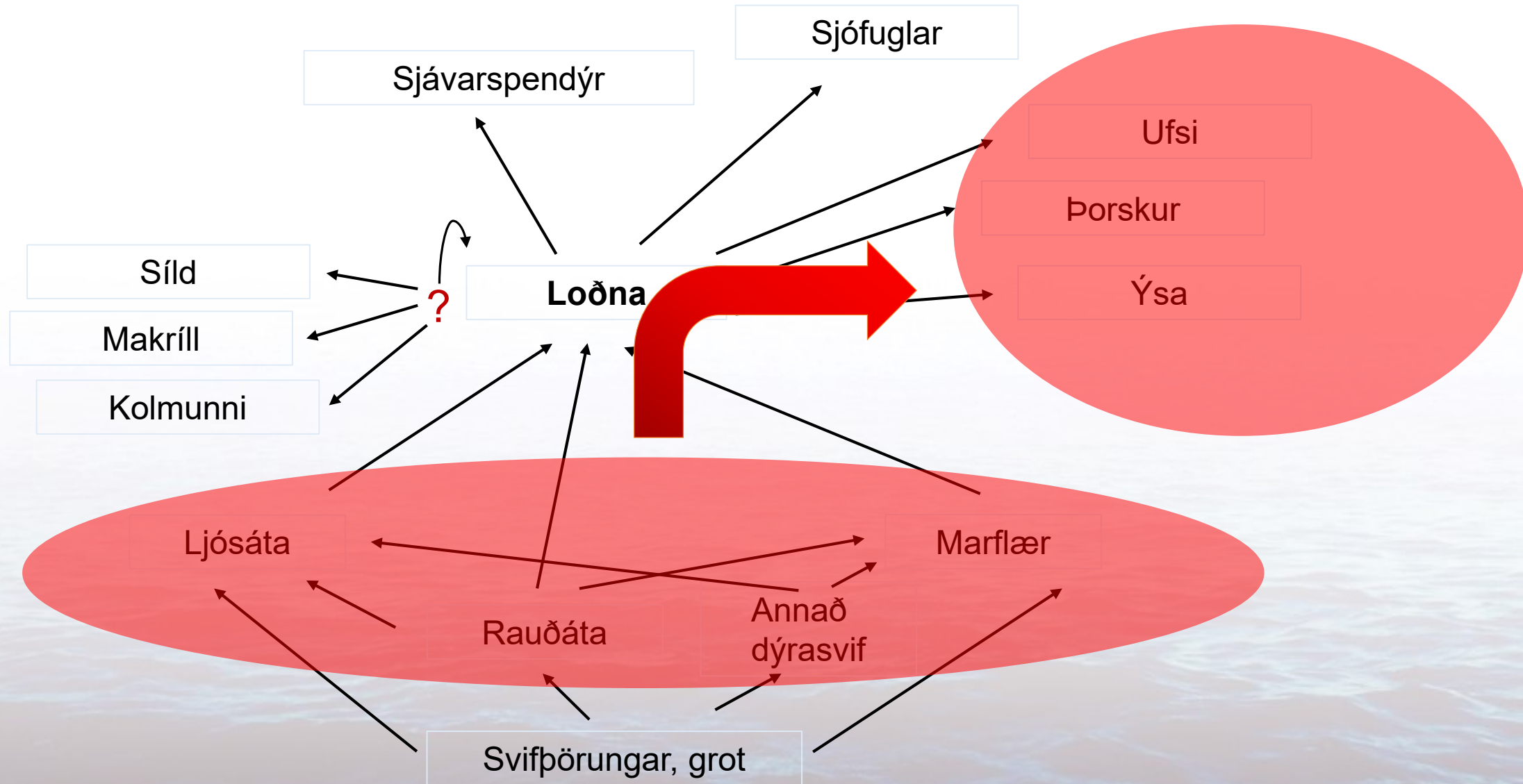
HAFRANNSÓKNASTOFNUN

Rannsókn- og ráðgjafarstofnun hafs og vatna

CAPELIN ROLE IN THE POLAR FRONT ECOSYSTEM

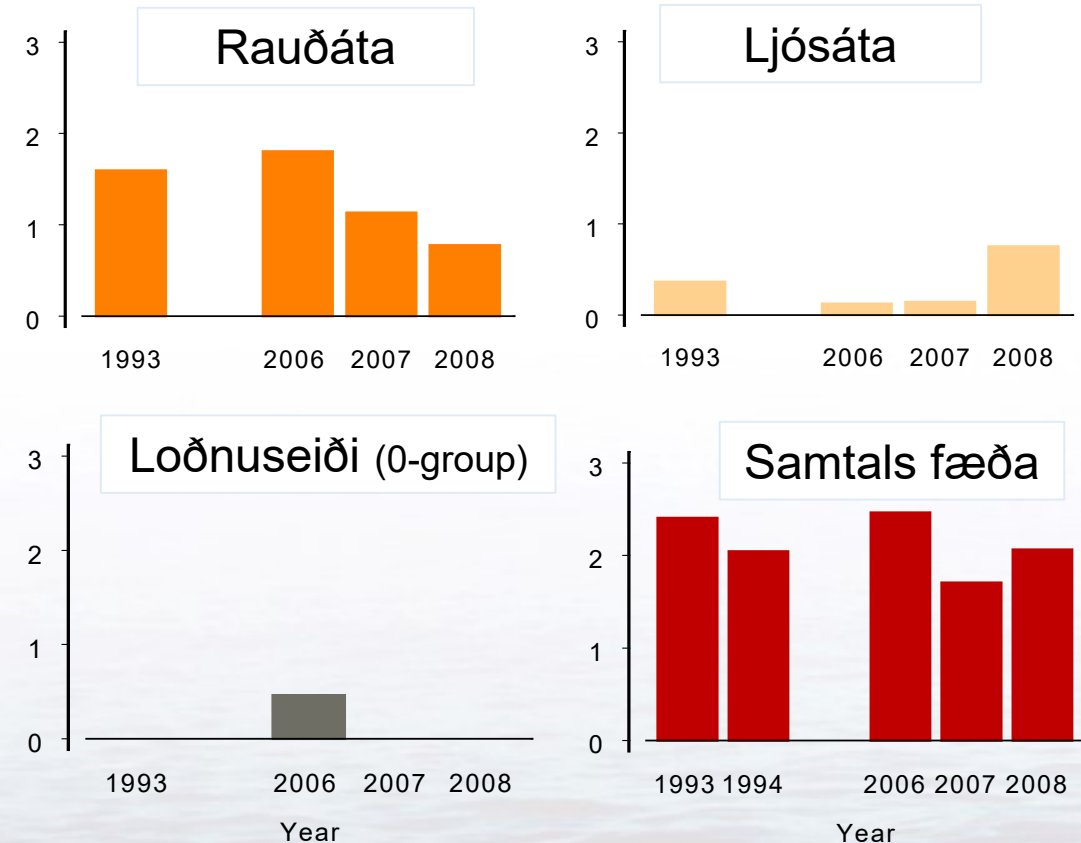


HLUTVERK LOÐNU Í FÆÐUVEFNUM

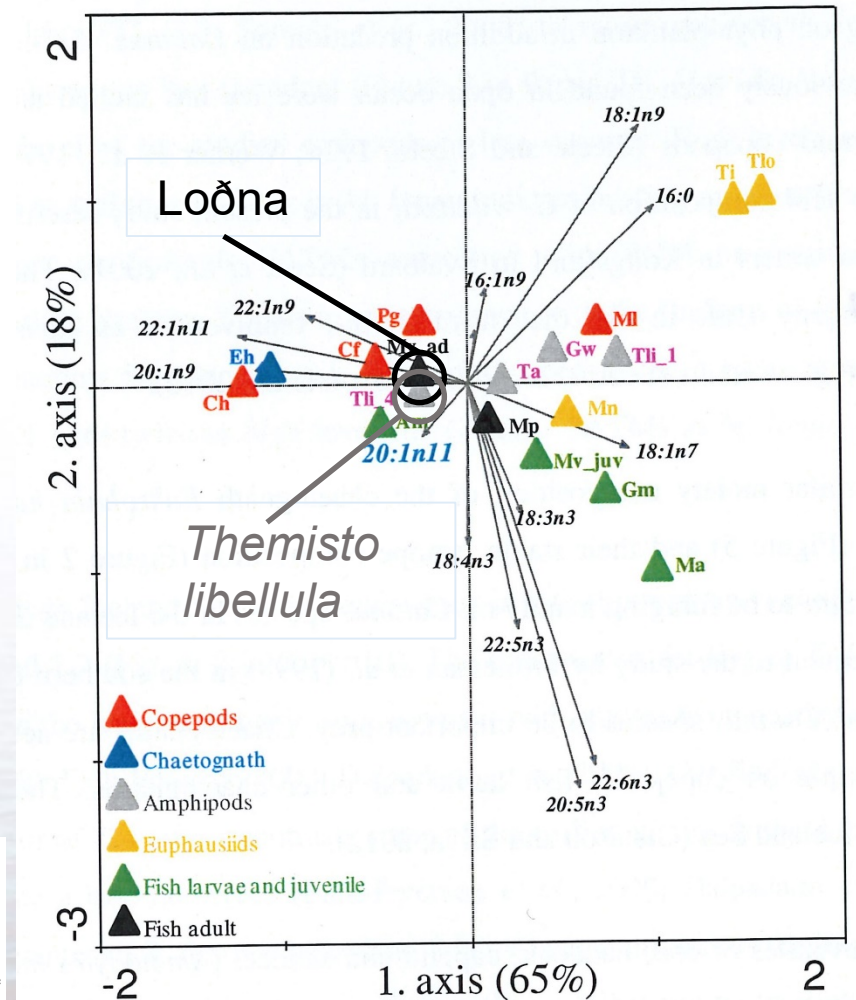
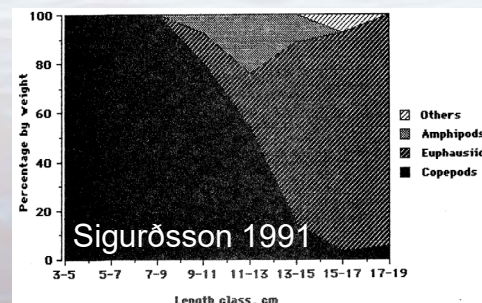


FÆÐA LOÐNU: MAGAINNIHALD AÐ SUMRI

JULY 1993-1994 AND 2006; AUGUST 2007-2008

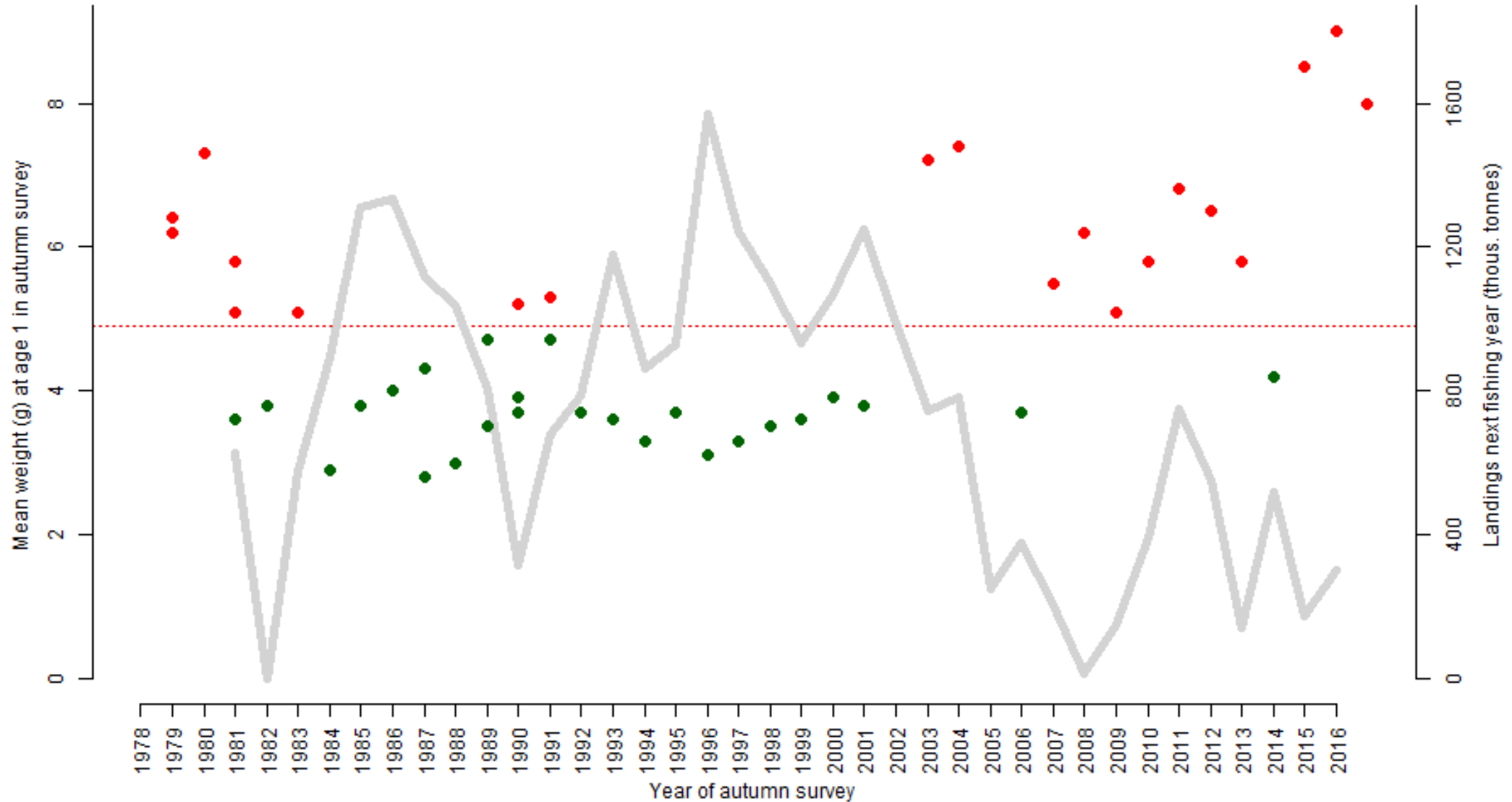


Olafur K. Pálsson et.al. 2012
(Astthorsson & Gislason 1997)

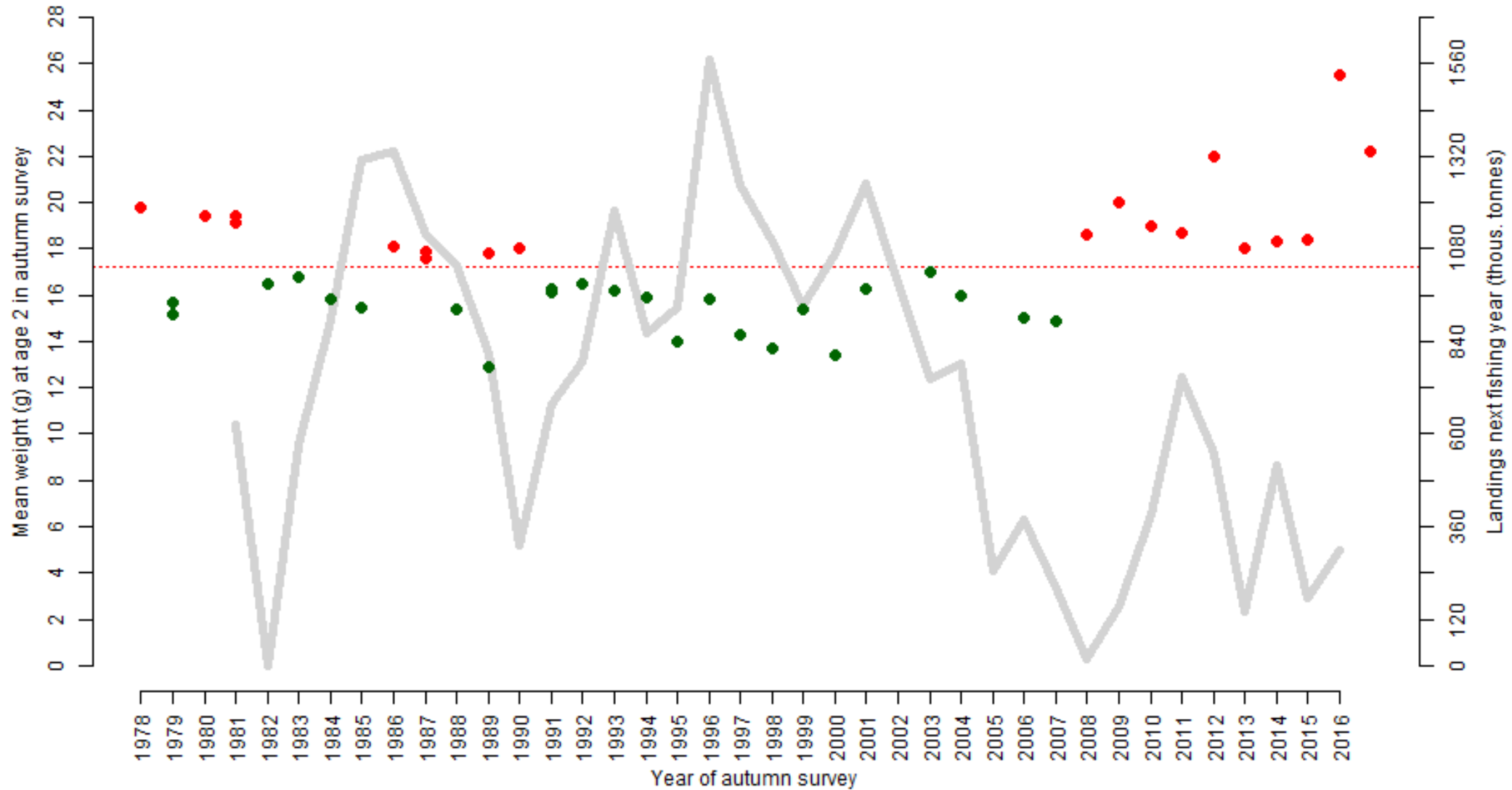


Hildur Petursdottir 2012

LOÐNA: MEÐALÞYNGD 1 ÁRS AÐ HAUSTI



LOÐNA: MEÐALÞYNGD 2JA ÁRA AÐ HAUSTI



ÁRLEGT ÁT AFRÆNINGJA

Cod, <i>Gadus morhua</i>
Cod
Saithe, <i>Pollachius virens</i>
Haddock, <i>Melanogrammus aeglefinus</i>
Greenland halibut, <i>Reinhardtius hippoglossoides</i>
Minke whale, <i>Balaenoptera acutorostrata</i>
Humpback whale, <i>Megaptera novaeangliae</i>
Humpback whale
Fin whale, <i>Balaenoptera physalus</i>
Fin whale
Guillemot, <i>Uria aalge</i>
Brünnlich's guillemot, <i>Uria lomvia</i>
Razorbill, <i>Alca torda</i>
Puffin, <i>Fratercula arctica</i>
Kittiwake, <i>Rissa dactyla</i>
Northern fulmar, <i>Fulmarus glacialis</i>
Total
Fishery (average annual catch of past 10 years)
Total

620	Fiskar	900†
100		100
80		80†
220†		220†
610		610
120	Hvalir	120
		800†
60		780
70*		140*
40*	Sjófuglar	80*
15*		30*
25*		50*
15*		30*
10*		20*
1985		3840
1050		1050
3035		4890

Björnsson *et al.*, 1997
 H. Björnsson, MRI, unpublished
 Jónsson, 1997
 Einarsson, 1997
 Sólmundsson, 1997
 Sigurjónsson and Víkingsson, 1998;
 Sigurjónsson *et al.*, 2000
 Stefánsson *et al.*, 1997;
 Sigurjónsson and Víkingsson, 1998
 Gunlaugsson and Víkingsson, 2001
 Sigurjónsson and Víkingsson, 1998
 Stefánsson *et al.* (1997)
 Lilliendal and Sólmundsson, 1997
 Lilliendal and Sólmundsson, 1997
 Lilliendal and Sólmundsson, 1997
 Lilliendal and Sólmundsson, 1997
 Lilliendal and Sólmundsson, 1997
 Lilliendal and Sólmundsson, 1997

ICES, 2001

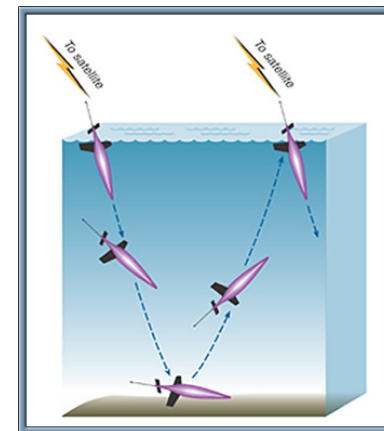
*Summer consumption only.

†Author's translation of source information into likely annual consumption.

‡New estimates of present annual consumption.

FRAMTÍÐ

- Efling rannsókna
 - Miklar breytingar í hafinu – við fylgjumst ekki nógu vel með
- Ný tækni og aðferðafræði
 - Fjarkannanir og sjálfvirk för
 - Gögn, upplýsingar og mælitæki víða til staðar (nýta betur)
- Aukið samstarf við hagsmunaaðila
- Aukið alþjóðlegt samstarf



LOKAORÐ

- Loðnan er gríðarlega mikilvæg í vistkerfinu
- Útbreiðsla og gönguhegðun síðustu tvo áratugi hefur breyst samhliða umhverfisbreytingum
- Vísbendingar um að samsetning fæðu hafi breyst
- Afleiðingar fyrir vistkerfið ekki vel þekktar
- Mikilvægt að efla rannsóknir bæði á umhverfi og lífríki. Það kallar á alþjóðlegt samstarf vísindamanna og hagsmunaaðila

TAKK FYRIR



HAFRANNSÓKNASTOFNUN

Rannsókn- og ráðgjafarstofnun hafs og vatna

Sérstakar þakkir:

Hildur Pétursdóttir

Höskuldur Björnsson

Héðinn Valdimarsson

Maria Dolores Pénez-Hernandez

Þorsteinn Sigurðsson

Sigurður Þór Jónsson ofl.